Galileo Was Wrong
The Church Was Right

The Evidence from
Modern Science

Volume II

Chapters 7 to 13

Seventh edition

Robert A. Sungenis, Ph.D.
and
Robert J. Bennett, Ph.D.

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This volume is dedicated to

Stephen Hawking

….who had the courage to admit that the scientific
evidence indicates the Earth is in the center of the
universe, but chose not to adopt it because he wished
for men and women to be modest
and not think they are special

Special Appreciation

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About the Authors

Robert A. Sungenis, Ph.D., is the founder of Catholic Apologetics International Publishing, Inc., a non-profit corporation. He holds advanced degrees in Theology and Religious Studies and was a physics major in college. His 700-page doctoral dissertation defended geocentric cosmology from scientific, theological and historical perspectives. He is the author of over twenty books on religion, politics, science and culture. He is also the managing partner of Stellar Motion Pictures, LLC in Los Angeles, which specializes in producing movies on science and religion. He is the executive producer of the recently released movie, *The Principle*. He has appeared on radio and television, including programs on CNN, the BBC and EWTN. He has authored all the chapters and appendices for *Galileo Was Wrong: The Church Was Right: The Evidence from Modern Science, Volume II*, except for Chapter 10.
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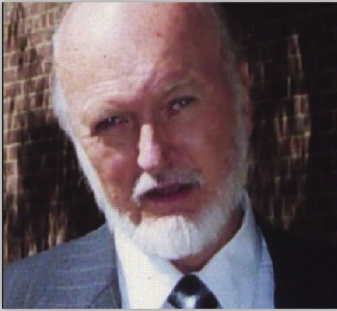
Robert J. Bennett, Ph.D., holds a doctorate in Physics from Stevens Institute of Technology with a thesis on General Relativity titled "Relativistic Rigid Body Motion." He served as a physics instructor at Manhattan College and Bergen Community College from 1967-1983, and is presently doing private tutoring in physics and mathematics. Dr. Bennett has written Chapter 10, a detailed, technical and mathematical explanation of the various arguments for Geocentrism. He has served as a consultant for the entire *Galileo Was Wrong: The Church Was Right* project.

"There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact."

Mark Twain[1]

"A scientific theory neither explains nor describes the world; it is nothing but an instrument."

Karl Popper[2]

"I think that we shall have to get accustomed to the idea that we must not look upon science as a 'body of knowledge,' but rather as a system of hypotheses, or as a system of guesses or anticipations that in principle cannot be justified, but with which we work as long as they stand up to tests, and of which we are never justified in saying that we know they are 'true' or 'more or less certain' or even 'probable.'"

Karl Popper[3]

"It is really quite amazing by what margins competent but conservative scientists and engineers can miss the mark, when they start with the preconceived idea that what they are investigating is impossible. When this happens, the most well-informed men become blinded by their prejudices and are unable to see what lies directly ahead of them."

Arthur C. Clarke[4]

"Physics is much too difficult for physicists."

David Herbert[5]

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[1] *Life on the Mississippi*, Signet Classics, 2001, p. 106.

[2] *Conjectures and Refutations: The Growth of Scientific Knowledge*, p. 102.

[3] *The Logic of Scientific Discovery*, 1935, reprint 2002, p. 318.

[4] Arthur C. Clarke, *Profiles of the Future: An Inquiry into the Limits of the Possible*, 1963, 1984, pp. 21-22. Clarke is also the author of *2001: A Space Odyssey*.

[5] As cited in *Hilbert* by Constance Reid, 1907, p. 127. Hilbert helped develop the theory of Relativity.

Chapter 7

The Cause of Gravity in the Geocentric Universe

One might think that for all the scientific knowledge man possesses, he would have discovered by now what causes one of the simplest and most common phenomena in the world – gravity. The reality is, however, that modern science is completely baffled about the nature of gravity. René Descartes claimed that the entire universal machine was directed by "ether eddies," which were said to cause the planets to revolve in continual circular motion. **Isaac Newton** didn't much care for the Frenchman's theory, preferring to demonstrate gravity as a mere mathematical phenomenon. Most people have been led to believe that Newton "discovered" gravity while sitting under an apple tree whereupon an apple falls on his head and Newton suddenly jumps to his feet realizing that some kind of force must have made the apple move downward. In reality, this story was an invention of Newton's so as to give himself priority over his peers in the discovery of gravity.[6] Whatever Newton's motivations, the question remaining for him and the rest of modern science concerned what "force" was making the apple move. Was this a force inherent in matter itself that caused it to be attracted by other matter? Or was something pushing or pulling the apple toward the Earth?
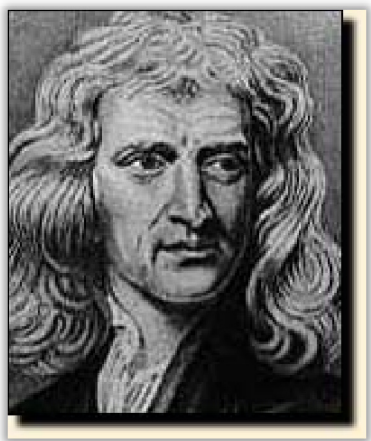
Although he speculated, Newton didn't know the cause of gravity. The only thing he could do is measure, within a respectable margin of

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[6] I. Bernard Cohen writes: "Newton also circulated the familiar story that a falling apple set him on a chain of reflections that led to the discovery of universal gravitation. Presumably this invention was also part of his campaign to push back the discovery of gravity, or at least the roots of the discovery, to a time 20 years before the *Principia*" ("Newton's Discovery of Gravity," *Scientific American*, 244 (3), 166, 1981).

error, the rate at which the apple, with its particular mass, fell to the Earth. Oft quoted from Newton is his letter to Bentley stating that he did not believe gravity was intrinsic to matter itself:

> It is inconceivable that inanimate brute matter should, without the mediation of something else which is not material, operate upon and affect the matter without mutual contact; as it must do if gravitation, in the sense of Epicurus, be essential and inherent in it. And this is the reason why I desired you would not ascribe innate gravity to me. That gravity should be innate, inherent and essential to matter, so that one body may act upon another at a distance through a vacuum, without mediation of anything else, by and through which their action and force may be conveyed from one to another, is to me so great an absurdity that I believe no man who has in philosophical matters a competent faculty of thinking can ever fall into it. Gravity must be caused by an agent acting constantly according to certain laws; but whether the agent be material or immaterial I have left to the consideration of my readers.[7]

The truth is that Newton wavered back and forth on whether gravity had a physical cause, and offered one of the first theories of its mechanical origin. His original theory incorporated the concept of a universal ether, which gave explanations for light, electric, magnetic, and gravitational forces. The ether that caused gravity was said to be tenacious and elastic in nature, condensing on objects as it descended from above. As Newton explains (in his original spelling):

> In which descent it may beare downe with it the bodyes it pervades with force proportionall to the superficies of all their parts it acts upon; nature making a circulation by the slow ascent of as much matter out of the bowels of the Earth in an aereall forme which for a time constitutes the Atmosphere, but being continually boyed up by the new Air…riseing underneath, at length…vanishes againe into the ethereall Spaces…and is attenuated into its first principle.[8]

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[7] Third Letter to Bentley, February 25, 1693, Newton's Correspondence, registered in the Royal Society in 1675, *Correspondence*, vol. 3, p. 253.

[8] Letter to Halley, June 20, 1686, in reference to Newton's paper "An Hypothesis Explaining the Properties of Light," registered in the Royal Society in 1675, *Correspondence*, p. 366; cited in *Annals of Science*, 25, 25-260, (1969), cited by

As to the origin of his inverse-square law, Newton held that it was ether (aka "spirit") that determined this mathematical formula:

> …that the descending spirit [ether] acts upon bodies here on the superficies of the Earth with force proportional to the superficies of their parts, which cannot be unless the diminution of its velocity in acting upon the first parts of any body it meets will be recompensed by the increase of its density arising from that retardation….Now if this spirit [ether] descend from above with uniform velocity, its density and consequently its force will be reciprocally proportional to the square of its distance from the center. But if it descend with accelerated motion, its density will every where diminish as much as its velocity increases, and so its force (according to the Hypothesis) will be the same as before, that is, still reciprocally as the square of its distance from the center.[9]

Four years later, Newton replaced the ether-stream idea by another hypothesis that postulated the increase in size of the particles with their distance from the center of the Earth. The larger particles would not fill in the pores of material bodies, which would leave room for the smaller particles to do so, and in turn displace the body downward.[10] Newton, however, wavered on a mechanical cause for gravity, at times attributing its cause to God's omnipresence, and later Fatio de Duillier writes of him:

> The plain truth is that he believes God to be omnipresent in the literal sense….He believes they [the Ancients] reckoned God the cause of it, nothing else, that is no body being the cause, since every body is heavy."[11]

In 1686, in a letter to Halley, Newton wrote of his inverse square law: "...but downwards that proportion does not hold," which he attributed to a reduction of the ether stream in the interior of the Earth by condensation.[12] In the second edition of the *Principia* in 1713, Newton stated that the force of gravity "operates not according to the quantity of the surfaces of the

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E. J. Aiton in "Newton's Ether-Stream Hypothesis and the Inverse Square Law of Gravitation" *Pushing Gravity*, p. 61.

[9] *Ibid*., Letter to Halley, *Correspondence*, p. 447.

[10] *Ibid*., *Correspondence*, p. 295.

[11] "Gravity in the Century of Light" in *Pushing Gravity*, *Ibid*., p. 14. "Fatio on the Cause of Universal Gravitation," pp. 56, 61.

[12] "Newton's Ether-Stream Hypothesis and the Inverse Square Law of Gravitation" *Pushing Gravity*, p. 61.

particles upon which it acts, but according to the quantity of the solid matter which they contain."[13] In the 1717 second edition of his *Opticks*, however, Newton suggested an alternate mechanical cause for gravitation, supposing that the density of the ether increased with the distance from the Earth, so that the elastic force of the ether impelled bodies towards the less dense parts.[14] E. J. Aiton sums up Newton's view:

> Although, as Newton admitted, the hypothesis was "one of my guesses which I did not rely on," his argument rested on the premise that, in its implications, the hypothesis reliably reflected his exact scientific views. As interpreted by Newton himself, the ether-stream hypothesis implies the inverse square law in free space, whether the velocity of the ether-stream is constant or accelerated.[15]

The Theories of De Duillier and Le Sage

In 1690, **Nicolas Fatio de Duillier**, a Swiss mathematician who, some say, had an intimate relationship with Newton,[16] presented an explanation of universal gravitation, of which Newton approved, to the Royal Society. Initially, Fatio sought to reconcile Newton's mathematical computations with Huygens' physical medium for gravity, thus introducing the concept of infinitesimally small particles traveling through or interacting with porous material bodies. Newton favored Fatio's theory, stating:

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[13] *Mathematical Principles of Natural Philosophy*, 1962, p. 546, Frans van Lunteren, "Fatio and the Cause for Universal Gravitation," *Pushing Gravity*, p. 56.
[14] Isaac Newton, *Opticks*, Dover Publications, 1952, Query 21, cited by van Lunteren, p. 62. Oliver Lodge notes: "First of all, Newton recognized the need of a medium for explaining gravitation. In his "Optical Queries" he shows that if the pressure of this medium is less in the neighbourhood of dense bodies than at great distances from them, dense bodies will be driven toward each other; and that if the diminution of pressure is inversely as the distance from the dense body, the law of force will be the inverse square law of gravitation" (*The Ether of Space*, p. 111).
[15] "Newton's Ether-Stream Hypothesis," in *Pushing Gravity*, p. 64.
[16] F. Manuel, *A Portrait of Isaac Newton*, Cambridge, MA, 1968, pp. 191-212.

And these are the necessary conditions of an hypothesis by which gravity is to be explained mechanically. The unique hypothesis by which gravity can be explained is however of this kind, and was first devised by the most ingenious geometer Mr. N. Fatio.[17]

Georges-Louis Le Sage was introduced to Fatio's theory through Gabriel Cramer in 1749, Fatio having died in 1753. Le Sage referred to the mechanical substance undergirding gravity as "ultramundane corpuscles," from his belief that God launched the corpuscles into motion at the beginning of creation from reaches outside the known universe, and thus they were "ultramundane."[18] James Evans adds:

Le Sage deduces the inverse-square law…a small spherical region of space, traversed by a current of ultramundane corpuscles traveling in all directions. The number of corpuscles that cross a unit of area on the surface of this small sphere will be spread out over a correspondingly larger area on the surface of a larger surrounding sphere, in such a fashion that the number crossing through a unit area will fall off as the inverse square of the distance…in Le Sage's system, apparently solid objects must be made mostly of empty space. In his *Mechanical Physics*, Le Sage speculated that the atoms of ordinary matter are like

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[17] *Principia*, Book III, cited in "The Unpublished Scientific Papers of Isaac Newton," A. R. Hall and M. Boas Hall, eds., Cambridge, MA, 1962, p. 315, cited by Frans van Lunteren in "Fatio on the Cause of Universal Gravitation," in *Pushing Gravity*, p. 55.

[18] Evans, "Gravity in the Century of Light," *Pushing Gravity*, p. 25.

'cages,' that is, they take up lots of space, but are mostly empty. In this way, ordinary objects block only a tiny fraction of the ultramundane corpuscles that are incident upon them.[19]

Le Sage's theory was largely rejected, mainly because of the objections of James Clerk Maxwell, although no one else, including Maxwell, offered an alternative model for the cause of gravity. Maxwell had rejected it mainly on thermodynamic grounds, claiming that the transfer of high kinetic energy from the corpuscles to a material object would incinerate the latter.[20]

Pierre-Simon Laplace (d. 1827), although never committing to Le Sage's theory, nevertheless concluded:

> …if one absolutely wants a mechanical cause of weight, it appears to me difficult to imagine one which explains it more happily than the hypothesis of M. Sage…[21]

Henri Poincaré had also rejected Le Sage's theory on the same basis as Maxwell, claiming that it would require the corpuscles to travel at 10^{24} faster than light, which would incinerate the material objects it touched. Le Sage had countered that his corpuscles would only have to move at 10^{13} faster than light.[22] To account for the objection from Poincaré, modifications to Le Sage's model were introduced by Kelvin and Preston. Kelvin (William Thomson) had established the kinetic theory of gases in 1873, and developed the idea that Le Sage's corpuscles behaved as gases, suggesting that the excess energy be dissipated by vibration and rotation of the corpuscles.[23] Maxwell and Poincaré then took a second look at the theory, especially in regard to the effects of gravitational shielding during eclipses, which also interested **Quirino Majorana** and Albert Michelson.[24]

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[19] *Ibid.*, pp. 25, 31.

[20] Maxwell published his review in the Ninth Edition of the *Encyclopedia Britannica* under the title "Atom," in 1875. Maxwell used the formula $p = Nmu^2$, where p is the pressure of the corpuscles, m the mass of the corpuscle, N the number of corpuscles, and u the velocity of the same.

[21] Laplace to J. –A. Deluc, October 1781, in Le Sage papers, Geneva, BPU; Ms. Suppl. 513, f. 260, cited by Evans, p. 31.

[22] James Evans, "Gravity in the Century of Light," in *Pushing Gravity*, p. 24.

[23] "Le Sage's Theory of Gravity: The Revival by Kelvin," Matthew R. Edwards in *Pushing Gravity*, pp. 68-71.

[24] Majorana found that placing a lead mass between a lead sphere and the Earth reduced the gravitational pull on the sphere, although very slightly, whereas

In 1877 Preston showed that Maxwell's mathematical formula was unbalanced. Maxwell died two years after Preston's paper, and thus his final thoughts are not known. In 1881, however, Kelvin retracted his support of Le Sage's theory based on its seeming inability to explain the perfect isotropy of gravity. Still, Lorentz in 1900 and Brush in 1911 attempted to revive Le Sage's theory by substituting electromagnetic waves for corpuscles. Assuming space is filled with radiation, Lorentz showed that charged particles would attract each other, but only if the incident energy were completely absorbed, which brought back the possibility of incineration. After this, Le Sage's theory had few adherents, especially since General Relativity dispensed altogether with a corpuscular theory of gravity, even though, as we noted earlier, Einstein still maintained the concept of "physical" ether defined by spacetime tensors.[25]

The Problems with General Relativity's Concept of Gravity

Einstein's postulate that nothing can go faster than the speed of light causes severe problems for current cosmology's concept of gravity, for gravity must then travel at the same speed, or a speed less than that of

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placing the lead mass above the sphere did not alter the pull. Majorana concluded that this contradicted Le Sage's theory of gravity, but it is also inconsistent with Newton's theory, since it does not account for gravitational shielding. Others hold that there is no clear distinction between Majorana's and Le Sage's views, even in principle; still others have found little or no results from gravitational shielding.

[25] Others who continued the Le Sage models appeared in the second half of the twentieth century: Radzievskii and Kagalnikova (1960); Shneiderov (1961); Buonomano and Engel (1976); Adamut (1976, 1982); Veselov (1981); Jaskkola (1996); and Van Flandern (1999).

light. But a gravitational force that is limited to the speed of light will cause enormous problems for the vast distances it must travel in the universe. For example, considering that the distance between the sun and Earth is 143 million kilometers, light from the sun takes 8.5 minutes to reach Earth. We on Earth don't notice this travel time because light is continually being discharged from the sun, but if the sun were to stop shinning, we wouldn't notice the absence of light until 8.5 minutes later (at least according to presently accepted theory about light). Now, imagine gravity working the same way. Since, as Newton's laws require, the sun, in the heliocentric model, is continually tugging at the Earth so that the Earth does not go flying off into space, then the force of gravity must be absolutely constant. Current science believes that the force of gravity travels from the sun to the Earth in 8.5 minutes or more. But this slow speed of gravity is not said to be a problem because, as is the case for light from the sun, the gravity sent from the sun to the Earth has been undisturbed for thousands of years. Its slow speed will not cause any problems because it already has an established connection between the sun and the Earth.

Although this may solve one problem, it creates another. By the same theoretical principle, if the sun were suddenly to stop issuing the force of gravity, the Earth would immediately depart from its orbit, the same as when we cut the string from a ball being twirled around in a circle. Once the string is cut, the ball will depart its orbit.[26] Conversely, light doesn't need an anchor in order to propagate. But since gravity is a radial force in Newtonian physics, it must operate under different laws. If not, then Newton's laws cannot be applied to the orbits of planets. The question remaining is: what principle of physics would account for the *immediate* reaction of the Earth if the gravitational "string" between them were suddenly cut?[27] This is similar to the problem that Newton had in explaining why the water in a spinning bucket would curve upward.

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[26] General Relativity tries to explain this dilemma by postulating that gravity isn't really a "force," per se, but only the result of matter (in this case, the matter of the sun and the planets) bending time and space, that is, the Earth follows a path that has been created by the sun pulling space into a circular frame.

[27] According to physicist Tom Van Flandern, gravity travels at least 2×10^{10} times faster than light. Van Flandern cites several methods of testing this speed, among them: (1) the angular momentum argument of binary pulsars, showing that the position, velocity, *and acceleration* of each mass is anticipated in much less than the light-time between the masses; (2) a non-null, three-body experiment involving solar eclipses in the Sun-Earth-Moon system, showing that optical and "gravitational" eclipses do not coincide; (3) neutron interferometer experiments, showing a dependence of acceleration on mass, and therefore a violation of the

As we noted earlier, General Relativity has its own problems in explaining gravity (and, for the record, Quantum Mechanics has no explanation for gravity). Physicist Thomas Van Flandern has pointed out many problems in General Relativity's hypotheses about gravity, and with good reason. Not only has General Relativity failed to provide adequate answers for stellar aberration, rotation, and action-at-a-distance (that is, without resorting to Mach's "distant rotating masses"), Van Flandern reminds us that

> …it is not widely appreciated that this [General Relativity] is a purely mathematical model, lacking a physical mechanism to initiate motion. For example, if a "space-time manifold" (like the rubber sheet) exists near a source of mass, why would a small particle placed at rest in that manifold (on the rubber sheet) begin to move toward the source mass? Indeed, why would curvature of the manifold even have a sense of "down" unless some force such as gravity already existed. Logically, the small particle at rest on a curved manifold would have no reason to end its rest unless a force acted on it.[28]

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weak equivalence principle (the geometric interpretation of gravitation); (4) the Walker-Dual experiment, showing in theory that changes in both gravitational and electrostatic fields propagate faster than the speed of light, c, a result reportedly given preliminary confirmation in a laboratory experiment. Being a heliocentrist, Van Flandern also depends on what he understands as: (5) a modern updating of the classical Laplace experiment based on the absence of any change in the angular momentum of the Earth's orbit (a necessary accompaniment of any propagation delay for gravity even in a static field); and (6) planetary radar-ranging data showing that the direction of Earth's gravitational acceleration toward the Sun does not coincide with the direction of arriving solar photons, but these can also be explained in the geocentric system by simply reversing the roles of Earth and Sun. (T. Van Flandern, *Physical Letters* A 250, 1998, 1-11; T. Van Flandern, *Dark Matter, Missing Planets and New Comets,* North Atlantic Books, Berkeley, CA, 1993; T. Van Flandern, "Relativity with Flat Spacetime," *Meta Research .Bulletin* 3, 9-13, 1994; T. Van Flandern, "Possible new properties of gravity," Parts I & H, *Meta Research Bulletin* 5, 23-29 & 38-50, 1996; "The Speed of Gravity: What the Experiments Say," *Meta Research Bulletin*, Oct. 18, 2002; Walker, W. D., "Superluminal propagation speed of longitudinally oscillating electrical fields," abstract in *Causality and Locality in Modern Physics and Astronomy: Open Questions and Possible Solutions,* S. Jeffers, ed., York University, North York, Ontario, #72, 1997).

[28] "Gravity" in *Pushing Gravity*, p. 94.

We might also add, if Relativity assumes a uniform curvature of space around any celestial body, why does Relativity accept that the orbits of the planets around the sun are elliptical instead of circular? According to Relativity, the planets stay in their orbits because they are following the "curved path of spacetime." Nothing is said about an elliptical path being an inherent feature of spacetime.

Regarding the problem Newtonian mechanics has in explaining either the spinning water bucket or the fate of a planet cut from the sun's gravity, General Relativity seeks to answer the problem by postulating the presence of "gravitational fields" which act as a type of agent passing between source and target, able to convey an action, and therefore dependent on the principle of causality. But since that is the case, Van Flandern retorts that

> …all existing experimental evidence requires the action of fields to be conveyed much faster than lightspeed. This situation is ironic because the reason why the geometric interpretation gained ascendancy over the field interpretation is that the implied faster-than-light action of fields appeared to allow causality violations [*e.g.*, moving backwards in time, according to the principles of Special Relativity]….Yet the field interpretation of General Relativity requires faster than light propagation. So if Special Relativity were a correct model of reality, the field interpretation would violate the causality principle, which is why it fell from popularity.[29]

Quantum astrophysicists see the same dilemma for General Relativity. Brian Greene writes:

> At the end of the day, no matter what holistic words one uses or what lack of information one highlights, two widely separated particles, each of which is governed by the randomness of quantum mechanics, somehow stay sufficiently "in touch" so that whatever one does, the other instantly does too. And that seems to suggest that some kind of faster-than-light something is operating between them. Where do we stand? There is no ironclad, universally accepted answer.[30]

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[29] "Gravity," pp. 94-95.
[30] Brian Greene, *The Fabric of the Cosmos: Space, Time and the Texture of Reality*, pp. 117-118.

Gerardus 't Hooft, a 1999 Nobel Laureate and theoretical physicist at Utrecht university puts things in perspective. Although Quantum Mechanics has been ballyhooed as science's greatest achievement, Dr. t' Hooft responds that it "is not the ultimate theory of nature...quantum mechanics is simply how the ultimate theory of nature is revealed to us." In an interview for *Discover*, science correspondent Kathy Svitil concludes that…
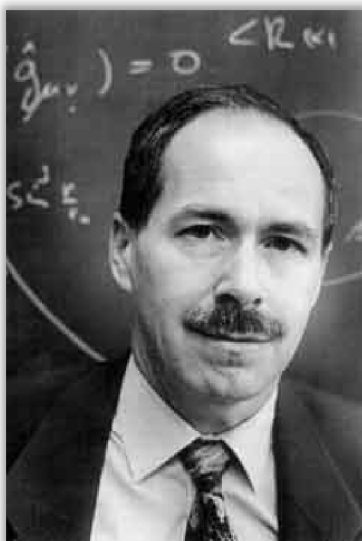
The heart of the problem is gravity. General relativity describes the way gravity operates on large scales but does not explain its origin. Quantum mechanics describes the subatomic world where the forces of nature arise, but it turns increasingly vague over extremely small distances. Quantum theory falls apart entirely at the Planck length – an unimaginably minuscule distance some 10^{-20} times the size of a proton – which is precisely where gravity holds sway. In 't Hooft's view, the universe follows orderly rules at the Planck length…[31]

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[31] *Discover*, May 2003, p. 13; Gerald 't Hooft, *Salamfestschrift*, eds., A. Ali, J. Ellis and S Randjbar-Daemi, World Scientific, Singapore, 1993. Gia Dvali, a physicist from New York University, says much the same: "Gravity is the biggest mystery. It's the oldest force we know, but we still understand so little about it" (*Discover*, October 2005, p. 57).

As Svitil says, gravity remains the unsolvable problem for any theory of physics. If, as 't Hooft suggests, the universe consists of a sea of Planck-dimension particles, there may be some means of discovering not only gravity's *physical* cause but also the "action-at-a-distance" problem that has been around since Isaac Newton first broached the subject.

In his 1998 paper, Van Flandern posited that the speed of gravity must travel at least 10 magnitudes higher than the speed of light. He writes: "Laboratory, solar system, and astrophysical experiments for the "speed of gravity" yield a lower limit of 2×10^{10} *c*."[32] Following Van Flandern's assertion, a team led by Sergei Kopeikin of the National Radio Astronomy Observatory took advantage of Jupiter's passing between Earth and the quasar J0842 + 1835 to test the speed of gravity. Kopeikin measured the gravity field distortions caused by Jupiter and published his results in December 2002 to a worldwide audience. Kopeikin stated that the speed of gravity was equal to the speed of light within a 20% margin of error.[33] Van Flandern then analyzed Kopeikin's data and found serious anomalies:

> New findings announced today by S. Kopeikin are invalid by both experimental and theoretical standards….In 2001, S. Kopeikin proposed an experiment to test the speed of gravity.[34]

> However, his result as described would have been a hybrid of near-instantaneous effects and lightspeed-delayed effects. The physical interpretation in his proposal… was objected to by T. van Flandern and independently by H. Asada.[35] ….the mistake made by Kopeikin is not unlike measuring the speed of a falling apple and claiming that is the speed of gravity. All gravitational phenomena unique to Einstein's relativity (GR)…arise in a static or near-static gravitational potential field…. Disturbances of this potential field or medium are called "gravitational waves." According to GR, such waves propagate at the speed of light, as do all other phenomena associated with the potential field that propagate at all. This speed has been confirmed indirectly by

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[32] "The Speed of Gravity – What the Experiments Say," *Physics Letters A*, 250:1-11, 1998. He adds: "The speed of gravity…has already been proved by six experiments to propagate much faster than light, perhaps billions of times faster."
[33] *Astrophysical Journal Letters*, April 10, 2003.
[34] "Testing the relativistic effect of the propagation of gravity by a very long baseline interferometry," *Astrophysical Journal*, 556:L1-L5.
[35] Van Flandern, 2002: (http://metaresearch.org/home /viewpoint/Kopeikin.asp) and H. Asada in *Astrophysical Journal*, 574:L69-L70.

binary pulsar observations. There is no current dispute about this, and no expectation of any other result for the propagation speed of gravitational waves. However, the name notwithstanding, "gravitational waves" have nothing to do with gravitational force. They are ultra-weak disturbances of the potential field or space-time medium due to acceleration of bodies. So far, they have proved too weak to detect directly in any laboratory or astrophysical experiment. They are certainly far too weak to have any influence on any macroscopic body in their path.[36]

Remarking further on gravity's speed, Van Flandern states:

Why do photons from the Sun travel at the speed of light in directions that are not parallel to the direction of the Earth's gravitational acceleration toward the Sun? Why do total eclipses of the Sun by the Moon reach mid-visible-eclipse about 40 seconds before the Sun and Moon's gravitational forces align? How do binary pulsars anticipate each other's future position, velocity, and acceleration faster than the light time between them

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[36] Van Flandern, "The speed of gravity," *Meta Research* Press Release, January 8, 2003. To support Van Flandern, in the section of their book titled "Detection of Gravitational Waves," Misner, Thorne and Wheeler state: "Man's potential detectors all lie in the solar system, where gravity is so weak and spacetime so nearly flat that a plane gravitational wave coming in remains for all practical purposes a plane gravitational wave" (*Gravitation*, p. 1004). They add: "Just as one identifies as 'water waves' small ripples rolling across the ocean, so one gives the name 'gravitational waves' to small ripples rolling across spacetime….Propagating through the universe, according to Einstein's theory, must be a complex pattern of small-scale ripples in the spacetime curvature" (*Gravitation*, p. 943), showing that "gravitational waves" are peculiar to Einstein's spacetime, not a measure of the speed of gravity. They are merely disturbances in the gravity already present. Van Flandern also noticed that Kopeikin changed the terms of the Einstein equation in order to have the speed of gravity not exceed c. Kopeikin "…rules out the possibility of c_g = infinity or $c_g \gg c$ in his results even before the experiment is performed. Kopeikin defined a new time $\tau = (c/c_g)t$ to replace the coordinate time t in the Einstein equation. However, because (c/c_g) is obviously forced to become very small or zero for large or infinite c_g, the role of the time coordinate is diminished or suppressed altogether by his substitution, which effectively eliminates many relativistic effects already verified in other experiments." In short, Van Flandern shows that Kopeikin was not measuring the speed of gravity, but was interpreting the data in reference to what he already believed about the speed of gravity from General Relativity.

would allow? How can black holes have gravity when nothing can get out because escape speed is greater than the speed of light, and how can they continue to update their external gravity fields?[37]

Van Flandern also proposes that the gravity-carrying medium (gravitons) and the light-carrying medium (which he calls "elysium") are separate and distinct, although occupying the same space.[38] This would be similar to the two-ether theory of Rothwarf, wherein the electropon medium is contained within a Planck-particle medium.[39] Obviously, each ether operates on a different scale, since plancktons are 10^{-20} smaller than electrons and positrons. The electron-positron medium will both be controlled by what travels in the Planck medium, *i.e.*, gravity, which will be seen in cases of refraction and other such electromagnetic-affecting phenomena.

Where the Le Sage model did not have a satisfactory answer for the perihelion of Mercury (since Mercury's mass makes no contribution to the perihelion), Van Flandern's "elysium" helps explain what might be the physical cause for Mercury's ellipse:

One of Louis de Broglie's chief contributions to physics was demonstrating that ordinary matter has wave properties too. We are therefore obliged to consider that orbiting bodies will be influenced by the density of the Elysium that they travel through because of the influence of Elysium on their electrons. Qualitatively, therefore, the elliptical motion of orbiting bodies is slowed most by elysium near perihelion, were that medium is densest; and is slowed least near aphelion, where Elysium is sparsest. This velocity imbalance (relatively slower at perihelion, relatively faster at aphelion) rotates the ellipse forward, which is

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[37] "The Speed of Gravity – What the Experiments Say," *Physics Letters A*, 250:1-11, 1998. As just one example of his evidence, Van Flandern remarks that data from the US Naval Observatory shows that the "Earth accelerates toward a point 20 arc seconds in front of the visible Sun, where the sun will appear to be in 8.3 minutes."

[38] Van Flandern also notes that "The reason for the failure of quantum physics to successfully model gravitation at a quantum level using these entities [the hypothetical 2-spin gravitons] should now be readily evident: the two completely different media are needed for elysium (the light-carrying medium) and for the gravitational-force carrying agents" ("Gravity," p. 116).

[39] Rothwarf, Frederick R and Sisir Roy "The Time Dependence of Fundamental Constants and Planck Scale Physics," November 14, 2003.

what an advance of perihelion means….This speed-change concept works well for purely wave phenomena, and allows the elysium concept to predict the first three tests of General Relativity because of its effect on the speed of light.[40]

Whereas it can be shown that light traveling from the sun to Earth has a displacement aberration of 20 arc seconds (which in the heliocentric system is caused by the speed of the Earth, but in the geocentric system is caused by the speed of the sun), gravity between the sun and Earth has no such "aberration" effect, and thus it provides no indication of a propagation speed. In other words, gravity propagates with an instantaneous, or even infinite speed, which was precisely what Newton assumed to be the case.

Tom van Flandern (1940 – 2009)

In dealing with the problem of drag forces and heat which would be caused by both the elysium and graviton ethers, **Van Flandern** proposes that the ethers dissipate heat equal to the level of absorption, summed up in the mathematical formulas of Victor Slabinski.[41] As Van Flandern explains:

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[40] "Gravity," p. 99. We should also add that Simhony's electron-positron ether lattice affects the electromagnetic material in a similar way. Although Van Flandern does not say it here, we could also add that the reason atomic clocks run at different speeds at ground level as opposed to high altitudes is due to the varying densities of ether medium close to Earth's surface as opposed to further away.

[41] "Notes on gravitation in the Meta Model," *Meta Research Bulletin* 7, 33-42; and "Force, Heat and Drag in the Graviton Model," Victor J. Slabinski, in *Pushing Gravity*, pp. 123-128. As Van Flandern summarizes: The gravitational constant (Slabinski's equation 16) depends on the products of absorption and scattering

So heat is deposited by gravitons, then is leisurely lost as the elysium circulates and freshens in separate activities that are not part of the graviton absorption/scattering process. This brings to mind the heat generated by a refrigerator. Most of it must be siphoned off and dumped to allow the important part of the process to operate. The net result is just what we need to make the Le Sage graviton model work.[42]

Van Flandern then cites the Michelson-Gale and Sagnac experiments:

Direct measurements of the speed of radio signals through near-Earth space in the Global Positioning System (GPS) show no detectible speed variation down to the level of at most 12 m/s. From that, we can conclude that elysium does not rotate with the Earth (as first shown by the Michelson-Gale experiment in 1925). The classical Sagnac experiment of 1913 indicates that elysium also does not rotate with a spinning laboratory platform, which is why a Michelson-Morley-type experiment on a rotating platform does detect fringe shifts. Therefore, elysium constituents must be quite small compared to atomic nuclei – something we might already have inferred from their lack of detection by experiments.[43]

We see here that, although Van Flandern may have a viable alternative to the question of gravity, being a heliocentrist, he will interpret the GPS and interferometer experiments with respect to a rotating Earth (*i.e.*, "elysium does not rotate with the Earth"). But since in Van Flandern's model the elysium does not rotate with the Earth, then it does not move laterally with the Earth's revolution around the sun, and this creates a problem for him. For if the Sagnac experiment, as he admits, shows absolute rotation against the elysium, then the elysium does, indeed, have measurable effects, and thus the combined effect of heliocentrism's Earth rotating (465 meters/sec) and revolving (30,000 meters/sec) should show up in interferometer experiments and GPS lag times, but they do not. Van Flandern accounts for this anomaly by postulating: "Therefore, the elysium constituents must be quite small compared to atomic nuclei –

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coefficients, the latter being huge compared to the former. Meanwhile, the heat flow (Slablinski's equation 19) depends only on the absorption coefficient (the part of the heat absorbed by matter instead of by elysium), and is therefore miniscule in comparison" ("Gravity," p. 105).

[42] "Gravity," p. 105.
[43] "Gravity," p. 116.

something we might already have inferred from their lack of detection by experiments." In other words, the elysium, although moving against the Earth at great speed (0.465 km/s + 30 km/s), has little or no effect on our instruments because of its infinitesimally small constitution. But how small must this medium be while at the same time being large enough to both carry light waves and outsize the graviton medium? Van Flandern does not say. The problem with having a suitable light-carrying medium is that, since the frequency of light's wave is 3×10^8 meters/sec, the velocity of any medium-dependent wave is the square root of the medium's elasticity divided by its density. Thus, supporting a wave moving at the speed of light would require a medium with a very high tensile strength and rigidity, but a medium so porous yet resilient that it produces "no detectable speed variations" on the planets which move through it, yet snaps back into its former position immediately. At the same time, this medium is invisible and non-reactive to our human senses. Is there such a medium?[44] We have already offered the biblical firmament as the perfect medium, and we will develop the idea more in later chapters.

In the geocentric model wherein the Earth is immobile and the ether is moving only slightly against it (1-4 km/sec), there is much less need to have the ether at infinitesimally small dimensions, since there is no need to account for high resistance. For example, as we noted earlier, if one of the ethers were an electron-positron plasma, we have a medium that is relatively close in size to atomic nuclei, yet both elastic and dense enough to support the speed of an electromagnetic wave, as well as supporting massive objects like planets and stars, without being appreciably affected. The other significant feature of the electron-positron plasma is that it has been positively identified. Unfortunately, as we noted earlier, it has also been positively misinterpreted as originating from the creation of matter from energy.

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[44] Other theories of gravitons include the "fat graviton" developed by Raman Sundrum of the University of Washington. As Sundrum is motivated by having to deal with the problem caused by the impossible energy created in equations that are based on quantum space containing infinitetesimal particles that pop in and out of existence (10^{120} times greater than what we observe), Sundrum proposes that gravitons are actually about 1/200th of an inch in size, yet the graviton "barely interacts with the matter and energy roiling through 'empty space, thereby eliminating the 10^{120} error…" In this model, "the fat graviton tends to skip over objects smaller than itself, so gravity should start to weaken over such short distances" (*Discover*, October 2005, pp. 56-57). Steven Weinberg had estimated the energy of the cosmological constant to be 10^{113} GeV, which amounts to a density of about 10^{89} grams per cubic centimeter (*Reviews of Modern Physics*, January 1989).

Incidentally, although Van Flandern says that the GPS shows no detectible speed variation, he qualifies this remark by saying "down to the level of at most 12 m/s." The Global Positioning Satellites have a 50-nanosecond discrepancy between the GPS and the ground stations. The "50 nanoseconds" corresponds to the 12 meters/second to which Van Flandern refers. Although Van Flandern does not say it here, the 12 m/s disparity is due mainly to the Sagnac effect. In the end, although Van Flandern says there is "no detectible speed variation," if, after taking into account that radio signals from the GPS must travel about 13,000 miles to the ground stations, there remains a 12 m/s difference in the reaction time between Earth and the GPS, we then have a residual time-lag between Earth and GPS that is comparable to the fringe shifts of the classic interferometer experiments.[45]

"Dark" Problems for Newtonian Gravity

Another problem for current cosmology is that, according to Newton's laws, the universe must have enough matter and energy to fill the enormous spaces left by its so-called "expanding universe." As it stands, even when all the matter in the universe is added up, the Big Bang theory has only 5% of what it needs to make the model work. Based on Newton's laws, there simply is not enough matter to account for the gravity and the luminosity normally associated with matter. In other words, there is 95% more gravity and light than there should be. As *Discover* magazine put it:

> ...when astronomers try to use Newton's equations on larger scales, say, to predict the movements of the stars orbiting the center of a galaxy, they get the wrong answers. In every single

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[45] The plane of the GPS orbit is the Earth's equator, and the GPS circle the Earth at an altitude of about 20,000 km (13,000 miles) and complete two full orbits per day. In the heliocentric model, this requires a speed twice that of Earth's rotation. Since the Earth's rotation at the equator is 465 meters/sec, the GPS are traveling at least 930 meters/second. Assuming the 12 meter/second lag, there is a 2.6% disparity between the radio signals and the movement of the GPS against Earth. Interestingly enough, forty years of interferometer experiments show a similar disparity (10% - 2.6%) between the speed of ether against the Earth (3000-8000 meters/second) and the speed of the Earth in its supposed revolution around the sun (30,000 meters/second). Since the ground stations for the GPS are not situated on the equator but are at various latitudes, this would increase the percentage of disparity from 2.5% to 5.0% at latitudes where the rotation speed is 50% of the equator's, to 7.5% at latitudes where the rotation speed is 25% of the equator's.

galaxy ever studied, the stars and gas move faster than Newton's laws say they should.[46]

To compensate for this, modern science has invented the matter they need. According to the best estimates, the required matter and energy makes up 95% of the universe yet with one major caveat – it cannot be seen or detected. The name given to this mysterious but as yet undiscovered substance is Dark Matter, and its cousin is Dark Energy. Essentially, the Dark Energy/Matter combination has the distinguished job of providing at least fourteen times more energy for the universe than the collective energies of all the stars, galaxies and black holes. Without Dark Matter and Dark Energy, a whole host of problems would occur. For example, galaxies, because they are spinning so fast, should be flying apart at the seams. Similarly, the constellations simply couldn't hold themselves together. Dark Matter comes to the rescue, for it provides the necessary mass for Newton's inverse-square law to operate, and thus act, as Eric Lerner quips, as the "invisible glue" that keeps everything from flying apart.[47] Without it the stars in the night sky would collapse and move

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[46] Tim Folger, "Nailing Down Gravity," *Discover*, October 2003, p. 36.

[47] Eric J. Lerner, *The Big Bang Never Happened*, New York, Random House, 1991, p. 13. He adds: "Finnish and American astronomers, analyzing recent observations, have shown that the mysterious dark matter isn't invisible – it *doesn't exist*….But that's not all: dark matter had to be quite different from ordinary matter…one of the two key predictions of the Big Bang was the abundance of helium and certain rare isotopes – deuterium (heavy hydrogen) and lithium. These predictions also depend on the density of the universe. If the dark matter was ordinary matter, the nuclear soup of the Big Bang would have been overcooked – too much helium and lithium, not enough deuterium. For theory to match observation, omega for ordinary matter, whether dark or bright, had to be around .02 or .03, hardly more than could be seen. If it wasn't ordinary matter, what could the dark matter be? Around 1980 worried cosmologists turned to the high-energy particle physicists. Were there any particles that might provide the dark matter but wouldn't mess up the nuclear cooking? Indeed, there just might be. Particle physicists provided a few possibilities: heavy neutrinos, axions, and WIMPs (Weakly Interacting Massive Particle – a catch-all term). All these particles could provide the mass needed for an omega of 1, and they were almost impossible to observe. Their only drawback was that, as in the case of cosmic strings, there was no evidence that they exist. But unless omega equaled 1 (thus lots of dark matter), the Big Bang theory wasn't even self-consistent. For the Big Bang to work, omega *had* to be 1, and dark matter *had* to exist. So, like the White Queen in *Through the Looking Glass* who convinced herself of several impossible things before breakfast, cosmologists decided that 99 percent of the universe was hypothetical, unobservable particles" (*ibid.*, pp. 13, 34-35). See also: Evidence for a Non-Expanding Universe: Surface Brightness Data from HUDF. Lerner states:

against one another.[48] To accomplish this feat, however, Dark Matter must be very dense as compared to the matter in galaxies, but this creates an additional problem, since it will require the cores of the galaxies to be hundreds or thousands of times denser than they actually have been observed to be. In addition, the Dark Matter model requires that the smallest galaxies should have been the first to form from the Big Bang and, over time, should become denser than other galaxies, but the raw evidence shows just the opposite. The converse of this scenario should be just as viable, however. If 95% of the universe is claimed to be Dark Matter, and if we find in the end that Dark Matter does not exist, we might hypothesize that the size of the universe has been estimated to be 95% bigger than it really is.

Another name given to the invisible Dark Matter is the acronym WIMP, which stands for "weakly interacting massive particles." So far, even the most sensitive detectors have not registered any WIMPs.[49] But without these "fudge factors," as the well-known theoretical physicist at Los Alamos National Laboratory in New Mexico, Michael Nieto, calls them, other scientists, such as Israeli physicist Mordehai Milgrom, propose that Newton's laws need to be radically reworked. Gravity cannot be said to be directly proportional to acceleration, he says, but "proportional to the square of the acceleration." Milgrom, speaking for the scientific community, is saying that Newton's laws are inadequate, and possibly incorrect. Perhaps due to coincidence his mathematical equations work in certain confined areas (*e.g.*, our solar system), but it is certainly not because Newton discovered the universal essence of gravity and motion. As Folger states, "...Newton's and Einstein's laws will be in for some

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"The data is clearly compatible with the non-expanding hypothesis and clearly incompatible with the expanding hypothesis, even with evolution. The universe, therefore, is not expanding," First Crisis in Cosmology Conference, AIP Conference Proceedings, Vol. 822, held in Moncao, Portugal, 23-25 June 2005. Edited by E.J Lerner and J.B. Almeida., p. 73 of pp. 60-74.

[48] See *Discover*, Bob Berman, "Sky Lights Meet the Dark Universe," Vol. 25, No 10, October 2004, p. 36. A recent issue of *Science* showed that modern cosmologists believe that the universe is 4% luminous matter; 26% Dark Matter; and 70% Dark Energy (Robert Irion, "The Warped Side of Dark Matter," *Science*, 300:1894, June 22, 2003).

[49] Writing in *Nature*, Geoff Brumfiel states: "Researchers from the Cryogenic Dark Matter Search II…have been looking for a type of theoretical particle called weakly interactive massive particles, or WIMPs….The new detector is four times more sensitive than any previous experiment….However since it started running in November last year, the detector has not seen a single WIMP" ("Particle no-show pans former find," *Nature*, May 6, 2004, p. 1).

major tweaking."[50] An alternate theory called "Modified Newtonian Dynamics" (MOND) is a little better in explaining the anomalies.

David Spergel, astrophysicist at Princeton University and member of the Wilkinson Microwave Anisotropy Probe launched by NASA June 30, 2001, states in an interview with *Discover*:

> The thing I'm most excited about is the precision….We know that ordinary matter accounts for only 4% of the mass of the universe. The rest consists of dark matter. It confirms many of the predictions we've been making.

Later in the interview when Folger asks: "Have we answered all the big questions," Spergel replies:

> There are still a bunch of them. What is dark matter? What is dark energy, the unseen thing that seems to be driving the universe to speed up? Those are fundamental questions. Another big one is understanding what caused inflation, the extremely rapid expansion that occurred in the universe's first moment of existence. WMAP and other experiments are just beginning to probe the physics of the early universe. And right now we have a model in which 4 percent of the universe is atoms and 96 percent is something else unidentified. I think it's hard to claim that we know it all![51]

Spergel admits that he has never detected Dark Matter, has never seen it, and doesn't even know what it is, yet in the face of all that ignorance he is positive it is out there, and he even knows that "dark energy" (which he also can't detect) is propelling it. He also admits that science is "just beginning to probe the physics of the early universe," and doesn't know what caused the so-called "rapid expansion," but he is nonetheless positive that there was a Big Bang and that the universe is expanding. This is the point much of today's science has come to – speculative theory is assumed as fact.

Yet there is even more to the story. Without Dark Matter to balance the equations, not only do Newton's laws need to be reworked, and not only is the Big Bang teetering on the scaffold, but Einstein's General

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[50] *Discover*, October 2003, p. 40.

[51] *Discover*, May 2003. Similarly, Nobel Laureate Stephen Weinberg stated: "I cannot deny a feeling of unreality in writing about the first three minutes [of the Big Bang] as if we really know what we are talking about" (*The First Three Minutes: A Modern View of the Origin of the Universe*, 1977, p. 9).

Relativity theory is nullified, for it gives the same solutions to matter and motion as Newton's laws, and is the engine for the Big Bang theory. As we noted earlier, Einstein produced his General Relativity field tensors by finding a math equation that he could work backward into Newton's force equations.[52] As one physicist honestly put it:

> Dark matter is needed if one assumes Einstein's field equations to be valid. However, there is no single observational hint at particles which could make up this dark matter. As a consequence, there are attempts to describe the same effects by a modification of the gravitational field equations, *e.g.* of Yukawa form, or by a modification of the dynamics of particles, like the MOND ansatz, recently formulated in a relativistic frame. Due to the lack of direct detection of Dark Matter particles, all those attempts are on the same footing.[53]

In reality, if there is no Dark Matter, then insofar as Newton and Einstein are involved, we have a classic case of the blind leading the blind. With all this negative evidence against Dark Matter one might predict that sooner or later it will be exposed for the myth that it appears to be. Recently one of the most comprehensive and reliable studies seeking to detect Dark Matter, the Hipparcos astrometry satellite, concluded the following: "The local dynamical density comes out as $\rho_0 = 0.076 \pm 0.015$ M_υ pc^{-3}, a value well below all previous determinations leaving no room

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[52] The 8π component in Einstein's field equation, $G = 8\pi T$ (in which G is the Einstein tensor and T is the stress or energy-momentum tensor), was added by determining what factor was necessary in order to make Einstein's equation equal to Newton's equation. This is why General Relativists, such as Misner, Thorne and Wheeler, can say: "The field equation [$G = 8\pi T$] even contains within itself the equations of motion ("Force = mass × acceleration") for the matter whose stress-energy generates the curvature" (*Gravitation*, p. 42). Cahill shows the inevitable problem with this approach: "…Newtonian gravity is now known to be seriously flawed, and so *ipso facto*, by using this postulate [3: "in the limit of low speeds the gravity formalism should agree with Newtonian gravity"] Einstein and Hilbert inadvertently developed a flawed theory of gravity" and "General Relativity does not permit the 'dark matter' effect, and this happens because General Relativity was forced to agree with Newtonian gravity, in the appropriate limits, and that theory also has no such effect" ("The Einstein Postulates: 1905-2005: A Critical Review of the Evidence," in *Einstein and Poincare: The Physical Vacuum*, 2006, pp. 131, 137).

[53] C. Lämmerzahl, O. Preuss and H. Dittus, "Is the Physics within the Solar System Really Understood," ZARM, University of Bremen, Germany; Max Planck Institute for Solar System Research, Germany, April 12, 2006, p. 2.

for any disk shaped component of dark matter."[54] In other words, the study has given the most accurate confirmation to date that there is no Dark Matter in the disc of the Milky Way. If there is no Dark Matter in the disc, we can logically assume that there is no such matter in the cosmos at large. Consequently, if the Dark Matter that science is depending upon to answer the anomalies in Newtonian and Einsteinian physics is now removed from their repertoire of pat answers, they will be forced to find alternatives. Only time will tell what they will be.

Many other such anomalies exist for the Big Bang theorists that we cannot cover in detail here. Suffice it to say that, such problems have created a major crisis in cosmological science. So far, every theory that is developed to explain the observable phenomenon is invariably contradicted by other theories. As Paul J. Steinhardt of Princeton University resigned himself to say: "If we only had one problem to worry about, you might blame it on [modeling], but when you have five problems, it's not so easy to dismiss them."[55] David Hilton, Caltech physicist, adds: "The question we ask ourselves is, 'Now what?' It's still a puzzle," to which his partner Jonathan Dorfan of Berkeley, amusingly adds: "In the end there is irrefutable evidence that we are here."[56] Thank God for that.

Geocentrists do not have such problems because, almost to a man, they understand that God created the galaxies as they presently appear. If smaller galaxies are not denser than larger galaxies, the simple reason is that they were all created simultaneously with the same density. Moreover, the spiral galaxies may act as clocks for the universe, since the more rapidly spinning core measured against the more slowly moving arms will only allow a limited amount of time before the spiral is wound up into a giant ball, and it will be completed in a few thousand years, not the 13.5 billion for which modern science seeks. In any case, it is interesting to see how tenaciously modern scientists hold on to the concept of Dark Matter even though they have no physical proof that it exists. Yet these scientists

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[54] M. Crézé, E. Chereul, O. Bienaymé and C. Pichon, "The distribution of nearby stars in phase space mapped by Hipparcos," *Astronomy and Astrophysics*, Sept. 3, 1997, p. 1. On the accuracy of Hipparcos, the authors state: "Since the accuracy of Hipparcos magnitudes is far beyond the necessities of this study, the sampling biases can only result from two effects: the parallax errors which, however unprecedently small are still of the order of 10% beyond 100 pc, and the stars lost at the time of the early selection due to the inaccuracy of apparent magnitudes available then" (*ibid*., p. 5).

[55] "A Cosmic Crisis? Dark Doings in the Universe" *Science News Online*, Oct. 13, 2001, by Ron Cowen.

[56] "Antimatter," *Discover*, August 2004, p. 71.

– after the same man whose theories led them to the concept of Dark Matter, Albert Einstein – are the very people who reject the existence of ether because it is said to be "undetectable." The ether was indeed detected but was either ignored or misunderstood, since science was working on another wrong premise – an Earth in motion.

Gravity has always been the sticking point in any physical or even theoretical physics model. It is not easily explained when it works as expected, much less when it doesn't follow any of the rules. Not only is it true that Newton's "laws" do not work for galaxies, but more disturbing anomalies have come to the surface. For example, scientists discovered that space probes such as "*Pioneer 10*, launched in 1972…seems to be defying the laws of gravity. [It] has been slowing down, as if the gravitational pull on it from the sun is growing progressively stronger the farther away it gets."[57] The same anomalies were noticed of *Pioneer 11*, as well as the *Ulysses* and *Galileo* probes.

> *Pioneer 10* is not the only spacecraft acting strangely. *Pioneer 11*, launched in 1973, also slowed down as it pulled away from the sun, right until NASA lost contact with it in 1995. And there's some evidence of similar bizarre effects on two other probes: *Ulysses*, which has been orbiting the sun for 13 years, and *Galileo*, which plunged into Jupiter's atmosphere last month.[58]

Commenting about these peculiar incidents, Michael Nieto concludes: "We don't know anything. Everything about gravity is mysterious."[59] Thomas Bowles, working at the same institution, admits: "Right now, we don't have a theory of how gravity is created."[60] Indeed, it is well to

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[57] "Nailing Down Gravity," *Discover*, October 2003, p. 36.

[58] *Ibid*. In the comprehensive paper "Is the Physics within the Solar System Really Understood?" Lämmerzahl, Preuss and Dittus (Max Planck Institute, April 12, 2006, pp. 1-23) show that the Pioneer anomalies cannot be explained by: dust, additional masses in the solar system, an accelerated sun, or the drift of clocks on earth. In addition to the Pioneer anomalies, the Lämmerzahl team remark on the "flyby" anomalies (occasion in which satellites, after swinging by Earth, possess a significant unexplained velocity increase of a few mm/s), and demonstrate that atmosphere, ocean tides, solid earth tides, charging of the spacecraft, magnetic moment, earth albedo, solar wind or spin-rotation coupling explain the problem. The team also shows that the Astronomical Unit has increased over time and that comets return a few days before predicted arrival, both without explanation.

[59] "Nailing Down Gravity," *Discover*, October 2003, p. 36.

[60] *Nature Reviews*, "Gravity Leaps into Quantum World," January 17, 2002, by Tom Clarke, p. 2.

remind ourselves of the fact that neither Newton nor Einstein could explain the how and why of gravity. As Koestler vividly points out:

> With true sleepwalker's assurance, Newton avoided the booby-traps strewn over the field: magnetism, circular inertia, Galileo's tides, Kepler's sweeping-brooms, Descartes' vortices – and at the same time knowingly walked into what looked like the deadliest trap of all: action-at-a-distance, ubiquitous, pervading the entire universe like the presence of the Holy Ghost. The enormity of this step can be vividly illustrated by the fact that a steel cable of a thickness equaling the diameter of the Earth would not be strong enough to hold the Earth in its orbit.[61]

Indeed, as Koestler implies, modern science should be holding its head in shame for all the grandiose theories of the universe it has produced over the years when the simple fact is it doesn't have the slightest clue how the most fundamental force of the universe works. The intractable nature of gravity is demonstrated, as Koestler notes, in the image of a 8000-mile-wide steel cable not being able to counteract the centrifugal force of the Earth revolving around the sun, while a mere kitchen magnet stuck to the door of a refrigerator can defy gravity. Not surprisingly, we find that

> Newton's concept of a "gravitational force" has always lain as an undigested lump in the stomach of science; and Einstein's surgical operation, though easing the symptoms, has brought no real remedy….Newton, in fact, could only get over the "absurdity" of his own concept by invoking either an (sic) ubiquitous ether (whose attributes were equally paradoxical) and/or God in person. The whole notion of a "force" which acts instantly at a distance without an intermediary agent, which traverses the vastest distances in zero seconds, and pulls at immense stellar objects with ubiquitous ghost-fingers – the whole idea is so mystical and "unscientific," that "modern" minds like Kepler, Galileo, and Descartes, who were fighting to break loose from Aristotelian animism, would instinctively tend to reject it as a relapse into the past….What made Newton's postulate nevertheless a modern Law of Nature, was his mathematical formulation of the mysterious entity to which it

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[61] *The Sleepwalkers*, p. 511.

referred. And that formulation Newton deduced from the discoveries of Kepler…[62]

Complaints against Newton's theory are a constant dripping on the disciplines of physics and astronomy. As one author put it:

> …classical [Newtonian] mechanics, with its principle of inertia and its proportionality of force and acceleration, makes assertions which not only are never confirmed by everyday experience, but whose direct experimental verification is fundamentally impossible: one cannot indeed introduce a material point all by itself into an infinite void and then cause a force that is constant in direction and magnitude to act on it; it is not even possible to attach any rational meaning to this formulation. And of all the experiments by means of which textbooks of mechanics are wont to prove the fundamental law of mechanics, not a single one has ever been carried out in practice.[63]

Dennis W. Sciama writes: "The Newtonian scheme contains arbitrary elements,"[64] while Halliday and Resnick complain that in Newton's theories there are "serious questions of logic that can be raised."[65] One obvious issue of logic involves the matter of cause and effect. As Oleg Jefimenko describes it, Newton's laws have "serious flaws" because, being "simultaneous in time" they do not "represent a causal relation." Additionally, "Newton's gravitational law conflicts with the conservation of momentum law," since a "gravitational field cannot propagate instantaneously."[66] Even more to the point is the quote from Heinrich Hertz, the famous discoverer of radio frequencies in the late 1800s:

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[62] *The Sleepwalkers*, p. 344. In addition to "Einstein's surgical operation" which "brought no real remedy," Koestler reminds us that "…'universal gravity' or 'electro-magnetic field' became verbal fetishes which hypnotized it into quiescence, disguising the fact that they are metaphysical concepts dressed in the mathematical language of physics" (*ibid*., p. 508).

[63] E. J. Dijksterhuis, *The Mechanization of the World Picture*, 1969, pp. 30-31. My thanks to van der Kamp for some of these citations.

[64] Dennis W. Sciama, *The Unity of the Universe*, 1961, p. 125.

[65] David Halliday and Robert Resnick, *Physics for Students of Science and Engineering*, 1963, p. 89.

[66] Oleg D. Jefimenko, *Gravitation and Cogravitation*, 2006, pp. 7-8.

It is exceedingly difficult to expound to thoughtful hearers the very introduction to mechanics without being occasionally embarrassed, without feeling tempted now and again to apologize, without wishing to get as quickly as possible over the rudiments and on to the examples which speak for themselves. I fancy that Newton himself must have felt embarrassment.[67]

Similarly, F. A. Kaempffer writes:

Newton's second law is certainly one of the most obscure of all the understandable relations underlying our description of the physical world in which we find ourselves. Anyone who has ever tried to explain this law to a person who insisted on asking questions will know the difficulty of giving good reasons for the facts embodied in it….Newton was well aware of these difficulties, as were others, but could find no satisfactory answer to them.[68]

Not only are anomalies about gravity being discovered above and below the surface of the Earth, but the same discrepancies are being discovered on its surface. For example, the results of Galileo's famed Pisa experiment have recently come into question. As we remember the story, Galileo climbed the tower of Pisa and proceeded to drop two objects, one much heavier than the other, at the same time. Galileo observed that both objects appeared to fall at the same rate of speed. This finding was in contrast to the view held by Aristotle, the Greek philosopher and scientist, who believed that the heavier object would fall faster (at least that is the view commonly attributed to Aristotle).[69] But scientists have found that

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[67] David Halliday and Robert Resnick, *Physics for Students of Science and Engineering*, 1963, p. 88.

[68] David Halliday and Robert Resnick, *Physics for Students of Science and Engineering*, 1963, p. 89.

[69] Many historians and scientists believe Aristotle did not hold that the heavier object falls faster; rather, he held the correct view that an object starting from a greater height will fall faster to the Earth than an object starting from a lesser height. The misunderstanding arises because Aristotle's writings on this point are somewhat ambiguous. Nevertheless, if we were to understand the downward force on an object at rest at a certain height as equal to the force needed to keep it at that particular height, and if we assigned the term "weight" to this force as Aristotle did, then it would certainly be true that the "weight" of an object would be greater the faster it falls. Similarly, because falling objects accelerate, more force is required to stop a falling object than to hold the same object at rest.

other factors, such as the dimensions of the object (*e.g.*, whether it is compact or elongated), have a direct effect on the speed with which the object falls to Earth. These variations are not due to the resistance of air. These sensitive experiments are performed in vacuums. For example, experiments performed with the ultra-sensitive Cavendish torsion balance reveal that elongated objects, made of the same material as compact objects, fall slower than the latter in a vacuum. When this was discovered a few years ago, some bewildered scientists tried to answer the surprising results by postulating a fifth fundamental force called "supergravity." The same experiments also found a discrepancy in Newton's famed inverse-square law, to the tune of 0.37%, quite innocuous to the average Joe on the street, but a gaping hole in the world of science.[70]

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[70] D. R. Long, "Experimental Examination of the Gravitational Inverse Square Law," *Nature*, April 1976, Vol. 260, pp. 417-418. More recently, experiments in pendulum behavior just prior to eclipses and within deep mine shafts have consistently presented severe anomalies in Relativity's theory of gravitation (see *Physical Review* D3, 823 and *General Relativity and Gravitation*, Vol. 24, No. 5, 1992, pp. 543-550; S. C. Holding and G. J. Tuck "A New Mine Determination of the Newtonian Gravitational Constant," *Nature*, Vol. 307, Feb. 1984, pp. 714-716; D. R. Long, "Why Do We Believe Newtonian Gravitation at Laboratory Dimensions?" *Physical Review* D 9 (1974) 850-852; D. R. Mikkelsen, M. J. Newman, "Constraints on the Gravitational Constant at Large Distances," *Physical Review*, D 16, 1977, 919-926; B. Schwarzschild, "From Mine Shafts to Cliffs: The 'Fifth Force' Remains Elusive," *Physics Today*, July, 21, 1988; C. C. Speake et al., "Test of the Inverse-Square Law of Gravitation Using the 300 m Tower at Erie, Colorado*,*" *Physical Review Letters* 65, 1990b, 1967-1971; F. D. Stacey, G. J. Tuck, "Geophysical Evidence for Non-Newtonian Gravity," *Nature* 292, 1981, 230-232; C.W. Stubbs et al, "Limits on Composition-Dependent Interactions Using a Laboratory Source: Is There a 'fifth force' Coupled to Isospin?" *Physical Review Letters* 62, 1989b, 609-612). Ephraim Fischbach, after analyzing the data from Eötvös experiments in the 1920s, which asserted that gravitational acceleration was independent of mass, concluded this was incorrect and that there was evidence of a limited composition-dependent "fifth force" that opposed gravity. His paper caused an uproar in the physics world (E. Fischbach, D. Sudarsky, A. Szafer, C. Talmage and S H. Aronson, *Physical Review Letters* 56, 3, 1986). Luigi Foschini, "Short Range Gravitational Fields: The Rise and Fall of the Fifth Force" (CNR Institute, 2002), claims to have solved this problem. Others, such as Peter Saulsan of MIT, say that the "fifth force" does not disturb General Relativity since hypercharge has an approximate range of only 200 meters. Charles Brush has demonstrated that metals of high atomic weight and density fall slightly faster than those of lower atomic weight and density, even though the same mass of each metal is used; and that the weight of metals changes with its physical condition (Charles F. Brush, "Some new experiments in gravitation," Proceedings of the American Philosophy Society, vol. 63, pp. 57-61,

The Physical Cause of Gravity

Once we understand that space is not a vacuum but is filled with an ether composite consisting of minute particles from the size of electrons and positrons to the Planck dimensions or beyond, we have the basis upon which to offer a physical cause for gravity.

In the past, science understood the atom to be composed mostly of empty space, but that is no longer the case. Protons, neutrons and electrons are now understood to compose a mere fraction of the total mass of the atom, the rest of the atom being comprised of the universal ether. As such, the ether is the primary building block of matter that holds everything together. The nucleon and its electrons are only distinctions in the vast ether sea.
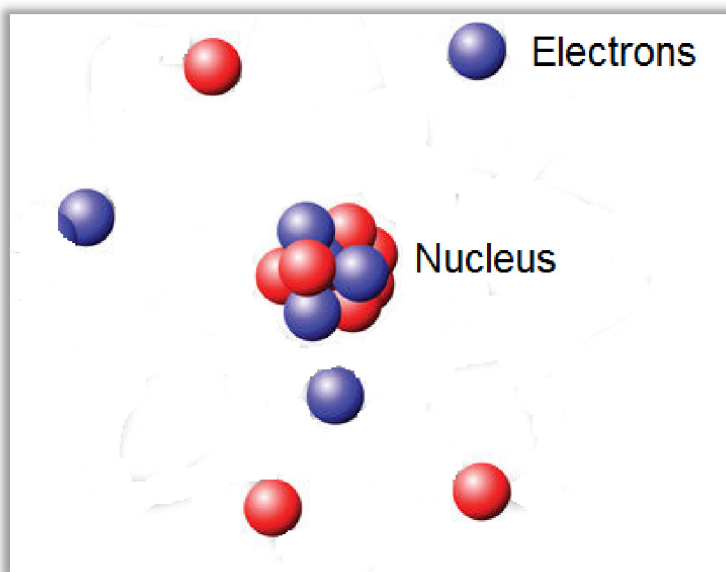
1924). Victor Crémieu demonstrated gravitation measured in water on the surface of the Earth is greater by one-tenth than that determined by Newton's theory (V.Crémieu, "Recherches sur la gravitation," *Comptes Rendus de l'Académie des Sciences*, Dec. 1906, pp. 887-889). D. Kelly has shown, when the absorption capacity is reduced by magnetizing or electrically energizing a material body, it is attracted at a lesser rate by Earth's gravity (Josef Hassleberger, "Comments on gravity drop tests performed by Donald Kelly," *Nexus*, Dec. 1994-Jan. 1995, pp. 48-49).

The most important principle in determining the physical cause of gravity is to understand the specific relationship between the atom and the ether. In the atom the mass of the nucleon and its accompanying electrons is displacing a certain amount of the universal ether. In other words, the ether serves as the interstitial substance that fills the so-called "empty space" of the atom.
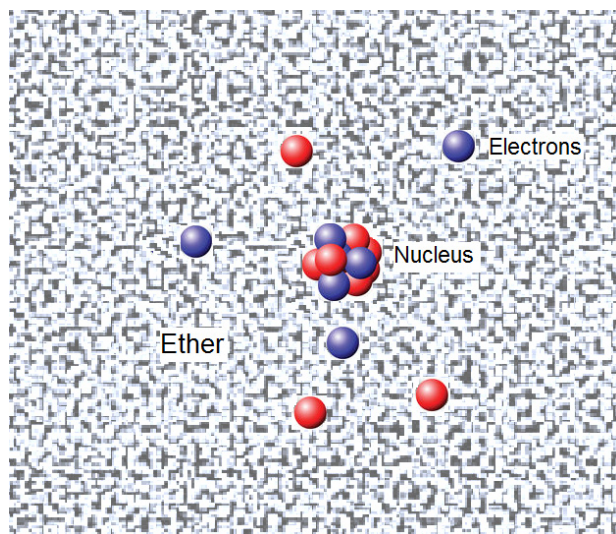
If the ether penetrated the nucleus and electron, the same difference would hold due to the emptiness of the atom.[71] Since atomic particles are less

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[71] That is, the ether penetrates the atom, but it does not penetrate either the nucleus or the electrons. This is not surprising in light of what we already know about atomic particles. Protons, for example, have been found to be virtually indestructible and they do not decay. So stable is the proton that experiments reveal its average lifetime must exceed 10^{32} years. Although protons have been theorized to consist of other particles (*e.g.*, leptons, quarks), nevertheless, in the cosmic realm the proton remains indestructible. Whereas 100 MeV is needed to remove an electron from an atom, and 10^6 MeV to remove protons from neutrons, it would take 10^{11} MeV to break down a proton. In fact, protons may be the fundamental particle, opposing the hypothesis today that there are even smaller particles, such as quarks and leptons. As Heisenberg noted: "First of all there is the thesis that the observed particles such as the proton, the pion, the hyperon consist of smaller particles: quarks, partons, gluons, charmed particles or whatever else, none of which have been observed. Apparently here the question was asked: "What does a proton consist of?" But the questioners appear to have forgotten the phrase "consist of" has a tolerably clear meaning only if the particle can be

dense than ether, yet occupy a definite position within the ether inside the atom, this means that the total density of the ether within the atom will be less than the density of ether outside the atom. This imbalance will cause an ether vacuum between the inside and outside of the atom. Since nature abhors a vacuum, the ether will seek to distribute itself in order to eliminate the vacuum. *In short, ether's effort to eliminate the vacuum is the cause of gravity*. That is, the less-dense ether inside the atom will attempt to draw in the denser ether outside the atom. This vacuum force will continue until equilibrium is reached, but, in fact, equilibrium is never reached, and thus the force of gravity between the two objects persists indefinitely.

The next logical question is: of two objects, what makes the smaller object fall toward the larger object? The answer is simple. In Newton's case, for example, the apple falls to the Earth because the larger the mass, the stronger the vacuum. The Earth, which is the larger mass, will create a stronger ether vacuum than a smaller mass, and thus the smaller mass (the apple) will be drawn toward the larger mass by the force of the Earth's greater ether vacuum. The reason the Earth creates a greater ether vacuum than the apple creates is that the more atomic mass an object has, the less interstitial ether it will possess in its given volume, and thus the greater the imbalance it will have with the ether outside its mass. The Earth, having more mass than the apple, has less interstitial ether within its particular volume and thus a greater ether vacuum.

By the same principle, Jupiter will have more gravitational force than the Earth because Jupiter, having more atomic mass than Earth, will have less interstitial ether for its given volume, and thus create a greater ether vacuum, which then attempts to pull more forcefully the ether from outside the planet in order to reach equilibrium. As the vacuum in the inside ether

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divided into pieces with a small amount of energy, much smaller than the rest mass of the particle itself. ...In the same way I am afraid that the quark hypothesis is not really taken seriously today by its proponents. Questions dealing with the statistics of quarks, the forces that keep them together, the reason why the quarks are never seen as free particles, the creation of pairs of quarks inside an elementary particle, are all left more or less undefined. If the quark hypothesis is really to be taken seriously, it is necessary to formulate precise mathematical assumptions for the quarks and for the forces that keep them together and to show, at least qualitatively, that all these assumptions reproduce the known features of particle physics" Werner Heisenberg, "The Nature of Elementary Particles," *Physics Today*, 29 (3), 32 (1976). Corroborating Heisenberg's objections, the proton may indeed be the fundamental nuclear particle since at the Planck temperature (10^{32}K), the black body radiation curve peaks at a wavelength which is equal to the size of the proton.

pulls the outside ether, it necessarily pulls the mass housing the outside ether.

A number of important observations can be made, illustrating the explanatory power of the ether-vacuum model of gravity:

- It explains why gravity is best understood as an "attractive" force, since the greater vacuum generated by the larger mass is forcing the smaller mass to be drawn toward it.

- It explains why gravity is a radial force. Since all material objects are curved, they will create an ether vacuum and attract objects outside of them based only on their radial geometry. Whereas Einstein claimed that matter curved space (and the curve was understood as the force of gravity), in reality it is matter that is curved and which then attempts to pull in the "space" (ether) around itself at every point on its curved surface.

- It explains why, in the local environment, the intensity of gravity lessens with distance on a geometrical scale, based on the inverse square law. The vacuum tension caused by the imbalance of ether will lessen as the distance increases, since the farther that material objects are from one another, the less imbalance of ether will exist between them.

- It explains why objects accelerate as they fall to Earth. The force from the vacuum in the Earth's ether is much greater than what the object can resist, therefore it falls. But since the object has a measure of resistance against the ether due to its specific atomic mass, the force of the ether vacuum, although pulling at one constant rate, will only gradually be able to bring its force upon the object. The more time available to bring the vacuum force upon the object, the greater will be the object's acceleration. (time becomes more available by increasing the distance the object falls).

- It explains why objects of differing mass placed at the same height will fall at the same rate of acceleration. The acceleration of an object is proportional to the amount of ether within the object and the resistance the object offers against the ether due to the object's mass. An object of more mass has less interstitial ether, but by the same token, because of its greater mass it has greater resistance to being pulled by the vacuum of ether outside of its mass.

Conversely, an object of less mass has more interstitial ether (and therefore the vacuum force is not as great), but less resistance (and therefore the vacuum will have an easier task moving it). All in all, the proportions balance completely so that large and small masses will fall at the same rate.

- It explains "action-at-a-distance," that is, why gravity can stretch for long distances and react instantaneously. The extreme density of the ether, which is accentuated by its rotation with the universe, allows it to act as an absolute rigid body, and thus it will allow even the smallest vibrations to be transmitted speedily over long distances.

- It explains the relationship between gravity and inertia. Since a material object is constantly attempting to reach ethereal equilibrium with its environment, the force created by the constant effort is inertia. By the same token, since in the presence of no mass and thus no ether vacuum, the energy of a force applied to a material object will not diminish, thus the object will remain in motion unless acted upon by a net external force. It is the ether that transmits the energy of the force and also keeps it constant.

- It explains why atoms experience the Sagnac effect. Since the ether forms an interstitial environment throughout the atom, it will allow the electrons to circle the nucleus in absolute motion.

A simple equation to represent the process between the ether and the atomic particles is:

$$\vec{F}_g \quad = \quad \frac{GM_1/E_d \times M_2/E_d}{R^2}$$

Where:

- $\vec{F}_g$ = force of gravity
- M_1 and M_2 = respective masses of atomic particles
- E_d = ether density
- R^2 = square of distance between M_1 and M_2
- G = the gravitational constant

Applied to Atomic Particles

If we apply the same ether density formulation to atomic particles, we can ascertain how forces behave within the atom. This formulation is the alternative to the Strong and Weak nuclear forces in the Standard Model. This model combines the force of gravity with the strong and weak nuclear forces as being derived by one basic phenomenon – the vacuum created by the universal Planck ether medium. Here is how it would work: Protons and neutrons take up space in the nucleus and thus displace a proportionate amount of the Planck ether. Electrons do the same. Because protons and neutrons have more mass than electrons, they displace less ether than the electron. As such, there is an ether vacuum created inside the atom at the level of the nucleus (*i.e.*, the lower density ether in the nucleus seeks to reach equilibrium with the higher density ether of the electron). The result is that the ether vacuum holds the electrons to the nucleus. At the same time, the charge of the electron causes it to move around the nucleus (just as light automatically moves forward when discharged). A balance is thus established between the electron's forward inertia and the inward pull of the electron toward the lower ether density nucleus. (This is analogous to the Standard Model's weak nuclear force). The result is a stable atom for atomic structures, at least those within a certain atomic number margin. Radiation occurs in higher numbered atomic elements (*e.g.*, uranium, plutonium) because the electron population and its attending charges exceeds the strength of the ether vacuum and thus the atom releases electrons. As for the analogy to the Standard Model's strong nuclear force, ether displacement by neutrons creates a sufficient ether vacuum in the nucleus that is used to keep the positively charged protons from separating.

Applied to Spiral Galaxies

If we apply the same ether density formulation to spiral galaxies which spin ten times faster than the basic equation $F = Gm_1m_2/r^2$ will allow, the variable in this case is the density of the ether (E_d). Just a slightly higher density will be enough to compensate for the extra rotation curve.

He stretches out the north over the void, and hangs the earth upon nothing.

He binds up the waters in his thick clouds, and the cloud is not rent under them.

He covers the face of the moon,
and spreads over it his cloud.

He has described a circle upon the face of the waters at the boundary between light and darkness.

Job 26:7-10

"The current state of knowledge can be summarized thus: In the beginning, there was nothing, which exploded."

Terry Pratchett[72]

"The great power of science is its ability, through brutal objectivity, to reveal to us truth we did not anticipate."

Robert Laughlin[73]

"It is impossible to convince a person of any true thing that will cost him money."

Robert Laughlin[74]

"You cannot depend on your eyes when your imagination is out of focus."

Mark Twain[75]

"Something unknown is doing we don't know what – that is what our theory amounts to."

Arthur Eddington[76]

"If the speed of light were discovered not to be constant, modern scientific theory would be devastated."

Marilyn vos Savant[77]

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[72] Terry Prachett, *Lords and Ladies*, 1996, p. 7.

[73] Robert Laughlin, *A Different Universe, Reinventing Physics from the Bottom Down*, 2005, p. xvi. Laughlin is a Nobel laureate in physics.

[74] *Ibid.*, p. 114.

[75] Twain's Notebook, 1898.

[76] Sir Arthur Eddington, *The Nature of the Physical World*, from the 1927 Gifford Lectures at the University of Edinburgh, 1929, p. 291.

[77] Marilyn vos Savant is the Guinness world's record holder for the highest IQ, currently at 208. The above response was given in answer to the question: "What one discovery or event would prove all or most of modern scientific theory wrong?" (cited from "Ask Marilyn," Parade magazine, May 22, 1988.

Chapter 8

How Old and How Big is the Geocentric Universe?

O ne of the more popular endeavors of physicists and astronomers today is to design an accurate model of the origin, age, and size of the universe. Unfortunately, this is an area fraught with speculation and uncertainty. As John Horgan notes:

> Cosmology, in spite of its close conjunction with particle physics, the most painstakingly precise of sciences, is far from being precise itself. That fact has been demonstrated by the persistent inability of astronomers to agree on a value for the Hubble constant, which is a measure of the size, age, and rate of expansion of the universe. To derive the Hubble constant, one must measure the breadth of the red shift of galaxies and their distance from the Earth. The former measurement is straightforward, but the latter is horrendously complicated. Astronomers cannot assume that the apparent brightness of a galaxy is proportional to its distance; the galaxy might be nearby, or it might simply be intrinsically bright…. The debate over the Hubble constant offers an obvious lesson: even when performing a seemingly straightforward calculation, cosmologists must make various assumptions that can influence their results, they must interpret their data, just as evolutionary biologists and historians do. One should thus take with a large grain of salt any claims based on high precision…. Our ability to describe the universe with simple, elegant models stems in large part from our lack of data, our ignorance. The more clearly we can see the universe in all its glorious detail, the more difficult it will be for us to explain with a simple theory how it came to be that way. Students of human history are well aware of this paradox, *but cosmologists may have a hard time accepting it*.[78]

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[78] John Horgan, *The End of Science*, 1996, p. 111, emphasis added.

As modern science's interpretation of the Michelson-Morley experiment was made from the presupposition that the Earth was moving through space, so today, elaborate models of the universe are made from the presupposition that there is no center to the universe, and that the Earth is at least 4.5 billion years old in a universe at least 13.7 billion years old (which figure has decreased from the original 20 billion proposed only a decade ago). In cataloguing the theories of the universe that have appeared just in the last century, one witnesses a myriad of competing and conflicting ideas, each one trying to reach the pinnacle with a "theory of everything" – the king of the hill that cannot be supplanted.

Much of the theorizing has been for the sole purpose of trying to make the universe self-sustaining, both in its origin and continuation. As we have pointed out many times, the main reason for modern science's quest is to take God out of the picture. If by some over-arching "laws" of physics the universe can be understood to appear virtually out of nowhere and perpetuate itself indefinitely, science has accomplished its long awaited Nietzschean goal of making God's existence superfluous. These efforts are led by such icons as Stephen Hawking who, after making suggestions for the origin of the universe, concludes:

> Thus all the complicated structures that we see in the universe might be explained by the no-boundary condition for the universe together with the uncertainty principle of quantum mechanics…So long as the universe had a beginning, we could suppose it had a creator. But if the universe is really completely self-contained, having no boundary or edge, it would have neither beginning nor end: it would simply be. *What place, then, for a creator*?[79]

"What place…for a creator?" Hawking shows that the pursuit of modern cosmology is not a casual endeavor but a full frontal assault on what was heretofore the exclusive domain of theology. Hawking even boasts of having circumvented a papal directive on the limits of cosmological speculation:

> In 1981 my interest in questions about the origin and fate of the universe was reawakened when I attended a conference on cosmology organized by the Jesuits in the Vatican. The Catholic Church had made a bad mistake with Galileo when it tried to lay down the law on a question of science, declaring that the sun

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[79] *A Brief History of Time*, pp. 140-141, emphasis added.

went around the Earth. Now, centuries later, it had decided to invite a number of experts to advise it on cosmology. At the end of the conference the participants were granted an audience with the pope. He told us that it was all right to study the evolution of the universe after the big bang, but we should not inquire into the big bang itself because that was the moment of Creation and therefore the work of God. I was glad then that he did not know the subject of the talk I had just given at the conference – the possibility that space-time was finite but had no boundary, which means that it had no beginning, no moment of Creation. I had no desire to share the fate of Galileo, with whom I feel a strong sense of identity, partly because of the coincidence of having been born exactly 300 years after his death![80]

Beginning with the Copernican revolution, not only has cosmological science sought to correct the Church's so-called "outdated" medieval science, it seems to have no trepidation sticking its head into the sacred world of the divine. Hence, the forbidden fruit has been bitten once again, and the serpent is leading man into thinking that he can become a god and determine his own fate. As Carl Sagan gloated: "A universe that is infinitely old requires no Creator."[81] Or his quip: "I would suggest that science is, at least in part, informed worship."[82] Fortunately, those of us who refuse to be swept away into the presumptuous boasts of modern science are comforted by the Scriptural words: "The fool hath said in his heart, 'There is no God.'"[83]

If anyone thinks that cosmology is merely an issue of science, let him think again. These men are driven by ideology, and one of their chief goals is to rid the world of the notion of God and, most of all, of being morally responsible to anyone greater than themselves. Albert Einstein, for example, dismissed the existence of God based on his reluctance to submit himself to reward and punishment from a divine being whom he

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[80] *A Brief History of Time*, p. 116.

[81] Carl Sagan, *Cosmos*, 1980, p. 243.

[82] *The Varieties of Scientific Experience: A Personal View of the Search for God*, Carl Sagan and Any Druyan, 2006, p. 31. Throughout the book, Sagan is rather disconcerted, even angry, that God, if he exists, did not make himself more easily known to man. Sagan suggests, for example, that God should have put a giant crucifix in orbit around the Earth to make his intentions clear (p. 167). Like most men, Sagan fails to see that God has made himself known by the very things Sagan sees in his telescope (Rm 1:19-20) but that God also hides himself from people like Sagan because they refuse to admit their sins (Rm 1: 18, 21-32).

[83] Psalm 14:1.

understood as a contradiction in terms. Although he was quite adept at combining space and time, Einstein refused to couple divine sovereignty with human free agency and, therefore, rejected the notion of a personal God altogether. His journals also tell us that he had a deep resentment toward Catholic priests in general. The popular concept of Einstein as the meek and mild professor whose only desire was truth and who was merely indifferent to Christianity's claims is mere propaganda. In addition to his atheism, Einstein led quite an immoral life (See Vol. II, Ch. 11).

In the realm of science, Einstein knew precisely what was at stake in the experiments of Arago, Airy, Fizeau and Michelson-Morley. He realized that unless science could come up with a convincing counter-explanation, the whole world would be worshiping at the feet of the Catholic Church, for she had stood her ground in the seventeenth century against the Copernican revolution. That Einstein would invent his fantastic theories precisely for such an ulterior motive has been noted several times in this volume. His colleagues did much the same. Echoing the sentiments of Stephen Hawking are the words of Arthur Eddington (the one man who catapulted Einstein to fame by his selective use of eclipse photographs) regarding his motivations for theories of cosmological origins that he preferred:

> The difficulty of applying this case [the cosmology of Lemaître] is that it seems to require a sudden and peculiar beginning of things.…Philosophically, the notion of a beginning of the present order of Nature is repugnant to me….I should like to find a genuine loophole.[84]

Considering that Eddington classed himself among an impeccable group of men that claimed to examine all scientific evidence objectively, we wonder how he and his colleagues could allow "philosophy" to get into the mix to determine cosmological origins. Of course, we already know the answer to that question. Modern science has shown itself to be anything but objective, especially when it comes to the subject of origins.[85]

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[84] Arthur Eddington, "On the Instability of Einstein's Spherical World," in *Monthly Notices of the Royal Astronomical Society*, 90, 1930, p. 672; and "The End of the World: from the Standpoint of Mathematical Physics," *Nature*, 127, 1931, p. 450, *The Fingerprint of God*, p. 66.

[85] The lack of objectivity among modern scientists regarding origins was probably stated no better than by geneticist Richard Lewontin: "We take the side of science in spite of the patent absurdity of some of its constructs, in spite of its failure to fulfill many of its extravagant promises of health and life, in spite of the tolerance of the scientific community for unsubstantiated just-so stories, because we have a

Although Eddington does not reveal it here, the reason "a beginning is repugnant" to him is that it necessitates the existence of a Creator, a Being to whom Eddington would be held accountable for his actions. Indeed, that particular idea is "repugnant" to modern man.

Astronomer Fred Hoyle, who, as we have seen earlier, was quite candid of his support of the geocentric cause by saying that "…the difference between a heliocentric and a geocentric theory is one of motions only, and that such a difference has no physical significance," is also quite frank about the philosophical motivations for preferring the former over the latter within a multi-billion year "Universe":

> The attribution of a definite age to the Universe, whatever it might be, is to exalt the concept of time above the Universe, and since the Universe is everything, this is crackpot in itself….God is identically equal to the universe.[86]

These ideas, however, did not start with Einstein, Eddington, or Hawking. They are as old as the hills. Yet, we can trace the accelerated development of scientific atheism to the so-called "Enlightenment," to the burgeoning philosophies and sciences that made it their objective to dethrone Christianity as the principal teacher of mankind. The lynch-pin of the whole affair, of course, was Copernican cosmology. Nothing could be accomplished until the Earth was demoted from its privileged place at the center of the universe. Although the Copernicans never really won the war, and, in fact, the battle is still being fought in our present day, nevertheless, they have succeeded in giving the *impression* they have won, and unfortunately, impressions rule the hearts of men. As Lakatos puts it:

> The Ptolemaists did their thing and the Copernicans did theirs
> and   at   the   end   the   Copernicans   scored   a   propaganda

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prior commitment, a commitment to materialism. It is not that the methods and institutions of science somehow compel us to accept a material explanation of the phenomenal world, but, on the contrary, that we are forced by our *a priori* adherence to material causes to create an apparatus of investigation and a set of concepts that produce material explanations, no matter how counterintuitive, no matter how mystifying to the uninitiated. Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door" ("Billions and Billions of Demons," *The New York Review of Books*, January 9, 1997, pp. 28, 31).

[86] Fred Hoyle, "The Universe: Past and Present Reflections," *Annual Reviews of Astronomy and Astrophysics*, 20, 1982, p. 3; Fred Hoyle and Chandra Wickramasinghe, *Evolution From Space*, New York: Simon and Schuster, 1981, p. 143.

victory….Therefore the acceptance of the Copernican theory becomes a matter of metaphysical belief.[87]

The Influence of Isaac Newton

The apparent victory was helped along by many philosophers and scientists, but some of the more prominent names include Isaac Newton (1642-1727) and Immanuel Kant, the former in his book *Philosophiae Naturalis Principia Mathematica* in 1689, and the latter in his 1755 book *Universal Natural History and Theory of the Heavens*.[88] Following Thomas Digges (d. 1595), Isaac Newton proposed that the universe was infinite. This idea was directly contrary to what had been taught for the first 1500 years of the Christian era. As Clark puts it:

> The comfortable idea of a finite universe with the Earth at its center had been suspect from the beginning of the scientific renaissance and had finally been abandoned with the coming of Newton.[89]

Newton's popularity among scientists helped make the concept of an infinite universe immediately acceptable, although he did have a formidable opponent in Gottfried Leibniz. Because Newton's views of the natural world were formed from a mixture of physical principles and spiritual intuition, he often explained the anomalies of his system by appealing to divine intrusion, something for which Leibniz severely criticized him.[90] Newton also dabbled in alchemy and the occult, and these

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[87] Imre Lakatos and Elie Zahar, "Why Did Copernicus' Research Program Supersede Ptolemy's," *The Copernican Achievement*, ed. Robert S. Westman, University of California Press, 1975, p. 367.

[88] Immanuel Kant, *Universal Natural History and Theory of the Heavens, Theories of the Heavens*, editor Milton K, 1957.

[89] *Einstein: The Life and Times*, p. 266. Clark adds: "As Einstein wrestled with the cosmological implications of the General Theory, the first of these alternatives, the Earth-centered universe of the Middle Ages, was effectively ruled out." Clark, however, cites no reason for ruling out the Earth-centered universe.

[90] Leibniz writes: "Sir Isaac Newton, and his followers, have also a very odd opinion concerning the work of God. According to their doctrine, God almighty needs to wind up his watch from time to time; otherwise it would cease to move. He had not, it seems sufficient foresight to make it a perpetual motion. Nay, the machine of God's making, is so imperfect, according to these gentlemen, that he is obliged to clean it now and then by an extraordinary concourse, and even to mend it, as a clockmaker mends his work; who must consequently be so much the more unskillful a workman, as he is often obliged to mend his work and set it right.

had a great effect on his worldview. As biographer Michael White resolved: "My conclusion is unequivocal: the influence of Newton's researches in alchemy was the key to his world-changing discoveries in science. His alchemical work and his science were inextricably linked."[91]

As we noted earlier, Newton made no definitive claim to understanding the sole cause of gravity, and, like many of his colleagues, he shifted from supposing it was caused by the inherent nature of matter, to the existence of ether, to the imposition of God. In fact, Newton found the interactions of gravity between the sun and the planets so complicated that he thought God had to adjust them quite frequently to keep things stable.[92] Although his inverse square law certainly helped science predict the effects of gravity, the principle wherein the intensity of a given energy dissipates four-fold for every doubling of the distance is a simple geometric phenomenon that occurs in spherically radiating entities, whether it be light, sound, gas, or gravity. The concentration of the substance will decrease because the area in which it spreads has increased. Kepler had discovered it for light, Newton for gravity. In effect, Newton merely discovered the geometry of gravity, but nothing about its origin or nature.

Newton's concept of gravity is important for one very significant reason – it determines his view of the universe. His initial ideas conceived that the material universe was finite but was surrounded by an infinite void

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According to my opinion, the same force and vigour remains always in the world, and only passes from one part to another, agreeably to the laws of nature, and the beautiful pre-established order...." (Philip P. Wiener, ed., Leibniz Selections, 1951, pp. 216-217).

[91] Michael White, *Isaac Newton: The Last Sorcerer*, 1997, p. 5.

[92] Ivars Peterson, *Newton's Clock: Chaos in the Solar System*, 1993, pp. 16, 226. Peterson writes: "The tangle of mutual gravitational interactions exhibited by the known planets and the sun was so complex that no complete mathematical solution seemed possible. Newton himself had noted certain irregularities in the movements of the planets that he suspected could lead to the disruption of the solar system unless orbits were, in effect, reset at strategic moments. He concluded that divine intervention was periodically necessary to maintain the system's equanimity." Newton also stated: "God...is himself the author and continual preserver of original forces or moving powers…[it is]...not a diminution, but the true glory of His workmanship, that nothing is done without his continual government and inspection. The notion of the world's being a great machine, going on without the interposition of God, as a clock continues to go without the assistance of a clockmaker, is the notion of materialism and fate, and tends to exclude providence and God's government in reality out of the world" (*Introduction to Concepts and Theories in Physical Science*, Gerald Holton, p. 284).

of non-material. But later he reasoned that a finite and bounded universe (*i.e.*, one possessing an edge) would "fall down into the middle of the whole space, and there compose one great spherical mass." He thus proposed that an infinite material universe spread out in infinite space would allow "the fixed stars, being equally spread out in all points of the heavens, to cancel out their mutual pulls by opposite attractions." In other words, Newton needed an infinite universe so that there would be no center in which the universe would collapse in on itself. Thus, in a letter to Richard Bentley in 1692, Newton wrote:

> It seems to me, that if the matter of our sun and planets, and all the matter of the universe, were evenly scattered through all the heavens, and every particle had an innate gravity towards all the rest, and the whole space throughout which this matter was scattered, was finite, the matter on the outside of this would by its gravity tend towards all the matter on the inside, and by consequence fall down into the middle of the whole space, and there compose one great spherical mass. But, if the matter were evenly disposed throughout an infinite space, it could never convene into one mass, but some of it would convene into one mass and some into another, so as to make an infinite number of great masses, scattered great distances from one to another throughout all that infinite space. And thus might the sun and fixed stars be formed, supposing the matter were of a lucid nature.[93]

What distinguished Newton's physics from modern physics is his notion of absolute space and time, which were independent of gravity, whereas Einstein held that space and time were relative and created by gravity, which was in turn created by mass. Newton held that God placed the stars and planets into absolute space and time, while Einstein held that stars and planets evolved and subsequently created space and time. Newton never did explain, however, how there could be absolute space and time in an infinite universe.

Although he believed in physical absolutes and God's providence in guiding the mechanical workings of the universe, we also see in Newton someone who is desperately struggling to make sense out of a temporal world he has constructed and which contains an impenetrable barrier

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[93] Isaac Newton, "To the Reverend Dr. Richard Bentley, at the Bishop of Worcester's House, Park Street, Westminster from Cambridge, December 10, 1692," in *Theories of the Universe*, Milton K. Munitz, 1957.

between itself and the absolutes. In effect, Newton's absolutes become nothing more than Platonic images that have only a chimera of reflection in the acentric and infinite cosmos he inherited from Galileo, Digges and Bruno. In this he shows us the dilemma of modern man. He writes:

> Absolute space, in its own nature, without relation to anything external, remains always similar and immovable. Relative space is some movable dimension or measure of the absolute spaces, which our senses determine by its position to bodies and which is commonly taken for immovable space; such is the dimension of a subterraneous, an aerial, or celestial space, determined by its position in respect of the Earth. Absolute and relative space are the same in figure and magnitude, but they do not remain always numerically the same. For if the Earth, for instance, moves, a space of our air, which relatively and in respect of the Earth remains always the same, will at one time be one part of the absolute space into which the air passes; at another time it will be another part of the same, and so, absolutely understood, it will be continually changed. [94]

With an Earth in motion, Newton is forced to give us two worlds, one absolute and one relative, and the Copernican dilemma is perpetuated:

> But real, absolute rest is the continuance of the body in the same part of that immovable space in which the ship itself, its cavity, and all that it contains is moved. Wherefore, if the Earth is really at rest, the body, which relatively rests in the ship, will really and absolutely move with the same velocity which the ship has on the Earth. But if the Earth also moves, the true and absolute motion of the body will arise, partly from the true motion of the Earth in immovable space, partly from the relative motion of the ship on the Earth. [95]

He only wishes it could be resolved, but knows that it cannot be: And so, instead of absolute places and motions, we use relative ones, and that without any inconvenience in common affairs; but in philosophical disquisitions, we ought to abstract from our senses and consider things themselves, distinct from what are

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[94] *Philosophiae Naturalis Principia Mathematica*, 2, trans. Andrew Motte, 1729, revised, Florian Cajori, Berkeley: University of California Press, 1934.
[95] *Philosophiae Naturalis Principia Mathematica*, 4.

only sensible measures of them. For it may be that there is no body really at rest to which the places and motions of others may be referred.

But we may distinguish rest and motion, absolute and relative, one from the other by their properties, causes, and effects. It is a property of rest that bodies really at rest do rest in respect to one another. And therefore, as it is possible that in the remote regions of the fixed stars, or perhaps far beyond them, there may be some body absolutely at rest, but impossible to know from the position of bodies to one another in our regions whether any of these do keep the same position to that remote body, it follows that absolute rest cannot be determined from the position of bodies in our regions.[96]

The only thing Newton musters to make some sense of his inherited acentric world is reliance on "true motion" determined by "force," but in the end this is also conditional and uncertain:

It is indeed a matter of great difficulty to discover and effectually to distinguish the true motions of particular bodies from the apparent, because the parts of that immovable space in which those motions are performed do by no means come under the observation of our senses. Yet the thing is not altogether desperate; for we have some arguments to guide us, partly from the apparent motions, which are the differences of the true motions; partly from the forces, which are the causes and effects of the true motions.[97]

Before we leave Newton, we need to reiterate what his "laws" of motion allowed and disallowed regarding the geocentric/heliocentric issue. It is a common presumption that Newton's laws of motion paved the way for the demise of the geocentric view, and that Johannes Kepler put the final nails into the coffin since he "fixed" the Copernican/Galilean solar system by replacing circular orbits with elliptical orbits. This is quite a misconception, however. Kepler's laws showed mathematically how the planets kept pace with observations, but this did not mean, contrary to Kepler, that the sun was the center of the solar system. Kepler believed the sun was the center based on his idea of "mystical harmonics" and other

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[96] *Philosophiae Naturalis Principia Mathematica*, 4.
[97] *Philosophiae Naturalis Principia Mathematica*, 4.

such esoteric beliefs. His goal was to give the sun a privileged position, bestowing it with almost divine qualities.[98] As noted previously, Kepler's goal was directly contrary to the desires of Tycho Brahe from whom Kepler confiscated the data for his heliocentric calculations of planetary motion. Brahe was a devout geocentrist and he implored Kepler to use his meticulous notations to continue supporting the geocentric system. Kepler, under pressure from other influences, forsook the promise he made to Brahe and adopted the heliocentric system.

In any case, it has been commonly interpolated from Newton's and Kepler's laws that the smaller body (*e.g.*, a planet) must revolve around the larger body (*e.g.*, the sun) due to the greater mass of the latter. The truth is, however, that none of the planets revolve around the sun; rather, both the sun and the planets revolve around what Newton called the "center of mass," which, in turn, corrected Kepler's third law of planetary motion.[99] Although it is true that, because the sun is so massive compared

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[98] Kepler writes: "The sun in the middle of the moving stars, himself at rest and yet the source of motion, carries the image of God the Father and Creator….He distributes his motive force through a medium which contains the moving bodies even as the Father creates through the Holy Ghost" (Letter to Maestlin, October 3, 1595, *Gesammelte Werke*, vol. xiii, p. 33, cited in *The Sleepwalkers*, p. 264). "Geometry existed before the Creation, is co-eternal with the mind of God, is God himself (what exists in God that is not God himself?)…" (Kepler's 1618 work *Harmonice Mundi*, Lib. IV, Casper's Biography, I., *Gesammelte Werke*, vol. vi).

[99] Kepler's third law, which took him twenty-two years to complete, is simply $P^2 = R^3$. Here P is the planet's orbital period (measured in sidereal years) and R is the semi-major axis (the distance between the planet and the sun). The Third Law is stated in his *Harmonice Mundi* (Harmony of the World) in the original Latin as: "Sed res est certissima exactissimaque, quod proportio, quae est inter binorum quorumconque planetarum tempora periodica, sit praecise sesquialtera proportionis mediarum distantiarum, id est orbium ipsorum" (V, 3, Prop. 8). For Mercury, P = 0.24 years and R = 0.39 astronomical units, which makes $P^2 = 0.06$ and $R^3 = 0.06$. The other planets are close to the ratio, but not exact. For Venus, P = 0.62 and R= 0.72, then $P^2 = 0.39$ and $R^3 = 0.37$. For Mars, P = 1.88 and R = 1.52, then $P^2 = 3.53$ and $R^3 = 3.51$. For Jupiter, P = 11.9 and R = 5.20, then $P^2 = 142$ and $R^3 = 141$. For Saturn, P = 29.5 and R = 9.54, then $P^2 = 870$ and $R^3 = 868$. For Uranus, P = 84 and R = 19.191, then $P^2 = 7056$ and $R^3 = 7068$. For Neptune, P = 165 and R = 30.071, then $P^2 = 27225$ and $R^3 = 27192$. For Pluto, P = 248 and R = 39.457, then $P^2 = 61504$ and $R^3 = 61429$. Kepler's original application of the Third Law was not quite accurate. Kepler, for example, calculated Saturn's semi-major axis to be 9 A.U. The cube is 729. The square root of 729 is 27, thus the orbital period of Saturn would be 27 years, but this is off by three years, since Saturn revolves around the sun in 30 years (*The Sleepwalkers*, p. 399). Newton modified Kepler's third law to: $(m_1 + m_2) P^2 = (d_1 + d_2)^3 = R^3$, in which *m* is the mass of the bodies, and *d* is the distance from each other.

to the planets that the "center of mass" will be near the center of the sun, the fact remains that it is technically incorrect to say that the smaller body revolves around the larger body. This principle becomes critically important when, for example, we are considering more than two bodies in the system. Our local system has eight planets (including Pluto) and a belt of asteroids to contend against the sun.[100] Charles Lane Poor describes it:

> Now so long as there are but two bodies in the system, these six elements are constant, and the smaller body will travel for ever around and around in its unvarying path. From these elements the actual position of the body at any time, past, present, or future, can be calculated by very simple formulas. If, however, a third body be introduced into our ideal universe, then the motions of the bodies are no longer simple and easily calculated. In fact, the paths of the three bodies become so complicated as to defy any mathematical description. Newton failed to find a solution to this problem; and every mathematician since his time has likewise failed.[101]

Ivars Peterson gives another view:

> [T]he problem of the solar system's stability has fascinated and tormented astronomers and mathematicians for more than 200 years. Somewhat to the embarrassment of contemporary experts, it remains one of the most perplexing, unsolved issues in celestial mechanics. Each step toward resolving this and related questions has only exposed additional uncertainties and even deeper mysteries. The crux of the matter hinges on the fact that it is one thing to write down the equations expressing the laws of motion and a totally different thing to solve those equations. As Newton and his successors quickly discovered, computing the motions of the planets and other bodies in the solar system is no

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[100] In the geocentric system, the Earth is not considered a planet. "Planet" comes from the Greek word πλανήτης meaning "wandering star," denoting that a planet is a body in constant motion. Since Earth is motionless, it is not counted among the planets.

[101] Charles Lane Poor, *Gravitation versus Relativity*, p. 122. Regarding the three-body problem, in 1912, K. F. Sundman attempted a solution based on a converging infinite series, but it converges much too slowly to be of any practical use. As it stands, no method has been developed to solve the equations of motion for a system with four or more bodies.

simple matter. In fact, the computations are often so complex that researchers now use supercomputers to solve them.[102]

This complexity is one reason Newton believed that God had to intervene frequently in order to "fix" the solar system.[103] But it is also another reason to reject the claim that the Copernican-Keplerian-Newtonian system wins the day because "it is so simple." Simple it is not. The epicycles of Ptolemy are child's play compared to the Newtonian model that must depend on integral and differential calculus to come even marginally close to explaining the perturbations among the planets and moons. Leonhard Euler stated he was overwhelmed in merely accounting for the moon's motion around the Earth, consequently concluding it to be impossible to predict all the perturbations of the entire solar system. Henri Poincaré also became quite involved in these calculations. He more or less revamped all previous methods but concluded that

> [A]lthough the equations representing three gravitationally interacting bodies yield a well-defined relationship between time and position, there exists no all-purpose, computational shortcut

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[102] Ivars Peterson, *Newton's Clock: Chaos in the Solar System*, p. 9. Considering that "super computers" must be employed to rescue man from the failure of Newton's theory to account for the complex motion of the planets, this inevitably leads to the suspicion that Joseph L. Adams' and Urbain J. J. Leverrier's discovery of Neptune as "the final proof of the universal application of Newton's law of gravitation" (as claimed by Morris Kline in *Mathematics and Western Culture*, p. 244) was highly unlikely in 1846. Their "discovery" of Neptune may have been as fortuitous as Jonathan Swift's guess in 1720 in *Gulliver's Travels*, or Kepler's guess in 1610, that if Jupiter had four moons and Earth had one, then Mars had two moons, but which was not verified by observation until 1877. This may be the reason that Wilfred de Fonvielle, to whom Leverrier displayed his calculations, remarked: "What if all that were not mere humbug" (cited in Arthur Lynch's *The Case Against Einstein*, p. 160, note). The same may be true for Percival Lowell's (d. 1916) guess that another planet (Pluto) existed due to perturbations in the orbits of Neptune and Uranus, since after astronomers observed Pluto through a telescope in 1930, it was also discovered that Lowell's calculations were based on fallacious data. I am indebted to N. Martin Gwynne for these astute observations.

[103] As Koestler writes: "He further believed that under the pressure of gravity the universe would collapse 'without a divine power to support it'; and moreover, that the small irregularities in the planetary motion would accumulate and throw the whole system our of gear if God did not from time to time set it right" (*The Sleepwalkers*, p. 536).

– no magic formula – for making accurate predictions of position far into the future. [104]

From these observations, it was Poincaré who produced what science now calls "dynamical chaos." In the end, Poincaré left Newton's laws of motion unchanged, but he radically altered our understanding of the types of behavior they mandate:

> The true goal of celestial mechanics is not the calculation of the ephemerides [tables of the locations of planets] but rather to discover if all phenomena can be explained by Newton's laws.[105]

The point of all this is to show that, not only are the movements of the heavenly bodies quite complex, it is necessary to account for all the bodies in a given system in order to know the trajectory of their motions. In this light, since Newton's laws of motion are not based on the idea that a smaller body revolves around a larger body but that bodies revolve around a center of mass, Newton's laws also require that, if the masses of all the heavenly bodies and the distances among them are taken into consideration, there will be one center of mass among them all. As we will see, when all the mass of the universe is taken into account, it is no stretch of the imagination to understand that Earth could be at the center of this gigantic bubble. We will cover this subject in more detail later.

The Influence of Immanuel Kant

Left with only the image of absolutes but the reality of relativism, the wall erected by Copernicus and Newton was made impenetrable by Immanuel Kant. After Kant's wrecking ball, man couldn't know anything about the absolute, let alone use it to cope with his existence. In his famous

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[104] Ivars Paterson, *Newton's Clock*, pp. 159-160.

[105] Henri Poincaré, *New Methods of Celestial Mechanics*, ed. Daniel L. Goroff, 1993, Introduction. Poincaré's words are quite apropos in our day, since there have been so many puzzling movements in space, from that of Saturn's moon Hyperion to those of man-made satellites. Evidences of anomalies in Newton's theory suggested themselves when scientists discovered that *Pioneer 10* "seems to be defying the laws of gravity. [It] has been slowing down, as if the gravitational pull on it from the sun is growing progressively stronger the farther away it gets" (Michael Nieto, *Discover*, October, 2003, p. 36). The same anomaly was noticed of *Pioneer 11*, as well as the *Ulysses* and *Galileo* probes.

Critique of Pure Reason,[106] as well as *Religion Within the Limits of Reason Alone*,[107] Kant did away with absolutes, innate ideas (from God), miracles, and just about anything that the medieval theologians had assumed was divinely sacrosanct. Moreover, Kant was influential in many areas of thought, since as a general rule, philosophy has a tendency to filter down over time into the arts, culture, and sciences, thus creating paradigms and superstructures to undergird all the other disciplines.

Kant had convinced the world that he had, indeed, demolished Augustine's and Aquinas' proofs for the existence of God. Things were never quite the same afterward. Although from the Enlightenment's perspective Kant appeared to give vitality and freedom to man's thought, in reality, he put man on a downward slope from which he has not yet recovered, and may never recover. So pervasive was Kant's philosophy he convinced mankind it could know nothing of the material world for certain, since everything man experienced was made such only by the *a priori* "categories of the mind," over which he had no control.

Most people are not aware of the fact that Kant's cosmology had as much influence on man's thinking as Kant's philosophy, enough for him to be called "the father of modern cosmology."[108] In writing the *Critique of Pure Reason*, Kant reveals that he came to the position of demoting pure reason due to two "proofs" about the construction of the universe.[109] In the first, Kant argues that the world must have had a beginning in time, otherwise, at the present time, an infinite number of years would have already elapsed, but that is impossible, thus our reasoning capabilities are inadequate to escape the contradiction. The second proof involves the concept of "empty time" before the world existed. An empty time consists of nothing, and thus it cannot have any differentiation between time

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[106] Immanuel Kant, "Critique of Pure Reason," *Great Books of the Western World*, vol. 42, ed., Robert Maynard Hutchins, *Encyclopedia Britannica*, 1952.

[107] Immanuel Kant, *Religion Within the Limits of Pure Reason Alone*, trans. T. M. Green and H. H. Hudson, 1960.

[108] Kant wrote the *Natural History and Theory of the Heavens* in 1755 and the *Metaphysical Foundations of Natural Science* in 1786, both of which held Newton's laws of motion and the celestial mechanics of Copernicanism in the greatest esteem. At the same time, however, he was the first to point out that Newton's laws, contrary to what Newton asserted, could not be derived from observation, and thus Kant refuted the "Baconian myth" that science begins only with observations. As Popper argues: "Newton's dynamics goes essentially beyond all observations. It is universal, exact and abstract; it arose historically out of myths; and we can show by purely logical means that it is not derivable from observation-statements" (*Conjectures and Refutations*, p. 190). Kant's mistake, of course, was his *a-posteriori* belief that Newtonian mechanics is irrefutable.

[109] *Critique of Pure Reason*, p. 454 ff.

intervals. But there is a moment just prior to the beginning of the world, which is differentiated from all previous empty time because of its proximity to the beginning of the world. But if this proximity to the world is supposed to be as empty as the previous intervals, then we have a contradiction, and thus our reasoning fails again. Thus Kant has "critiqued" pure reason so that it cannot serve as a foundation.

These unsolvable contradictions Kant called "antinomies." He concluded that our concepts of space and time are not applicable to the universe at large. Although we can apply space and time to ordinary events, Kant insisted that space and time are not real in themselves and are merely products of our mental intuition that we use to attempt to understand the universe. The only proper use of our mental abilities is as instruments of observation; they supply, as it were, frames of reference for our limited experience. Therefore, if we misapply space and time to issues that transcend our experience (as demonstrated in the two proofs above), our concepts will break down, and thus "pure reason," that is, reason without reliance on our limited sense experience, is impossible.[110]

Another contribution of Kant's was his "primal nebula" theory, which was, in many respects, the proto-type to the modern Big Bang theory. It held that the universe evolved by a gradual formation of galaxies and planets from a collection of molecules in random motion, a process that would continue *ad infinitum*. This was a subtle yet "scientific" attempt to minimize the role of God, while natural forces, with a seeming mind of their own, formed the complex and life-sustaining elements of the universe. For Kant, it was impossible to know anything about the origins of these random particles since, if a divine being created them, the question of his existence was beyond man's capabilities. All in all, Kant gave mankind a strictly mechanistic universe, with no beginning and no end, and, as a proto-Einstein, he introduced the concept that time and space are relative with no absolute counterpart.[111] Kant led science in the direction of a mechanized, impersonal and relativistic universe, and thus he served as a mentor to Einstein. As Arthur Miller notes:

> Seelig (1952) writes that while at Aarau, Einstein did not participate in any of the numerous beer parties because he took seriously Bismarck's advice that "beer makes one dumb and lazy." Instead, continued Seelig, Einstein became "intoxicated on Kant's *Critique of Pure Reason*." Max Talmey, a medical student who dined weekly with the Einstein family, introduced

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[110] *Critique of Pure Reason*, p. 518ff.
[111] *Albert Einstein's Special Theory of Relativity*, p. 170.

the thirteen-year old Albert to Kant's writings. Talmey recalled that "Kant's works, incomprehensible to ordinary mortals, seemed clear to him."

Infinite Problems with an Infinite Universe

As we saw with science's problematic attempts to interpret the experiments both of stellar aberration and interferometry by means of a heliocentric model, so too, the infinite universe that was proposed to house the celestial bodies had grave problems. A survey of the data allows us to conclude quite safely that all attempts to make the universe infinite were for the express purpose of escaping the necessity of having a center of absolute rest. A finite universe implies a center, and the data allowed little escape from this conclusion. As James Trefil sees the connection:

> By the first years of the twentieth century, astronomers using very clever statistical tools had found that the universe, as we recognized it, was indeed finite. *We were sensibly near the center*."[112]

One of the more serious and still unsolved problems dictating against an infinite universe is what has come to be known as Olbers' Paradox. Actually, astronomer **Edmund Halley**, a contemporary of Newton with whom the latter corresponded quite frequently, discovered the paradox before Olbers. In 1715 Halley reasoned that if the universe were infinite, it would contain an infinite number of stars, which then meant that the night sky should be as bright as daylight. In fact, the entire face of the sky should look as bright as the sun, as if there were thousands of suns in the sky, overlapping each other so that no space would be without light. This

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[112] James S. Trefil, *Space Time Infinity*, 1985, p. 61.

paradox was such a glaring problem that no one even proposed a solution for three decades. The first was P. L. de Cheseaux, in 1744, followed almost a century later by **Heinrich W. M. Olbers** in 1823.[113] To resolve the problem, both scientists proposed that a substance (*i.e.*, dust) existed in interstellar space that was absorbing the immense light from the stars, which therefore made the night sky dark.

By the late 1800s, however, science discovered through the works of Josef Stefan and **Ludwig Boltzmann** that matter seeks a point of equilibrium with its environment, and in order to reach that point, it will dissipate as much energy as it consumes. If not, it will build up heat, and if the heat reaches a critical level, the matter will deteriorate. Even if the light were to transpose into infrared radiation, it would still reach Earth. Moreover, even if there were a number of dust particles that reflected light away from the Earth, there would be a proportionate amount that would reflect light toward the Earth, with the net result being the same.

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[113] J. D. North, *The Measure of the Universe*, 1965.

The scattering effect of light is the same reason why on a cloudy day we cannot readily determine the location of the sun. These facts discounted Olbers' explanation, and thus the dark night sky remained a "paradox."[114] Except for one brief attempt to revive Olbers' explanation (which was proposed in 1930 by Robert Trumpler)[115] the astronomical community, either by design or by accident, failed to apply Boltzmann's principles of radiation emission to their quest for the infinite universe until the advent of Hermann Bondi's "Steady State" theory in 1960. Bondi proposed that the energy from the stars was transformed into matter. Logically, if radiation became matter (thanks to $E = mc^2$), then Olbers' Paradox could be solved, since the excess radiation would now have an inexhaustible repository.[116] As Stephen Hawking explains it:

> The steady state theory required a modification of general relativity to allow for the continual creation of matter, but the rate that was involved was so low (about one particle per cubic kilometer per year) that it was not in conflict with experiment.[117]

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[114] As Stephen Hawking describes it: "Further evidence was provided by the so-called second law of thermodynamics, formulated by the German physicist Ludwig Boltzmann. It states that the total amount of disorder in the universe (which is measured by a quantity called entropy) always increases with time. This, like the argument about human progress, suggests that the universe can have been going only for a finite time. Otherwise, it would by now have degenerated into a state of complete disorder, in which everything would be at the same temperature" (*Black Holes and Baby Universes and Other Essays*, 1994, p. 87). According to John Ross of Harvard: "Ordinarily the second law is stated for isolated systems, but the second law applies equally well to open systems..." (*Chemical and Engineering News*, July 27, 1980, p. 40).

[115] Trumpler discovered the existence of interstellar dust and, after comparing the angular sizes and brightness of globular clusters, reasoned that the dust was absorbing radiation. He also found that distant star clusters were bigger than nearby clusters, and he postulated that this was due to interstellar dust, which absorbed radiation from the distant clusters and thus made them appear fainter and more distant. Dust grains absorb optical photons. The energy carried by those photons cannot vanish. Instead, it must heat the dust grains. Since grains are solid, then upon becoming heated they will radiate a blackbody spectrum. For typical grain sizes of a micron or so, and the observed spectrum of the interstellar radiation field, one can derive typical grain temperatures by applying Wein's law. The emission properties of grains determine the general chemical composition of the dust: Ices (water ice, CO_2, etc.), graphite, silicates, iron.

[116] Hermann Bondi, *Cosmology*, 1960, pp. 20-22.

[117] Stephen Hawking, *A Brief History of Time*, p. 47.

We note how Hawking shows no compunction for the fact that science was willing to modify one of its most sacrosanct theories (*i.e.*, General Relativity) to make room for Bondi's explanation for Olbers' Paradox.[118] It wasn't enough that no one had ever proved that energy could create matter, but now they were going to make sure that the factory never stopped producing it. None of this seems to bother Hawking, for, as he states: "the rate…was so low." This is the same sort of preferred logic that String Theorists use to explain why virtual particles, which are said to "pop in and out of existence," do not violate the First Law of Thermodynamics, that is, simply because they are "gone in a flash."[119]

Various modern cosmologists attempt to explain Olbers' paradox by asserting: (a) if the galaxies are receding from us, then much of their light is red-shifted and thus the energy of the light is undetectable; (b) if the universe was created in the Big Bang, the light from the most distant stars has not had enough time to reach us, and (c) the expansion of the universe will dissipate starlight. All these proposals, however, are based on question-begging speculations. First, there is no proof that galaxies are receding from us since redshift has not been proven to be a measure of either distance or velocity, and even if it were, how would one know that the light has been redshifted if the energy is "undetectable"? If it is undetectable (and thus produces a dark sky) this could just as well be the case because the energy does not exist. Second, it is illogical to argue that light from distant stars has not yet reached the Earth, since in an infinite universe there would be an infinite number of star generations, making an infinite amount of light in the universe. Third, an expanding universe cannot alter the first law of thermodynamics, which currently holds that energy can neither be created nor destroyed. If in some way starlight loses its energy, the energy still exists in another form and place, and it will find

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[118] "Modification" of the General Theory is quite a presumptuous undertaking by Hawking since it was Einstein who desired to solve Olber's paradox by General Relativity. As Clark writes: "The reasons for rejecting the Newtonian universe can be simply understood….For it seemed mathematically clear that the effect of an infinite number of stars would, even at infinite distances, produce an infinitely strong force whose effect would be to give the stars a high velocity through the universe….Einstein was therefore forced to consider whether it was possible to conceive of a universe that would contain a finite number of stars distributed equally through unbounded space. His answer to the apparent contradiction lay in the idea that matter itself produced the curvature of space" (*Einstein: The Life and Times*, pp. 267-268).
[119] The First Law of Thermodynamics previously held that neither matter nor energy can be created or destroyed, which has since eliminated matter from the Law.

its way to Earth, nonetheless.[120] In the end, the infinite universe behaves precisely opposite to the way its inventors intended it to work.

Meanwhile, problems for the concept of an infinite universe were just beginning. Since, as noted above, an infinite universe would produce an infinite amount of electromagnetic radiation, then by the same principle the universe would produce an infinite amount of every other transmittable phenomenon of nature, including gravity. Gravity would be especially troublesome since no one could possibly suggest that its effects would be minimized by "absorption from cosmic dust." Gravity knows no barriers and has no limits. Ironically, Newton's attempt to save the collapse of the universe by proposing that it be infinite is the very thing that would cause it to collapse. Although this obvious bit of logic completely escaped the mind of Newton, scientists about two hundred years after him became very aware of the problem gravity presented, but didn't know quite what to do about it. Rather than abandon the infinite universe, they concocted "repulsive forces" by reworking Newton's equations so as to counteract the "infinite" force of gravity. Here we see the same fudging of numbers that Hawking's colleagues applied to Bondi's theory. In this case, the dubious distinction belongs to Hugo von Seeliger, J. C. Kapteyn and Carl Neumann. Current advocates of this cosmology, such as Andre Assis, seek, as he puts it, for

> …a universe that is boundless and infinite in space, which has always existed without any creation, and with an infinite amount of matter in all directions….it has no preferred center, so that any point can arbitrarily be chosen as its center,

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[120] Even those hoping for a resolution to Olber's paradox admit the poor history of its attempted resolutions, and specifically the dubiousness of the "expanding universe" solution. Paul Wesson states: "For most combinations of the cosmological model, galaxy formation redshift and galaxy evolution, the expansion only reduces the intensity by a factor of about 3-4…This confirms the conclusion drawn from earlier bolometric calculations of the extragalactic background light by Wesson, Valle, and Stabell, and shows Harrison is right about Olber's paradox. Contrary to what is implied in some books, the latter is not resolved mainly by the cosmological redshift. The darkness of intergalactic space is a result primarily of the finite age of the galaxies, in conjunction with other factors including the finite speed of light, and only secondarily of the expansion of the universe ("Olber's Paradox and the Spectral Intensity of the Extragalactic Background Light," *The Astrophysical Journal*, 367:399-406, February, 1991). We must add, however, that the "finite age of galaxies" would do little to solve the problem in a universe that continually made galaxies *ad infinitum*.

so that Newton's gravity "paradox is solved with the Seeliger-Neumann potential energy, even keeping an infinite and homogeneous universe."[121]

Einstein's Fudge Factor: The Cosmological Constant

During this time, of course, Einstein's vision of the universe held sway. Without repeating what we have already discovered about his bizarre universe, suffice it to say, it had its own set of paradoxes. Einstein's original formula kept the universe from collapsing (with a little help from the infamous fudge factor called the "cosmological constant"), but this solution was unstable, since the slightest imbalance in the constant would result in an expansion of the universe, which in turn would increase the repulsive force and decrease gravity, and thus increase the expansion exponentially. Conversely, the slightest contraction would result in a premature collapse of the universe. Interestingly enough, Nobel laureate Robert Laughlin explains the problems in terms of our old friend, ether:

> The closet of general relativity contains a horrible skeleton known as the cosmological constant. This is a correction to the Einstein field equations compatible with relativity and having the physical meaning of a uniform mass density of relativistic ether. Einstein originally set this constant to zero on the grounds that no such effect seemed to exist. The vacuum, as far as anyone knew, was really empty. He then gave it a small nonzero value in response to cosmological observations that seemed to indicate the opposite, and then later removed it again as the observations improved.[122]

Here we see that the "cosmological constant" was not merely some innocent mathematical figure. In short, Einstein was trapped like the proverbial rat in a corner. If he kept the cosmological constant at zero, his universe would be unstable. If he gave it a non zero value, he would have to admit the existence of ether – the very substance that was initially denied by his Special Theory of Relativity. Thanks to Laughlin's analysis we have been alerted to the connection. Perhaps this is the reason that in 1916, at just the time he was developing his General Theory of Relativity, Einstein suddenly had a new affection for ether possessing "physical properties." Laughlin reveals the inherent problems such theories will face:

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[121] Andre K. T. Assis, Relational Mechanics, 1999, pp. 94, 93. See also *The Milky Way Galaxy and Statistical Cosmology: 1890-1924*, Erich Robert Paul, 1993.
[122] Robert B. Laughlin, *A Different Universe*, p. 123.

The view of space-time as a nonsubstance with substance-like properties is neither logical nor consistent. It is instead an ideology that grew out of old battles over the validity of relativity. At its core is the belief that the symmetry of relativity is different from all other symmetries in being absolute. It cannot be violated for any reason at any length scale, no matter how small….This belief may be correct, but it is an enormous speculative leap.[123]

This is certainly the irony of ironies. In order to exist, Relativity must function as an oxymoron – it must be absolute! This is the inevitable consequence of a theory that is erroneous from the start. Laughlin tries his best to save Relativity from its self-destruction, but as we will see, he can only appeal to mystery and ignorance as his cudgel:

Despite its having become embedded in the discipline [of Relativity], the idea of absolute symmetry makes no sense. Symmetries are caused *by* things, not the cause *of* things. If relativity is *always* true, then there has to be an underlying reason. Attempts to evade this problem inevitably result in contradictions. Thus if we try to write down relativistic equations describing the spectroscopy of the vacuum, we discover that the equations are mathematical nonsense unless either relativity or gauge invariance, an equally important symmetry, is postulated to fail at extremely short distances. No workable fix to this problem has ever been discovered. String theory, originally invented for this purpose, has not succeeded. In addition to its legendary appetite for higher dimensions, it also has problems at short length scales, albeit more subtle ones, and has never been shown to evolve into the standard model at long length scales, as required for compatibility with experiment.[124]

Laughlin then enlightens us to a further anomaly and its accompanying coverup:

Thus the innocent observation that the vacuum of space is empty is not innocent at all, but is instead compelling evidence that light and gravity are linked and probably both collective in nature. Real light, like real quantum-mechanical sound, differs

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[123] Robert B. Laughlin, *A Different Universe*, pp. 123-124.
[124] *Ibid*., pp. 124-125.

from its idealized Newtonian counterpart in containing energy even when it is stone cold. According to the principle of relativity, this energy should have generated mass, and this, in turn, should have generated gravity. We have no idea why it does not, so we deal with the problem the way a government might, namely by simply declaring empty space not to gravitate.[125]

As we can see, physicists were discovering that the mathematics that allowed them to toy with whatever universe their minds imagined was the same mathematics that made uncompromising demands they simply could not satisfy. As Hubble stated it:

> Such a universe, if it contains matter, will be unstable. At best it could be in unstable equilibrium, like a ball balanced on a point. The slightest disturbance would upset the balance – and internal disturbances evidently must occur. The universe would then revert to its natural state of either contraction or expansion….At this point the cosmologist seizes upon the observed red-shifts, interprets them as velocity-shifts, and presents them as viable evidence that the actual universe is now expanding, and expanding rapidly.[126]
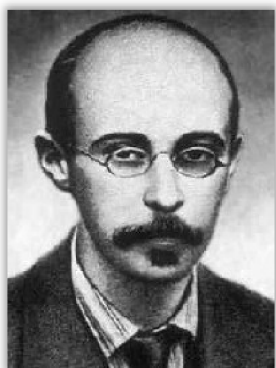
In the 1920s Willem de Sitter and **Alexander Friedmann** attempted to find a solution to Einstein's problem, but after they reworked his equations, cosmology didn't know whether it was coming or going, literally and figuratively. De Sitter's modifications had it expanding, while Friedmann's had it contracting, and there was an infinity of possible outcomes between these two extremes depending on how one played with the numbers. Last but not least, General Relativity, as every Relativist must admit, invariably leads back to a "singularity."

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[125] *Ibid*., p. 125. Laughlin adds: "The desire to explain away the gravity paradox microscopically is also the motivation for the invention of supersymmetry, a mathematical construction that assigns a special complementary partner to every known elementary particle. Were a superpartner ever discovered in nature, the hope for a reductionist explanation for the emptiness of space might be rekindled, but this has not happened, at least not yet" (*ibid*).
[126] *The Observational Approach to Cosmology*, pp. 54-55.

There is no escape from this conclusion, mathematically speaking. "Singularity" is the word modern cosmologists employ in order to cover up the fact that they have not the foggiest notion what happens when, according to the logical conclusions of Einstein's theory, all the matter and energy of the universe is sucked back up into the proverbial abyss. Whither it goes, or from whence it came, no one seems to know. Except for a few bold scientific entrepreneurs who don't mind running the risk of appearing mentally unbalanced by suggesting that "singularities" come from "other universes and dimensions," modern science is mute, and painfully so, not to mention the fact that these "other universes" would have the same problem of collapsing in on themselves as our universe.

The lesson to be learned here is that it is extremely dangerous to play with infinity. Anything that is posited as infinite outside of God always leads to absurdities. Physicists and mathematicians have become painfully aware of this intractable problem. The reason we hear talk of "parallel universes" and "alternate histories" from Hollywood's science fiction dramas is that these ideas have already been bandied about in scientific circles as the solutions to the perplexing problems in modern cosmology. Charles Seife, for example, has reasoned that if two premises are accepted: (a) infinite space, and (b) the second law of thermodynamics, then when the second law is applied to blackholes, it leads to a "holographic bound." This means that any portion of energy and matter enclosed in a finite sphere can be arranged in only a finite number of ways. Accordingly, if the universe is infinite, it means there must be an infinite number of ways to arrange energy and matter that are different than what appears in our little universe. This would inevitably lead to an infinite assortment of universes, with the haunting possibility that a whole host of them are presently mirroring your reading of this book. These imaginative solutions are inevitably created when men mistake the universe for their god.[127]

Edwin Hubble and Modern Cosmology's Wax Nose

Undaunted, the theorists marched onward. As we noted earlier, the main impetus for the expanding universe theory was **Edwin Hubble**, although the idea actually originated with Willem de Sitter. Hubble based his theory of expansion on the redshift of starlight. As we have cited earlier, although Hubble admitted to other viable interpretations of redshift, nevertheless, the interpretation the science establishment connects to Hubble is that redshift is caused by the stretching of the starlight's wavelength, a stretching that is said to be the result of the star's enormous

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[127] "Physics in the Twilight Zone," *Science*, 305:464, 2004.

recession speed away from the Earth. The faster the recession, the more the wavelength would be stretched, and thus, the larger the redshift and the further away the star was said to be. The calculation of its recession speed became known as Hubble's Law.

Edwin Hubble (1889 – 1953)

To fit with the data he observed in 1929, Hubble figured that his "H" constant, which was the proportion between the speed of the galaxy compared to its distance away from us, would have to be 100 kilometers per second per megaparsec.[128] Thus, if a galaxy was said to be 10 megaparsecs away from us, Hubble's Law held that it must recede with a velocity of 1000 kilometers per second. If the galaxy were a gigaparsec from us (which is 1000 megaparsecs), it must recede with a velocity of 100,000 kilometers per second.

Why was Hubble's Law so important to modern cosmologists? With this law, one could calculate the rate of expansion, and once one knew the rate, one could then determine how long the expansion had been taking place and, therefore, determine when the universe began. If one could imagine the expansion being reversed until the universe went back to its original form, the Hubble Law could retroactively calculate the age of the

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[128] A "megaparsec" equals 3.3×10^6 light years. A "light year" is the distance light travels in a year, at 300,000 kilometers per second, which equals 3×10^{19} kilometers. Edwin Hubble, "A Relation Between Distance and Radial Velocity Among Extra-Galactic Nebula," *Proceedings of the National Academy of Science*, 15, 1929, pp. 168-173. Edwin Hubble and Milton Humason, "The Velocity-Distance Relation Among Extra-Galactic Nebulae," *Astrophysical Journal*, 74, 1931.

universe. If scientists could make the age long enough, then there would be sufficient room to fit in both cosmic and biological evolution. Indeed, the stakes were certainly high.

Milton Humason (1891 – 1972)

The circumstances surrounding Hubble's interpretation of the redshift are intriguing. Hubble worked with Milton Humason, but only Hubble's name is associated with the redshift/expansion theory. The primary reason is that Humason was very reluctant to provide evidence for an expanding universe. The scientific community, based on Einstein's reworked mathematical formulas (courtesy of de Sitter and Friedmann), had already decided that the universe was expanding, but they were missing observational evidence. Consequently, the science community was predisposed to interpret redshift as a Doppler phenomenon wherein galaxies are understood to be moving away at great speeds from the observer.[129] This is in the face of the fact that there was no proof for a

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[129] A Doppler shift, as it is known in sound mechanics, is the expansion of sound's wavelength as the source of the sound recedes from you (or contraction as the source approaches you). We hear a rapid change in pitch, for example, when a speeding train blowing its whistle either approaches us or recedes from us. Many scientists today claim that the same thing happens to light when it travels, that is, those who believe light is a wave say that the wave expands as the source of light recedes from the observer. The principle of the lengthening or shortening of wavelength was first proposed by Johann Christian Doppler in 1842 but resisted by the science community for two decades. His findings were confined to sound waves. His theory was confirmed by the Dutch scientist C. H. D. Buijs-Ballot in 1845. In 1860 Ernst Mach proposed the Doppler effect was true for light waves,

connection between receding galaxies and redshift, or that galaxies are receding at all, or that redshift is to be interpreted as a Doppler shift. In a paper published in 1931 Humason wrote:

> It is not at all certain that the large redshifts observed in the spectra are to be interpreted as a Doppler effect but, for convenience, they are interpreted in terms of velocity and referred to as apparent velocities.[130]

To refer to them as only "apparent" velocities means that Humason was not committing himself to the Friedmann-Lemaître-Einstein-de Sitter hypothesis. Hubble, of course, knew of Humason's doubts and makes reference to them: "But later, after the 'velocity-distance relation' had been formulated, and Humason's observations of faint nebulae began to accumulate, the earlier, complete certainty of the interpretation began to fade."[131] We might say that Humason paid a dear price for his non-conformance. Whereas in the early going, the discovery of the redshift/velocity ratio was attributed to "Hubble-Humason," later, when it was clear that Humason would be the first not to commit, his name was dropped, which is why the public only knows it as "Hubble's Law."

Interestingly enough, regardless of what the science establishment now associates exclusively with Edwin Hubble, the fact remains that even Hubble never fully committed himself to the now popular interpretation.

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which was tested by W. Huggins in 1868. It wasn't until 1901 that Russian scientist and editor of the *Astrophysical Journal*, Aristarkh Belopolsky, found the same effect in light waves, which was confirmed by J. Stark in 1905 and Quirino Majorana in 1918. One theory posits that redshift is caused by light's travel through an electron-positron net pervading all space (M. Simhony, *Invitation to the Natural Physics of Matter, Space, Radiation*, Singapore, New Jersey, World Scientific Publishing, 1994, p. 252; and John Kierein, "Implications of the Compton Effect Interpretation of the Redshift," *IEEE Trans. Plasma Science* 18, 61 (1990), et al.). In any case, it should be noted that the "Hubble Constant" has not been very constant. In 1926 it had a value of 500 km/sec/megaparsec. With several intermittent decreases, it now stands at 50.3 km/sec/megaparsec (Michael Rowan-Robinson, "Extragalactic Distance Scale," *Nature*, Dec. 16, 1976, vol. 264, p. 603).

[130] "Velocity-Distance Relation Among Extra-Gallactic Nebulae," *Astrophysical Journal*, 74, 1931. We even see Humason's reluctance positioned in the very title of another article containing the word "apparent": "The Apparent Radial Velocities of 100 Extra-Galactic Nebulae," *Astrophysical Journal*, 83, 1936. Humason held his ground even in the face of redshifts he found between 1931-1936 corresponding to 40,000 km/sec.

[131] *The Observational Approach to Cosmology*, p. 29.

Hubble was quite aware of what the science community desired, but maintained his distance. He writes:

> This explanation interprets redshifts as Doppler effects, that is to say, as velocity-shifts, indicating actual motion of recession. It may be stated with some confidence that redshifts are velocity-shifts or else they represent some hitherto unrecognized principle in physics…. Meanwhile, redshifts may be expressed on a scale of velocities as a matter of convenience. They behave as velocity-shifts behave and they are very simply represented on the same familiar scale, regardless of the ultimate interpretation. The term "apparent velocity" may be used in carefully considered statements, and the adjective always implied where it is omitted in general usage.[132]

Obviously, Hubble is making the same conclusion as Humason, that is, he was only committing to the idea of an "apparent velocity" of the galaxies, not an actual velocity. Confirming his meaning is a 1934 lecture in which Hubble cautioned:

> The field is new, but it offers rather definite prospects not only of testing the form of the velocity-distance relation beyond the reach of the spectrograph, but even of critically testing the very interpretation of redshifts as due to motion. With this possibility in view, the cautious observer refrains from committing himself to the present interpretation and prefers the colorless term "apparent velocity."[133]

This is especially significant since in Hubble's day an alternate explanation to redshift had not yet been postulated. Doppler shift was the only game in town, yet Hubble still was not committing himself to it. This skepticism is stated clearly in many works, but especially in the following:

> The investigations were designed to determine whether or not redshifts represent actual recession. In principle, the problem can be solved; a rapidly receding light source appears fainter than a similar but stationary source at the same momentary distance....

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[132] *The Realm of the Nebulae*, Yale Univ. Press, 1936, pp. 122-123. *The Observational Approach to Cosmology*, p. 22.
[133] 1934 lecture titled: "Redshifts in the Spectra of Nebulae," *The Halley Lecture*, May 8, 1934, Oxford: Clarendon Press, 1934, p. 14.

For velocities of a few miles or a few hundred miles per second, the dimming factor is negligible. But for the extremely distant nebulae, where the apparent recessions reach tens of thousands of miles per second, the effects are large enough to be readily observed and measured. Hence, if the distances of the nebulae were known quite accurately we could measure their apparent faintness and tell at once whether or not they are receding at the rates indicated by redshifts.

Unfortunately, the problem is not so simple. The only general criterion of great distances is the very apparent faintness of the nebulae which we wish to test. Therefore, the proposed test involves a vicious circle, and the dimming factor merely leads to an error in distance. However, a possible escape from the vicious circle is found in the following procedure. Since the intrinsic luminosities of nebulae are known, their apparent faintness furnishes two scales of distance, depending upon whether we assume the nebulae to be stationary or receding. If, then, we analyze our data, if we map the observable region, using first one scale and then the other, we may find that the wrong scale leads to contradictions or at least to grave difficulties. Such attempts have been made and one scale does lead to trouble. *It is the scale which includes the dimming factors of recession, which assumes that the universe is expanding*.[134]

As we have noted in our earlier discussion of Hubble, he then came to the place where he knew (considering what he actually saw in his telescope) that there were only two options left to him. He writes:

Thus the use of dimming corrections leads to a particular kind of universe, but one which most students are likely to reject as highly improbable. Furthermore, the strange features of this universe are merely the dimming corrections expressed in different terms. Omit the dimming factors, and the oddities vanish. We are left with the simple, even familiar concept of a sensibly infinite universe. All the difficulties are transferred to the interpretation of redshifts which cannot then be the familiar velocity shifts….Meanwhile, on the basis of the evidence now

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[134] "The Interpretation of the Redshifts," pp. 108-109, in "The Problem of the Expanding Universe," *American Scientist*, Vol. 30, No. 2, April 1942, emphasis added.

available, apparent discrepancies between theory and observation must be recognized. A choice is presented, as once before in the days of Copernicus, between a strangely small, finite universe and a sensibly infinite universe plus a new principle of nature.[135]

In his 1937 book, *The Observational Approach to Cosmology*, he is even more candid about his doubts regarding the interpretation of redshift, as well as his doubts about the Relativity theory behind it. He was honest enough to admit that there was another viable interpretation, and his book shows that he was deeply troubled by it, for he had no way to disprove it. It was the interpretation which holds that redshift, among other factors, may simply be due to light's energy loss as it collides or interacts with the mediums or debris in space. As Hubble puts the possibility:

> …light loses energy in proportion to the distance it travels through space. The law, in this form, sounds quite plausible. Internebular space, we believe, cannot be entirely empty. There must be a gravitational field through which the light-quanta travel for many millions of years before they reach the observer, and there may be some interaction between the quanta and the surrounding medium…. Light may lose energy during its journey through space, but if so, we do not yet know how the loss can be explained.[136]

The longer light must travel, the more it will interact with the particles of space and the more energy it will lose, and thus the longer will be its shift to the red end of the spectrum. Estimates say that light would

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[135] Edwin Hubble, "The Problem of the Expanding Universe," *American Scientist*, Vol. 30, No. 2, April 1942, pp. 99f; *The Observational Approach to Cosmology*, p. 21. Hubble also states: "for a stationary universe, the law of redshifts is sensibly linear.…The results may be stated simply. If the nebulae are stationary, the law of redshifts is sensibly linear; redshifts are a constant multiple of distances. In other words, each unit of light path contributes the same amount of redshift" (p. 111). Likewise, in a paper Hubble wrote with Richard Tolman in 1935, he concludes that the observational information is "not yet sufficient to permit a decision between recessional or other causes for the redshift" (Edwin Hubble and Richard Tolman, "Two Methods of Investigating the Nature of the Nebular Redshift," *Astrophysical Journal*, 82:302-37, 1935). Of the "two methods," of course, one is that redshift does not represent velocity.
[136] *The Observational Approach to Cosmology*, p. 30.

lose about 5-7% of its energy every 109 light years of distance.[137]   Hubble is so bothered by this possibility that he feels compelled to mention it about a dozen times throughout the book.[138]

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[137] Fritz Zwicky was the first to propose the theory of "tired" light ("Redshift of Spectral Lines," *Proceedings of the National Academy of Sciences*, 1929, v. 15, pp. 773-779), but this was merely the default position for the fact that "Hubble has shown that the observational data which he has obtained do not agree satisfactorily with the homogeneous relativistic cosmological models [*viz.*, the Big Bang theory]" (Guy Omer, "A Nonhomogeneous Cosmological Model," 1949, p. 164). Among the many advocates of the "tired" light theory is the Ukrainian team of N. A. Zhuck, V. V. Moroz, A. A. Varaksin who, rejecting Big Bang cosmology due to the distribution and nature of the 23,760 quasars they examined, are forced to conclude that "the Cosmic Microwave Background Radiation can be either the remainder of the high temperature explosion of the super-dense substance *or the total radiation of all stars of the stationary universe with the said dissipation of the energy of light*." ("Quasars and the Large Scale Structure of the Universe," N. A. Zhuck, V. V. Moroz, A. A. Varaksin (*Spacetime and Substance, International Physical Journal*, Ukraine, Vol. 2, No. 5 (10) 2001, p. 193, emphasis added); and N. A. Zhuck in "The Microwave Background Radiation as aggregate radiation of all stars," XVII International Conference, April 12-14, 2000, Moscow (in Russian); and in *Spacetime and Substance* 1:1, 29-34 (2000). The same conclusion comes from Alex M. Chepick: "The urgency of "tired" light is proved for the stationary universe model and the value of energy loss of a photon on one cycle of light's wave is constant….The most surprising conclusion…is the value of energy loss of a photon on one cycle of light's wave is not dependent on a wavelength! Therefore it is a global physical constant….In a 1 meter vacuum a part of the energy loss of light makes $z = 10^{-27}$…because of equal contribution of electrical and magnetic components into the energy of the wave EMF, and that during one cycle there are 4 power transmissions between the electrical and magnetic fields, probably it is necessary to consider energy loss for each such transformation at ε/4." The writers also conclude: "The constancy of this loss suggests [the] existence of stable particles with approximately 10^{-69} kg [*i.e.*, mass of the photon] ("The Calculation of the Indispensable Accuracy of the Measuring of an EM's Wave Energy," *Spacetime and Substance*, Vol. 3, 2002, No. 3, 13, p. 111). See also Goldhaber and Nieto "New Geomagnetic Limit on the Mass of the Photon," *Physical Review Letters* 21:8, 1968, p. 567, which establishes a limit of 2.3×10^{-15} ev. Lakes, "Experimental limits on the Photon Mass and Cosmic Magnetic Vector Potential," *Physical Review Letters* 80:9, 1998, p. 1826. In 1981, David A. Hanes address the "tired light" issue in the article "Is the Universe Expanding?" (*Nature* 289:745). Other scientists who proposed the "tired light" theory were Max Born and Erwin Finlay-Freundlich but they never developed the theory. Paul LaViolette also advances the theory ("Is the Universe Really Expanding? *Astrophysical Journal*, 301, 544-553, 1986). Halton Arp holds "tired light" is discounted by the fact that no increase in redshift has been seen from light traveling through dense galactic material; that quasars close together can

Throughout the book we see Hubble struggling to make the data conform to the theories of the day. On the one hand, he knows that if he interprets redshift as a velocity-indicator, then he winds up with a universe that is too small and too young to accommodate the theory of biological evolution. As he puts it:

> A universe that has been expanding in this manner would be so extraordinarily young, the time-interval since the expansion began would be so brief, that suspicions are at once aroused concerning either the interpretation of redshifts as velocity-shifts or the cosmological theory in its present form.[139]

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have vastly different redshifts; that younger quasars have higher redshift; the Butcher-Oemler effect of galaxies of moderate redshift having blue and ultraviolet light; high redshift quasars in the middle of low redshift galaxies (*The Einstein Cross* – G2237+ 0305). Arp holds redshift is intrinsic to the object, and since each object is different because it is "created" at a different time, varying redshifts are produced (*Seeing Red*, pp. 97, 108, 159, 166, 173, 195).

[138] *The Observational Approach to Cosmology*, Oxford, 1937, Preface: "the phenomena of red-shifts whose significance is still uncertain"; p. 21: "the law of redshifts…but the uncertainties were considerable"; p. 26: "…red-shifts as velocity-shifts…seems to imply a strange and dubious universe, very young and very small…seems to imply that red-shifts are not primarily velocity-shifts…the observer is inclined to keep an open mind…"; p. 31: "Red-shifts are produced either in the nebulae, where the light originates, or in the intervening space through which the light travels….At present, however, the direct investigation ends in a vicious circle, and the persistent observer is forced to consider a possible indirect attack on the problem"; p. 39: "There seems to be no *a priori* necessity for a linear law of expansion, a strict proportionality between red-shifts and distance"; p. 43: "Thus, the familiar interpretation of red-shifts as velocity-shifts leads to strange and dubious conclusions; while the unknown, alternative interpretation leads to conclusions that seem plausible and even familiar"; p. 44: "The fundamental question is the interpretation of red-shifts"; p. 55: "At this point the cosmologist seizes upon the observed red-shifts, interprets them as velocity-shifts…" Radio astronomer, Grote Reber (d. 2002), who built the first radio telescope in 1937, points out many of these very pages in Hubble's book to indicate that Hubble had "grave doubts about redshifts being caused by relative motion." As noted previously, Reber is the true discoverer of the Cosmic Background Radiation, not Penzias and Wilson ("Cosmic Static at 144 meters wavelength," *Journal of the Franklin Institute*, vol. 285 (Jan. 1968), pp. 1-12). A biographical note reveals that Reber's mother was Edwin Hubble's seventh-grade teacher.

[139] *Ibid*., p. 46.

But if Hubble interprets redshift as a loss of light's energy, he has a more "plausible" model for redshift but one that produces an "indefinitely large" universe and, most of all, does not allow for the postulates of Special or General Relativity. As he puts it:

> On the other hand, if the recession factor is dropped, if red-shifts are not primarily velocity-shifts, the picture is simple and plausible. There is no evidence of expansion and no restriction of the time-scale, no trace of spatial curvature, and no limitation of spatial dimensions.[140]

What a dilemma for science! Hubble's only other alternative had already been discounted – an Earth-centered cosmos that was closed and finite. So what does a good scientist do in such a situation? He preserves the sacrosanct theory of General Relativity as best he can by making convenient *ad hoc* assumptions and creating arbitrary variables that will give it some semblance of respectability. The first assumption needed is that the universe is "homogeneous," that is:

> …there must be no favored location in the universe [*i.e.*, no central Earth], no center, no boundary; all must see the universe alike. And, in order to ensure this situation, the cosmologist postulates spatial isotropy and spatial homogeneity.…[141]

Once "homogeneity" is assumed (not proven), one needs to get to an "expanding universe," for this will help support the trend in modern cosmology toward the Big Bang theory. But if one introduces expansion into a homogeneous universe, this will cause an imbalance in the "law of distribution" wherein, as Hubble warns his reader:

> …the density of the nebular distribution increases outwards, symmetrically in all directions, leaving the observer in a unique position. Such a favoured position, of course, is intolerable; moreover, it represents a discrepancy with the theory, because the theory postulates homogeneity. Therefore, in order to restore homogeneity, and to escape the horror of a unique position, the departures from uniformity, which are introduced by the recession factors, must be compensated by the second term

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[140] *Ibid*., p. 63.
[141] *Ibid*., p. 63.

representing effects of spatial curvature. There seems to be no other escape.[142]

In other words, rather than the nebulae thinning out as the distance from their origin increases (as one would expect in an expanding universe), conversely, Hubble's telescope tells him that the distant nebulae have the same concentration as the nearer nebulae. So now Hubble needs to invent another variable that will compensate for this lack of thinning out. Hubble makes no excuses for the *ad hoc* nature of this seemingly desperate attempt to salvage modern theory. He writes:

> To the observer the procedure seems artificial…in testing the relativistic theory, he introduces a new postulate, namely recession of the nebulae, and it leads to discrepancies. Therefore, he adds still another postulate, namely, spatial curvature, in order to compensate the discrepancies introduced by the first.[143]

In other words, geodesic geometry is used to curve the space of the homogeneous universe so that it can bend to conform with the mathematics of General Relativity. As Hubble puts it:

> Theoretical investigators, guided by the assumption of homogeneity, adopt Riemannian geometry which operates in curved space. The curvature cannot be visualized….It is sufficient to say that the nature of the curvature is indicated, and the amount is measured, by the radius of curvature (which projects, as it were, to higher dimensions). The radius in our universe might be positive, negative or zero, and might be large or small. A positive curvature implies closed space, a universe with a definite, finite volume but with no boundary. A negative curvature implies open space, an infinite universe. The limiting case of zero curvature is 'flat' Euclidean space with an infinite radius…and, in all but flat space, the amount of curvature has a wide range of possible values.[144]

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[142] *Ibid*., pp. 58-59. Hubble adds: "Observations demonstrate that: $\log_{10} N = 0.6 m_c$ + constant. Relativistic cosmology requires that $\log_{10} N = 0.6(m_c - d\lambda/\lambda + C_v)$ + constant, therefore $C_v = d\lambda/\lambda$. The curvature of space is demonstrated and measured by the postulated recession of the nebulae." N = number of nebulae per square degree; m_c = the limiting faintness express as a magnitude; $d\lambda/\lambda$ = the recession factor; C_v is the effect of spatial curvature.
[143] *The Observational Approach to Cosmology*, p. 59.
[144] *The Observational Approach to Cosmology*, pp. 54-55.

But, even after admitting that his "theoretical investigators" produce such *ad hoc* solutions, nevertheless, in order to remain with the consensus, Hubble adds his own *ad hoc* touches to round out the picture:

> Actually, no curvature can be found which exactly compensates for the apparent departures from uniformity in each of the surveys. Nevertheless, if we admit the presence of rather considerable systematic errors in the observations, it is possible to select a curvature which will more or less restore homogeneity. Hidden errors of the necessary dimensions are by no means impossible in the very delicate investigations near the limits of a great telescope. Therefore the expanding universe can be saved by introducing a sufficient amount of spatial curvature.[145]

All in an effort to save the "expanding universe," Hubble is so desperate that, realizing even "curvature" cannot solve the problem, he proposes that perhaps there was an error in what he saw with his own eyes through his own telescope. He doesn't know for certain such error exists, but he depends on it nevertheless. This is quite ironic since Hubble's book is titled *The Observational Approach to Cosmology*, wherein the operative word is "Observational." In the end, Hubble's view is not about what Hubble "observes" but only what his philosophical presuppositions will allow him to believe. In the end Hubble makes a travesty of "observational" cosmology.

As far as modern science is concerned, Hubble remains somewhat of an enigma. Although he dismissed the viable Earth-centered solution for his "observations," his book leaves his colleagues with an equivocation that they would rather he not have said: "Two pictures of the universe are sharply drawn…*we seem to face, as once before in the days of Copernicus, a choice…*" The science establishment has made a concerted effort to ignore this equivocation, however. As they did in order to support Einstein's Relativity theory when, in 1919, the world's scientists promoted only one of Eddington's eclipse photographs (and ignored the rest) to show anyone who would believe them that light bent around the sun in accord with the predictions of General Relativity, so they ignore Hubble's alternate interpretation of redshift and cite only his initial paper of 1929, for it appears to be the only one that indicates redshift as the sole indicator of radial velocity. These unconscionable breeches of protocol are common

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[145] *The Observational Approach to Cosmology*, p. 60.

in the science establishment. In most cases, only the evidence supporting the prevailing view will be published in the journals and popular books.

Allan Sandage, who is known for taking over the work of Hubble and who was dubbed by the *New York Times* as "the grand old man of cosmology," makes a concerted effort to give the impression that either Hubble made a mistake in doubting that redshift is a velocity indicator, or that he didn't mean what he wrote:

> We now come to one of the most remarkable episodes in all of science. Hubble's detailed analysis...is a most fascinating study of how an interpretation, without caution con-cerning possible systematic errors, led to a conclusion that the systematic redshift effect is probably not due to a true Friedmann-Lemaître expansion, but rather to an unknown, then as now, unidentified principle of nature. Indeed, even in the abstract to this 1936 paper on the *Effects of Redshift on the Distribution of Nebulae*, Hubble concluded: 'The high density suggests that the expanding models are a forced interpretation of the data.' His belief that the expansion probably is not real persisted even into his final 1953 paper which was the Darwin lecture of the RAS, given in May of the year he died in September. What were the steps leading to this conclusion that, in today's climate, seems so remarkable?[146]

It is "remarkable" to Sandage because he is the heir-apparent to Big Bang cosmology, and it is his job to make sure that Hubble's doubts about the redshift/velocity relationship are covered up. Sandage has made it quite clear that, opposed to Hubble, he is firmly committed to Big Bang expansion theory. In one popular venue Sandage says: "The expansion of the entire universe is the most important single hard scientific fact of cosmology,"[147] but, of course, it is not a "fact" at all, let alone a "hard" one. That Sandage is aware of Hubble's reluctance to interpret redshift as a function of velocity is freely admitted:

> Hubble concluded that his observed log *N(m)* distribution showed a large departure from Euclidean geometry, provided that the effect of redshifts on the apparent magnitudes was calculated as if the redshifts were due to a real expansion. A different correction is required if no motion exists, the redshifts

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[146]http://nedwww.ipac.caltech.edu/level5/Sandage2/ Sandage2_3.html).
[147] "Cosmology," *Hammond Barnhart Dictionary of Science*, Barnhart Books, 1986.

then being due to an unknown cause. Hubble believed that his count data gave a more reasonable result concerning spatial curvature if the redshift correction was made assuming *no recession*. To the very end of his writings he maintained this position, favoring (or at the very least keeping open) the model where *no true expansion* exists, and therefore that the redshift "represents a hitherto unrecognized principle of nature." This viewpoint is emphasized *(a)* in *The Realm of the Nebulae, (b)* in his reply (Hubble 1937a) to the criticisms of the 1936 papers by Eddington and by McVittie, and *(c)* in his 1937 Rhodes Lectures published as *The Observational Approach to Cosmology* (Hubble 1937b). It also persists in his last published scientific paper which is an account of his Darwin Lecture (Hubble 1953).[148]

Not only was Hubble opposed to the "Friedmann-Lemaître expansion," but in the same 1936 paper he points to another target – General Relativity:

…if redshifts are not primarily due to velocity shifts, the observable region loses much of its significance. The velocity-distance relation is linear; the distribution of nebulae [galaxies] is uniform; there is no evidence of expansion, no trace of curvature, no restriction of the time scale.[149]

The reader should stop and digest what an amazing statement this is. Without any equivocation, Hubble declares that, if he is correct that the redshift/velocity relationship is mistaken, Einstein's theory of Relativity is totally erroneous. Space "curvature" and "restriction of the time scale"

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[148] Allan Sandage, *Journal of the Royal Astronomical Society of Canada*, Vol. 83, No. 6, Dec. 1989.

[149] *Astrophysical Journal* 84, 517 (1936), p. 553; and *The Observational Approach to Cosmology*, p. 63. Hubble continues: "The unexpected and truly remarkable features are introduced by the *additional assumption that redshifts measure recession*. The velocity-distance relation deviates from linearity by the exact amount of the postulated recession. The distribution departs from uniformity by the exact amount of the recession. The departures are compensated by curvature, which is the exact equivalent of the recession. Unless the coincidences are evidence of an underlying necessary relation between the various factors, *they detract materially from the plausibility of the interpretation*, the small scale of the expanding model, both in space and time is a novelty, and as such will require rather decisive evidence for its acceptance" (emphasis added).

were Relativity's basic tenets. Without them, there is no Relativity. No wonder Sandage does his best to silence Hubble's doubts. Without the relation between redshift and velocity, Einstein has become worse than the medievals he accused of practicing superstition.

All in all, the importance of this cross-section of astrophysical theory cannot be underestimated due to the esteem Hubble enjoys as the world's greatest astronomer of the twentieth century. As Sandage says of Hubble: "His success was remarkable, and his proportionate influence nearly unparalleled in modern astronomy."[150] But as they did with Humason, so they did with Hubble. If a scientist does not support the *status quo*, he or she is ostracized or reinterpreted, and that is why hardly anyone in college physics classes knows of Hubble's alternatives or the grave problems he saw in the redshift/velocity relationship.

Irrespective of his quandary regarding whether redshift is related to velocity, Hubble's proposed age of the universe gave at least some semblance of a time-scale that would not force science to capitulate to the six-day creation of Genesis. In his 1953 George Darwin lecture he states:

> When no recession factors are included, the law will represent approximately a linear relation between redshifts and distance. When recession factors are included, the distance relation is...accelerated expansion... the age of the universe is likely to be between 3000 and 4000 million years, and thus comparable with the age of rock in the crust of the Earth.[151]

Although it is difficult to know from the syntax whether Hubble was basing the time-span of 3-4 billion years upon the inclusion or elimination of recession factors, nevertheless, he gives us only 3-4 billion years for the "age of the universe." Note that Hubble did not say "age of the Earth." This is what is known in cosmology as "Hubble time," since it was derived directly from Hubble's Law of Expansion, and it was only one of three dating methods used at that time, the other two being radiometric dating by isotope decay and the composition of stars.

Hubble's conclusions caused quite a problem. A universe that was expanding for only 3-4 billion years would mean that the Earth, which was

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[150] Allan Sandage, *Journal of the Royal Astronomical Society of Canada*, Vol. 83, No. 6, Dec. 1989.

[151] "The Law of Redshifts," George Darwin Lecture, May 1953, *Royal Astronomical Society*, 113, 658. Allan Sandage claims that the sentence "the age of the universe is likely to be between 3000 and 4000 million years" refers to the fact that "no recession factor is included," but this cannot be proven based on the syntax of Hubble's paragraph.

understood to come long after the initial expansion, would not be old enough to match the evidence from the burgeoning field of radiometrics that the Earth itself had to be at least 3-4 billion years old, which would require the universe to be much older. "Hubble time," of course, was far lower than that allowed by radiometric dating or star composition. In fact, even though Sandage claims that Hubble's 3-4 billion year time-span is based on "no recession factor" (and, therefore, Hubble's time-span would be higher if a recession were included), nevertheless admits:

> There was, of course, the embarrassment that the inverse of the Hubble expansion rate (*i.e.,* the Hubble time) was only two billion years on Hubble's 1930 to 1953 distance scale whereas the Earth was believed to be a bit older than three billion years even in 1936. It was left to the inventors of the steady state cosmology to emphasize this discrepancy of time scales, pointing out that any of the Friedmann models (*sans* cosmological constant) that were used to espouse a 'beginning' could not be true"[152]

Guy Omer had already pointed out these difficulties in the late 1940s. He writes:

> E. Hubble has shown that the observational data which he has obtained do not agree satisfactorily with the homogeneous relativistic cosmological models….The model has a short time scale. The present age of the model must be less than 1.2×10^9 [1.2 billion] years. This is about one-third the recent estimation of the age of the earth as an independent body, made by A. Holmes. This is probably the most serious difficulty of the homogeneous model. Because of the unrealistic aspects of the homogeneous relativistic model, Hubble proposed an alternate model which would be essentially static and homogeneous and in which the red shift would be produced by some unknown but nonrecessional mechanism.[153]

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[152] Allan Sandage, *Journal of the Royal Astronomical Society of Canada*, Vol. 83, No. 6, Dec. 1989.

[153] Guy C. Omer, Jr., "A Nonhomogeneous Cosmological Model," *Journal of the American Astronomical Society*, 109, 1949, pp. 164-165. Omer continues: "There have been several suggestions of possible mechanisms which would produce red shifts without having actual physical recession. As noted earlier, F. Zwicky [*Proceedings of the National Academy of Sciences*, 15, 773, 1929] has proposed that photons may lose energy with time, perhaps by a gravitational interaction

Since it was necessary to have the age of the Earth coincide with radiometrics, and since Hubble's law only provided half the needed age, various theories were proposed to bridge the gap so as to add the needed years to evolutionary theory. Hubble had already come across some ingenious solutions from his colleagues. He writes:

> Theories may be revised, new information may alter the complexion of things, but meanwhile we face a rather serious dilemma. Some there are who stoutly maintain that the Earth may well be older than the expansion of the universe. Others suggest that in those crowded, jostling yesterdays, the rhythm of events was faster than the rhythm of the spacious universe today; evolution then proceeded apace, and, into the faint surviving traces, we now misread the evidence of a great antiquity.[154]

But Hubble admitted that such excuses "…sound like special pleading, like forced solutions of the difficulty."[155]

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with the matter along their trajectories. R. C. Tolman [*Relativity, Thermodynamics, and Cosmology*, Oxford, Clarendon Press, 1934, pp. 285ff], however, has shown that 'gravitational drag' cannot account for the observed red shift if the relativity theory is valid. If the extragalactic red shift were produced by 'gravitational drag,' we should expect to measure red shifts within our own local group which would be greater than those indicated by Hubble's linear law, since the mean density of matter within the local group is greater than the average density of matter for the entire universe. If the photon's loss of energy were dependent upon time alone, we should expect to measure red shifts within our own local group which would be exactly equal to those predicted by Hubble's linear law." In order to save face for the theory, Hubble was ready to "suggest that the law of red shifts does not operate within the local group" (Omer, p. 166). The same difficulty arose: how to square this theory with evolution. Omer continues: "P. A. M. Dirac has proposed that the physical 'constants' are not constant with time but may vary in a systematic manner. This proposal would account for an observed red shift without any actual physical recession….E. Teller [*Physical Review*, 73, 801, 1948] has recently criticized Dirac's proposal, since there is considerable geological and biological evidence that the surface temperature of the earth has been reasonably constant for the last 5×10^8 years. With Dirac's hypothesis and the additional assumption that the masses of the earth and the sun have remained constant, Teller finds that the surface temperature of the earth would have been near the boiling-point for water within this time interval" (Omer, p. 166).

[154] *The Observational Approach to Cosmology*, p. 44.
[155] *Ibid*.

The Proposed Solutions of Lemaître, Eddington and Others

Fathe Georges Lemaître had quite a convenient explanation for Hubble's problem. In his model, the universe expands, but it reaches a point where the expansion slows down, at least long enough to allow the Earth to age sufficiently to match radiometric dating.[156] What causes this "slow down" is anyone's guess, for Lemaître gives his readers few clues.

Father Georges Lemaître (1894 – 1966)

Next in line was **Arthur Eddington**. As noted previously, he is a good example of how ideology rules science. Not liking Lemaître's concept of at least some beginning to the universe, Eddington writes: "Philosophically, the notion of a beginning of the present order of Nature is repugnant to me….I should like to find a genuine loophole."[157] Hence, as he did when he turned the inconclusive eclipse photographs into a conclusive support for General Relativity, Eddington shows that he is not above twisting the evidence to support his own philosophy. Nothing less than an infinite universe was on Eddington's agenda. By now we know the motivations for preferring an infinite universe – it needs no Creator, and thus there is no God to whom Eddington must answer.

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[156] Georges Lemaître, "A Homogeneous Universe of Constant Mass and Increasing Radius Accounting for the Radial Velocity of Extra-Galactic Nebulae," *Royal Astronomical Society*, 91, 1931, pp. 483ff, translated from the original French paper published in 1927.
[157] Eddington, "End of the World: From the Standpoint of Mathematical Physics," *Nature*, 127, 1931, p. 450.

Lemaître then continued the see-saw. Trying to pacify Eddington, Lemaître suggested that the universe evolved from a single, primeval atom. This would, he hoped, "be far enough from the present order of Nature to be not at all repugnant." He writes:

> We could conceive the beginning of the universe in the form of a unique atom, the atomic weight of which is the total mass of the universe. This highly unstable atom would divide in smaller and smaller atoms by a kind of super-radioactive process.[158]

Lemaître's view was eventually dubbed the "cosmic egg" theory, and eventually led to the concept of the "Big Bang," the popular term originally coined in jest by Sir Fred Hoyle. In essence, while Lemaître roosted on the "cosmic egg," **Arthur Eddington** advocated a "cosmic chicken," a universe that, as he desired, "allows evolution an infinite time to get started."[159] Hence, the question of which came first, the "cosmic egg" or the "cosmic chicken," would dictate the course of all the various theories of cosmology proposed in the twentieth century.

Lemaître, being a Catholic priest and thus committed to at least some semblance of exegetical logic, had his own problems, since the only "cosmic egg" to which Genesis gives any credence is the "Earth, without form and void" on the first day of creation. So if the Earth is the first thing in existence, then there cannot be a Big Bang. Consequently, any cosmological theory positing that the universe began with something other than the Earth has simply misinterpreted, ignored, or rejected, the words of inspired Scripture.

Unfortunately, many Catholic scholars were doing just that in the period Lemaître was writing. In the 1940s Fr. Pierre Tielhard de Chardin, a paleontologist, was adapting Lemaître's long-ages to his own theory which advocated the biological evolution of man.[160] Prior to Tielhard was George

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[158] Georges Lemaître, *The Primeval Atom: An Essay on Cosmogony*, trans. Betty and Serge Korff, 1950, pp. 99-100.

[159] Georges Lemaître, "On the Instability of Einstein's Spherical World," p. 672. See also "The Instability of the Einstein Universe," W. B. Bonnor, *Royal Astronomical Society*, December 9, 1954.

[160] *The Phenomenon of Man*, Harper & Row, 1975, revised English translation by Benjamin Wall. The Church refused to allow de Chardin to publish his books. In short, de Chardin ascribes all present turmoil in the world to the crisis or

Mivart in his 1871 book *On the Genesis of Species*,[161] which was followed by Fr. Ernest Messenger in his 1932 book, *Evolution and Theology: The Problem of Man's Origin*.[162] Suffice it to say that most of Catholic academia has capitulated to the Copernican, Evolutionary, Relativity model of cosmology and have thereby disowned their traditional heritage. De Chardin made an intimate connection between the fall of geocentrism and the rise of evolutionism:

> With the end of geocentrism, what was emerging was the evolutionist point of view. All that Galileo's judges could distinctly see as menaced was the miracle of Joshua. The fact was that in consequence the seeds of decomposition had been introduced into the whole of the Genesis theory of the fall: and we are only today beginning to appreciate the depth of the

"phenomenon" which comes before every new mutation. He sees God as the Primal Impulse manifested in matter. From the Big Bang explosion that he believed occurred 20 billion years ago, de Chardin asserted that the "primal Creator" pressed into all matter, generating an ever greater spiritual consciousness, the final destiny being the "Omega Point" in which the divine impulse is perfectly manifested in all humanity. The knowledge needed to arrive at the Omega Point is preserved for future generations in the "noosphere," a collection of all the progressive thoughts of mankind. He writes: "the noosphere….Because it contains and engenders consciousness, space-time is necessarily *of a convergent nature.* Accordingly its enormous layers, followed in the right direction, must somewhere ahead become involuted to a point which we might call Omega, which fuses and consumes them integrally in itself..." (p. 259). Tielhard de Chardin became quite infamous in science circles when his forgery of Piltdown Man was exposed forty years after he introduced it as a missing-link.

[161] *On the Genesis of Species*, 1871. Mivart was a creationist early on, and later, while teaching at the University of Louvain, he became a theistic evolutionist. Mivart's thesis was that the statement in Genesis 1, "according to their kinds" referred to "species" in biological science. Theistic evolutionists were not accepted by the secular world, however. T. H. Huxley, for example, refuted Mivart's attempt at coinciding Genesis and evolution, as well as contesting Mivart's view that various Church Fathers and Scholastics, notably Francisco Suarez, could be interpreted as teaching the concept of evolution wherein one species gives rise to another. Huxley's motivation was to sever religion completely from science. At one point he stated that religion "could never lay its hands, could never touch, even with the tip of its finger, that dream with which our little life is rounded" (*Einstein: The Life and Times*, p. 503).

[162] *Evolution and Theology: The Problem of Man's Origin*, 1932. Messenger also translated Canon Henri de Dorlodot's book into English in 1922, under the title *Darwinism and Catholic Thought*. Also in this genre is Enrico Zoffoli's book *Cristianesimo: corso di teologia cattolica* (Udine: Edizioni Segno, 1994).

changes which at that time were already potentially completed.[163]

The theories continued. Nothing short of a half-dozen other theories were proposed in the 1930s through 1950s. Prompted by Sir James Jeans' 1929 theory – a theory which held that, due to the time needed to break up star clusters, the universe was not billions, but trillions of years old, and that the universe is continually creating new matter which it obtains from other dimensions – the idea of an infinite universe was revived.[164] A universe with no beginning and no end would, in other words, produce a steady number of stars with unending births and evolutions. As one can surmise quite quickly, the goal of modern cosmology was to get to the point of making the Creator's presence superfluous, since matter was deemed quite capable of generating itself. Since distant galaxies appeared to be the same form, size and distribution as nearer galaxies, and yet were said to be part of an expanding universe, the only solution left was to claim that matter was filling the void by steadily and perpetually creating itself. As we noted earlier, this idea was eventually popularized by Hermann Bondi in 1960, and further promoted by Stephen Hawking. Both of these men have serious ideological motivations for their theories. Hawking, as we recall, made no apologies for allowing his personal philosophy to dictate his cosmological conclusions. He writes:

> However we are not able to make cosmological models without some admixture of ideology. In the earliest cosmologies, man placed himself in a commanding position at the center of the universe. Since the time of Copernicus we have been steadily demoted to a medium sized planet going round a medium sized star on the outer edge of a fairly average galaxy, which is itself simply one of a local group of galaxies. Indeed we are now so democratic that we would not claim that our position in space is specially distinguished in any way. We shall, following Bondi (1960), call this assumption the Copernican principle.[165]

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[163] Teilhard de Chardin, "Fall, Redemption and Geocentrism," in *Christianity and Evolution*, 1969, 1971, William Collins Co., Harcourt, p. 38.

[164] Jeans writes: "…matter can be continuously in the process of creation…stars and other astronomical bodies as passing in an endless steady stream from creation to extinction…with a new generation always ready to step into the place vacated by the old" (James Jeans, *Astronomy and Cosmogony*, 2nd ed, 1929, p. 421).

[165] Stephen Hawking and G. F. R. Ellis, *The Large Scale Structure of Space-Time*, 1973, p. 134.

Here we see the intimate connection between the theories of Bondi and Hawking, both of whom were eager to perpetuate the "Copernican Principle." Bondi made it clear that philosophical motivations were the impetus of his cosmological inventions in the following statement:

> …the problem of the origin of the universe, that is, the problem of creation, is brought within the scope of physical inquiry and is examined in detail instead of, as in other theories, being handed over to metaphysics.[166]

The Galaxy Formation Problem

As we have seen, modern astrophysics likes to keep its anomalies a well-kept secret. Here is another: it cannot explain the formation of galaxies. In 1975, James Binney informed us:

> The real problems of galaxy formation remain very much unsolved. The greatest difficulty is that we still have no idea what induced the formation of the first bound objects in an expanding universe."[167]

Ivan King stated that the problem was a "flagrant scandal that is rarely mentioned in public."[168] A recent study by Johns Hopkins University with a press release by Karl Glazebrook on July 7, 2004 stated:

> It seems that an unexpectedly large fraction of stars in big galaxies were already in place early in the universe's formation, and that challenges what we've believed. We thought massive galaxies came much later….This was the most comprehensive survey every done covering the bulk of the galaxies that represent conditions in the early universe. We expected to find basically zero massive galaxies beyond about 9 billion years ago, because theoretical models predict that massive galaxies form

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[166] Hermann Bondi, *Cosmology*, 2nd ed., Cambridge University Press, 1960, p. 140. Bondi had been advocating this view since 1948.

[167] *Nature*, 255:275-276, 1975; See also: J. Binney, 1981b, in *The Structure and Evolution of Normal Galaxies*, ed. S. M. Fall and D. Lynden-Bell, Cambridge: Cambridge Univ. Press. J. Binney, 1982b, *Annual Review of Astronomy and Astrophysics*, 20, 399.

[168] *The Evolution of Galaxies and Stellar Populations*, ed. B. M. Tinsley and R. B. Larson, New Haven: Yale University Observatory, 1977. Ivan R. King was professor of astronomy at the University of California, Berkeley.

last. Instead, we found highly developed galaxies that just shouldn't have been there, but are."[169]

Sir Fred Hoyle, was also not shy divulging the philosophical basis for his cosmological views. In his partiality to the "steady state" theory, he revealed,

[It] seemed attractive, especially when taken in conjunction with aesthetic objections to the creation of the universe in the remote past. For it seems against the spirit of scientific inquiry to regard observable effects as arising from "causes unknown to science," and this in principle is what creation-in-the-past implies.[170]

Eric Lerner says much the same, as quoted by Marcus Chown of *New Scientist*:

Take the most distant galaxies ever spotted, for example. According to the accepted view, when we observe ultra-distant galaxies we should see them in their youth, full of stars not long spawned from gas clouds. This is because light from these faraway galaxies has taken billions of years to reach us, and so the galaxies must appear as they were shortly after the big bang. But there is a problem. "We don't see young galaxies," says Lerner. "We see old ones."

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[169] Alan M. MacRobert confirms the dilemma: "Astronomers thought they had a nice, clear picture of how galaxies formed billions of years ago – but now the picture is suddenly turning muddy. A team studying the faintest galaxies ever to have their spectra taken is finding far too many big, mature galaxies similar to our Milky Way much too early in cosmic history. 'Theorists are not yet at the point of panic, but they're getting there'" (*Sky and Telescope*, "Old Galaxies in the Young Universe," January 6, 2004). The BBC, in "Hubble's Deepest Shot is a Puzzle," reports of the 800 exposures in a patch of Hubble's Ultra Deep Field that there are far fewer stars existing than expected, stating that this "brings into question current ideas on cosmic evolution." Leader of the survey, Dr. Andrew Bunker, stated: "Another possibility is that physics was very different in the early Universe; our understanding of the recipe stars obey *when they form* is flawed" (BBC News, Sept. 23, 2004), emphasis added.

[170] Fred Hoyle, "A New Model for the Expanding Universe," *Royal Astronomical Society*, 108, 1948, p. 372. In his book, *The Nature of the Universe*, Oxford University Press, 1952, Hoyle admits: "there is a good deal of cosmology in the Bible…it is a remarkable conception," but concludes that Christianity is a "desperate attempt to find an escape from the truly dreadful situation in which we find ourselves…an eternity of frustration" (pp. 109-111).

He cites recent observations of high-red-shift galaxies from NASA's Spitzer space telescope. A galaxy's red shift is a measure of how much the universe has expanded since it emitted its light. As the light travels through an expanding universe, its wavelength gets stretched, as if the light wave were drawn on a piece of elastic. The increase in wavelength corresponds to a shift towards the red end of the spectrum.

The Spitzer galaxies have red shifts that correspond to a time when the universe was between about 600 million and 1 billion years old. Galaxies this young should be full of newborn stars that emit blue light because they are so hot. The galaxies should not contain many older stars that are cool and red. "But they do," says Lerner.

Spitzer is the first telescope able to detect red stars in faraway galaxies because it is sensitive to infrared light. This means it can detect red light from stars in high-red-shift galaxies that has been pushed deep into the infrared during its journey to Earth. "It turns out these galaxies aren't young at all," says Lerner. "They have pretty much the same range of stars as present-day galaxies."

And that is bad news for the big bang. Among the stars in today's galaxies are red giants that have taken billions of years to burn all their hydrogen and reach this bloated phase. So the Spitzer observations suggest that some of the stars in ultra-distant galaxies are older than the galaxies themselves, which plunges the standard model of cosmology into crisis.[171]

By this time the reader should be able to see very clearly the driving force behind the inventions of these men. Their deep and uncompromising desire to safeguard Copernican cosmology could not be stated more forcefully. Apparently, they will say or do whatever it takes to remove Earth from the center of the universe. Of course, those of us on the other side know why: deep down, Hawking, Bondi, Hoyle, *et al*., know that the Creator exists, but they choose to suppress that knowledge, and thus they concoct whatever cosmological theories they can in order to convince

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[171] Marcus Chown, "Did the big bang really happen," *New Scientist*, July 2, 2005, p. 2.

themselves, even if only temporarily, that not only does He not exist, but that He is not even needed.

The self-creation of matter has been the underlying agenda of almost all of modern cosmology, but, of course, it is all a lie, and men are continually deceived by it. The reason the galaxies are fully formed and distributed non-randomly is simply because God created them all at the same time and placed them in their special positions in the universe. In reality, the most plausible explanation left to the scientist is that the galaxies were instantaneously formed whole and fully functional, for that is what the scientific evidence shows to us. But that solution, of course, is "unthinkable" to modern scientists. Accordingly, Isaiah can say:

> Lift up your eyes on high and see who has created these *stars*,
> the One who leads forth their host by number, He calls them all
> by name; because of the greatness of His might and the strength
> of *His* power, not one of them is missing.[172]

Simple physical laws preclude galaxies from existing for billions of years, since it is well documented that in spiral galaxies, for example, the dense cores rotate faster than the outer arms. As such, the arms would either become very twisted or eventually wrap around and fuse into the core in a very short time.[173] That the galaxies are presently in such pristine shape demonstrates they are indeed very young. Similarly, individual stars provide us with the same evidence. No one has ever found evidence of a star forming. Only exploding stars have been discovered. The same is true of stellar novas. They occur every 20-30 years when a star dies and becomes a super nova. However, there are fewer than 300 super nova rings (which are the remnants of the explosions) in the entire observable universe. If the universe is billions of years old, there should be literally millions of such rings. This evidence indicates that the stars were made fully formed in recent history and intermittently deteriorate by natural causes. As astronomer Gerardus Bouw notes:

> Evolutionary models have never been successful in accounting
> for the formation of a single star, let alone a whole galaxy or
> even a cluster of galaxies (Jones, B. J. T., 1976, *Review of
> Modern Physics*, 48:107). Virtually every model in vogue today,
> which attempts to account for such objects, assumes that they

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[172] Isaiah 40:26. Also, Psalm 147:4 [146:4]: "He counts the number of the stars; He gives names to all of them."
[173] *Physics of the Galaxy and Interstellar Matter*, 1987, pp. 352-413. *In the Beginning*, Walt Brown, pp. 23, 30.

were formed from the collapse of certain density irregularities postulated to be present in the early stages of the Big Bang. Without such an assumption, the physics of collapsing gas clouds would not allow for the formation of objects even remotely resembling the major constituents of the universe. A number of explanations have been proposed to account for such density irregularities, including magneto-hydrodynamical "pinch" effects (Fennelly, A. J., 1980, *Physical Review Letters*, 44:955), but the existence of the required cosmic magnetic field is in doubt and the 3-degree Kelvin blackbody radiation reveals no evidence for any significant clumps of matter at the time believed to be about a million years into the evolution of the Big Bang.[174]

Additionally, if the galaxies are receding from us at the enormous speeds dictated by the Big Bang, then they should have broken their gravitational bonds long ago, and the farthest galaxies should be seen to have dissipated, but according to the above reports, such is not occurring. Big Bang cosmology attempts to answer this galactic anomaly with the forces of Dark Matter, claiming that the gravity of the latter is holding the former together, and that Dark Energy is propelling the Dark Matter. This, of course, is pure speculation since, with all the powerful telescopes available, no one has seen anything resembling Dark Matter or Dark Energy, and thus the science community has invented its convenient phantoms for themselves and the gullible public.

Gamow and the Birth of the Big Bang

George Gamow, the precursor to the modern idea of the Big Bang, was also a firm believer in the instantaneous and perpetual creation of matter. As he modeled his theory of the universe to coincide with his work in nuclear physics during the Manhattan Project, Gamow held that just as the atom bomb could create, in a millionth of a second, radioactive elements that were later found in the deserts of midwestern test sites, so too, the elements of the universe could have been created in a super explosion at the beginning of time. Gamow's theory was thunderously applauded by the scientific

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[174] *The Biblical Astronomer*, vol. 14, no. 110, p. 112.

community, a community that was looking for anything to get them out of the dead ends left to them by de Sitter, Lemaître and Friedmann. Of course, Gamow did not have an explanation for how this super explosion originated, but that didn't really matter for as far as everyone was concerned, in this case the ends justified the means. Reminiscing about a conversation with Einstein, he writes:

> I remember that once, walking with him to the institute, I mentioned Pascual Jordan's idea of how a star can be created from nothing, since at the point zero its negative gravitational mass defect is numerically equal to its positive rest mass. Einstein stopped in his tracks, and, since we were crossing a street, several cars had to stop to avoid running us down."[175]

Indeed, the whole world has been stopped in its tracks because of the preposterous idea that matter creates itself. Matter has become the god of modern man, powerful enough to bring itself into being, evolve into stars and human beings, and continue on into eternity while watching its creatures die their hapless deaths.[176] As Carl Sagan preached:

> We are the local embodiment of a Cosmos grown to self-awareness. We have begun to contemplate our origins. We are star-stuff pondering the stars!… Our ancestors worshipped the Sun, and they were not that foolish. It makes sense to revere the Sun and the stars, for we are their children.[177]

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[175] G. Gamow, *My World Line*, 1970, p. 150.

[176] Some Big Bang theorists invoke the Heisenberg Uncertainty Principle to excuse themselves from having to explain the origin of matter. Since the Uncertainty Principle holds that a particle's position and momentum ($\Delta E\ \Delta t \leq h/2\pi$), or its energy and time ($\Delta x\ \Delta p \leq h/2\pi$), cannot be known, its advocates conclude that such limitations preclude the discovery of the origin of matter. This solution puts the cart before the horse, as it were, since the Heisenberg Uncertainty Principle was originally derived from the study of already existing matter and thus cannot be applied to pre-existing states. Moreover, the Uncertainty Principle allows for at least one of the needed components (*i.e.*, either position or momentum in $\Delta E\ \Delta t \leq h/2\pi$; or energy or time in $\Delta x\ \Delta p \leq h/2\pi$), thus forcing the theorists to choose at least one for the beginning of the Big Bang. But even if the Uncertainty Principle were invoked, the theorists must then confront the Entropy law, which holds that the initial explosion would tend to increasing disorder, not to the order we see today.

[177] Carl Sagan, *Cosmos*, 1980, p. 243.

After Gamow and company, more and more powerful telescopes were built. The universe Hubble saw in 1929 was being dwarfed by what men were discovering in the last half of the twentieth century (at least with the formulas they currently use to measure astral distances). The universe was no longer measured in megaparsecs but gigaparsecs.[178] But if one enforced the Doppler interpretation of redshifts on a universe that was gigaparsecs in size, Hubble's Law would be forced to say that the outer galaxies were receding from Earth faster than the speed of light. The very theory that gave them the expanding universe was now faced with a universe that was, as it were, too big for its britches, and which ends up contradicting Einstein's most cherished fact of life – the violation of *c in vacuo*.

So what did science do? Rather than face embarrassment by having to modify the foundation of its theory, it changed the "expanding" universe into an "exploding" universe, and thus the Big Bang concept was born – that primeval "point of singularity" infinitesimally smaller than the dot of the *i* on this page that, holding all the material of the universe, decided, for whatever reason, to explode about 13.7 billion years ago in a fraction of a second, and is still exploding, producing all that we see in the starry universe today and the recessional speeds to go along with them.[179] Here was the key ingredient: As it explodes it is said to "create space," and thus the galaxies are not receding faster than light, rather, space is created faster than light can travel, and the galaxies are merely being pulled along with the expansion so it only appears as if they are traveling faster than light. If one asks: "Where is the new space created during expansion?" theorists such as Misner, Thorne and Wheeler retort: "That is a meaningless

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[178] A gigaparsec is 1000 megaparsecs. 50 gigaparsecs equal 1.5×10^{11} light years, as opposed to one megaparsec, which equals 3.3×10^6 light years.

[179] The theorists hold that the Big Bang started 13.5 billion years ago in the Planck dimensions from a volume of 10^{-40} cubic centimeters with a diameter of 3.14×10^{-13} centimeters, and was filled with particles of 1.62×10^{-33} centimeters packed solidly and having a density of 4.22×10^{93}, and a gravitational attraction between each particle of 1.3×10^{49} dynes (roughly 10^{46} greater than Earth's gravity). These theorists conveniently choose the Planck dimensions in order to avoid the infinite dimensions demanded by a singularity. The advocates postulate that a group of these Planck particles numbering 10^{60} spontaneously broke away, creating a hole of 3.14×10^{-13} centimeters in diameter but which was filled in 2×10^{-23} seconds. For some unexplained reason, the implosion does not reabsorb the 10^{60} particles (even though the gravitational attraction is immense), and the 10^{60} Planck particles do not remember that they are supposed to cease existing in 4×10^{-44} seconds but keep expanding into what we now have as the present universe (satirically described by G. Bouw in *The Biblical Astronomer*, vol. 12, no. 99, 2002 and vol. 13, no. 104).

question."[180] Once again, science pulled the proverbial rabbit out of the proverbial hat.

The Anti-Big Bang Movement

Since the evolving Big Bang theory contains so many baseless assumptions, *ad hoc* assertions, and philosophical absurdities, it is hardly surprising to find opponents appearing frequently on the scene. For example, Tom Van Flandern remarks:

> The Big Bang…no longer makes testable predictions wherein proponents agree that a failure would falsify the hypothesis. Instead, the theory is continually amended to account for all new, unexpected discoveries. Indeed, many young scientists now think of this as a normal process in science! They forget, or were never taught, that a model has value only when it can predict new things that differentiate the model from chance and from other models before the new things are discovered. Explanations of new things are supposed to flow from the basic theory itself with, at most, an adjustable parameter or two, and not from add-on bits of new theory….Perhaps never in the history of science has so much quality evidence accumulated against a model so widely accepted within a field.[181]

> The Big Bang theory is the accepted model for the origin of the universe. This theory requires us to accept the following…that all the matter and energy in the entire universe were contained in an infinitesimal point at the "beginning"; that for some unknown reason it all exploded; that space and time themselves expanded out of that explosion; that at first space expanded faster than the speed of light; that the explosion was so uniform it emitted an almost perfectly uniform radiation everywhere; and the same explosion was non-uniform enough to create the observed, quite irregular matter distribution in the universe; that the chaos from the explosion eventually organized itself into the structures presently seen in the universe, contrary to the principle of entropy (which basically states that you shouldn't get order out of chaos); that all matter in the universe expands away from all

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[180] *Gravitation*, p. 739.
[181] T. Van Flandern, "The Top 30 Problems with the Big Bang," *Apeiron* 9, 2, April 2002.

other matter as space itself continues to expand, although there is no center; that the expansion of space itself occurs between all galactic clusters and larger structures, but does not occur at all on scales as small as individual galaxies or the solar system; that vast assemblies of galaxies stream through space together relative to other assemblies; and that immense voids separate immense walls of galaxies, all condensed from the same explosion.[182]

When the Big Bang theory was in its infancy, the well-respected astronomer Robert Dicke offered this sobering assessment of its unlikelihood:

The puzzle here is the following: how did the initial explosion become started with such precision, the outward radial motion became so finely adjusted as to enable the various parts of the Universe to fly apart while continuously slowing in the rate of expansion? There seems to be no fundamental theoretical reason for such a fine balance. If the fireball had expanded only 0.1 per cent faster, the present rate of expansion would have been 3×10^3 times as great. Had the initial expansion rate been 0.1 per cent less and the Universe would have expanded to only 3×10^{-6} of its present radius before collapsing. At this maximum radius the density of ordinary matter would have been 10^{-12} gm/cm^3, over 10^{16} times as great as the present mass density. No stars could have formed in such a Universe, for it would not have existed long enough to form stars.[183]

Of course, we must not hesitate to add that, as convincing as scientists 'in the know' can make the Big Bang appear, still, the alternatives offered by what are known as "dissident" astronomers and physicists are not really

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[182] Tom Van Flandern, *Dark Matter, Missing Planets and New Comets*, 1993, p. xvi. In another instance he adds: "…it should not be forgotten that it is not even certain that the universe is presently expanding (as opposed to contracting) even within the context of the Big Bang theory. Sumner has recently argued that the new space introduced by the expansion must dilute the permitivity of the vacuum, which in turn must alter the frequency of electrons around atoms. This affects observed redshift twice as strongly as the speed of expansion. When this consideration is factored into the equations, it turns out that the present universe is actually collapsing, not expanding, under Big Bang premises!" (*ibid*., p. 400).
[183] Robert H. Dicke, *Gravitation and the Universe*, Jayne Lectures for 1969, American Philosophical Society, Independence Square, Philadelphia, 1970, p. 62.

much better. We catch the alternative in Van Flandern's opening remarks of his critique: "This theory [the Big Bang] requires us to accept the following: time and space have not always existed; both began a finite time ago; and both the age and size of the universe are finite." What Van Flandern is pushing for, as are all the other "dissident" cosmologists such as Halton Arp, Eric Lerner, Michael Ibison, Hermann Bondi, Paul Marmet, Jayant Narlikar, Sisir Roy, and others, is "an evolving universe without beginning or end,"[184] a return to the "Steady-State" model, the same one proposed by Eddington, which Lemaître turned into the "cosmic egg."

But the infinite universe is an equally ridiculous concept. As we will see below, although it doesn't have the process problems of the Big Bang, it has origin problems, since it obviously has no origin. Except for God, anything that doesn't have an origin is a logical fallacy. Even God cannot create something infinite, for what is infinite is God. As we noted, beginning with Isaac Newton, there has been a war occurring in cosmological circles between the finite universe and the infinite universe, with no end in sight. Although both theories are wrong, at least the "cosmic egg" theory is a step closer to reality, since its foundation is that there was a "beginning" to it all. The biblical account tells us, however, that the primordial "egg" of the Big Bang was not a "singularity," but the Earth itself, called into being before any other heavenly body by the one who is Uncreated.

Redshift and the New Alternative

As we noted earlier, there is quite a divergence of opinion regarding the interpretation of redshift. The Big Bang theory says that we see a

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[184] So stated by Eric Lerner in "An Open Letter to the Scientific Community," *New Scientist*, May 22, 2004, p. 20, as he represents thirty-three other signers to the document. Lerner writes: "…the Big Bang is not the only framework available for understanding the history of the universe. Plasma cosmology and the steady-state model both hypothesize an evolving universe without beginning or end." Again on July 2, 2005, *New Scientist* quotes Lerner: "This isn't science. Big Bang predictions are consistently wrong and are being fixed after the event," the editor adding that "So much so, that today's 'standard model' of cosmology has become an ugly mishmash comprising the basic Big Bang theory, inflation and a generous helping of dark matter and dark energy" (Marcus Chown in "The End of the Beginning," *New Scientist*, July 2, 2005, p. 30). In his major work on the subject, Lerner adds: "If the Big Bang hypothesis is wrong, then the foundation of modern particle physics collapses and entirely new approaches are required. Indeed, particle physics also suffers from an increasing contradiction between theory and experiment" (Eric J. Lerner, *The Big Bang Never Happened*, 1991, p. 4).

redshift in starlight because the light's wavelength is stretched. Longer waves produce a shift to the red end of the spectrum of white light. The light is stretched because, as other components of the Big Bang theory state, the stars are receding from the Earth at tremendous speeds, and therefore, when the light leaves from this rapidly moving star, since it must travel at the same speed, c, and cover the same distance over time, the only way to compensate for these factors is for the light to have a longer wavelength. This is almost common knowledge today.

What is not so commonly known but is vitally important for understanding why Big Bang theorists (besides their philosophical presuppositions) hold to such an exclusive interpretation of the redshift is that they are invariably advocates of Relativity theory, a theory positing that space is void, that is, it lacks any kind of material substance. Space, to the Relativist, is not an independent entity but is created and molded by gravitational pockets all over the universe. When space is so molded it is a vacuum (except, of course, for the matter that created it). As such, light traveling from a star has nothing physical with which to interact, and therefore nothing in space can interfere with the light as it travels. As far as Relativity is concerned, light is always traveling in a pristine environment in outer space, supposedly making its own electromagnetic medium as it travels. Hence, the only possible explanation for why redshift appears in starlight is that it is due to the motion of the star, specifically the supposed recession of the star away from Earth, *i.e.*, the expanding universe theory.

But the problem with the Big Bang's interpretation of the redshift is that it is not in the least supported by the hard data from observation. One of the Big Bang's chief opponents is astronomer Halton Arp. Although we must say at the outset that Arp's alternative "infinite" universe is also erroneous, nevertheless, we can use his vast research to show that the Big Bang's interpretation of redshift finds itself in the same unfortunate category.

Halton Arp was at one time an associate of Edwin Hubble, but as of this date he is the black sheep of the astrophysical community because, like Hubble and Humason, he dared to suggest an alternative to the expanding universe concept. Arp was systematically marginalized after his extensive work on the redshifts of quasars and galaxies indicated the universe was *not* expanding. As astrophysicist Jayant Narlikar writes:

> The ludicrous climax came about ten years ago when Arp was denied the use of telescopes in major observatories. The reason given was that his findings "did not make sense," and were therefore a "waste of time." In other words, telescopes are meant

only to confirm the established ideas and not turn up anomalous data.[185]
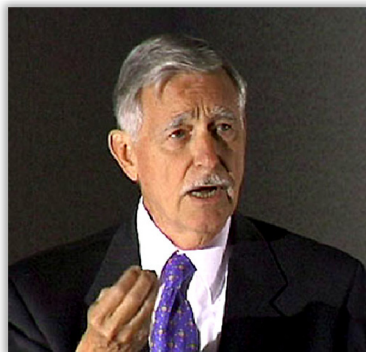
The ostracizing of Arp and the ignoring of his evidence shows quite clearly the personal agendas and the ignorance abounding in the halls of science today. Regardless of whether Arp's interpretation of redshift is correct, it is quite clear that the science establishment is refusing to consider the evidence based upon its biased presuppositions and its desire to preserve the *status quo*. According to Arp, it is easy to figure out why:

> [I]f the cause of these redshifts is misunderstood, then distances can be wrong by factors of 10 to 100, and luminosities and masses will be wrong by factors up to 10,000. We would have a totally erroneous picture of extragalactic space, and be faced with one of the most embarrassing boondoggles in our intellectual history.[186]

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[185] *Times of India*, July 30, 1994. Astrophysicist Paul Marmet concurs: "Science is said to be about searching for truth, but the harsh reality is that those whose views clash with established theories often find themselves ridiculed and denied funds and publications." www.newton physics.on.ca. Arp writes in his new book, *Seeing Red*, concerning his first book, *Quasars, Redshifts and Controversies*: "…the book became a list of topics and objects to be avoided at all cost. Most professional astronomers had no intention of reading about things that were contrary to what they knew to be correct. Their interest usually reached only as far as using the library copy to see if their name was in the index….More than 10 years have passed and, in spite of determined opposition, I believe the observational evidence has become overwhelming, and the Big Bang has in reality been toppled" (*Seeing Red: Redshifts, Cosmology and Academic Science*, Montreal, *Apeiron*, 1998, pp. i, ii).
[186] *Seeing Red*, p. 1.

Just as physicists in 1887 looked for a way to escape from the "embarrassing boondoggle" looming behind the Michelson-Morley experiment (by which, if Relativity had not come along as the remedy, everyone would be back to a pre-Copernican cosmos), so today cosmologists are looking for a savior to relieve them of having to accept a smaller universe. As we noted earlier, one candidate for their salvation is Dark Matter, and its companion, Dark Energy. No one has ever seen either of these constituents, but the Big Bang theory says they are there, nevertheless.

Throughout his book Arp uses detailed observational evidence to show why the Big Bang interpretation of redshift is erroneous. From an analysis of X-ray sources, Seyfert Galaxies, Companion Galaxies, individual stars in the same galaxy, clusters of galaxies, and a critique of the so-called "gravitational lensing" effect, Arp makes quite a convincing case. His alternate view postulates that:

> On the theoretical front it has become more persuasive that particle masses determine intrinsic redshifts and that these change with cosmic age. Therefore episodic creation of matter will imprint redshift steps on objects created at different epochs. In addition it appears increasingly useful to view particle masses to be communicated by wave-like carriers in a Machian universe.[187]

Thus, Arp postulates that redshift is an indication of age, wherein newly "created" objects will have a higher redshift. But it appears that Arp is making the same assumption regarding Carl Anderson's 1932 discovery of the positron that Big Bang theorists made. In fact, Arp refers to the very process of electron-positron creation.[188] This view, of course, has a very

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[187] *Seeing Red: Redshifts, Cosmology and Academic Science*, p. 195. He adds: "In 1993, Jayant Narlikar and I had published a paper outlining how newly created matter would have a high redshift, and demonstrated how to account quantitatively for quasar and galaxy redshifts as a function of their age" (*ibid.*, p. 137).

[188] He writes: "As for the creation of matter from a zero mass state [Arp's view], it is often objected that pair *creation* of electrons and positrons from photons in terrestrial laboratories does not produce low-mass electrons. The answer must be that these photons are localized packets of energy and the *created* electrons and positrons are local entities – not drawn from elsewhere in the universe" (*ibid.*, p. 234); Arp also refers to the decay of the "Planck particle" as another source of the creation of matter: "Also in 1993, however, Fred Hoyle, Geoffrey Burbidge and Jayant Narlikar introduced the quasi-steady state cosmology (QSSC). There they

difficult time preserving the First Law of Thermodynamics. Suffice it to say, there is a mixing and matching of various theories and observations in astrophysics today because, basically, no one really knows what is going on in the universe. As we noted earlier from astronomer Fred Hoyle: "The whole history of science shows that each generation finds the universe to be stranger than the preceding generation ever conceived it to be."[189]

Accordingly, Arp holds that the "tired light" theory for redshift is discounted by the fact that: (a) no increase in redshift has been seen from light traveling through dense galactic material; (b) that some quasars which are close together have vastly different redshifts; (c) that younger quasars have higher redshifts; (d) that the Butcher-Oemler effect shows galaxies of moderate redshift have blue and ultraviolet light; and (e) that high redshift quasars are often in the middle of low redshift galaxies (*e.g.*, *The Einstein Cross* – G2237+ 0305).[190]

Irrespective of his alternate theory, the fact is that Arp still believes in a "much older, larger universe,"[191] and, as noted, supports his new method for his preferred cosmogony by appealing to the "creation" of matter. He believes his theory is correct because he simply has no other explanation for the origin of matter in his infinite universe, and thus, he has no qualms positing that the universe continues what it has been doing for eternity,

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created the matter in the form of Planck particles. The mass of the present day Planck particle is about 10^{19} GeV/c^2. In the short time scale of about 10^{-43} seconds the particle is unstable and decays into baryons and mesons…the Planck particle is *created* in the Quantum Gravity era…" (*ibid*., pp. 137-138, emphasis added); "It is natural to think of the 'material vacuum' or the 'zero point energy field' as possible thermalizing components in intergalactic space. This is simply saying that there is no such thing as empty space – that it contains at least some electromagnetic field and possibly quantum creation and annihilation and/or virtual particles. For example, newly created low mass electrons would be extremely efficient radiation thermalizers" (*ibid*., p. 237).

[189] Fred Hoyle, *Astronomy and Cosmology*, 1975, p. 48.

[190] Ya. B. Zel'dovich adds: "If the energy loss is caused by an interaction with the intergalactic matter, it is accompanied by a transfer of momentum; that is, there is a change of the direction of motion of the photon. There would then be a smearing out of images; a distant star would be seen as a disc, not a point, and that is not what is observed.…if the decay of photons is possible at all, those in radio waves must decay especially rapidly! This would mean that the Maxwell equation for a static electric field would have to be changed.…There is no experimental indication of such effects: the radio-frequency radiation from distant sources is transmitted to us not a bit more poorly than visible light, and the red shift measured in different parts of the spectrum is exactly the same…" (Misner, Thorne and Wheeler, *Gravitation*, p. 775).

[191] *Seeing Red*, p. 8.

that is, creating matter all by itself. Hence, not only is Arp's concept just as speculative and bizarre as that of the Big Bang theorists whom he critiques, he is also positioning himself against the biblical perspective since Holy Writ assures us that matter was called into being by its Creator; that creation was limited to six days, and that the appearance of inorganic matter in the cosmos was completed on the Fourth of the days of creation.

Further, as much as Arp is against Big Bang cosmologists, he is a firm supporter of Relativity theory and the Copernican universe, since he makes it quite evident that he refuses to interpret the periodicity of redshift as an indicator of the centrality of Earth. Arp writes:

> For supposed recession velocities of quasars, to measure equal steps in all directions in the sky means we are at the center of a series of explosions. *This is an anti-Copernican embarrassment*. So a simple glance at the evidence discussed in this Chapter shows that extragalactic redshifts, in general, cannot be velocities. Hence the whole foundation of extragalactic astronomy and Big Bang theory is swept away.[192]

Note how Arp assumes as his foundational truth that Earth is *not* in the center of the universe and, in fact, he uses this premise as a goad to embarrass the Big Bang theorists. In fact, we might say that Arp's alternative hypothesis regarding redshift is for the express purpose of trying to solve the Copernican dilemma created by the Big Bang. Unfortunately for Arp, the reality is that he is in the same dilemma as the Big Bang theorists he critiques.

The Use and Abuse of Stellar Parallax

Regarding the size and limits of the universe, if there is one cosmological phenomenon that has been consistently advocated as the vindicator of heliocentrism, it is stellar parallax. Science books by the hundreds have declared that Frederich Bessel finally discovered heliocentrism's long-awaited proof when, in 1838, he observed a slight shift in the position of a nearby star (Cygnus 61) against the background of a more distant star. Copernican astronomers continue to praise Bessel, but invariably they do so without either the slightest indication that parallax does not prove heliocentrism or any admission that there is a perfectly good alternative which allows one to interpret parallax from a geocentric perspective. For example, Alan Hirshfeld, writing one of the more recent

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[192] *Seeing Red*, p. 195, emphasis added.

books on parallax, attempts to convince his reader that parallax is the last word of the heliocentric/geocentric debate:

> In Newton's day, the Ptolemaic system and the Keplerian version of the Copernican system were taught side by side in the universities of the world. But the pendulum of belief had swung irreversibly to the Copernican side. In the minds of most scientists, the heliocentric universe had become fact…Yet there remained a crucial missing element in what was otherwise a complete and compelling picture of the universe: *Not one shred of indisputable observational proof existed that the Earth moved through space*. Here then was the holy grail of many an astronomer. To prove that the Earth in fact revolved in a wide orbit around the Sun, the parallax of just one star – any star – had to be detected. The hunt for stellar parallax was on.[193]

Before we get into Hirshfeld's analysis of parallax, we pause to note his revelation concerning how heliocentrism was accepted. Hirshfeld admits that even prior to the discovery of what he deems as "indisputable observational proof," modern science had already accepted heliocentrism as a "fact." One wonders why this glaring anachronism that puts "fact" before "indisputable observational proof" doesn't cause Hirshfeld any concern, but there it is nonetheless. Of course, Hirshfeld's attempt to put fact before proof will become even more egregious when we show that not even parallax offers the "indisputable observational proof" that he is seeking. If Hirshfeld is ignorant of the inability of parallax to prove heliocentrism, then it shows how badly he and the modern scientific community he represents are out of touch with reality. In effect, Hirshfeld's anachronism gives us a clear example of the underlying bias in the Copernican establishment, for it demonstrates quite handily that it was not by any fact of science that heliocentrism reached acceptance, but only because "most scientists" had already made up their minds based on little more than their philosophical preferences.

How Parallax Measures Distance

First, we will investigate a little history about parallax measurements. Parallaxes have been measured for thousands of stars. For only about 700 stars, however, are the parallaxes large enough to be measured with a

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[193] Alan Hirshfeld, *The Race to Measure the Cosmos*, 2001, p. 47, emphasis added.

precision of 10 percent or better. Of those 700 stars, most of the ones within 20 parsecs from Earth are invisible to the unaided eye and are intrinsically less luminous than our sun. The vast majority of all known stars are too distant for their parallaxes to be measured, so that scientists must resort to non-empirical methods. Most of these methods are either statistical or indirect.[194]

With the advent of the Hipparcos satellite launched in 1989 by the European Space Agency, its telescopes gathered 3.5 years worth of data on stellar positions and magnitudes, which were eventually published in 1997. Viewing the stars through two telescopes 58 degrees apart, Hipparcos measured the parallax of 118,000 selected stars within an accuracy of 0.001 seconds of arc. This accuracy is comparable to viewing a baseball in Los Angeles from a telescope in New York. Another mission, named Tycho (after Tycho de Brahe) measured the parallax of a million stars, but only to an accuracy of 0.01 seconds of arc.

As accurate as these measurements appear to be, the reality is, beyond 100 light years, it is hardly possible to measure an accurate parallax. Even within 20 light-years, parallax measurements are accurate only to within one light-year. At 50 light-years from Earth the error could be as high as 5-10 light-years in distance. All in all, within a 10% margin of error, Hipparcos measured the parallaxes of about 28,000 stars of up to 300 light-years from Earth. For any star beyond 300 light years, scientists are forced to estimate its distance from Earth by other means, none of which are proven methods of measurement (*e.g.*, redshift).[195]

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[194] George Abell, *Exploration of the Universe*, 1969, pp. 377-378.

[195] Other methods of determining parallax include: Photometric parallaxes, which are found by estimating a star's absolute magnitude (M) based on a spectral classification, and comparing that with its apparent magnitude (m). Statistical parallaxes could perhaps extend to 500 parsecs, but this only applies to groups of stars, not individual stars. Overall, of the half dozen or so methods employed today to measure astral distances, none of them are indisputable (including distances measured by redshift, Cepheid variables, luminosity, color of stars, etc.). There is only one purely empirical method, parallax (and its attendant modifications such as Spectroscopic, Moving Cluster Method, and Statistical Method), but it is quite limited in its applicability, since it can accurately measure only a thousand or so stars. In effect, modern science is left without an irrefutable means to measure cosmological distances, and thus all the literature espousing that stars, galaxies or quasars are billions of light years away from Earth is an unproven scientific assertion. Using Cepheid variables, for example, is certainly a question-begging venture, since Cepheids are too far away to be measured by parallax and, thus, depends on an unproven statistical method to measure distance. Other methods such as Secular Parallax, Expansion Parallax, Kinematic Distance, Light Echo Distance, Baade-Wesselink Method, Expanding Photosphere Method,

To understand how parallax is formed, in front of your face, place your finger from your right hand at arms length and align it with a finger from your left hand at half an arm's length. Observe your fingers first with your right eye open and then with your left eye open. As you switch your vision from one eye to the other, the nearer finger will appear to shift to the right.

In the heliocentric system, parallax is said to occur when, on one side of the Earth's orbit, say January 1, two stars are viewed at the same time in a telescope, one star near us and the other star far away (at least by conventional means to measure star distances). Let's say that the two stars we view on January 1 are aligned vertically in the same plane, that is, one star is at a higher position in our telescope lens than the other but both are on the same vertical line. Six months pass and we look at the same two stars on July 1. If parallax is demonstrated, we will see that the stars are not in a vertical alignment any longer. Assuming the Earth has orbited in a counterclockwise direction, the nearer star appears to have shifted to the right. This is due to the fact that, in the interval of six months, one has looked at the two stars from two separate locations that are 185 million miles apart (the diameter of the Earth's orbit). Since astronomers can now detect stellar parallax among a select few stars, they are predisposed to allowing the Copernican worldview to interpret the phenomenon as proof for the Earth's movement around the sun.

What most people do not know (and what most scientists keep from them) is that in the geocentric system the same optical phenomenon can be demonstrated. In the geocentric system, the stars are centered on the sun, (which is also true in the heliocentric system). The only difference, of course, is that in the geocentric system the Earth is fixed in space while the sun and stars revolve counterclockwise around the Earth. On January 1 we will notice that the two stars from our above example are in vertical alignment. When we look at these same two stars again on July 1 as the sun and stars have traveled halfway across the sky, the nearer star will appear to have shifted to the right of the farther star, at the same precise angle as in the heliocentric model. (To see animation of parallax from both a heliocentric and geocentric system, go to the menu button on the compact disc).

This equivalence of the geocentric parallax to the heliocentric parallax is nothing out of the ordinary. Based on geometrical reciprocity, the two

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Main Sequence Fitting, RR Lyrae Distance and about a dozen or so other methods have been proposed for measuring star distances, each with their own problems and uncertainties, and all of which makes one reflect on the veracity of Jeremiah 31:37: "Thus says the Lord: "If the heavens above can be measured, and the foundations of the earth below can be explored, then I will cast off all the descendants of Israel for all that they have done, says the Lord."

systems must be equal on all counts. The only difference is that in the heliocentric model the Earth is moving and the stars are fixed, while in the geocentric model the Earth is fixed and the stars are moving. What is out of the ordinary, however, is that the natural equivalence between the two systems has been systematically suppressed out of almost every science book written since the days of Newton, yet it is as simple and natural as the symmetry between one's right hand and left hand. By the mere fact of the equivalence, parallax does not prove heliocentrism. It only proves that there is an annual shift between the Earth and the stars. Rather, history shows that the phenomenon of parallax only proves there has been a rush to judgment in favor of heliocentrism that was based on nothing more than preference, not scientific fact.

The Neo-Tychonic Model

One stumbling block toward understanding the equivalence between the heliocentric and geocentric concepts of parallax is that the original model of geocentrism advocated by Tycho Brahe did not have the stars centered on the sun; they were centered on the Earth. That being the case, no parallax would be detected, at least based on the above mechanics and geometric proportions. That is, the stars would be in the same vertical alignment when one looked at them six months apart. Perhaps no one in Bessel's day realized that the only thing required to bring the geocentric model into conformity with the results of heliocentric model was to shift the center of the stars from the Earth to the sun. Consequently, the geocentric model that had the stars centered on the sun never gained its rightful place in the halls of astronomy. Tycho Brahe had not presented such a model because in his day (1546-1601) no one had yet discovered a stellar parallax, and, in fact, this lacuna in the astronomical evidence was one of the arguments Tycho used to discredit heliocentrism. As it stands now, however, unless some astronomical proof is forthcoming that demonstrates that the stars are not centered on the sun (which is virtually impossible to do based on observation), then geocentrism has the same mechanical answer to the phenomenon of parallax as the heliocentric model. All that is needed is a slight modification to the original Tychonic model, which most geocentrists know as the modified or neo-Tychonic model.

The neo-Tychonic model has been known to modern astronomy for quite some time and is still mentioned in some circles. For example, at the department of physics at the University of Illinois, one class lecture states:

It is often said that Tycho's model implies the absence of parallax, and that Copernicus' requires parallax. However, it would not be a major conceptual change to have the stars orbit the sun (like the planets) for Tycho, which would give the same yearly shifts in their apparent positions as parallax gives. Thus if parallax were observed, a flexible Tychonean could adjust the theory to account for it, without undue complexity. What if parallax were not observed? For Copernicus, one only requires that the stars be far enough away for the parallax to be unmeasurable. Therefore the presence or absence of parallax doesn't force the choice of one type of model over the other. If different stars were to show different amounts of parallax, that would rule out the possibility of them all being on one sphere, but still not really decide between Tycho and Copernicus.[196]

The same course material adds the following conclusion:

In fact, if we don't worry about the distant stars, these two models describe identical relative motions of all the objects in the solar system. So the role of observation is not as direct as you might have guessed. There is no bare observation that can distinguish whether Tycho (taken broadly) or Copernicus (taken broadly) is right.[197]

Some geocentrists, although seeing the merits of the neo-Tychonic model, still prefer to find a solution by retaining the Earth as the center of the orbit of the stars. They prefer this model because they assume Scripture puts Earth at the exact center of the circling stars. If this is a correct understanding of the relationship between the stars and the Earth, it will require an entirely different explanation for stellar parallax. The proposed explanation is that the light from the two stars will be distorted by its movement through the cosmic medium, and/or distorted by the sun's gravitational pull on the light. Since one star is farther away from the other, the amount of distortion between them will be proportionally different, and thus one star will be shifted against the other. The ray of light, as it were, is moved out of its normal path into a slightly different path before it reaches our telescope. This is very similar to the concept of

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[196] University of Illinois, Physics 319, Spring 2004, Lecture 03, p. 8. In the last few years the same explanation for parallax has been promoted by astronomer Gerardus Bouw. He has also coined the term "modified Tychonic model" (*Geocentricity*, Association for Biblical Astronomy, Cleveland, 1992, p. 232).

[197] University of Illinois, Physics 319, Spring 2004, Lecture 03, p. 8.

stellar aberration that we analyzed earlier concerning James Bradley's discovery in 1728 of the ellipse formed over a period of a year by the star *Gamma Draconis*. In that case either the light from *Gamma Draconis* was shifted due to the finite speed of light having to travel such a great distance, or because the light is affected by the medium due to its long journey. As such, stellar aberration and parallax are the same phenomenon in the unmodified Tychonic model, whereas in the neo-Tychonic model, they are distinct.[198]

All things being equal, the neo-Tychonic model is the simplest explanation of geocentric parallax, and consequently, as Bradley found, stellar aberration would be a different phenomenon than stellar parallax. Not only is the neo-Tychonic model a more sound explanation of parallax with respect to the geometry (for it is simply a mirror image of the heliocentric model), but also because it is able to incorporate the vast distances to the stars, if, indeed, it is a fact that the stars are very far away. The unmodified Tychonic model works better, and is designed for, a smaller universe, while the neo-Tychonic model has no problem sustaining the gigaparsec sizes we commonly hear associated with modern astronomy.

More importantly, since those who favor an unmodified Tychonic model do so out of an allegiance to the assumption that Earth must be the center of the stellar revolutions, it is this very assumption that brings the validity of the model into question. Scripture does not say that the Earth is the center for the stars; it says only that the Earth is immobile. Granted, one can certainly advance an argument that the Earth should assume the center position based on nothing more than the definition of immobility within a sphere. Geometrically speaking, the only point that would not move, relative to the rest of the rotating sphere, is the exact center. Yet this fact merely begs the question: what constitutes the sphere of which Earth is the immobile center? Do the stars themselves define the universal sphere, or is the universal sphere defined by itself? By force of logic, we are compelled to say that the stars are merely *contained within* the universal sphere, but are not necessarily the composite body by which the sphere is defined. This is especially true when we understand that, besides the stars and other celestial bodies comprising the universe, the universal sphere has its own substance (ether), and thus it has a mass and velocity independent of the stars. It is the universe's own mass that is rotating around the immobile Earth, and as it does so, it carries the stars with it. As such, there is nothing to prohibit the stars from being slightly shifted to one side of the universal sphere and thus have their center on the sun,

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[198] Walter van der Kamp advocated the unmodified Tychonic model.

whereas the universal sphere itself is centered on the Earth. In fact, if that is the case, we would obtain the characteristic precession or "wobble" that we see in so many sectors of the cosmos. All this can be accomplished by keeping the Earth as the immobile center of the universe.

Are the Stars Close or Far Away?

Finally, in remarking about the equivalence between the geocentric and heliocentric models for parallax, we must reiterate that the parallax in either system is based on the assumption that a vast distance separates the two stars being viewed in the telescope. But this is only an *assumption*, not a proven fact. Although we presently work from the assumption given to us by modern astronomy that the stars are very large and very far away, there is no indisputable proof for that conclusion. The stars could be very close and very small. Even with the finest optical instruments, the stars and galaxies remain as mere points of light through our telescope lenses. No one has ever obtained a finer focal point. In fact, modern astronomy has found that the stars have a much smaller angular size than previously estimated. Logically, then, it is impossible to be absolutely certain whether the star is large and distant as opposed to small and near based only on its size and luminosity. As a recent article in *Sky and Telescope* admitted:

> A bedrock problem in astronomy is simply figuring out how far away things are. Practically everything else about an object – its true size, its energy output – all the stuff you have to know to understand it – depends on simply knowing how far away it is. And even now, the poor quality of many astronomical distances remains a nagging problem.[199]

Recently the research team of astronomer Roberto Ragazzoni of the Astrophysical Observatory in Arcetri, Italy studied two images from the Hubble space telescope: one of a galaxy calculated to be 5 billion light years from Earth and another of an exploding star 42 million light years away. Although similar pictures have been produced by the Hubble space telescope for quite a while, Ragazzoni is apparently the first one to notice that no matter how far away the objects are purported to be, the Hubble pictures are always crisp and clear, never out of focus. With regard to the Big Bang theory, this creates a problem. Ragazzoni explains:

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[199] Alan MacRobert, "'The Antennae' Fall Into Line," *Sky and Telescope*, May 9, 2008.

You don't see a universe that is blurred. If you take any Hubble Space Telescope Deep Field image you see sharp images, which is enough to tell us that the light has not been distorted or perturbed by fluctuations in space-time from the source to the observer.[200]

Ragazzoni, *et al*., ascribe the lack of distortion to apparent discrepancies in Quantum mechanics that theorizes a Planck-scale ether between the star and the observer. They write:

It has been noted (Lieu & Hillmann) that the cumulative effect of Planck-scale phenomenology, or the structure of spacetime at extremely small scales, can lead to the loss of the phase radiation emitted at large distances from the observer. We elaborate on such an approach and demonstrate that such an effect would lead to an apparent blurring of distant point sources. Evidence of the diffraction pattern from the Hubble Space Telescope observations of SN 1994D and the unresolved appearance of a Hubble Deep Field galaxy at z = 5.34 lead us to put stringent limits on the effects of Planck-scale phenomenology.[201]

Yet one might just as well ascribe the lack of distortion to the fact that the exploding star and the galaxy are not separated by 4.958 billion light years of space but are relatively close to one another; that neither the star nor the galaxy are very far away from Earth; and/or that the redshift of 5.34 assigned to the galaxy is not measuring its distance but its own peculiar radiation.

Various modern astronomers freely admit that the starry cosmos might be very close to us and not as vast as present cosmology dictates. In fact, one theory holds that much of what we see in the heavens beyond a certain point is a mere reflection. For example, the well-known astrophysicist of Princeton University, David Spergel, has recently found such evidence. Working alongside mathematician Jeffrey Weeks, *New Scientist* reports:

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[200] Robert Roy Britt, Space.com, April 2, 2003 interviewing Roberto Ragazzoni concerning the article "The Lack of Observational Evidence for the Quantum Structure of Spacetime at Planck Scales," *The Astrophysical Journal*, April 10, 2003, co-authored by Massimo Turatto and Wolfgang Gaessler.
[201] "The Lack of Observational Evidence for the Quantum Structure of Spacetime at Planck Scales," *The Astrophysical Journal*, April 10, 2003, p. L1.

…scientists have announced tantalizing hints that the universe is actually relatively small, with a hall-of-mirrors illusion tricking us into thinking that space stretches on forever….Weeks and his colleagues, a team of astrophysicists in France, say the WMAP results suggest that the universe is not only small, but that space wraps back on itself in a bizarre way (*Nature*, vol. 425, p. 593)…. Effectively, the universe would be like a hall of mirrors, with the wraparound effect producing multiple images of everything inside." [Spergel adds]: "If we could prove that the universe was finite and small, that would be Earth-shattering. It would really change our view of the universe."[202]

In any case, applying parallax to the measure of stellar distances has its limitations. Its advocates admit that it cannot do so accurately beyond 300 light-years. Empirically speaking, then, no one is required to commit himself to a universe greater in size than 600 light-years in diameter. Any claims to something larger are simply not conclusive, since it has become obvious that, with all the anomalies associated with measuring distance by a star's redshift, we have no indisputable yardstick to measure the universe.[203]

One other possible indication for a smaller universe is that stellar ellipses are all about the same size, although some have more eccentricity than others. As the reasoning goes: ellipses of the same size suggest that the stars are not very far apart. Moreover, if parallax is understood as stellar aberration, this would allow the stellar ellipses to be contained within a small universe of no more than 50 light-days in diameter. In this

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[202] Hazel Muir, "Does the Universe Go On Forever," *New Scientist*, October 11, 2003, p. 6.

[203] Martin Selbrede poses an interesting possibility for using redshift as a distance indicator, but one totally diverse from the modern Big Bang theory. After citing numerous sources showing that centrifugal force is caused by the rotation of the cosmic mass, Selbrede adds that the upward pull caused from the rotation will affect the travel of light from the stars to the earth. Citing Richard Feynman's *Lectures in Physics*, vol. 2, pp. 42-10 and 42-11, and Misner, Thorne and Wheeler's discussion 38.5 "Tests of Geodesic Motion: Gravitational Redshift Experiments" in their book *Gravitation*, pp. 1055-1060, Selbrede theorizes that redshift is not a Doppler phenomenon initiated by a receding star, but a gravitational/centrifugal phenomenon of a rotating star field. If so, he concludes: "This in turn would provide a new basis for measuring the distance of celestial objects, one wholly different than the system erected upon the Doppler view of the red shift, which could involve a significant remapping of the heavens" (*The Chalcedon Report*, 1994, p. 12). Of course, the distances measured would be much less than the distance claimed by Big Bang cosmology.

situation the stars would be encased in a stellatum, a circular band of definite but narrow thickness around the Earth. As Van der Kamp notes:

> Looking at the star Alpha Centauri from an Earth circling the sun, parallax measurements and trigonometry would assure us that the two are 1.3 parsecs, or more than 4.2 light years apart. But looking from an Earth circled by the sun, the distance turns out to be less than one twenty-fifth of that amount.[204]

The first one to propose such an arrangement was Thomas Wright (1750), who held the "grindstone" model wherein the stars were located between two concentric shells around the Earth. Accordingly, one could argue that the various biblical passages referring to the known and unchanging constellations (*e.g.*, God's challenge to Job: "Can you bind the chains of the Pleiades, or loose the cords of Orion? Can you lead forth the Mazzaroth [Zodiac] in their season, or can you guide the Bear with its children?")[205] imply that constellations can be formed because of the close proximity of its stars. It is also possible, however, to explain the appearance of these constellations simply because a few stars near the Earth can form the configuration, while other stars are too far away from Earth to form any visible constellations for the observer.

Although a small universe encased by a stellatum is certainly possible, ultimately it makes little difference to the geocentric model whether the universe is large, small, or somewhere in between. **Gerardus Bouw** has argued for a large universe (although by his own admission he is not absolutely committed to it, provided the physics of a small universe can be adequately explained). Bouw has four basic arguments for a large universe: (1) aberration is not parallax;[206] (2) the diameters of expanding

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[204] Walter van der Kamp, *De Labore Solis*, p. 145.

[205] Job 38:31-32, RSV. Some appeal to Apocalypse 6:13's "And the stars of heaven fell unto the Earth," but this is not to be understood literally, for John is seeing a symbolic vision in heaven. See my book: *The Catholic Apologetics Study Bible*, Vol. 2, *The Apocalypse of St. John*, Queenship Publishing, 2006.

[206] Bouw's colleague, Walter van der Kamp, argued for a small universe and posited that stellar aberration and parallax were the same phenomenon. To that issue, Bouw writes: "It is significant that the moon, streetlights, and artificial

nebulae;[207] (3) measurements of star diameters; (4) the nature of physics. Of these, the fourth is the most comprehensive and thus requires the adoption of Bouw's overall understanding of how the universe is put together. According to that understanding, Bouw argues that the "fundamental constants" of physics (*e.g.*, gravity, electric charges, position, time, temperature, entropy) can only be joined together in a limited number of ways in order that no one constant conflicts with the others. Since there is a plurality of fundamental constants, a least common denominator is needed to join them all together. This is accomplished in two ways, both of which are at the extreme ends of the physical spectrum. On the one hand, it is accomplished by reducing the mixing crucible to scales much smaller than atomic particles so that all the necessary constants are represented in their irreducible form; and, on the other hand, to test how these constants react in sizes as big as the universe, which is the ultimate large-scale environment. The crucial constants that need to be joined together are: Planck's constant, Boltzmann's constant, the speed of light, and the gravitational constant. When these constants are combined in their proper proportions, they will provide fundamental units in time, length, charge, mass and temperature, and they will, in turn, give us the corresponding size for the universe. As Bouw understands it:

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satellites do not exhibit aberration. Any source of light originating inside the earth's gravitational field does not exhibit aberration. This may mean that aberration originates at the edges of gravitational fields, for the sun and planets do exhibit aberration" (*American Ephemeris and Nautical Almanac*, 1968, pp. x, 485). "That the sun and planets exhibit aberration presents us with the proof against Walter van der Kamp's thesis that aberration is actually parallax. If Walter's interpretation is correct, the planets and the sun should not participate in the 20".496 aberration because they are too close to the earth. Since they do, Walter's model requires the planets and the sun all to be 58 light-days from the earth, the same distance as the stars….There is another…problem….Unless the stars were [sic] all exactly the same distance from earth, there will be slight differences in their parallax. Indeed, such differences are detected" (*Biblical Astronomer*, Vol. 4, No. 67, p. 11).

[207] Bouw uses Betelgeuse as an example as it is blowing off gas at a rate of 10 km/sec. "The shell of material around it is 50'' (seconds of arc) across. If we assume a 50-light-day universe, then 1 km at the edge of the universe would subtend an angle of about 2×10^{-7} arc sec. This means that in one year Betelgeuse's shell would grow by 49'' of arc which, in about 40 years, would grow to the apparent size of the full moon. It would seem from the 50-light-day universe model that Betelgeuse's shell is only about a year old; but the stuff has been seen streaming out of the star for tens of years" (*The Geocentric Papers*, p. 38).

The size of the atom is about 10^{-13} cm. The size of the nucleus is about a thousandth of that. As we proceed to smaller and smaller scales nothing interesting seems to be happening until we get to a scale of about 10^{-33} cm. At that size, called a *Planck length*, fascinating things happen…. we find that the warp and woof of heaven comes into focus. Physics attempts to derive relationships between the different properties of objects. Such relationships typically involve certain constants: values which are generally assumed not to change over time. The speed of light is such a constant. So is the gravitational constant. It turns out that there are relationships among these constants themselves, and those relationships all express themselves to specifics at the Planck length.[208]

The fundamental units of length and time combine to give the speed of light which is tied to the expansion rate of the universe. Thus from the constants we can derive some large numbers which can be interpreted as the size of the universe, a speed limit for matter (which most scientists today use to infer an age but the quantity is actually determined by the expansion rate of the universe, not its age), and an apparent mass. These quantities, which actually define the laws of physics, are tied to a large universe and not a small universe.[209]

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[208] Gerardus D. Bouw, *Geocentricity*, pp. 324-325.

[209] Gerardus Bouw, *The Geocentric Papers*, p. 39. Bouw qualifies his remarks by one other possibility for a small universe: "…a model which holds that the parallaxes of stars are not due to a Tychonian-like oscillation of stars and sun about the Earth but are due to the eccentricity of the path which the sun and stars take about the Earth. Since the eccentricity of the Earth-sun path is 0.017, this would make all parallax-based distances about 60 times closer. This would make the nearest star system, Alpha Centauri, to be about 24 light-days distant or about 360,000,000,000 miles. The star would be about 14,500 miles in diameter. Sirius…would be 1.8 light-months distant which would place it 54 light-days out….The main problem with this variant of a small universe is that the physics for such small, hot plasmas (stars) would have to be developed….A non-gravitationally bound plasma would quickly disrupt" (*ibid*).

The earth is vast, and heaven is high,

and the sun is swift in its course,

for it makes the circuit of the heavens

and returns to its place in one day.

Is he not great who does these things?

But truth is great, and stronger than all things.

1 Esdras 4:34-35

"We're just children looking for answers....As the island of our knowledge grows, so does the shore of our ignorance."

John Wheeler[210]

"Never run after a bus or a woman or a cosmological theory, because there'll always be another one in a few minutes."

Wheeler's Yale acquaintance

"Your sages were wrong to submit to the non-Jewish scholars. They assented to a lie, for the truth lay with the Jewish sages."

Tycho Brahe[211]

"If it be granted that the Earth moves, it would seem more natural to suppose that there is no system at all, but only scattered globes, than to construct a system of which the sun is the center"

Francis Bacon[212]

"One may understand the cosmos, but never the ego; the self is more distant than any star."   G. K. Chesterton[213]

"…we are at the center of a series of explosions. This is an anti-Copernican embarrassment."

Halton Arp[214]

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[210] Interview with John Horgan, as cited in *The End of Science*, p. 83.
[211] Tycho Brahe to Jewish astronomer David Gans. André Neher, *Jewish Thought and the Scientific Revolution of the Sixteenth Century: David Gans (1541-1613) and His Times*, translated from the French by David Maisel, 1986, p. 218.
[212] Attributed, not verified.
[213] G. K. Chesterton, *Orthodoxy*, New York, Doubleday, 1957, p. 54.
[214] *Seeing Red: Redshifts, Cosmology and Academic Science*, p. 195.

Chapter 9

Modern Science and the Acceptance
of Geocentrism by Principle

In previous chapters we discovered that a geocentric system is geometrically and kinematically the same as a heliocentric system. As Hoyle reminds us: "The equivalence of these two pictures was already known to Apollonius, who lived in the third century, B.C., long before Ptolemy (ca. A.D. 150)."[215] As Thomas Kuhn noted of the orrery:

> Now imagine that…the whole mechanism is picked up…and put down again with the sun fixed at the central position formerly held by the Earth…All of the geometric spatial relations of the Earth, sun and Mars…are preserved…and since only the fixed point of the mechanism has been changed, all the relative motions must be identical…the Tychonic system is transformed to the Copernican system simply by holding the sun fixed instead of the Earth. The relative motion of the planets are the same in both systems, and the harmonies are therefore preserved.[216]

The next phase of our investigation must address the matter of how the geocentric system relates to the rest of the universe. It is one thing to use an orrery to demonstrate the equivalence between the heliocentric and geocentric systems in regard to the *annual* motions of the sun and planets, but we also need to explain the daily motions. In the heliocentric system, of course, the daily motion is accounted for by supposing that the Earth rotates on its axis every 24 hours. As such, the sun, moon, and stars will appear to circle the Earth each day. Conversely, the geocentric system holds that the motion of these celestial bodies is a *real* motion and is not an apparent one caused by a rotation of the Earth. In fact, this system would more appropriately be called a "geostatic" system. Whereas "geocentric" literally means that the Earth is the center of the universe,

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[215] Fred Hoyle, *Nicolaus Copernicus*, 1973, p. 63.
[216] Thomas S. Kuhn, *The Copernican Revolution*, 1959, pp. 204-205.

"geostatic" means that the universe is rotating around the Earth, in addition to the fact that the Earth is in the center of the universe.

Explaining a geostatic universe is a little more involved than explaining a geocentric universe. For this very reason, some geocentrists have opted for the model in which the Earth, even though it is the center of the universe, nevertheless, rotates on its axis every 24 hours.[217] For the dedicated scripturalist, and especially one of the Catholic faith, a rotating Earth in a geocentric universe is not a viable option. First, the condemnation of Copernicanism issued in the papal and Sacred Congregation pronouncements of the seventeenth century included the censoring of the "diurnal movement of the Earth," that is, it condemned both an Earth that revolved around the sun *and* an Earth that rotated on an axis. We will address these pronouncements in more detail in Volume II of this series. For now we merely note that most geocentrists are also geostatists, simply because, using Scripture as the sole arbiter between the heliocentric and geocentric models, they understand that the Earth does not move at all, either laterally, tangentially, angularly or in any other way. It is the center of the universe and is the only celestial body that does not move. Galaxies, stars, the sun, moon, planets, the cosmic microwave background radiation, and every other celestial object or force are in daily motion around an immobile Earth. In this way, the Earth is the absolute frame of reference for every movement in the sky, rendering the theory of Relativity erroneous and superfluous.

Absolute Rest versus Relative Motion

In reference to Relativity theory, we noted in Chapter 4 that Einstein's struggle to understand Maxwell's equations concerning electricity and magnetism demonstrated the difference between absolute rest and relative motion. Let us recall Einstein's description of this phenomenon:

> For if the magnet is in motion and the conductor at rest, there arises in the neighborhood of the magnet an electric field with a certain definite energy, producing a current at the places where parts of the conductor are situated. But if the magnet is stationary and the conductor in motion, no electric field arises in the neighborhood of the magnet. In the conductor, however, we find an electromotive force, to which in itself there is no

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[217] One example of a geocentric/rotating Earth model is that of Fernand Crombette, which will be critiqued in volume II of this series.

corresponding energy, but which gives rise – assuming the equality of the relative motion in the two cases discussed – to electric currents of the same path and intensity as those produced by the electric form in the former case.[218]

As we noted previously, the conventional explanation of this phenomenon is: if the conductor is moving toward a stationary magnet, then the electrical charge in the conductor is pulled around the conductor by the force of the magnetic field. Conversely, if the magnet is moving toward the conductor, the increasing magnetic field produces an electric field that drives the charge around the conductor. In order for this to occur, the relationship between the conductor and the magnet cannot be "relative"; rather, we have a case of absolute rest and absolute motion. In Maxwell's explanation it made a difference whether the magnet or the conductor was at rest, for each case produced a different location for the same electrical current and thus he produced two separate equations for the results. Einstein did not accept Maxwell's explanation. The reason is noted in the parenthetical statement he adds toward the end of the above paragraph: "…assuming the equality of the relative motion in the two cases discussed…" If the "relative motion" is the same in both cases (that is, a conductor moving toward a stationary magnet is the same as a magnet moving toward a stationary conductor), Einstein assumed that the results should be identical, that is, in both cases the current produced should either be always around the magnet or always around the conductor, and not switch between the magnet and the conductor. Since the results were not identical, Einstein sought to find a reason, but he would do so assuming the principle of Relativity and its application of "fields."

Having a relativistic explanation to the above phenomenon was very important to Einstein, since it would also provide him with an explanation why the light beams of Michelson-Morley's interferometer were not affected by the "movement of the Earth." As Einstein "relativized" Maxwell's magnet and conductor, so he did with Michelson-Morley's interferometer. Both experiments were vitally important to him. A solution for one would necessarily be the same for the other. Both had to be relativized or neither could be relativized.

If, for all the reasons we have stated thus far, such "relativizing" of results is prohibited, our only recourse is a system built on absolute rest and absolute motion. In the case of the magnet and the conductor, respectively, we must say that one is at absolute rest while the other is in

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[218] Zur Electrodynamik Bewegter Körper ("On the Electrodynamics of Moving Bodies"), *Annalen der Physik*, Vol. 17, 1905, p. 1.

absolute motion, each "absolute" marked by the production of an electric current in a different location.[219] In the case of the Michelson-Morley experiment, we are left with the absolute rest of the Earth and the absolute motion of the light beams.

In addition, the above phenomenon regarding absolute rest and absolute motion presents a situation in which Einstein's relativizing of the Earth's rotation in a fixed universe as co-equivalent to a rotating universe around a fixed Earth, although conceptually equivalent, demands, as does Maxwell's concept of the conductor and magnet, that we dispense with the dualism and insist that ultimately only one can be right. As Maxwell was able to distinguish between whether the magnet or the conductor was moving depending on where the electric current appeared, so it should be possible to perform experiments, or reinterpret already performed experiments, to determine which of the cosmological models is correct.[220] We, of course, predict that such experiments, if properly designed, will show that the Earth is in absolute rest and the universe in absolute motion. Laying aside the mathematical "transformation" contortions of Lorentz and Einstein, we already have confirmation that the interferometer and similar experiments demonstrate this to be the case.

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[219] That is, an object resting on the Earth is in a state of absolute rest, since the Earth is already at absolute rest compared to the rest of the universe. Accordingly, any object in motion on the Earth is in absolute motion, since the Earth is the absolute reference frame against which the object moves.

[220] An experiment demonstrating the difference between the heliocentric and geostatic systems would be based on Maxwell's laws. For example, a charged object at rest on a geostatic Earth should produce no magnetic field if it is placed at the poles or the equator. The same object on a diurnally moving Earth, however, should produce no magnetic field when placed at the poles, but should produce a magnetic field at the equator corresponding to its electric charge multiplied by the rotation velocity of the Earth, which is assumed to be 1054 mph. The magnetic field of the Earth can either be subtracted from the resulting measurements, or the experiment can be performed in a diamagnetic container (since it excludes external fields). At any latitude the magnetic field will be present, albeit it will be smaller the further away from the equator the experiment is performed. As such, experiments can be performed at two latitudes of considerable distance from each other. If there is no difference between the two respective magnetic fields, then the result is null and the geostatic system has been vindicated. The only experimental difficulty would be to find a way to make the magnetometer be at rest with respect to the center of the Earth.

Fred Hoyle's Geocentrism

The issue regarding whether the Earth is rotating in a fixed universe or the universe is rotating around a fixed Earth has not escaped a few prominent physicists and astronomers. We have already mentioned George Berkeley and Ernst Mach as examples of those who recognized the equivalence between the two systems. Einstein, Eddington, Born and many others found that little argument could be mounted against the equivalence. Yet another prominent voice is astronomer Fred Hoyle. Whereas other physicists and astronomers are very careful not to educate the public to the equivalence between the geocentric and heliocentric systems, Hoyle has been quite candid in providing the necessary information, often to the consternation of his colleagues. In this respect, Hoyle's book, *Nicolaus Copernicus: An Essay on His Life and Work*, although a commemorative effort celebrating the 500th anniversary of the birth of Copernicus, is actually a landmark work revealing in detail the false impression left by the Copernican revolution. As one reviewer noted, Hoyle's book is

> …the only brief account, using understandable modern terminology, of what Ptolemy and Copernicus really did. Epicycles are just data analysis (Fourier series), they don't imply any underlying theory of mechanics. Copernicus did not prove that the Earth moves, he made the equivalent of a coordinate transformation and showed that an Earth-centered system and a sun-centered system describe the data with about the same number of epicycles.[221]

Although in the final analysis Hoyle is a true-blue Copernican (as is the above reviewer), he is not the least bit embarrassed in pointing out the flaws and inadequacies of either the Copernican system or the cosmetic refinements offered by the Keplerian system. In fact, in order to explain the workings of any system, Hoyle frequently resorts to employing geocentric diagrams, since they are, by his own admission, easier to use. In any case, it is the last chapter of Hoyle's book that will be the focus of our analysis, for here, after having shown that there is no kinematical difference between a sun-centered and an Earth-centered system, Hoyle reveals the crux of the debate between heliocentrism and geocentrism. He begins:

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[221] Physicist J. L. McCauley, Letter on file, 2005.

At the beginning of Chapter I it was stated that we can take either the Earth or the Sun, or any other point for that matter, as the center of the solar system. This is certainly so for the purely kinematical problem of describing the planetary motions. It is also possible to take any point as the center even in dynamics, although a recognition of this freedom of choice had to await the present century. Scientists of the nineteenth century felt the heliocentric theory to be established when they determined the first stellar parallaxes. The positions of the nearby stars were found to undergo annual oscillations, which were taken as reflections of the Earth's annual motion around the Sun. But, kinematically speaking, we can always give to the stars epicyclic motions similar to the ones we found for the planets in Chapter IV. Indeed, if we wish to consider the Earth to be at rest, it will be necessary to give an annual epicyclic motion to every object in the distant universe, as well as to the planets of the solar system. We cannot dismiss such a procedure simply on grounds of inconvenience or absurdity. If our feeling that the Earth really goes around the Sun, not the Sun around the Earth, has any objective validity, there must be some important physical property, expressible in precise mathematical terms, which emerges in the heliocentric picture but not in a geocentric one. What can this property be?[222]

Thus far, even though he is a heliocentrist by preference who is looking for some proof of his system, Hoyle has been fair with his geocentric counterpart. What other avowed heliocentrists ridicule as "absurd," Hoyle counts as a viable alternative. In fact, we should add here that many pages earlier Hoyle had already suggested to his reader that one of the reasons the stars may follow an epicyclic pattern is due to what

…was already known to the Greeks that spring-to-summer-to-autumn differs from autumn-to-winter-to-spring by three days. It was explained by Hipparchus."[223]

Since, as Hoyle admits, in the geocentric system the universe rotates around the Earth and carries the sun with it, it follows that both the sun and the stars will form an annual epicyclic path with respect to the Earth. As we suggested earlier, the epicycles may exist because there is a designed

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[222] *Nicolaus Copernicus*, pp. 82-83.
[223] *Nicolaus Copernicus*, p. 52.

imbalance in the distribution of matter in the universe that will subsequently cause a precession or wobble in the rotation, which in turn will help produce the periodic movement that we experience practically on Earth as the four seasons. In this view, the universe is much like a spinning gyroscope that wobbles when it begins to tilt, or when it is disturbed while rotating; or has an additional weight at one point on its circumference.

In his next section, Hoyle delves deeply into Newton's laws of motion:

> Consider the well-known Newtonian equation: mass × acceleration = force. The mass for any particular body is intended to be always the same, independent of where the body is situated or of how it is moving. Suppose we describe the position of a body as a function of time in some given reference frame, and suppose we know the mass. Then, provided we also have explicit knowledge of the force acting on the body, Newton's equation gives us its acceleration. Determining the motion from there on is simply a mathematical problem – in technical terms we have to integrate the above equation. This procedure, which forms the basis of Newtonian mechanics, fails unless we know the force explicitly. In the Newtonian theory of the planetary motions, the theory leading to the basic ellipse from which we worked in Chapter IV, the force is taken to be given by the well-known inverse law: Two masses, m_1 and m_2, distance r apart, attract each other with a force Gm_1m_2/r^2 where G is a numerical constant. The force is directed along the line joining the bodies.[224]

Here Hoyle is simply giving his reader a lesson in basic physics, while at the same time introducing him to certain inadequacies of Newton's laws that we noted earlier when citing the work of Dennis Sciama. Now Hoyle applies this critique to the crux of the issue:

> Now comes the critical question: In what frame of reference is this law considered to operate? In the solar system we cannot consider the inverse-square law to operate *both* in the situation in which the Sun is taken as the center and in that in which the Earth is taken as the center, because Newton's equation would then lead to contradictory results. We should find a planet following a different orbit according to which center we chose,

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[224] *Nicolaus Copernicus*, pp. 83-84.

and a body cannot follow two paths (at any rate not in classical physics). It follows that in order to use the inverse-square law in a constructive way we must make a definite choice of center. The situation which now emerges is that to obtain results that agree with observation we must choose the Sun as the center. If the Earth were chosen instead, some law of force other than the inverse-square law would be needed to give motion that agreed with observation.[225]

Hoyle is reiterating one of the most commonly used arguments to support the heliocentric theory. Based on Newton's inverse-square law, it is ordinarily assumed that a massive body like the sun could not possibly revolve around the tiny Earth. Thus, for the moment, Hoyle seems to be giving credence to the heliocentric theory over the geocentric. In reality, he is only setting up the means by which one will be able to discern the flaws in this traditional thinking. He continues:

> Although in the nineteenth century this argument was believed to be a satisfactory justification of the heliocentric theory, one found causes for disquiet if one looked into it a little more carefully. When we seek to improve on the accuracy of calculation by including mutual gravitational interactions between planets, we find – again in order to calculate correctly – that the center of the solar system must be placed at an abstract point known as the "center of mass," which is displaced quite appreciably from the center of the Sun. And if we imagine a star to pass moderately close to the solar system, in order to calculate the perturbing effect correctly, again using the inverse-square rule, it would be essential to use a "center of mass" which included the star. The "center" in this case would lie even farther away from the center of the Sun. It appears, then, that the "center" to be used for any set of bodies depends on the way in which the local system is considered to be isolated from the universe as a whole. If a new body is added to the set from outside, or if a body is taken away, the "center" changes.[226]

By this analysis Hoyle has admitted one very important discovery of modern cosmology, that is, the stars affect what occurs in our sun-Earth system. This is not difficult even for a heliocentrist to understand, since in

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[225] *Nicolaus Copernicus*, pp. 84-85.
[226] *Nicolaus Copernicus*, p. 85.

his system the sun is revolving around the Milky Way at a speed of about 500,000 miles per hour (which is about eight times faster than he believes the Earth is revolving around the sun). If the sun must travel so fast in order to equal the Milky Way's pull toward the center, then it can be safely said that the mass of stars at the core of the galaxy have a great effect on the sun, and in turn, a great effect on the planets going around the sun. Hoyle, for simplicity's sake, confined his example to "a star…moderately close to the solar system," but in reality, there are trillions upon trillions of stars in the universe; and each one, however small, has an effect on our sun-Earth system. As such, the stars must be strategically placed in the universe in order to allow the proper balance of forces to be maintained in the sun-Earth system. No doubt this is implied in such Scriptural passages as Psalm 147:4: "He determines the number of the stars, he gives to all of them their names," or Isaiah 40:26: "Lift up your eyes on high and see who has created these stars. He who brings out their host by number, He calls them all by name; by the greatness of His might, and by the strength of his power, not one is missing."

We can draw two more points from the foregoing information. First, since the stars produce forces affecting our sun-Earth system, then it would be logical to conclude that the forces we experience in our locale are, in part, a product of the conglomeration of stellar forces acting upon us. This means that such things as the inverse-square law, centrifugal force, Coriolis force, and any other force or momentum we calculate on Earth must in part be a result of the forces surrounding us from the universe. As Misner, Thorne and Wheeler have stated it: "Mass there governs inertia here."[227] For example, although the inverse-square law is normally understood as being the ratio of the mass to the distance of two or more local objects (*e.g.*, sun and Earth), in reality, the formula Gm_1m_2/r^2 implicitly includes the mass, force, and distance of all the universe's stars, as well as the objects in the immediate locale under consideration. A simple way to understand this is: if the universe did not have stars, then Gm_1m_2/r^2 would be inaccurate and need to be revised. As Hoyle has noted, even one close star can affect the "center of mass" in our sun-Earth system. Accordingly, one must understand the effect of the trillions of stars in the universe and apply it to the phenomena of gravity and inertia.

Consequently, modern science is unable to refute the proposition that Gm_1m_2/r^2 is a product of both the local and the non-local systems due to the fact that it has not been able to explain the cause of gravity. Although the components of Gm_1m_2/r^2 appear as if the force of gravity is merely a

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[227] *Gravitation*, pp. 543, 546-47, 549. That is, the mass of the stars governs inertia on Earth.

ratio of mass to distance of the local bodies, since modern science has no explanation for what actually causes gravity and can only tell us that the force increases or decreases depending on mass and distance, it cannot discount the rest of the universe as being integrally involved in the increase or decrease of gravitational force. For example, two local bodies may merely be disturbances in a sea of gravitational force emanating from the remote regions of the universe that we, in turn, conveniently measure by the formula Gm_1m_2/r^2, and which modern science, without knowing any differently, attributes only to the interaction between the two bodies in our local system.

Another facet of the principle that Hoyle brings out regarding the "center of mass" (also known as a "barycenter") and how it is affected by the stars is that, since, as we stipulated, the stars are precisely numbered and strategically placed in the universe (which coincides with the fact that, according to Genesis 1:1-2, the Earth was the first strategically placed object in the universe), then it follows that this precise alignment of the stars would be in a counterbalancing formation against our sun and planets, situated in such a way as to make Earth the immovable barycenter of the universe. Accordingly, such passages as Job 26:9 [LXX 26:7]: "He…hangs the Earth upon nothing," which indicates that the Earth is suspended in space and not supported in any sense by any other celestial body, would be precisely the case if the Earth were the "center of mass" for the universe. If a hole could be dug to the center of the Earth, the above circumstance would be analogous to placing a baseball at the center where it would be suspended weightless and motionless. Yet gyroscopic laws show that any force that attempts to move the barycenter will be resisted by the entire system, and analogously the Earth will resist any force against it with the help of the entire universe. Just as a small gyroscope will keep a huge oil tanker afloat across the ocean without swaying, so the universe in rotation does the same with the center of mass, the Earth.[228] Anaximander (d. 547 B.C.) held to the same idea: "The Earth…is held up by nothing, but remains stationary owing to the fact that it is equally distant from all other things."[229] Perhaps he obtained his view from the Hebrew writers that antedated him by at least a millennium.

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[228] Charles W. Misner, Kip S. Thorne and John A. Wheeler, *Gravitation*, 1973, pp. 1117-1119.
[229] As obtained from Aristotle's *De Caelo*, 295b32, cited in Popper's *Conjectures and Refutations*, p. 138. Anaximander, however, understood the Earth to be in the shape of a drum rather than a globe.

The Gyroscopic Effect on the Earth

Misner, Thorne and Wheeler confirm these mechanical principles from a Relativistic perspective. Acknowledging the gyroscope principle between the Earth and the stars, they write:

> Assume that any nongravitational forces acting on the gyroscope are applied at its center of mass, so that there is no torque in its proper reference frame. Then the gyroscope will 'Fermi-Walker transport' its spin along its world line...The spin is a purely spatial vector in this co-moving frame; its length remains fixed (conservation of angular momentum); and its direction is regulated by the Fermi-Walker transport law. The basis vectors of the co-moving frame are not Fermi-Walker transported, by contrast with the spin. Rather, they are tied by a pure boost (no rotation!) To the PPN [Parametrized Post-Newtonian, p. 1069] coordinate grid, which in turn is tied to an inertial frame far from the solar system, which in turn one expects to be fixed relative to the 'distant stars.' Thus, by calculating the precession of the spin relative to the co-moving frame, one is in effect evaluating the spin's angular velocity of precession, relative to a frame fixed on the sky by the distant stars.[230]

It would certainly require an infinite mind to see everything at once and calculate all the interacting forces so that every object could be placed in its proper position in the universe. Modern science certainly can raise no objection to the possibility of such a universe, for its very laws give it sanction. In fact, as photographs of the universe show, there may be a good reason why the distribution of stars in some places of the universe is not isotropic, that is, why various sections of the universe contain no stars, and other parts contain huge clumps of stars. These variations are not accidental but are the precise distribution patterns required in order to maintain the forces that keep Earth as the barycenter in the midst of a sun and planets that are whirling about its equatorial plane.

Hoyle proceeds in his argumentation:

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[230] Charles W. Misner, Kip S. Thorne and John A. Wheeler, *Gravitation*, 1973, p. 1117. Misner, et al, already stated much earlier in their book that the CMB had the precise form and intensity expected if Earth were the centerpiece of a blackbody cavity (*Gravitation*, pp. 764-797). The logical conclusion should have been that the Earth *is in the center* of the universe and the universe is closed.

A similar circumstance was already present throughout our calculations, when we regarded angles as being measured with respect to a "fixed direction," it being implied that distant stars had directions that were "fixed" in this sense. If we make a calculation, using both Newton's equation and the inverse-square law, but measuring angles with respect to a direction that rotates with respect to the distant universe, things go very wrong. Newton was fully aware that his system of dynamics would work correctly only provided the "fixed directions" in the theory were chosen in a suitable way. His reference to the well-known rotating-bucket experiment was intended to illustrate this point.[231]

Here Hoyle merely touches upon a subject that we covered at great length in previous chapters – Newton's rotating-bucket of water. We discovered that the water in the bucket shows that there is an outside force causing the water to climb the inside walls of the bucket. Newton's explanation was that the water was curving upward in relation to absolute space, and that rotation was the unique movement that caused it, a phenomenon that today we call centrifugal force. But Newton, by his own admission, did not know the physical reason why a rotating object had such an outward force. It is good to remember that Newton did not have an explanation for the causes of all the forces for which he has become famous (gravity, inertia, centrifugal force). He merely had a knack for figuring out the mathematical relationship among these mysterious forces.

As we noted, Ernst Mach and Albert Einstein proposed their own gravitational theories in order to explain the water-bucket phenomenon. Mach insisted that the water curved upward because it was reacting to the gravity from the mass of distant stars surrounding it. Einstein had a similar answer, except that he attempted to make the gravitational force of the stars combine with the local force of space-time, but in essence, the stars remain a vital force in the bending of the surface of the water. In any case, Hoyle's reference to Newton's water-bucket shows that he knows there is more to this cosmological puzzle than meets the eye, and that the conventional means of supporting the heliocentric theory (*viz.*, by the inverse-square law) is simply not going to pass muster. Hoyle continues:

It is clear therefore that in order to define the appropriate "center" of the local system in a useful way, and in order to define "fixed directions" relative to which angles are to be

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[231] *Nicolaus Copernicus*, pp. 85-86.

measured, we must take account of the relation of the local system to the universe outside. It seems that the local laws of force take simple forms only when the center is unaccelerated with respect to a frame of reference determined by the universe in the large, and when the fixed directions do not rotate with respect to the distant universe. From this point of view we can compare the heliocentric and geocentric theories of the solar system in an unequivocal way. We ask: Is it the Sun that is accelerated with respect to the universe, or is it the Earth?[232]

Thus, having admitted that he cannot speak of a "center" unless he includes the universe at large, Hoyle nevertheless presses for the option of applying a local frame of reference, since that will be the only way to give preference to choosing the Earth as the accelerating body rather than the sun. As such, Hoyle answers his own question:

Neglecting small effects, the answer is that the Earth is accelerated, not the Sun. Hence we must use the heliocentric theory if we wish to take advantage of simple rules for the local forces.[233]

In other words, in order to give legitimacy to the heliocentric system, Hoyle must resort, even against his clear admissions concerning the force of the entire universe, to limiting his analysis to the local system of the sun and Earth. By eliminating the stars, Hoyle can then claim that the inverse-square law is merely a local phenomenon, and thus demand that the smaller body (Earth) accelerate against the larger body (the sun), rather than vice-versa. Unfortunately, this is the problem with most of modern cosmology. Although they acknowledge the powerful force of the stars due to the fact that the sun (supposedly) revolves around its own galaxy, (and the galaxy revolves around other galactic clusters at a speed even faster than the sun), yet when support is required for the heliocentric system, modern cosmology conveniently removes the stars and galaxies from the grand scheme of things in order to be left with mere "local" forces in order to have the Earth accelerating with respect to the sun.

Being the honest astronomer and physicist he is, however, Hoyle still leaves room for his geocentric opponent, saying, "But this is not to say that we cannot use the geocentric theory if we are willing to use more complex

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[232] *Nicolaus Copernicus*, p. 86.
[233] *Nicolaus Copernicus*, p. 86.

rules for the forces."[234] By "complex…forces" Hoyle is referring to the force of the trillions of stars in the universe, forces which it would be very difficult for him to calculate but that he knows implicitly affect our local system. Amazingly, Hoyle admits that if the "complex forces" and "fixed directions" are followed step-by-step until their logical end, the barycenter of the universe will drift further away from the sun and closer to the Earth. Newton tried to stop this drift by propping up his "absolute space," but since that is merely a convenient invention, Hoyle recognizes that this only leaves the stars and the rest of the universe to define the barycenter. Thus, not only has Hoyle admitted to the viability of the geocentric system based on the equivalence of the geocentric and heliocentric "kinematics," he has now given full credence to the geocentric system by admitting that alternative measurements of forces can be used to show how the geocentric system functions.

Hoyle is not done yet. He gives further reasons for questioning the wisdom of modern science in settling upon heliocentrism as its preferred model.

> The present discussion has been formulated from the standpoint of the Newtonian theory, which is not well suited to problems concerning the universe in the large. We might hope therefore that the Einstein theory, which is well suited to such problems, would throw more light on the matter. But instead of adding further support to the heliocentric picture of the planetary motions, the Einstein theory goes in the opposite direction, giving increased respectability to the geocentric picture. The relation of the two pictures is reduced to a mere coordinate transformation, and it is the main tenet of the Einstein theory that any two ways of looking at the world which are related to each other by a coordinate transformation are entirely equivalent from a physical point of view. Moreover, in the Einstein theory the method of calculating the effect of gravitation is changed to a form which applies equally to all such related ways of expressing a problem.[235]

As we noted in earlier chapters dealing with Einstein, it is quite ironic when we consider that Einstein's theory was formulated for the express purpose of relativizing nature so that no one could lay claim to a motionless Earth, yet this same theory forces science to come full circle

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[234] *Nicolaus Copernicus*, pp. 86-87.
[235] *Nicolaus Copernicus*, p. 87.

and admit that a motionless Earth in the center of the universe is just as physically and mathematically viable as a moving Earth in a fixed universe. In the face of this, Hoyle tries one last ditch effort to save face for heliocentrism:

> It may still happen that it is easier to work through the details of a particular problem with respect to one coordinate system rather than to another, but no special physical merit is to be adduced from such a circumstance. Indeed, from a mathe-matical point of view, the problem of the planetary motions certainly continues to be easier to grapple with in the heliocentric picture. The simplication of such a picture shows itself in the Einstein theory through boundary conditions which are impressed on the space-time structure at a large distance from the Sun – which is to say in terms of the control imposed by the universe in the large.[236]

As we see, although Hoyle proposes that heliocentrism is easier to use on a mathematical basis, nevertheless, he reinforces the fact that nothing in the heliocentric system provides it a "special physical merit." In other words, there is no physical basis for preferring heliocentrism over geocentrism, let alone any proof for it; rather, there is merely the option of representing the heliocentric system by a less laborious mathematical analysis. Even that point is a matter of opinion, since the "mathematics" to which Hoyle is referring is "Einstein's theory through boundary conditions…imposed by the universe at large." This is Einstein's attempt, through the use of geodesics and tensor calculus, to meld the local reference frame with the universe's reference frame. Einstein used this same melding of local and universal forces in order to explain Newton's water-bucket phenomenon.

Hoyle makes his final admission in the last paragraph of the book:

> So we come back full circle to what was said at the beginning of this book. Today we cannot say that the Copernican theory is "right" and the Ptolemaic theory "wrong" in any meaningful physical sense. The two theories, when improved by adding terms involving the square and higher powers of the eccentricities of the planetary orbits, are physically equivalent to one another. What we can say, however, is that we would hardly have come to recognize that this is so if scientists over four centuries or more had not elected to follow the Copernican point

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[236] *Nicolaus Copernicus*, pp. 87-88.

of view. The Ptolemaic system would have proved sterile because progress would have proven too difficult.[237]

In other words, the one thing that the venture into Copernicanism accomplished is to reinforce the viability of the Ptolemaic system. In effect, Hoyle has shown us that the battle between heliocentrism and geocentrism, at least with respect to daily motions, is over the adoption of a purely local system as opposed to a non-local or universal system. As we have seen throughout this volume, there is no escape from the latter. Although the fact is often camouflaged under different names, modern physics has not only accepted that motion can only properly be explained by reference to the non-local system, but Quantum Mechanics has divorced itself almost entirely from the local system prescribed by Relativity theory.[238]

Einstein's Geocentrism

Still, if one were to insist upon a Relativistic explanation of forces, it is, ironically, Relativity that lends the greatest support to a geocentric universe. For example, in a June 25, 1913, letter to Ernst Mach, Einstein writes the following:

> [Y]our happy investigations on the foundations of mechanics, Planck's unjustified criticism notwithstanding, will receive brilliant confirmation. For it necessarily turns out that inertia originates in a kind of interaction between bodies, quite in the sense of your considerations on Newton's pail experiment. The first consequence is on p. 6 of my paper. The following additional points emerge: (1) If one accelerates a heavy shell of matter S, then a mass enclosed by that shell experiences an accelerative force. (2) If one rotates the shell relative to the fixed stars about an axis going through its center, a Coriolis force

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[237] *Nicolaus Copernicus*, p. 88.
[238] As Misner, Thorne and Wheeler state: "The uncertainty principle thus deprives one of any way whatsoever to predict, or even to give meaning to, 'the deterministic classical history of space evolving in time.' *No prediction of spacetime, therefore no meaning for spacetime*, is the verdict of the quantum principle. That object which is central to all of classical general relativity, the four-dimensional spacetime geometry, simply does not exist, except in classical approximation" (*Gravitation*, pp. 1182-3, emphasis theirs).

arises in the interior of the shell, that is, the plane of a Foucault pendulum is dragged around.[239]

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[239] A series of four letters compiled by Friedrich Herneck in "Zum Briefwechsel Albert Einsteins mit Ernst Mach," *Forschungen und Fortschritte*, 37:239-43, 1963. The original letter was released from the estate of Albert Einstein by the executors Helen Dukas and Otto Nathan. Copy of the original letter is reproduced in Misner, Thorne and Wheeler's *Gravitation*, pp. 544-545. Other sources verify Einstein's mathematical analysis. In 1978, **Lawrence P. Orwig** of the University of Wisconsin discovered that: "The interior field of a thin mass shell or arbitrary momentum per unit mass *a* …in a parameter ($V^2 = 1-2m/R + a^2/R^2$) which measures the nearness of the shell to its gravitational radius….Shell shape is arbitrary beyond the requirement of sphericity in the limits of $a > 0$ or $V > 0$. It is shown that as $V > 0$, the interior inertial frames are dragged around rigidly at the same rate as the shell, for all *a*" (Lawrence P. Orwig, "Machian Effect in Compact, Rapidly Spinning Shells," *Physical Review* D, 1757-1763, 1978, abstract). **Oyvind Grøn and Erik Eriksen** say much the same. Citing Orwig's previous work, they write: "It was found that in the limit of a spherical shell with a radius equal to its Schwarzschild radius, the interior inertial frames are dragged around rigidly with the same angular velocity as that of the shell. In this case of 'perfect dragging' the motion of the inertial frames is completely determined by the shell" ("Translational Inertial Dragging," *General Relativity and Gravitation*, Vol. 21, No. 2, 1989, pp. 109-110. My thanks to Martin Selbrede for these sources and analysis). To show how General Relativity posits no barriers to geocentrism, Grøn and Eriksen provide an incontestable example of its application: "As an illustration of the role of inertial dragging for the validity of the strong principle of relativity, we consider the Moon orbiting the Earth. As seen by an observer on the Moon both the Moon and the Earth are at rest. If the observer solves Einstein's field equations for the vacuum space-time outside the Earth, he might come up with the Schwarzschild solution and conclude that the Moon should fall toward the Earth, which it does not. So it seems impossible to consider the Moon as at rest, which would imply that the strong principle of relativity is not valid. This problem has the following solution. As observed from the Moon the cosmic mass rotates. The rotating cosmic mass has to be included when the Moon observer solves Einstein's field equations. Doing this he finds that the rotating cosmic mass induces the rotational nontidal gravitational field which is interpreted as the centrifugal field in Newtonian theory. This field explains to him why the Moon does not fall" ("Translational Inertial Dragging," *General Relativity and Gravitation*, Vol. 21, No. 2, 1989, pp. 117-118). Regarding the feasibility of a rotating universe, **Yu. N. Obukov** found that there are no adverse effects: "…the analysis of its relation to Mach's principle….there is a general belief that rotation of the universe is always a source of many undesirable consequences, most serious of which are timelike closed curves, parallax effects, and anisotropy of the microwave background radiation. The aim of this paper is…to show that the above phenomena are not inevitable (and in fact, are not caused by rotation)….As we see, pure rotation can be, in principle, large, contrary to the wide-spread

Although Einstein is supposing that the stars are "fixed" and that the Earth rotates, according to Relativity theory the above paragraph can just as easily be applied to a rotating star-system (the universe) around a fixed Earth. In such a case, the universe would be the "heavy shell of matter S," which, as it rotates, will create "an accelerative force" on the "mass enclosed by that shell," the "mass" being any heavenly body. The "accelerative force" is understood by Einstein to be the "Coriolis force," which is the force commonly cited to explain why "a Foucault pendulum" rotates. In other words, a universe of stars rotating around a fixed Earth will cause the peculiar movement of the Foucault pendulum just as a rotating Earth in a "fixed star" system. Like a leaf in a whirlpool, the pendulum would be carried around and around. It has inertia because it is caught in the gravitational draft of the stars' diurnal circular movement. In fact, under the heading "dragging of inertial frames," Misner, Thorne and Wheeler posit that the angular velocity of the Foucault pendulum would be equal to that of the rotation of the stars. They write:

> Consider a bit of solid ground near the geographic pole, and a support erected there, and from it hanging a pendulum. Though the sky is cloudy, the observer watches the track of the Foucault pendulum as it slowly turns through 360º. Then the sky clears and, miracle of miracles, the pendulum is found to be swinging all the time on an arc fixed relative to the far-away stars. If "mass there governs inertia here," as envisaged by Mach, how can this be?

> Enlarge the question. By the democratic principle that equal masses are created equal, the mass of the Earth must come into the bookkeeping of the Foucault pendulum. Its plane of rotation must be dragged around with a slight angular velocity, ω_{drag}, relative to the so-called "fixed stars"….The distant stars must influence the natural plane of vibration of the Foucault pendulum as the nearby rotating shell of matter does, provided that the stars are not so far away…that the curvature of space begins to introduce substantial corrections into the calculation of Thirring and Lense. In other words, no reason is apparent why all masses

prejudice that large vorticity confronts many crucial observations. In particular, the most popular claim that vorticity causes anisotropy of the microwave background radiation is apparently wrong…It is shear, not rotation, which is the true (and only) source of anisotropy of the background radiation" ("Rotation in Cosmology," *General Relativity and Gravitation*, Vol. 24, No. 2, 1992, pp. 121, 123-124).

should not be treated on the same footing….Mach's idea that mass there determines inertia here has its complete mathematical account in Einstein's geometrodynamic law. "Point out, please," the anti-Machian critic says, "the masses responsible for this inertia." In answer, recall that Einstein's theory includes not only the geometrodynamic law, but also, in Einstein's view, the boundary condition that the universe be closed….This mass-energy, real or effective, is to be viewed as responsible for the inertial properties of the test particle that at first sight looked all alone in the universe.[240]

It would be no surprise to find the same reasoning in Einstein's thinking. I will interject explanations in brackets so the reader can follow Einstein's flow of thought in concrete terms:

Let K [the universe] be a Galilean-Newtonian coordinate system [a system of three dimensions extending to the edge of the universe], and let K′ [the Earth] be a coordinate system rotating uniformly relative to K [the universe]. Then centrifugal forces would be in effect for masses at rest in the K′ coordinate system [the Earth], while no such forces would be present for objects at rest in K [the universe]. Already Newton viewed this as proof that the rotation of K′ [the Earth] had to be considered as "absolute," and that K′ [the Earth] could not then be treated as the "resting" frame of K [the universe]. Yet, as E. Mach has shown, this argument is not sound. One need not view the existence of such centrifugal forces as originating from the motion of K′ [the Earth]; one could just as well account for them as resulting from the average rotational effect of distant, detectable masses as evidenced in the vicinity of K′ [the Earth], whereby K′ [the Earth] is treated as being at rest. If Newtonian mechanics disallow such a view, then this could very well be the foundation for the defects of that theory…[241]

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[240] Misner, Thorne and Wheeler, *Gravitation*, pp. 547-549. NB: the authors cite the work of Thirring and Lense work of 1918 and 1921 (which Einstein also cited in his book *The Meaning of Relativity*).

[241] Hans Thirring, "Über die Wirkung rotierender ferner Massen in der Einsteinschen Gravitationstheorie," *Physikalische Zeitschrift* 19, 33, 1918, translated: "On the Effect of Rotating Distant Masses in Einstein's Theory of Gravitation." Three years later, Thirring made a correction and wrote the essay: "Berichtigung zu meiner Arbeit: 'Über die Wirkung rotierender ferner Massen in der Einsteinschen Gravitationstheorie,'" *Physikalische Zeitschrift* 22, 29 (1921),

In other words, Einstein has confirmed that a universe in rotation around the Earth would produce the same centrifugal and Coriolis forces attributed to a rotating Earth in a fixed universe. In essence, what Einstein attempted to take away with Special Relativity (to avoid the intractable problems precipitated by the Michelson-Morley experiment), he must now give back with General Relativity and admit that his entire scheme leads inevitably back to the "unthinkable" position that the Earth is immobile in the center of the universe.

Thirring's Geocentrism

Adding to the discussion, Misner, *et al*., make reference to the work of **Hans Thirring** as offering support for their conclusions. In his 1918 paper, Thirring examined the motion of rotating bodies. His purpose was to determine how the universe, if it were a rotating shell, would affect movement on Earth (*e.g.*, Foucault pendulums, wind currents, weather satellites). Inadvertently, it provided Thirring with a mathematical model for a geocentric universe. Thirring found that objects would move as we normally see them move, but with an additional force pulling away from the center and thus opposite the pull of gravity. After five pages of tensor calculus, Thirring makes some preliminary conclusions, but with a new discovery. He writes:
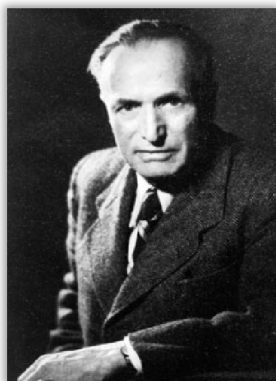
> As one can see, the first terms of the X and Y components correspond to the Coriolis force, and the second terms correspond to the centrifugal force. The third equation yields the surprising result that the centrifugal force possesses an axial component.[242]

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translated: "Correction to my paper 'On the Effect of Rotating Distant Masses in Einstein's Theory of Gravitation.'" Thirring wrote: "Hence, over and against my original formula, the Coriolis force remains unchanged. However, a factor of 4/5 has to be included in the term containing the centrifugal force….The fundamental result of my paper (the appearance of centrifugal and Coriolis forces in the gravitational field of rotating distant masses) remains completely unchanged. H. Thirring, Vienna, October 15, 1920."

[242] *Ibid*., p. 37.

The "axial component" is the force that pulls toward the equator and is in addition to the radial or outward force we normally associate with centrifugal force. (As we note below, it is the axial component that is now being associated with the recent discovery of "frame-dragging"). **Thirring** explains this "new" component as follows:

> As seen by an observer-at-rest, those surface elements of the hollow sphere which are nearest the equator have a greater velocity, and hence also a greater apparent (inertial and gravitational) mass than those about the poles. The field of a rotating hollow sphere of uniform surface density is therefore conformable to the field of a spherical shell at rest for which the surface density increases with increasing polar angle, θ. That is, points away from the equatorial plane are drawn towards the equatorial plane.[243]

In other words, being a believer in Relativity and preferring Copernicanism, Thirring attempts to explain the pull toward the Earth's equator by saying that objects near the equator attain more mass than objects at the poles since the former are moving faster, (*i.e.*, 1054 mph in Earth's rotation as opposed to practically zero rotation at the poles). Relativity proposes that objects in motion have more mass than immobile objects, thus, it is the "extra mass" in motion that is creating the axial centrifugal force.

Moreover, letting Relativity do its work, Thirring says that the above situation would be the same if the Earth were fixed and the surrounding rotating shell (*i.e.*, the universe) had the equatorial part of its shell possess a greater thickness than its poles. This is quite an inviting proposal to a geocentrist since it provides not only the cosmological origin of the axial component, but also a component for the origin of the force necessary for the universe to precess, or wobble, as it turns, thus creating the seasons and many of the other precessional phenomena we observe in the sky. The reason the tilt never accrues to more than 23.5 degrees is that the axial force keeps bringing the universe back to the equatorial plane, all such motion pivoting on the barycenter, the Earth.

As in all gyroscopes, the center of mass does not move, and thus the universe can rotate and precess without ever disturbing the Earth. This is so since all such forces, whether gravitational, centrifugal, or Coriolis, will

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[243] *Ibid*., p. 37. Thirring adds: "We also note in passing that it is easy to visualize that in the interior of such a hollow sphere of unequal surface density, forces appear analogous to the centrifugal forces."

act on the very center of the mass (in this instance, the very center of the Earth). As Newton himself noted about gravity, it is as if all the gravitational force is directed to the very center of the Earth. Anything that is materially and solidly attached to the center (as is the rest of the radius of the Earth) will likewise take part in the forces directed at the very center. Any temporary detachment, such as a shifting of the mantel from the core, may reveal itself in some kind of cataclysm at the surface (earthquake, volcano).

Thirring goes on to state: "Finally, from equation 25 we can see that if body and sphere rotate in the same sense, then there results a reduction in the centrifugal and Coriolis forces."[244] That is, if both the universe and the Earth were rotating, the centrifugal and Coriolis forces would be less than they are presently. At first, Thirring thought he might have an error in his calculations, but as it turned out, the forces had the same magnitude as centrifugal and Coriolis forces (the same forces that Einstein spoke about as occurring in his rotating "heavy shell of matter"). As Thirring notes in his concluding remark:

> By means of a concrete example it has been shown that in an Einsteinian gravitational field, caused by distant rotating masses, forces appear which are analogous to the centrifugal and Coriolis forces.

Thus Thirring found what had eluded heliocentric mechanics since the time of Newton, that is, a physical explanation for centrifugal and Coriolis forces. The reason for this is obvious: Thirring included the mass of the universe in his calculations, whereas heliocentric mechanics limits itself to explaining force and movement to masses in the local system. In any case, Thirring discovered that centrifugal and Coriolis forces are caused by the forces in the universe, and thus they are outward gravitational forces. When a ball is swung on a rope, the reason the ball moves outward is that it is being attracted by the gravity of all the objects in the universe. (Newtonian mechanics has no physical explanation for the ball's outward tug on the string). The very act of rotation introduces us to the connection between the ball and the stars. Similarly, the reason a Foucault pendulum forms a parabola is not necessarily because the Earth underneath is rotating, but because the forces from the cosmos are dragging the free-moving pendulum. As such, Misner's, *et al*. appeal to Relativistic "frame dragging" to explain a particular motion is discounted in favor of a real and physical frame-dragging – that of the pendulum

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[244] *Ibid*. p. 39.

"frame" itself moved by the force of the cosmos against the fixed "frame" of Earth.

Recently NASA's Joint Center for Earth Systems Technology headed by Erricos Pavlis, along with Ignazio Cuifolini of the University of Lecce, made claims of confirming Einstein's General Relativity by measuring the long-awaited Lense-Thirring effect. The effect shows itself as a "precession of the satellite's node on the equatorial plane," and is said to be caused by the

> Earth's rotation…which curves space-time in its vicinity…creating 'mass' currents, in analogy to magnetic currents in electrodynamics….Our new result agrees with the GR theory to 99% ± 5%.[245]

These results, however, do not prove either General Relativity or a rotating Earth. In fact, as noted above, Thirring's original 1918 model theorized the universe as a rotating shell around a fixed-Earth as opposed to a rotating Earth in a fixed-universe. Thirring realized that in Einstein's theory "the required equivalence appears to be guaranteed by the general covariance of the field equations,"[246] and thus any claims that the additional force discovered by Thirring is proof of a rotating Earth is simply ignoring the very foundation of both Einstein's and Thirring's work. In fact, the Lense-Thirring effect leans toward a rotating universe since it is easier to see how the large mass of the universe would drag the matter inside of it as opposed to the small Earth trying to accomplish a similar task.

In any case, Thirring's tensor calculus revealed that there was an additional gravitational field (the axial component) caused by the rotation of the shell, although small enough that it had not been detected until the work of Pavlis and Cuifolini.

Joseph Lense joined Thirring and made more calculations, this time replacing the rotating shell by a rotating solid sphere, and still the same forces appeared.[247] The importance of the discovery is accentuated by the

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[245] Ben Chao, NASA Space Geodesy Branch, Code 926, Goddard Space Flight, Nov. 1, 2004. I. Ciufolini, E. C. Pavlis. "A Confirmation of the General Relativistic Prediction of the Lense-Thirring Effect," *Nature*, 431, 958-60, October 21, 2004.

[246] Thirring, p. 33.

[247] Joseph Lense and Hans Thirring, "Über den Einfluss der Eigenrotation der Zentralkörper auf die Bewegung der Planeten und Monde nach der Einsteinschen Gravitationstheorie," *Physikalische Zeitschrift* 19, 156-163 (1918), translated: "On the Influence of the Proper Rotation of Central Bodies on the Motions of Planets

fact that Newtonian mechanics did not incorporate such a force. Consequently, since proponents of General Relativity understand Einstein's theory as filling in the gaps of Newtonian mechanics, it is natural for them to seek an explanation of the Lense-Thirring effect by recourse to Einstein's concept of "frame-dragging," thus positing that the supposedly rotating Earth was "dragging" part of the space-time continuum and thus producing a small force, which they then turned into "proof" of General Relativity.
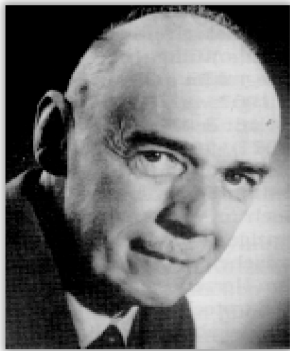
In reality, however, the Lense-Thirring effect proved only that the movement of the surrounding object against its center creates a small force. Again, since Lense-Thirring found that the force created by the rotating object was directed away from the center, and thus opposite the pull of gravity, the larger forces would be analogous to the centrifugal and Coriolis forces that have long been without a mechanical explanation in Newtonian mechanics. This is why General Relativity had to borrow from Machian mechanics, saving face for the theory by mathematically creating the presence of "gravitational potentials" which supplied the forces that pulled away from the center of the object in view.

Interestingly enough, these results also coincide with the Michelson-Morley experiment and the remaining interferometer experiments up to Joos in 1932. Each of the interferometers found a small positive result, coinciding with an ether drift of about 1-4 km/sec. If this can be attributed to the rotation of the universe wherein the 1-4 km/sec is the residual drift of that which is much greater at the rim of the universe, we have the substance of the mechanical properties needed to transport the required forces. In other words, the rim of the universe (which is analogous to the "shell" in Lense-Thirring terminology) are the layers above the firmament which, in rotation, cause the centrifugal and Coriolis forces felt on Earth, and which are then transported from the rim to the Earth by the ether,

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and Moons According to Einstein's Theory of Gravitation." They write: "…the rotation of distant masses produces a gravitational field equivalent to a centrifugal field. From another perspective it seems interesting now, by the same means, to perform the not too difficult task of integrating the field equations for a rotating solid sphere. In the Newtonian theory one can exactly replace the field in the space surrounding a (stationary or rotating) sphere of incomprehensible fluid as equivalent to that of a point mass; but for a rotating sphere this is not the case. In the latter case…there appear supplementary terms corresponding to centrifugal and Coriolis forces" (p. 156).

detected in all interferometer experiments. Not knowing any better, Thirring tries to explain the previous undetectability of the centrifugal axial component by saying:

> The fact that in nature we only have been able to observe a radial, but never an axial component of the centrifugal force can be brought into agreement with the results obtained here by noting that the approximation of the heaven of fixed stars by means of an infinitesimally thin hollow sphere is certainly not physical.[248]

We maintain, however, that the "hollow sphere" is physical, and thus the recent discovery of the frame-dragging effect has a physical cause, not a "space-time" cause. The tremendous centrifugal forces created by the rotating universe are the forces that counterbalance the force of gravity. The centrifugal force is the weakest near the Earth and the strongest near the rim of the universe. Since gravity on Earth is not overcome by the centrifugal force, objects can cling to the Earth. But if an object on Earth reaches a certain speed (which we know as "escape velocity"), then it joins the centrifugal force. As such, the sun and planets are positioned so precisely around the Earth that the centrifugal forces balance the gravitational force and thus all the bodies remain in their balanced positions, and the balance is felt as inertia, by which they maintain the regularity of their orbits.

Lense and Thirring are not the only modern physicists and mathematicians to posit the plausibility of a fixed-Earth within a rotating universe. Granted, none of these scientists introduce their findings by stating they have accepted geocentrism as a scientific fact; rather, they affirm they have accepted the scientific principle that the same forces claimed for a heliocentric model can be applied equally well to a geocentric universe.

Rosser's Geocentrism

Strange to tell, the "unthinkable" geocentric universe finds rich support from the very theory designed to banish it once and for all, General Relativity. Consider, for example, one of the main objections raised by newcomers to geocentrism, that the Earth cannot rest immobile at the center of the universe since it would be impossible for the stars to revolve around the Earth at such tremendous speeds, speeds thousands of

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[248] *Ibid.*, p. 38.

times faster than the speed of light. The common objection, which is based on Einstein's postulate, is: "Nothing can go faster than the speed of light." The answer to this objection often comes as a shock, but it is a fact nonetheless. First, according to Einstein's very own Relativity theory, the objection would only apply to Special Relativity, in the absence of a gravitational field (as noted earlier, even in that case, Einstein had to modify this tenet). According to Einstein's more advanced General Relativity theory, anything can go faster than the speed of light (a fact not often admitted by Relativists with a bias toward shutting out alternative models). Earlier we cited William G. V. Rosser addressing this concept, and it is worth repeating, since so many people are misinformed about what Relativity allows and disallows:

> Relative to the stationary roundabout [the Earth], the distant stars would have a velocity $r\omega$ [radius x angular velocity] and for sufficiently large values of r, the stars would be moving relative to O' [the observer] with linear velocities exceeding 3×10^8 m/sec, the terrestrial value of the velocity of light. At first sight this appears to be a contradiction…that the velocities of all material bodies must be less than c [the speed of light]. However, the restriction $u < c = 3 \times 10^8$ m/sec is restricted to the theory of Special Relativity. According to the General theory, it is possible to choose local reference frames in which, over a limited volume of space, there is no gravitational field, and relative to such a reference frame the velocity of light is equal to c. However, this is not true when gravitational fields are present. In addition to the lengths of rods and the rates of clocks the velocity of light is affected by a gravitational field. If gravitational fields are present the velocities of either material bodies or of light can assume *any numerical value* depending on the strength of the gravitational field. If one considers the rotating roundabout as being at rest, the centrifugal gravitational field assumes enormous values at large distances, and it is consistent with the theory of General Relativity for the velocities of distant bodies to exceed 3×10^8 m/sec under these conditions.[249]

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[249] *An Introduction to the Theory of Relativity*, William G. V. Rosser, 1964, p. 460, italics and comments in brackets added. Rosser adds: "Relative to an inertial frame the 'fixed' stars are at rest or moving with uniform velocity. However, relative to a reference frame accelerating relative to an inertial frame the stars are accelerating. It is quite feasible that accelerating masses give different gravitational forces from the gravitational forces due to the same masses when

As we noted earlier, Einstein admitted to this very principle, and some critics used it to posit a major contradiction between Special and General Relativity. Einstein writes:

> In the second place our result shows that, according to the general theory of relativity, the law of the constancy of the velocity of light *in vacuo*, which constitutes one of the two fundamental assumptions in the special theory of relativity and to which we have already frequently referred, cannot claim any unlimited validity. A curvature of rays of light can only take place when the velocity of propagation of light varies with position. Now we might think that as a consequence of this, the special theory of relativity and with it the whole theory of relativity would be laid in the dust. But in reality this is not the case. We can only conclude that the special theory of relativity cannot claim an unlimited domain of validity; its results hold only so long as we are able to disregard the influences of gravitational fields on the phenomena (*e.g.*, of light).[250]

As Rosser freely admits, General Relativity really has no choice in the matter. It must possess the inherent ability to make any point in the universe the center and produce coordinate transformations in accord with that center. Once it picks its center, then all the gravitational forces in the universe must balance. Hence, if an immobile Earth is chosen as the center, then all the forces in the universe will combine together such that,

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they are moving with uniform velocity. Thus the conditions in an accelerating reference frame are different from the conditions in inertial frames, since the stars are accelerating relative to the accelerating reference frame. It seems plausible to try to interpret inertial forces as gravitational forces due to the accelerations of the stars relative to the reference frame chosen." Einstein was criticized on this very point by Ph. Lenard in a 1917 open debate, later published in 1920. Lenard stated: "superluminal velocities seem really to create a difficulty for the principle of relativity; given that they arise in relation to an arbitrary body, as soon as they are attributed not to the body, but to the whole world, something which the principle of relativity in its simplest and heretofore existing form allows as equivalent" ("Allgemeine Diskussion über Relativitätstheorie," *Physikalische Zeitschrift*, 1920, pp. 666-668, cited in Kostro's *Einstein and the Ether*, p. 87). As an aside, Rosser also points out the following: "It has often been suggested that a direct experimental check of the principle of the constancy of the velocity of light is impossible, since one would have to assume it to be true to synchronize the spatially separated clocks" (*ibid.*, p. 133).

[250] Albert Einstein, *Relativity: The Special and the General Theory*, authorized translation by Robert W. Lawson, 1961, p. 85.

when Einstein's field equations are employed to calculate the forces, they will balance out just as when Einstein employed them for a moving Earth. In other words, one can choose any center and reformulate the relative forces of the entire universe from the perspective of that particular center using the mathematics of General Relativity. This application is understood as the "strong" principle of Relativity. If such a reciprocal relationship did not exist between respectively chosen centers, then General Relativity would be falsified; and if General Relativity is falsified, then modern science lacks any answer to the experiments which have demonstrated both a motionless Earth (Michelson-Morley, *et al.*) and absolute space (Sagnac, Michelson-Gale, *et al.*), and we are back to geocentrism in any case. Hence, General Relativity has uniquely fulfilled the qualifications of the proverbial dog chasing its tail.

Bondi's Geocentrism

Like the rest of the physicists to whom we ascribe the word "geocentrism" in this chapter, Sir Hermann Bondi (d. 2005) would not refer to himself as a geocentrist. He, nevertheless, would be one of the first to admit that modern physics ably defends geocentric cosmology. This becomes abundantly clear in a 1994 paper Bondi wrote titled: "Angular Momentum of Cylindrical Systems in General Relativity."[251]

Bondi discovered two important facts from General Relativity that can be employed to defend geocentrism. First, Bondi derived and quantified what has been traditionally known as angular momentum, discovering in the process that the universe's cylindrical symmetry

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[251] Royal Society Proceedings, Series A - Mathematical and Physical Sciences, vol. 446, no. 1926, July 8, 1994, pp. 57-66.

prohibits gravitational waves from carrying angular momentum. This finding resolves a critique of geocentrism which posited that, to conserve angular momentum, the universe would slow down if a mass is raised on Earth and accelerate if the same mass were lowered. Bondi showed that, according to General Relativity, this is not the case, and thus the criticism is neutralized. Related to the above, Bondi also discovered that, according to General Relativity, all the mass beyond the Schwarzschild radius (where the tangential speed of the universe exceeds c) can be ignored, since it will contribute nothing more to the frame dragging and centrifugal forces already present. He writes:

> The main point to note is that whereas in the newtonian, non-rotation of the reference system at infinity is taken for granted, in the relativistic treatment such rotation is permitted but irrelevant to the measure of angular momentum, which is an intrinsic characteristic of the material system….What is the nature of this limit? For such a cylinder the required angular velocity makes the tangential velocity at $r = r_2$ equal to the speed of light….Both the space drag on the core and A [angular momentum] will be unaffected by such outside layers….The conservation of A occurs even if gravitational waves are emitted by the cylinder. This is perhaps not surprising, since the cylindrical symmetry of the waves precludes their carrying angular momentum…. Therefore the intrinsic nature of the angular momentum of the inner becomes patent as it is wholly unaffected by anything that goes on outside. Thus there is no transfer of angular momentum between outer and inner.[252]

Bondi arrived at the above derivation a little earlier in his paper:

> It is a remarkable fact, discussed later, and of some relevance to Machian considerations, that this unique conserved measure of angular momentum appropriate to the symmetry imposed is independent of any superposed state of rotation.[253]

The same conclusion was stated in a different way in Bondi's abstract: "It emerges that angular momentum and space drag behave very

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[252] "Angular Momentum of Cylindrical Systems in General Relativity Royal Society Proceedings," Series A - Mathematical and Physical Sciences, vol. 446, no. 1926, July 8, 1994, pp. 63-64.
[253] *Ibid.*, p. 61. My thanks to Martin Selbrede for bringing Bondi's paper to my attention, and his help in analyzing it.

differently as thicker and thicker spinning cylinders are studied."[254] Hence, from the perspective of General Relativity, Bondi makes geocentrism completely feasible. That is, if the argument against geocentrism that appeals to the conservation of angular momentum is valid, it would violate the strong principle of Relativity. To rescue Relativity theory from this failure, Bondi, by means of his meticulous tensor analysis, has simultaneously refuted the objection as it has traditionally been directed against geocentrism. The angular velocities used by Bondi are completely compatible with geocentric mechanics, since his analysis specifically validates cosmologies which have rotations at tangential velocities far greater than the speed of light.

The Lemaître-Tolman-Bondi Model

Another aspect of Bondi's teaching that makes geocentrism feasible is his development, along with Georges Lemaître and Richard Tolman, of the spherically symmetrical expanding universe.[255] Einstein's field equations allow at least two possible universes that were, more or less, diametrically opposed to one another: an isotropic homogeneous universe or an isotropic inhomogeneous universe. The former is the model that eventually developed into the Big Bang theory. As we noted earlier, such a universe will appear the same from every direction, and thus it has no center or distinguishing point. Today this model generally goes by the name of the Lemaître-Robertson-Walker model. But Einstein's field equations also allowed a spherical universe with a center, which was developed by Lemaître, and later by Tolman, Bondi and a few others. As we noted in Chapter 2 in the discussion of Stephen Hawking's "modesty," in a spherical universe with a center (and most likely with Earth in that very center), few Relativists admit the fact that Lemaître introduced a prior model. This model was non-homogeneous and isotropic, and thus it necessarily comprised a center, that is, a distinct place from which the view of the universe would be unique. This is commonly known among physicists today as the Lemaître-Tolman-Bondi model.

Astrophysicist George Ellis, who, we noted previously, advocated that the Earth is in a central location in the universe, affirmed the Tolman-Bondi model in his award-winning 1978 paper. His abstract states:

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[254] *Ibid*., p. 57.

[255] Hermann Bondi, "Spherically Symmetrical Models in General Relativity," *Monthly Notices of the Royal Astronomical Society*, vol. 107, Nos. 5, 6, 1947, pp. 410-425. By "spherically symmetrical" Bondi means there is a center to the universe. He says as much in his paper: "We shall show that in our spherically symmetrical universe with the standard source at its center…" (*ibid*., p. 413).

It is shown that spherically symmetric static general relativistic cosmological space-times can reproduce the same cosmological observations as the currently favored Friedmann-Robertson-Walker universes, if the usual assumptions are made about the local physical laws determining the behavior of matter, provided that the universe is inhomogeneous and our galaxy is situated close to one of its centers.[256]

Ellis adds that only three things can lead us to conclude that the universe we live in is not such a static space-time spherically symmetric universe: "(i) unverifiable a priori assumptions, (ii) detailed physical and astrophysical arguments, or (iii) observation of the time variation of cosmological quantities" and concludes:

…the standard models of a principle of uniformity (the cosmological or Copernican principle). This is assumed for *a priori* reasons and not tested by observations. However, it is precisely this principle that we wish to call into question. The static inhomogeneous model discussed in this paper shows that the usual unambiguous deduction that the universe is expanding is a consequence of an unverified assumption, namely, the uniformity assumption. *This assumption is made because it is believed to be unreasonable that we should be near the center of the Universe*. [Ellis adds footnote here citing Steven Weinberg's *Gravitation and Cosmology*, 1972].[257]

As we noted previously, the inhomogeneous models of the universe were being proposed mainly because too many problems were cropping up in the homogeneous models. Modern cosmology was, as the saying goes, 'caught between a rock and a hard place.' Accepting the homogeneous

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[256] George F. R. Ellis, "Is the Universe Expanding?" *General Relativity and Gravitation*, vol. 9, no. 2, February, 1978, p. 87.

[257] George F. R. Ellis, "Is the Universe Expanding?" *General Relativity and Gravitation*, vol. 9, no. 2, February, 1978, p. 87. In a subsequent work, Ellis, et al., state: "The problem is that while isotropy is directly observable, homogeneity (on a cosmological scale) is not. In the standard discussions the assumption of homogeneity is made *a priori*, either directly, or in some equivalent form (*e.g.*, as the assumption that the Universe is isotropic for *all* observers), and so is not subjected to observational verification. Accordingly the standard 'proof' of the expansion of the Universe is based on an unverified *a priori* assumption" (George F. R. Ellis, R. Maartens and S. D. Nel, "The Expansion of the Universe," *Monthly Notices of the Royal Astronomical Society*, 184, 1978, p. 440).

models would produce universes that would either explode or implode. If they accepted the inhomogeneous model, they also had to accept the distinct possibility of an Earth-centered universe, which was apt to be rejected on "philosophical grounds." To their consternation, cosmologists were producing very stable inhomogeneous universes, and doing so, ironically, with Einstein's field equations.[258] Yet, as Gerard de Vaucouleurs noted:

> With few exceptions, modern theories of cosmology have come to be variations on the homogeneous, isotropic models of general relativity. Other theories are usually referred to as 'unorthodox,' probably as a warning to students against heresy. When inhomogeneities [read: theories that can lead to an Earth-centered universe] are considered (if at all), they are treated as unimportant fluctuations amenable to first-order variational treatment.[259]

Brill and Cohen's Geocentrism

In regard to the Schwarzschild radius and the Machian principle for geocentrism, Dieter R. Brill and Jeffrey M. Cohen write:

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[258] Summary analysis by Andrzej Krasinski, *Inhomogeneous Cosmological Models*, University of Cambridge Press, 1997; George A. Lemaître, *The Expanding Universe*, 1933 Ann. Soc. Sci Bruxelles A53 51 (French), reprinted in 1997 in *General Relativity and Gravitation*, 29, 641; Hermann Bondi, "Spherically Symmetrical Models in General Relativity," *Monthly Notices of the Royal Astronomical Society*, vol. 107, 410B, 1947; Richard Tolman, The Effect of Inhomogeneity on Cosmological Models, 1934 Proceedings of the National Academy of Sciences, 20 169, reprinted in 1997 General Relativity and Gravitation, 29 935; A. Krasinski A and C. Hellaby, "Structure Formation in the Lemaître-Tolman model," *Physical Review*, D65 023501, 2002; Guy C. Omer, Jr., "A Nonhomogeneous Cosmological Model," *The Astrophysical Journal*, vol. 109, 1949, pp. 164-176; Ronald Kantowski, "The Coma Cluster as a Spherical Inhomogeneity in Relativistic Dust," *The Astrophysical Journal*, vol. 155, March 1969; Gerard de Vaucouleurs, Science, "The Case for a Hierarchial Cosmology," vol. 167, No. 3922, Feb. 27, 1970; W. B. Bonnor, "A Non-Uniform Relativistic Cosmological Model," *Monthly Notices of the Royal Astronomical Society*, 159, 1972, pp. 261-268; Stamatia Mavrides, "Anomalous Hubble Expansion and Inhomogeneous Cosmological Models," *Monthly Notices of the Royal Astronomical Society*, 177, 1976, pp. 709-716.
[259] Gerard de Vaucouleurs, "The Case for a Hierarchial Cosmology," *Science*, vol. 167, No. 3922, 1970, p. 1204.

"[T]here is general agreement that the dragging along of inertial frames by rotating masses is a Machian effect. In particular, for mass shells comprising more nearly *all* the matter in the universe than those treated by Thirring, Mach's principle suggests that the inertial properties of space inside the shell no longer depend on the inertial frame at infinity, but are completely determined by the shell itself….A shell of matter of radius equal to its Schwarzschild radius has often been taken as an idealized cosmological model of our universe. Our result shows that in such a model there cannot be a rotation of the local inertial frame in the center relative to the large masses in the universe. In this sense our result explains why the 'fixed stars' are indeed fixed in our inertial frame, and in this sense the result is consistent with Mach's principle"[260]

In this statement, Brill and Cohen agree with the above findings of Bondi concerning the irrelevance of the region beyond the Schwarzschild radius in determining inertial effects. But more importantly, they show that "there cannot be a rotation of the local inertial frame in the center relative to the large masses in the universe," which means either the shell of "fixed stars" must be fixed around a rotating center, or the center must be the fixed point for a revolving shell, since, as they say, "the result is consistent with Mach's principle."

Moon and Spencer's Geocentrism

The late M.I.T. professor Parry Moon and her partner Domina Spencer had been on the forefront of spelling out the unsettling implications of Relativity theory since their paper on Mach's principle first appeared in 1956. Not only did they perform experiments refuting Einstein's postulate on the speed of light, they demonstrated by the use of the concept of universal time that space must be explained in terms of Euclidean geometry.[261] Moon and Spencer also showed the disastrous implications for Relativity from both the 1913 Sagnac experiment and the 1924 Michelson-Gale experiment.[262] All in all, their findings left geocentrism as a viable concern, with no evidence to refute its plausibility.

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[260] Dieter R. Brill and Jeffrey M. Cohen, "Rotating Masses and Their Effect on Inertial Frames," *Physical Review*, 143, Issue 4, March 25, 1966, pp. 1012, 1014.

[261] Parry Moon and Domina Spencer, "Mach's Principle," *Philosophy of Science*, 26, 1959, pp. 125-35.

[262] Parry Moon, Domina Eberle Spencer and Euclid Eberle Moon, "The Michelson-Gale Experiment and its Effects on the Postulates of the Velocity of

Møller's Geocentrism

Just a few years before Moon and Spencer, C. Møller published his *The Theory of Relativity* which took Einstein's thought to its logical conclusion: what happens if instead of having the Earth rotate, we make the universe revolve around the Earth? Møller used a ring model instead of Thirring's shell but came to the same conclusion as Thirring: a universe moving around the Earth cannot be denied. He writes:

> …we may expect that a rotating spherical shell of uniform mass density will produce effects inside the shell similar to the rotation of the distant celestial masses….For a rotating shell of matter, however, Thirring found the interesting result that the field in the interior of the shell…is similar to the field in a rotating system of co-ordinates, thus leading to gravitational forces similar to the usual centrifugal and Coriolis forces. We shall here consider the somewhat simpler case of a rotating massive ring of rest mass M_0 and radius R, which is rotating clockwise in the *xy*-plane with angular velocity ω.[263]

He then concludes:

> …the above considerations suggest a connection between the gravitational constant κ, the total mass M in the world [universe], and the mean distance R of the distant celestial masses, of the type $M\kappa c^2/4\pi R \approx 1$. It is interesting that the dependence on the angular velocity of the gravitational forces inside a rotating shell is exactly the same as in a rotating system of reference.[264]

Perhaps frightened at the results, Møller excised them from his second edition published twenty years later, even though the Thirring model was widely available for public reading.

Light," *Physics Essays* 3, No. 4, 1990, pp. 421-428; Parry Moon, Domina Eberle Spencer and Shama Y. Uma, "The Sagnac Effect and the Postulates of the Velocity of Light," *Physics Essays* 4, No. 2, 1991, pp. 242-252.
[263] C. Møller, *The Theory of Relativity*, 1952, pp. 317-318.
[264] *Ibid*., p. 320.

Brown's Geocentrism

Still in the same decade, G. Burniston Brown did something even more remarkable. Although it had been commonly thought that Newtonian mechanics supported only a heliocentric solar system, Brown showed how Newton's formulas serve the geocentric model just as well. Similar to Hoyle's analysis noted earlier, Brown sought to give an explanation of inertia "in terms of the total amount of matter in the universe and its distribution," which, we might add, is similar to the concept of a universal plenum appearing in various geocentric models. Brown then used this concept to explain other physical phenomena (red-shift, planetary perihelion, electromagnetic induction, etc.) by means of "non-instantaneous action-at-a-distance" (*e.g.*, force moving no faster than the speed of light). To find the origin of, and to calculate the inertial forces, Brown uses the geocentric model of a rotating universe revolving around a stationary Earth:

> …we can inquire into the problem of inertia. If this is not due to movement with respect to "absolute space," it ought to be due to surrounding matter, as suggested by Bishop Berkeley when criticizing Newton, and later by Mach. Now the evidence of astronomical observation at the present time is that the matter of the universe is distributed more or less uniformly, and to about the same distance in all directions. We must therefore consider the force on a moving body at the center of a spherical distribution of matter of uniform density ρ (dynamical units) and radius R. Using the postulate of physical relativity, we can take our particle of mass *m* [Earth] to be at the centre of coordinates, and the universe moving in the opposite direction.[265]

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[265] G. B. Brown, "A Theory of Action at a Distance," *Proceedings of the Physical Society* B, 1955, vol. 68, p. 676. Brown continues: "On calculating the force…we find that for a steady velocity the force of the universe on *m* is zero, but for an acceleration *f* there is an opposing force equal to $-(4/3)(\pi m\rho R^2/c^2)(f)$. If we take this to be the force of inertia and write m_1 for the inertial mass, we shall have $F = m_1 f = 4/3\ \pi\rho R^2/c2$ (*mf*). Thus the ratio of the attractive mass to the inertial mass of a body…should be given by $3c^2/4\pi\rho R^2$ or $G = 9c^4/16\pi^2\rho^2 R^4$. Taking G = 6.7 × 10^{-8} and R = 2 × 10^{27} cm [which is very close to Van Flandern's figure of 3.2 × 10^{27}cm] we can calculate the mean density of matter in the universe…which yields 10^{-27} g/cm^{-3}, a result which agrees with present estimates (Zwicky 1952)." Brown also realized that "Stellar aberration therefore confirms a very important fact: we know the one-way velocity of light" (Letter to a Mr. Stout, October 15, 1980, copy on file).

Nightingale's Geocentrism

About twenty years later, J. David Nightingale transposed the Einsteinian equation of Mach's principle in terms of classical Newtonian physics, demonstrating the viability of a fixed Earth in a rotating universe.[266] Another twenty years passed, and the science community was still employing the geocentric model to establish Mach's principle.

Lynden-Bell's Geocentrism

D. Lynden-Bell, J. Katz, and J. Bičák wrote a ground-breaking paper on the relation between inertial frames and angular momentum. They also refer to Lense and Thirring (1918) who, they say, "showed that, indeed, a rotating massive bucket many leagues thick [in answer to Mach's query] would drag around a Foucault pendulum…" They refer to the above paper by Brill and Cohen "who demonstrated that such dragging becomes complete when the radius of a massive rotating sphere reaches its

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[266] J. David Nightingale, "Specific Physical Consequences of Mach's Principle," *American Journal of Physics*, 1977, vol. 45, pp. 376-379. The Einstein equation of Mach's principle was stated in his 1956 book *The Meaning of Relativity*, 5th edition, formula 118, p. 102 as $d/dt\ [(1 + \sigma)v] = c^2\nabla\sigma + \partial A/\partial t - [v \times (\nabla \times A)]$ where $1 + \sigma$ inert mass (*i.e.*, the Earth); $\partial A/\partial t$ is the inductive action of a large accelerated mass (*i.e.*, the Universe); and the $[v \times (\nabla\times A)]$ represent the Coriolis force. Nightingale transposes this to the Newtonian formula: $d/dt\ [m_t (1 + \sigma)v] = m_t c^2\ \sigma$ and finally $d/dt\ [(1 + \sigma)v] = c^2\nabla\sigma + (4GM/rc^2)f$, where f = acceleration of *M*. After working out the equations he concludes: "It is interesting to note that, if we take away the entire mass of the observable universe (10^{79} baryons?), which for the sake of argument is situated on a 'celestial sphere' of average radius *r*, we find….It would not be unreasonable to contemplate that the inertial mass of a small test particle [*i.e.*, Earth] could be entirely due to the mass of the observable universe...if *M* is taken to be the mass of the universe, the ratio of the accelerations is approximately 1:1. Thus, whatever wobbles the entire universe most certainly, according to Eq. 6 [$…(4GM/rc^2)f…$] wobbles us likewise." As Misner, Thorne and Wheeler demonstrated, in this sense the Earth will be held in position by the entire universe, and any attempt to move the Earth will first have to move the universe. Nightingale also anticipates the "frame dragging" effect predicted by Thirring and Lense as he demonstrates the mathematical results of a ring rotating around a small test object (*ibid.*, p. 377). In the geocentric model these are attributed to "dragging" effects of the ether that holds the composite of all the forces generated by the rotating universe, and these components can easily be applied to Einstein's equation of Mach's principle noted above.

Schwarzschild radius. Thus Mach's question is fully vindicated."[267] The Machian principle was further reinforced by Lindblom and Brill (1974) concerning their work on a massive spherical shell in free fall, which investigation "showed the remarkable result that the inertial frame inside such an infalling slowly rotating shell rotates uniformly at each moment…consistent with Wheeler's (1964) interpretation."[268]

The Lynden-Bell team stresses several times their "general proof that the angular momentum of any closed universe is zero," which is to be expected in a spherical universe containing equal mass distribution. Interestingly enough, the null value for the angular momentum will provide the fixed and undisturbed cradle for the barycenter, the Earth, and thus Mach's principle has inadvertently vindicated geocentrism.

Immediately after the above relationship is established, Lynden-Bell then cite Embacher (1988) who "has demonstrated that both dragging and centrifugal effects occur with the correct ratio within systems of rotating cylinders."[269] In other words, even though the rotating universe generates no angular momentum to twist or rotate the Earth, it nevertheless generates other forces that are at work on the Earth's surface (*e.g.*, axial centrifugal force or "dragging effects"; radial centrifugal forces and Coriolis forces).

In the end, Lynden-Bell completely exonerate Mach's principle, at least, as they say, "if the universe is closed." In one of their concluding statements they write:

> Therefore motions in a closed universe do provide a complete determination of the $h_0 k$. Thus the observable motions of the heavenly bodies do in this sense provide the inertial frame, just as Mach supposed. THIS IS OUR PRIMARY RESULT.[270]

Barbour and Bertotti's Geocentrism

Considering that Lynden-Bell's paper includes ten pages of the most rigorous mathematical analyses to date of Mach's principle (*i.e.*, that the universe in rotation around a fixed Earth equates to an Earth in rotation within a fixed universe), geocentrism has been established by the very

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[267] D. Lynden-Bell, J. Katz, and J. Bičák, "Mach's Principle from the Relativistic Constraint Equations," *Monthly Notices of the Royal Astronomical Society*, 272, 150, 1995.
[268] *Ibid*., p. 151.
[269] *Ibid*., p. 151.
[270] *Ibid*., p. 158, emphasis theirs.

physics that sought to dethrone it in 1905.[271] With all this evidence available, it is no surprise that **Julian B. Barbour** admitted in 1994: "all solutions of Einstein's equations are Machian,"[272] and it was Barbour's work with Bruno Bertotti in 1977 that was the foundation for his conclusion. In this work, Barbour and Bertotti propose that "neither Special or General Relativity fulfills Mach's ideal," and thus set out to demonstrate Mach's principle in a classical, pre-relativistic framework. As they do so, they invoke Leibniz's conception of physics since he, along with Mach two hundred years later, was critical of Newtonian dynamics based on the fact that physics is "ultimately concerned with the relations between things and not between things and abstract space."[273] They pointed out that Newtonian physics had an inherent problem answering the phenomena of the bucket of swirling water (since Newton resorted to saying the cause of the water's concavity was due to the unproven "absolute space").

> Mach's specific contribution was to suggest that the blatant contradiction…might be due to the presence of distant matter in the Universe. Thus, his conjecture, expressed in modern terms, was that a completely relational physics of the Universe considered as a whole could lead to an effective local physics…The present work shows, we believe, that this conjecture was completely correct and that the observed matter distribution in the Universe lends strong support to Mach's ideas.[274]

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[271] The working definition of "Mach's Principle" with which Lynden-Bell is working is the one taken from Hermann Bondi in 1952: "By Mach's principle we mean that: 'All motions, velocities, rotations and accelerations are relative. Local inertial frames are determined through the distributions of energy and momentum in the Universe by some weighted averages of the apparent motions'" (D. Lynden-Bell, p. 151).

[272] D. Lynden-Bell, p. 151. Bruno Bertotti was professor of Quantum Mechanics at the University of Pavia, Italy, and worked with Erwin Schrödinger at the Dublin Institute for Advanced Studies.

[273] J. B. Barbour and B. Bertotti, "Gravity and Inertia in a Machian Framework," *Il Nuovo Cimento*, 32B, 1:1-27, March 11, 1977, cited in "The Geocentric Papers," *Association for Biblical Astronomy*, Cleveland, Ohio. p. 88.

[274] Barbour and Bertotti, as cited in "The Geocentric Papers," p. 89.

After demonstrating through the use of Lagrangian derivatives the "invariant" component of Leibniz's theory, and by assuming a non-rotating universe, the authors, by means of a Hamiltonian, find that "the Galileo group can be derived dynamically from the Leibniz group," and thus they are successful in deriving: (a) Berkeley's contention against Newton's version of inertia; (b) Newton's laws, albeit with a "small correction" to account for Mercury's perihelion; (c) an answer to Kepler's "cosmic coincidences" between the parameters of the universe and planetary motion; (d) a Machian reason why light's speed is limited to a "critical velocity" [300,000 km/sec] in the local environment, which is said not to be due to "space-time," but to the "imprint of the Universe on local physics."[275] This "imprint" of the Universe the authors call *protophysics*.

To arrive at this final point, Barbour and Bertotti then present the case of a rotating universe around a fixed Earth. They can do so, of course, since there is no difference between a heliocentric or geocentric model in either Machian physics or General Relativity:

> Let us first consider the case when the massive body is a rigid, uniform shell of mass M_o and radius R_o [*e.g.*, the universe]. The test body [*e.g.*, the Earth] is near the center of the shell (coincident with the center of the cosmological shell and the origin of co-ordinates); thus $r_i << R_o$.[276]

Employing the Machian model the authors also derive the Lense-Thirring effect associated with General Relativity, but insist that: "our calculation is, however, superior from a Machian point of view: in our model the space outside the shell does not have any absolute inertial properties (they are determined by the cosmological shell)." In other words, unlike General Relativity, the Machian model isn't measured by

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[275] The authors add: "The averaged overall motion of the Universe is of necessity imprinted on local physics through its appearance in the 'coupling constant' $G = 4R\dot{R}^2/M$. In the framework of the theory we have developed, it is a remarkable coincidence that the magnitude of $\dot{R}$ is so close to the velocity of light. Nowhere has light entered into our considerations. This poses the following question: why does the local physics we observe around us have a distinguished velocity? The conventional answer is that the basic physical reality is space-time with a metric locally diagonalizable to the form (1, -1, -1, 1). This structure is assumed to be independent of the matter in the Universe. Our present work suggests quite a different explanation; it is that special relativity just reflects the imprint of the Universe on local physics."

[276] *Ibid*., p. 98.

recourse to an absolute reference point outside the universe. The Machian mechanics are self-contained.

To finish off the analysis, Barbour and Bertotti employ another Machian example: "Now we consider an analogous example: a rotating sphere [*e.g.*, the universe] of radius *a* and mass *m* and a test particle [*e.g.*, the Earth] at a distance *r* >>*a* from it [many light years in distance]." After running it through their working equation, the authors find:

> [T]he first term of our theory: the gravitational action of a finite, spherical body at rest is not the same as if its mass were concentrated at the center, as happens both in Newtonian physics and in general relativity…. The last term amounts to a small…increase of the gravitational constant…the internal motion mechanism, which of necessity leads to attractive gravity, explains gravity in a way radically different from all other theories.[277]

And so, Barbour and Bertotti's work has not only advanced Machian mechanics from a mere theoretical concept to a rigorously supported mathematical system, but has also led to some startling principles of physics that were heretofore unknown, and which answer a variety of issues much more easily than the heliocentric model.[278]

The Problem of Earth's Diurnal Motion

Although an Earth in diurnal motion provides Copernicans with a viable mechanical model of the movements of the solar system, it also creates various anomalies. One of these regards the effect of the tides on the rotation of the Earth. According to evolutionary cosmology, the Earth's spin has been steadily decreasing over the 4.5 billion years it has been in

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[277] *Ibid*., p. 98.

[278] We can add to this the findings of Joseph Rosen, stating, "…small subsystems of the universe contribute relatively little to the total action….We can take a further step and state that the existence of $L_1(U_0u)$ that we just proved, is a formal statement of the extended Mach principle. The statement that the evolution equations for tiny isolated systems are determined by $L_1(U_0u)$ via Hamilton's principle implies that the laws of physical properties of the raw material of which such system consist, are indeed determined by the whole universe, since $L_1(U_0u)$ is so determined" (*American Journal of Physics*, Vol. 49, No. 3, March 1981, p. 263). This again shows the viability of a geocentric universe. Theoretical physicists must accept this outcome since otherwise the laws of physics would then depend on one's location in the universe.

existence and has now reached the point that it rotates once in 24 hours. The main cause for this slowdown is said to be the tidal action of the Earth's oceans, which causes a drag on the rotation. As popular astronomer Fred Hoyle describes it:

> In the past the Earth rotated considerably more rapidly than it does now: at the time of its origin the cycle of day and night may have been as short as 10 hours. The spin of the Earth must accordingly have been slowed down during the 4,000 million years or so that have elapsed since the early period of its life. The agency responsible for the braking action is known. It is just the twice-daily tides that are raised by the Moon and the Sun. The oceanic tides cause a frictional resistance when they impinge on the continental margins. This friction produces heat at the expense of the energy of rotation of the Earth, thereby slightly slowing the Earth's spin. In return for its effect on the Earth, the Moon experiences a force that pushes it gradually farther and farther away from us.[279]

So here we have two problems, and both, any mechanic might agree, are due to the fact that the more moving parts a machine contains, the more chance exists that something can go wrong. The Copernican system requires the Earth to possess a double movement (diurnal and translational) that must be in lock-step with the rest of the solar system and the universe at large. That's quite a demand on a little planet seeking to preserve its delicate balance of life. The geocentric system is much simpler, requiring no effort from the Earth, least of all a double-effort, to keep pace with the universe, and thus little chance for it to upset its own environment. The only thing necessary is that the giant wheel of the universe keep turning, but its sheer mass makes this rotation almost effortless under the laws of inertia. The tides would not slow down the universe's rotation around Earth anymore than a drop of water would make the level of the oceans rise. Not so in the heliocentric system. The need for a rotating Earth not only puts an inordinate amount of pressure on the tiny planet to keep pace with the universe, it will cause tremendous stresses and strains on all the Earth's components. Earth must now adjust to, and compensate for, all the stresses and strains associated with movement, not the least of which is keeping the Earth in a complicated double motion. If, as Hoyle suggests, the tides slow the Earth's rotation, we should be able to measure this decrease year by year, no matter how

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[279] *Frontiers in Astronomy*, pp. 15-16.

small it is, for there is nothing magical about rotation that it should suddenly be satisfied when it reaches a 24-hour threshold.[280] We can take a wild guess that Copernicus didn't think of these problems when he proposed his heliocentric system to correct the calendar.

The second problem (which seems to have slipped Hoyle's mind since he doesn't attempt an answer) is that if the moon has been steadily departing from the Earth during the same time the Earth has slowed from a 10-hour per day rotation to one of 24-hours over the last "4,000 million years," then the moon must be much farther away from us now than it was several million years ago. In fact, using lasers, we know precisely how much the moon falls out of its orbit – to the tune of 4 centimeters per year.[281] That might not seem like much, but when you add up the decay over the time span Hoyle has proposed, it means the moon (assuming the same uniformitarian environment that scientists assume for their coveted theory of evolution), would have increased its radial distance by 16 billion centimeters in the course of "4,000 million years" (give or take a few million to account for the fact that the moon, according to solar evolutionary theory, may not yet have been in existence when the Earth was first formed). Still, in 4 billion years this amounts to 99,416 miles, which is about 40% of the moon's current distance from Earth. If we use evolution's current estimates of the Earth's age, the numbers are even greater, since 4.5 billion years yields 111,843 miles or 47% of today's Earth-moon distance. These calculations are based on an arithmetic proportion, but they might just as well be based on a geometric proportion, since physical laws would require the moon's recession in past time to have been more than 4 cm/year. In fact, the calculus shows that just 2 billion years ago the moon would have been less than 25,000 miles from Earth, and orbiting 3.5 times per day, thus causing tides at least a million

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[280] K. E. Veselov adds that: "It is an established fact that over the past 25 years the rotational speed of the Earth has been slowing down and changing with a one-year period. The duration of the diurnal period has during these years been increasing at an average rate of 12.5×10^{-3} second/year…the longitudes of the perihelia of the planets anomalously shift in 100 terrestrial years over appreciable distances….Tidal friction inside the Earth can account for only about one-sixth of the retardation of its rotation. Accordingly, the value of that retardation for the past 25 years obtained experimentally by employing atomic timing devices is simply dismissed as anomalous" ("Chance Coincidences or Natural Phenomena," *Pushing Gravity*, pp. 169-170).

[281] NASA puts the recession at 3.8 cm/year ("Moon Slipping Away from Earth," *Geo*, Vol. 3, July 1981, p. 137). Current science holds that the moon is losing kinetic energy as it daily transfers mega watts of energy into the Earth's oceans (Gary D. Egbert and Richard D. Ray, "The Motion in the Ocean," *Nature*, July 15, 2000, p. 42).

times greater than they are today.[282] Moreover, when the Earth was rotating once every 10 hours or so, in between the massive flooding caused by the moon's close proximity, such intermittent levels of light and darkness, exorbitant temperature fluctuations, and many other extreme environmental factors, would wreak havoc on the tender ecosystems that make life possible. Suffice it to say, none of these parameters are conducive to supporting life on Earth, especially in the uniformitarian environment upon which evolution so heavily depends.[283]

Of course, Hoyle's bigger problem is trying to explain how, if the tides are continually producing a braking effect on the Earth's rotation, the Earth can now sustain a rotation period of 24-hours, especially if in the past it decreased from a 10-hour per day rotation. Here is Hoyle's solution:

> Now the atmosphere of the Earth oscillates up and down….Not only this, but the atmosphere is pushed by the same forces as those that raise the oceanic tides…But the force due to the Moon…does not act in resonance with the oscillations of the

[282] Current science tries to explain this anomaly by suggesting that tidal forces were less than they are today. Bruce Bills and Richard Ray state: "The torques were therefore correspondingly smaller than they would otherwise have been if the admittances had maintained their present day values" ("Lunar Orbital Evolution: A Synthesis of Recent Results," *Geophysical Research Letters* 26, 19: 3045-3048, October 1, 1999, p. 3046; also B. A. Kagan and N. B. Maslova, "A stochastic model of the Earth-Moon tidal evolution accounting for the cyclic variations of resonant properties of the ocean: An asymptotic solution," *Earth, Moon and Planets* 66: 173-188, 1994; and G. E. Williams, "Geological constraints on the Precambrian history of the Earth's rotation and the Moon's orbit," *Reviews of Geophysics* 38, 1: 37-59, February, 2000. All these explanations, however, are quite self-serving since they choose parameters that conveniently fit into an Earth/moon age of 4.5 billion years. They also fail to account for the additional braking effect that higher tides would have caused, as well as the additional effect the Earth would have had on the moon when their distance was closer and the Earth was spinning faster.

[283] Veselov adds: "In 100 terrestrial years the Moon should turn in relation to the Earth by 372 seconds of arc, and in 1000 years, by 37220 seconds, *i.e.*, by almost one-fifth of its radius. Apart from the secular shortening of the period of the Moon's revolution around the Earth by 0.0009 seconds a year, there should be periodic changes of that shortening with an amplitude of 0.0052 seconds, periodic changes of the duration of the rotational period by 0.052 seconds, and a swaying of the pericenter by 0.21 seconds….The change in the periods of the revolution of the sixth and seventh satellites of Jupiter is of the order of 0.002 sec/terrestrial year, and the rotation of the pericenter longitude of Amalthea amounts to approximately 2000 seconds per 100 terrestrial years… ("Chance Coincidences or Natural Phenomena," *Pushing Gravity*, p. 181).

atmosphere and consequently does not build up appreciable motions of the atmospheric gases. The somewhat weaker pushes due to the Sun do act in resonance with the atmosphere, however. The result is that very considerable up and down motions of the air are set up. These motions are accompanied by oscillations of pressure….The variations occur twice daily, just as the oceanic tides do. The pressure is found to be at a maximum about two hours before midday and about two hours before midnight. By a careful calculation it can be shown that this precedence of the atmospheric tides before midday and midnight cause the gravitational field of the sun to put a twist on the Earth tending to speed it up…the twist is comparable with the slowing-down effect of the oceanic tides, just as Holmberg's theory requires it to be.[284]

So here Hoyle attempts to give us the impression that this system is as precise as a clock. After all, "two hours before midday and about two hours before midnight" this adjustment by the sun takes place "by a careful calculation," so we need not worry that our sleep habits will ever be disturbed. Then again, the clock Hoyle envisions has only relative precision, for he then adds that the results are only based on "the law of averages":

It is important to realize that the speeding-up process need not exactly compensate all the time for the slowing-down effect of the oceanic tides. It is sufficient if the two processes compensate each other on the average, averages being calculated over say a time of 100,000 years. Indeed exact equality at all times is not to be expected for the reason that the slowing effect is likely to vary quite appreciably and quickly from one time to another….But now here is the crucial point. As the Earth slowed to a day of 24 hours the pushes of the Sun gradually came into resonance with the oscillation of the atmosphere….This went on until the speeding-up process came into average balance with the slowing

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[284] *Frontiers of Astronomy*, pp. 16-17. Without any explanation or proof why Holmberg's theory would do so, Hoyle adds that Holmberg's "very recent theory…disagrees that the cycle of day and night will ever take longer than 24 hours in the future." It is rather amazing how Hoyle puts such trust in a "very recent theory" to explain such a crucial part of his Copernican universe, yet all without the slightest proof to the reader. We are to take it on Hoyle's word that Holmberg has it all worked out, and no further inquiry is required.

effect of the oceanic tides. A state of balance has been operative ever since.[285]

Now if the effect of speeding-up produced by the sun can "vary quite appreciably and quickly," yet tidal action occurs twice daily without fail and always has the effect of slowing down the Earth, should we not experience at least a fraction of this difference in our present day? No, Hoyle assures us, this process magically reached a "state of balance" by the time we humans reached a point of evolutionary cognition, and we can now work backwards, as it were, and figure out that our hominid ancestors did not enjoy eight hours of nocturnal sleep as we humans do. This is a good example of what Van der Kamp calls "that invalid theoretical syllogism, the *modus ponendo ponens*."[286] Such self-serving cosmological models, propped up by nothing more than anachronistic logic and a "very recent theory" are common in the modern Copernican world. Although Hoyle is seeking to salvage the Copernican system, the laws of physics simply will not allow him to ignore the braking effect of tidal action, so he must have another mechanism to compensate for the anomaly that tidal action creates for a 24-hour rotation. The sun, which, previous to the anomaly, is understood as that solitary force which inhibits the Earth's wish to fly off into space, is now assigned to give an opposite force in order to make the Earth rotate faster, and just enough so that it doesn't disturb the 24-hour cycle. What incredible powers of discretion this sun possesses! Of course, no such contradictory forces, fine-tuning, or "law of averages" exist in the geocentric model, for there isn't a force in the cosmos, including tidal forces, that can stop the gigantic ball of the universe from rotating once it is given its initial push. It will be as precise as a Swiss watch, from now until doomsday, and without all the moving parts working against each other.

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[285] *Ibid.*, p. 17.
[286] *De Labore Solis*, p. 28. Van der Kamp writes: "If situation P is the case, we agree, then we shall observe the phenomenon Q. Now indeed we observe Q. Does it therefore follow that P is the factual state of affairs? By no means necessarily, for Q may be caused by a variety of other circumstances. As one of my textbooks of logic remarks: 'We shall have frequent occasions to call the reader's attention to this fallacy. It is sometimes committed by eminent men of science, who fail to distinguish between necessary and probable inferences, or who disregard the distinction between demonstrating a proposition and verifying it.'"

"…it might seem that if we observe all other galaxies to be moving away from us, then we must be at the center of the universe….There is, however, an alternate explanation….We have no scientific evidence for, or against, this assumption. We believe it only on grounds of modesty"

Stephen Hawking[287]

"Scientists have ideological positions just like everyone else, especially in conflicted situations, and sometimes the consequences are bizarre."

Robert B. Laughlin[288]

"Equations, however impressive and complex, cannot arrive at the truth if the initial assumptions are incorrect."

Arthur C. Clarke[289]

"Then I would feel sorry for the good Lord. The theory is correct anyway."

Albert Einstein[290]

"He who puts the cart before the horse can at best proceed backwards."

Walter van der Kamp[291]

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[287] Stephen Hawking, *A Brief History of Time*, 1988, p. 42.

[288] *A Different Universe*, p. 50.

[289] Arthur C. Clarke, *Profiles of the Future: An Inquiry into the Limits of the Possible*, 1963, 1984, p. 21.

[290] In answer to the question of doctoral student Ilse Rosenthal-Schnieder, in 1919, about how he would have reacted if his general theory of relativity had not been confirmed experimentally that year by Arthur Eddington. Quoted in Rosenthal-Schnieder, *Reality and Scientific Truth*, p. 74, as cited in *The Expanded Quotable Einstein*, Alice Calaprice, 2000, p. 238.

[291] *Bulletin of the Tychonian Society*, November 1982, p. 14.

Chapter 10

Technical and Summary Analysis of Geocentrism

Dr. Robert Bennett

In this chapter we will analyze the arguments for geocentric cosmology with more detail and technical analysis, including the corresponding mathematical equations, charts, graphs, pictorials and technical points. To begin, there are three geokinetic claims for terrestrial motion:

1) Spin claim: Earth rotates around the polar axis every day
2) Heliocentric claim: Earth moves around the Sun every year.
3) Cosmic Linear claim: Earth translates as part of a cosmic group: solar system, galaxy, local group of galaxies, etc.

We will cover each of these three claims in the following analysis.

Part 1: Does the Earth Rotate?

First we will analyze (1): the geokinetic claims that the Earth is spinning daily around its polar axis with respect to the fixed stars.

The Geokinetic Claim

All claims center on the inertial forces called centrifugal and Coriolis that explain the following effects and others based on the presumption of Earth's rotation:

1) Coriolis forces produce an East to West motion in projectiles, pendula and atmospheric winds. The Foucault pendulum and weather cyclones are examples.

2) Centrifugal forces cause the water and air near the equator to rise as inertial effects of the Earth's rotation – the polar flattening and equatorial bulge. This also explains why the acceleration of gravity is less at the equator.

3) The Sagnac effect used in laser gyroscopes and the precession of mechanical gyrocompasses indicate the Earth is spinning. Tidal braking of rotation causes the occasional adding of 'leap' seconds to the standard year.

Claims and Responses

Claim: The Earth's rotation causes the inertial effects that surround it, the Coriolis and centrifugal pseudo-forces. If the Earth did not spin, these forces would not be present.

Response: *All the various effects noted above depend on the assumption that the inertial effects can only be caused by the Earth's rotation. Implicitly denied is the equally valid premise that the rotation of the external world, the universe, can cause the very same inertial forces – centripetal and Coriolis. That premise is known as Mach's Principle. Mach's idea can be stated as:*

> The inertia of any system is the result of the interaction of that system and the rest of the universe. In other words, every particle in the universe ultimately has an effect on every other particle.

According to Mach, the Earth in an empty universe would feel no inertial forces. Without any external reference it would be impossible to determine whether that object is rotating or not. Mach said the inertial forces on the Earth are caused by the sum of the gravitational forces from cosmic bodies such as the distant stars; the rotation of the Earth only makes sense relative to these cosmic objects.

Barbour and Bertotti proved that a large hollow sphere (representing the distant star fields) rotating around a small solid sphere inside (modeling the Earth) produced exactly the same pattern of Coriolis and centrifugal forces that are claimed as proof of Earth's spinning in space. If the hollow shell of matter accelerates or rotates, any object inside the shell will tend to be carried along with the acceleration or rotation to some extent. But they note this all-important fact: <u>An object at the center of the hollow sphere will not be affected by the inertial forces.</u> The space around the Earth will exhibit the inertial effects of the distant sphere, but not the Earth itself, if it is centrally located.

From Mach's principle we can conclude that inertia is a universal property, like gravity. But in Mach's principle the conventional interpretation of distant masses as causing inertial effects around the Earth is too restrictive. The cause of inertia could also logically be the properties of the space around each object, modified by the presence of the mass in or around that space. In other words the ether/firmament may be the source of inertia, which causes the gravity and inertial effects on bodies embedded in the ether. The ether's properties are changed by the masses (via feedback), but it is the ether that is the primary or first cause. Linear inertia is the resistance to an actual or attempted change in motion of objects moving linearly caused by the ether drag.

Einstein was intrigued by, but ambiguous about, Mach's principle. This is strange, because Mach's principle states a principle of relativity for rotation, similar to Special Relativity's assertion concerning relative linear motion. An inconsistency with relativity would arise if rotational effects were not reciprocal. Distant masses would be discounted as a potent source of inertia.

No measurement of absolute or preferred rotation has been made to test whether the Earth is rotating or its surroundings. Until such a test is performed, Mach's principle is a valid statement; it has not been disproven experimentally. It is only a hurdle in the minds of those who wish it were not so.

A Simple Model

The technical explanation of gravitational and inertial forces surrounding the Earth depends on the physical concept of a field that fills the space between the interacting objects. Although the field is expressed mathematically as a function, for simplification we can picture it as invisible lines of force that terminate on the bodies, taking the Earth as one object and the rest of the universe as the other. If neither the Earth nor the universe rotated, then gravity lines from the Earth would be only vertical from the surface and there would be no inertial forces. If the Earth spins and the stars do not, then the vertical lines will be bent to produce the observed rotational effects of inertia. The picture is now of spiral or vortex lines surrounding the Earth, visually expressing the presence of horizontal inertial forces. The greater the rotation, the greater the deflection of the gravity lines sideways. Using the field concept of force lines allows us to picture how an object moving above the Earth knows that the Earth is rotating beneath it. All of this is conventional physics, for which there is no dispute.

Conventional physics, however, claims this is the *only* model of rotational reality. It does this by ignoring role reversal – the consideration that the Earth could be at rest and the stars in rotation around it. Logically, the gravity lines, like a string, have two ends. One end is at the Earth's surface and the other on one of the distant stars. If the remote stars rotate, their gravity lines connected to Earth will also bend, creating the same spiral pattern as when the Earth rotates. This model will explain the measured inertial forces just as well as the rotating Earth model. To satisfy the scientist, this visualization of relative rotation must have formal mathematical support, or what is known as a "formal proof."

Formal Proof

Newton's concept of absolute space pictured the fixed star shell as being approximately at rest as viewed from Earth. Newton sought to test his concept of absolute space using a water bucket to simulate the Earth in rotation. When the water in the bucket was not in rotation, the surface would be flat, since there were no centripetal inertial forces present. When the water rotated, centrifugal forces would push the water surface up the bucket sides to form a parabola. This was a simple but crude way of detecting rotation, equivalent in purpose to the present day optical gyroscope. Since Newton's absolute space was thought to be unobservable, only rotation with respect to the fixed star shell could curve the water surface. Newton thought that if the Earth were not rotating with respect to his absolute space, the water surface would be flat. There would be no inertial forces.

Berkeley and Mach held a contrary view. From their geometrical point of view, it matters not if the Earth is rotating and the star shell is at rest, or the converse. The same forces of inertia (Coriolis and centrifugal) exist for both. Mach's geometrical point of view was that relative rotation was reversible; it does not matter if the Earth is rotating and the star shell is at rest, or the stationary Earth is surrounded by the rotating star shell. Newton's mechanics is asymmetric but Mach said that a correct theory of mechanics should not break the symmetry of rotational viewpoint. Newton's equations have physical meaning only with the existence of the fixed star shell. The fixed star shell is needed to establish when centrifugal forces will be produced.

This leads us to the premises of the formal proof:

1. The Earth rotating uniformly with respect to the stationary star shell with angular velocity ω produces forces of inertia (*i.e.*, Coriolis and centrifugal forces).

2. The star shell uniformly rotating with respect to the stationary Earth with angular velocity ω produces a constant homogeneous, vector, magnetic-type gravity (MTG) or gravitomagnetic field, described by the vector potential

$$A = (B \times r)/2$$

where **B** is gravity's induction vector (not the magnetic field). The vector cross product indicates that the MTG field is orthogonal to both the position vector **r** and **B.**

What we must prove:

The equation of motion of a body in a spherically symmetric gravity field and in constant homogeneous MTG (magnetic-type gravity) field, described by means of **A**, is exactly the same as an equation of motion for this body in the same gravity field in the coordinate system uniformly rotating with respect to the stationary fixed star shell with $\omega = (B)/2$.

The Lagrangian for the inertial body with an Earth spinning at ω and the fixed star shell is:

$$\mathcal{L} = (m/2)v^2 + mv \cdot (\omega \times r) + (m/2)(\omega \times r)^2 - mV$$

$V = GMe/r$ = gravity potential; Me = Mass of Earth

The variational equation of motion is:

$$d(mv)/dt = -2m(\omega \times v) - m[\omega \times (\omega \times r)] + mE$$

where $E = -\mathbf{grad}V$, $-2m(\omega \times v)$ is the Coriolis force, $-m[\omega \times (\omega \times r)$ is the centrifugal force. The Lagrangian for the inertial body "m" with a star shell spin of ω and the Earth stationary is:

$$\mathcal{L} = (m/2)v^2 + mv \cdot A + (m/2)A^2 - mV: \quad V = GMe/r$$

The variational equation of motion is:

$$d(mv)/dt = -m(v \times B) - m/4[(B \times r) \times B] + mE$$

If the condition for relative rotation is chosen, $\omega = B/2$, the motion equations in both views are identical.

Physical Constituents of a Geocentric Universe

Key preliminary concepts

- Ether
- Parallax vs. aberration
- Parallax vs. transit delay
- General covariance
- Occam's razor

Definition of Ether

Ether (a) fills all space, (b) is more rigid than steel, (c) is more flexible than any known substance. These three properties allow connection to be made between ether and the Genesis firmament (Gn 1:6-9), which has the following characteristics as noted in the text analysis.

- Ether is the medium for propagating electromagnetic waves.
- Ether is a "less dense" (lacking a definition, an appeal to physical intuition) material form of matter, a fluid of photon quanta.
- Light speed is only constant in relation to the medium and its properties, such as density.
- The density of ether is related to gravity as Einstein's view of the solar eclipse is related to the bending of light through air of differing temperatures.
- Ether can be dragged along – entrained – with matter, proportional to Fresnel's drag coefficient.
- Modern cosmology's invention of Dark Matter is the result of its dismissal of a pervasive universal ether and the differing densities of ether.

Possible Suppositions/Conclusions

The possibility of ether-matter drag provides the reason for very small measurements from precise interferometer experiments. Ether might have a liquid crystal structure to account for transverse wave propagation. The transmission of energy and radiation is affected by the density and flow of ether.

Types

1) Electromagnetic or luminiferous: the only one treated here.
2) Gravitational or ponderomotive: related directly to the firmament, but left undeveloped as a very broad topic.
3) Merits future detailed exposition. Static Magnetic: may be related to the other two

Modern possibilities

(a) The zero point energy (ZPG) and fluctuations (ZPF) of the quantum vacuum
(b) The vast sea of neutrinos
(c) The virtual particles of quantum field theory
(d) Particles of Planck length
(e) The EPOLA - an alternating lattice of electrons and positrons (see: Theories of the Ether[292])

Zero drag: Ether that is totally unaffected by a gravitational field is called "unentrained," meaning without any drag or friction. Objects like the Earth would move through ether without dragging any along. The unchanged flow of ether through the Earth (or vice-versa!) would allow Measurement of any motion around the Sun (revolution) or spin (polar rotation). As will be shown, the Michelson-Morley experiment was able to detect such an ether wind of revolution at 0.01% of *c* and a small non-null result was found, but not to the level expected for an unentrained ether.

Partial drag: If the ether is partially entrained, Earth's gravity field would make it denser at the Earth's surface than at higher altitudes, similar to the atmospheric density variation. The partially dragged ether would be traveling at a fraction of the Earth's revolution speed. A small level of drag would produce a small but non-null change in the relative velocity between the Earth and the ether. Detection of this small change by any laboratory experiment, like the Michelson-Morley experiment, would depend on the instrument sensitivity.

Total drag: Complete entrainment of the ether by the Earth is a special case of partial dragging, with the dragging factor equal to 1. No relative motion between ether and earth will be detected, since the ether is moving (being dragged) at the same speed as Earth's speed.

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[292] http://www.mountainman.com.au/aether.html.

Models: Picture still water as ether and a swimmer as a light photon. When riding in a boat, a person moves with the speed of the boat. Diving into the water (ether) the swimmer (photon) can only swim at his physical limit. Once out of the boat the swimmer has the speed and direction of the dive, which is independent of the boat's velocity. If the water gets muddy (thicker), the swimmer's speed slows according to the density of the water (ether). The ether thus determines light speed, not the velocity of the source.

As an analog of drag in an elastic/flexible ether, consider a car's motion through air, with the car modeling the Earth and the ether. If the road serves as an absolute reference frame – an alternative form of a rigid and immobile ether – the speedometer always measures the true absolute speed of the car along the road (*i.e.*, Earth with respect to the absolute frame).

- No drag: an open convertible - the air streams past the driver with no interaction - the air stream measures the true car speed.
- Partial drag: car with a window open - some of the air is trapped inside and forced to move with the car.
- Total drag: all windows are closed - all the air is forced to move with the car.

History of Light and Ether

Newton's particle theory of light explained reflection but not wave phenomena, such as refraction and diffraction. He proposed the existence of an "ethereal medium" – simply called ether - with these properties:

- it supported vibrations faster than light.
- its particles are much smaller than those of air or the light particles.
- much thinner and flexible than air.
- offers little resistance to object motion (friction).
- able to exert pressure on objects by expansion.

Bradley's stellar aberration could be caused by the Earth's movement through the ether. Starlight could be bent in the ether and hit the Earth at an angle, moving the image of the star.

George Stokes thought ether might be rigid for high speeds and fluid at lower, like tar at cold and hot temperatures. Slow objects could penetrate it easily, but not light.

Fresnel proposed the following:

- ether is at rest in free space.
- ether density is different in different substances.
- speed of light in any substance varies inversely as the square root of the ether density.
- light waves are propagated in the free ether in any direction, always with the same velocity with respect to the ether.
- Earth in its motion in space passes freely through the ether without disturbing it.

In general, 19th century physicists thought there was an absolute ether; the dragged ether was denied. The absolute ether was at rest while all cosmic objects moved through it. The motion of the Earth and the motion of an absolute ether are tied together logically. Only if the Earth is at rest in the absolute ether can light travel with equal speed in all directions (isotropically). If the Earth is moving in the absolute ether, the measured speed of light cannot be isotropic. Other possibilities include a fixed Earth and a mobile ether.

Ether as wind

In the heliocentric model, the Earth travels through the ether in its orbit around the sun at a speed of about 30 km/second. A detectable "ether wind," varying with time of day and season, should produce components due to Earth's motion relative to the solar system that are separable from the overall motion of that system. The ether effect on light would be like the wind effect on sound.

Ether and rotation

Recent experiments show that a rotating object has unexplained mechanical anomalies compared to a non-rotating one.

1) Rotating objects falling in ether accelerate faster than 'g', the free fall value for non-rotating objects in a vacuum.
2) Pendula with rotating bob weights deviate from harmonic motion, with lower frequencies than pendula with non-rotating bobs.
3) A precessing gyroscope has inertial mass greater than its gravitational mass.

4) If a gyroscope is forced to precess by applying an external torque, objects placed around the gyroscope cause it to exhibit an increase of inertia.

Besides supporting the ether concept, these experiments can be verified with simple equipment and precision clocks.

Geocentrism and Ether Flexibility

Geocentrism has two options for the transparent ether, either rigid or flexible/plastic, with either one perhaps different from Maxwell's luminiferous ether. A null result from the Michelson-Morley experiment implies a stationary Earth embedded in this rigid ether, the absolute reference frame. However, any non-null result (as in the Dayton Miller and all later interferometer experiments) would imply that the ether is flexible and that the premise of rigidity is incorrect, not that the Earth moves through the ether.

Although cited as having a null result for detecting the ether-Earth motion, careful analysis of the Michelson-Morley experiment by Maurice Allais and others has shown that there was a small but detectable fringe shift measured with the Michelson-Morley interferometers, consistent with the later observations with improved apparatus. The non-null results eliminate the rigid ether as a possibility, so the Earth is the only fixed object, immersed in a universal flexible ether. Hence, Mach's principle can be applied with two options:

1) The ether is fixed and contains a rotating shell of distant matter that provides for the attractive forces needed to explain and synchronize the daily, monthly and yearly celestial motions, as well as explain the local inertial forces near the Earth. All objects move through the ether, except the Earth.
2) The ether is flexible and rotating, providing the forces needed to explain and synchronize the daily, monthly and yearly celestial motions, as well as explain the local inertial forces near the Earth. The rotating ether carries the heavenly objects around the Earth, like boats in a whirlpool.

In view of the Michelson-Morley-type experiments (correctly interpreted) the rigid ether was rejected, so option 1 above is eliminated. Thus, the geocentric model is a rotating invisible ether causing all cosmic objects to perform all the motions observed from Earth. It is this ether type that is meant by the "firmament" of Genesis 1:6-9.

In order to synchronize all cosmic motions, the firmament must be able to transmit changes in location and motion across the universe at least as fast as gravitational changes, which have a lower limit of $2 \times 10^{10} c$, or 1,860,000,000,000,000 miles per second. The speed may be higher.

Ether flux and celestial motions

Etherometry proposes that the rotational and translatory movements of planets, stars and galaxies are the result of spinning motions of ether vortices ordered in a hierarchy. Ether flows and vortices are associated with each star, planet, moon, and the sun, as well as groupings such as clusters and galaxies and the Milky Way. Simply put, ether that flows toward the Earth from deep space imparts downward impulses on the Earth (gravity), while the spin of the Earth's ether vortex causes the inertial forces of centrifugal and Coriolis forces.

Ether motion around the Earth can be deduced from satellite motion, since ethereal rotational motion around an object sustains orbital motion. The translational speed of a satellite is zero at the geostationary distance of 22,000 miles above the Earth. It increases steadily to 18,000 mph at low earth orbit of 70 miles, then decreases sharply at lower altitudes with atmospheric absorption of the ether flow, so that at tropospheric altitudes it will either be moving with or causing the jet stream of up to 200 mph.

The slight west-to-east rotation of the etherosphere at the Earth's surface accounts for the results of Sagnac-type experiments which have shown that the speed of light is slightly faster around the Earth from west to east than from east to west. Moreover, the almost vertical descent of the ether flux at very low altitudes explains the apparent vertical motion of free fall. A free falling object is slightly swept eastward by the ethereal rotation, an effect only noticeable for high falls or with precision instruments.

Modern science presumes the absolute motion of the earth to be the result of two independent motions: (a) the orbital motion around the sun at 30 kilometers per second, (b) and the cosmic motion of the sun and the solar system. Some ether drift measurements indicate motion of the solar system towards the constellation Hercules at a speed of 19 kilometers per second, which is claimed to be only relative motion of the sun with regard to nearby stars.

In order to subtract the Earth's revolution and rotation, the ether-drift effect must be monitored continuously over twenty-four hours and at three or more months of the year. The direction of the orbital motion could not be identified in the monthly curves, which is interpreted as indicating that the orbital component is probably much smaller than the cosmic

component. This phenomenon can also be interpreted as indicating the Earth has no orbital motion, but this is not acceptable to the modern cosmologist. Note also, as the Michelson-Morley experiment shows a slight drift, modern cosmology interprets it as a null result; and when the ether drift shows no orbital component, a null result, it is assumed to be non-null!

When plotted against sidereal time, a marked consistency was shown in the readings for the azimuth and magnitude, as though they were related to a common cause. The curves showed conclusively that the observed ether effect is:

- Dependent upon sidereal time.
- Independent of diurnal and seasonal changes of temperature and other terrestrial causes.
- Thus independent of the Earth's alleged rotation and revolution.
- A cosmic phenomenon.

The conclusion stated that there is a positive, systematic ether-drift effect, corresponding to a *constant* relative motion of the Earth and the ether, with an apparent velocity of ten kilometers per second toward the north pole of the ecliptic, having a right ascension of 17 hours and a declination of +65°.

The Stokes ether concept (that the ether is partially entrained by matter moving through it), suggests that the observed velocity of ten kilometers per second might be only a fraction of the absolute velocity; that the actual velocity of the cosmic motion might be two hundred kilometers or more, per second. A first approximation to the velocity of the cosmic component of motion was found to be 200 kilometers per second.

Reduced velocity and displaced azimuth are unexplained. The observed effect is presumed to be of second order in v^2/c^2 and the ether is wholly stagnant and undisturbed by the motion of the Earth through it.

Two unexplained facts of ether-Earth motion remain:

- The fringe displacement has always been less than was expected, indicating a reduced velocity of relative motion, as though the ether through which the interferometer is being carried by the Earth's motion was not absolutely at rest.
- The direction of the cosmic motion should swing back and forth across the north and south line once in each sidereal day because of the rotation of the earth on its axis. This is not observed.

Ether and Relativity

The principle of relativity, which was first formulated by Poincaré, stated that no motion experiment in the universe can detect a point of absolute rest or a preferred direction. Motion and rest are arbitrary choices of definition. The equivalence of all directions is called spatial isotropy.

All reference frames moving relative to each other with constant velocity in a straight line are called inertial reference frames (IRF). The relativity principle is equivalent to saying there is no absolute or preferred inertial reference frame - the laws of motion are equally valid in all.

Calculations of dynamics from the time of Galileo to Einstein used Galilean relativity:

- The velocity of an object is added to the vector velocity difference between the two reference frames – a Galilean transformation.
- The geometry of space is assumed to be Euclidean (flat or not curved). Light travels in straight lines in Euclidean space.
- Time is absolute – the same for all observers.

Galilean relativity was the basis for the laws of Newtonian mechanics but it did not hold for the electromagnetic laws of Maxwell that involved relative motion. Maxwell's laws assumed a luminiferous ether medium for the electro-magnetic radiation, which led to forces dependent on the object's velocity. Thus, combining Maxwell equations and the Galilean transformation allowed an absolute velocity with respect to a preferred frame of reference, the ether. If the symmetric Lorentz transformation of Special Relativity theory is used to change inertial reference frames, the Maxwell equations will still be consistent, since Special Relativity theory has no ether. Special Relativity theory had restored the dynamical equivalence of inertial reference frames for electromagnetism. The null results for ether motion predicted by Special Relativity theory made the ether irrelevant and unnecessary. Now position in space or time was not absolute, but measurements depended only on the observer's speed.

But new problems arose. Time now became relative; observers in relative motion could not agree on their clock readings or on whether events were simultaneous. The human intuition of a universal time had to be abandoned. More seriously, the divine delegation of absolute and universal timekeeping to the motion of the heavenly lights in Day Four of creation was disregarded.

Light measurement differed from that of matter because light travels in the universal ether frame. Sounds in an airplane travel along with the air inside the aircraft and obey the Galilean transformation. But a light beam

in the plane would not. It would show some effect of its motion in the universal ether.

What and where was the special coordinate system at rest in the ether? Maxwell had measured electro-magnetic properties of empty space, the ether vacuum, including its resistance of 377 ohms. As a heliocentrist he noted that the "drift" of Earth through the ether should be found in the annual changes of the Earth's motion around the Sun, or the daily variation of rotation (although these changes were 60 times smaller than the yearly changes). This was the motivation for the Michelson-Morley experiment.

Some physicists realized that a number of problems in modern physics would be simplified with the ether concept. Others said the ether makes it difficult to explain modern experiments. In reality, it is only true if the immobile Earth is rejected as a possible cause, a latent premise in experimental interpretation continuing to this very day.

Relativity contains many paradoxes, some based on Einstein's changes in belief. He simultaneously proposed that in Special Relativity there is no ether, yet in General Relativity space is curved by nothing. His position on ether depends on the date. From 1905 to 1915, the age of Special Relativity, there was no need for ether. From 1915 on, in the age of General Relativity, he states: "we may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, there exists an ether" [NB: but there is no other sense in which to understand the ether]. "According to the general theory of relativity space without ether is unthinkable."

Of course the rejection of relativity is inherent in the acceptance of geocentrism. Some objective physicists are only now realizing from other astronomical evidence that a viable possibility to explain the Michelson-Morley experiment is that the Earth is stationary in the universe. Yes, the dreaded word – geocentrism.

Parallax versus Aberration

The ellipse patterns formed by parallax and aberration are similar and, indeed, are superimposed for nearby stars. But the two stellar effects can be separated, as discussed below in heliocentric terms.

Because of the yearly change in position of the Earth, the direction in which a star is observed changes annually. Unlike aberration, the parallax angle is proportional to the ratio of the diameter of the Earth's orbit to its distance from the star. Bradley observed a different periodic variation in the apparent position of stars, reflecting changes in the velocity rather than in the position of the Earth over the course of a year.

Transit Delay versus Aberration

A light beam on the left shines toward a target, such as Earth. Far to the right are two stars for direction references. For aberration – shown at the bottom – the target Earth is at rest. Light travels from the original position of the source toward the bottom star, reaching the target when the source is opposite the Earth. The aberration angle between the original and final positions of the source is the angle between the two stars.

Transit delay is shown in the top diagram for a stationary source and moving target, a view just as valid as the bottom, by the principle of relativity. To hit the target, the beam must be sent in the direction of the top star when the target lines up with the bottom star. Hunters call this "leading the target." By geometry this leading angle, due to transit delay, is the same as the aberration angle in the bottom diagram.

General covariance

In theoretical physics, general covariance is the invariance of the form of physical laws under arbitrary coordinate transformations. The principle was formulated by Einstein who wanted to extend the Lorentz covariance in Special Relativity to non-inertial frames in General Relativity. All physical theories such as mechanics and electrodynamics must necessarily have a generally covariant formulation.

Physics dabblers will sometimes claim that astronomical observations must be made from a heliocentric point of view. They insist that the use of a geocentric coordinate system will not correctly describe celestial motions, events and alignments, like occultations and eclipses. This point of view – never raised by professional scientists – reveals a failure to recognize the difference between the intrinsic *physical* properties and relationships of a system (which exist independently of any description of it) and the arbitrary *mathematical* coordinate system used to describe the system.

The location of a point on the Earth's surface can be equally described with Cartesian, spherical or elliptical coordinates with the origin at the Earth's center. The system may have a symmetry which matches that of the coordinate system and simplifies the mathematical clutter used in its description (such as the spherical coordinates and the Earth). Nevertheless, any reasonable coordinate system may be used. The weave pattern of a net does not determine the shape of the objects that are put into it.

Occam's Razor

Given two equally predictive theories, choose the simpler, or
The simplest answer is usually the correct answer.

This philosophical advice of Occam was extended to choosing competing physical theories when they could not be separated by reason or experiment. An example often used is General Relativity theory versus all its proposed alternative theories. When expressed in geometrical terms, such as the curving of space as a ball does when placed on a trampoline, or when the dynamics is expressed as one single tensor equation, General Relativity theory is said to be the simplest of theories, and appeal is often made to its mathematical "beauty." Thus, we see that even aesthetic judgments are employed, as opposed to objective ones.

A problem is being ignored in the General Relativity theory example, however. General Relativity's equations expand to 10 non-linear differential equations, which are usually intractable to solve precisely, except for the simplest symmetrical models. The computations are far from beautiful; they are horrendous. Occam's razor can hide complexity in a veneer of deceptive simplicity.

Generally speaking, there are also other issues. A fully open epistemology accepts more sources of truth than does science, such as divine revelation. Whenever revelation – which is the word of the infinitely simple God – overlaps science, it trumps Occam's Razor. Science ignores this freely given gift of truth at the risk of giving an unnatural interpretation of nature.

Occam's razor is often implicit in many interpretations of modern science when an effect/experiment can be explained by more than one cause. No more is this true than in saying the stars are fixed and not rotating, since the opposite view requires that the entire cosmos is focused on Earth, as Scripture describes. To be geocentric is to be theocentric, a challenge of faith that modernists will not accept.

Geocentrism assumed an ether, a preferred frame, and a universal time. Einstein's Special Relativity theory did not. But none of the following eleven independent experiments, which were said to confirm Special Relativity experimentally, can distinguish Relativity from Geocentrism, or from the ether theories of Lorentz or Hatch.

Foucault pendulum

Conceived as an experiment to demonstrate the rotation of the Earth; the motion of the Foucault pendulum is a result of the Coriolis effect. It

must be long and free to swing in any vertical plane. The first Foucault pendulum exhibited to the public was in 1851 of the Paris Observatory. It was the first dynamical proof of the rotation in an easy-to-see experiment.

At either North or South Pole, the plane of oscillation of a pendulum remains pointing in the same direction while the Earth rotates underneath it, taking one sidereal day (23 hours 56 minutes) to complete a rotation. Placed at the equator the plane of oscillation rotates with the Earth, so there is no apparent rotation. Other latitudes produce partial rotation. If $n =$ degrees per day and $\varphi =$ Latitude angle, then

$$n = 360^0 \sin \phi$$

To view the swings for a full day the pendulum should include a periodic source of input energy to overcome air friction and resistance at the point of support.

Sagnac Effect

Experiment design:

The Sagnac interferometer uses ring interferometry to split a beam of light. The two beams travel around the ring in opposite directions and produce an interference fringe pattern when they overlap. The ring interferometer is located on a rotating platform whose interference lines are shifted sideways when compared to the platform when not rotating. The shift sideways is proportional to the angular velocity of the rotating platform. During rotation the points of entry and exit move while the light is propagating so that the beam moving opposite to rotation covers less distance than the co-rotating beam. The pattern found with each angular velocity has a phase-shift corresponding to that angular velocity.
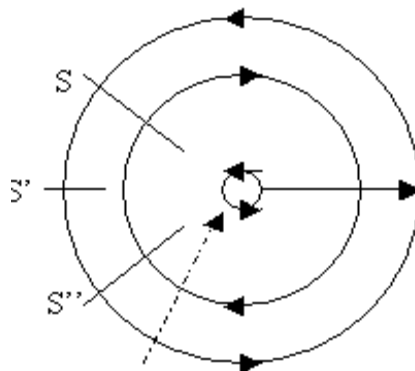
Sagnac apparatus turning clockwise

The counter-clockwise beam in the diagram above opposes the rotation of the platform and returns to the light source when the source is at S'. The second beam, traveling clockwise with the direction of rotation of the equipment, returns to the light source when the source is at S". Seen by an observer on the spinning platform, the light signals return to the same point, but at different times. Points S and S' are points on the fixed laboratory desk, as they would be marked beneath the spinning disc by a stationary observer in the laboratory.

If t_0 is the time when the disc is at rest, *i.e.* the path length divided by the speed of light, then:

$$t_o = 2\pi r/\boldsymbol{c}$$

The time t', as observed aboard the spinning disc, for the counter-rotating beam to complete a circuit, is:

$$t' = 2\pi r/(\boldsymbol{c} + v)$$

where v is the speed of a point on the periphery of the disc with respect to the axis of spinning. The time t'', as observed aboard the spinning disc, for the co-rotating beam to complete a circuit, is:

$$t'' = 2\pi r/(\boldsymbol{c} - v)$$

The time for the counter-rotating light to circle the ring is less than when stationary, so this beam is superluminal. The co-rotating beam takes a longer time to traverse the circle, so its speed is subluminal. In either case the speed of light exhibits anisotropy, contrary to Special Relativity.

For small values of v, t' is t_0 : As v approaches c, t' becomes $t_0/2$, and the speed relative to the observer becomes $2\boldsymbol{c}$. As the speed v approaches c, dt'' becomes infinite, because the light and point S are traveling in the same direction and the time for the light signal to gain one complete circuit on the point S is infinite, while the observer sees the light speed approach zero.

Sagnac found a fringe shift resulting from the difference in travel times and lengths having the size:

$$\Delta n = 8\boldsymbol{\omega r}^2/c\lambda$$

Alternatively, in terms of the time difference and the area of the loop **A,**

$$\Delta t = 4A\omega/c^2$$

At only two revolutions per second, Sagnac found that absolute rotation could be measured.

In a ring laser, the light is generated and sustained by including laser excitation in the path of the light. When a ring laser is rotating, the different effective paths of the two opposite-moving laser beams generate two frequencies with equal number of cycles. A standing wave is created in the ring laser which is always stationary with respect to the local inertial frame of reference – the laboratory – whether the laser is rotating or not. If the ring is rotated, the nodes of the standing waves can be recorded as they pass by an observation point. Interference of the two laser frequencies forms a beat frequency, the difference between the two counter propagating modes. The beat frequency period varies linearly with the angular velocity of the ring laser with respect to the local inertial frame of reference.

$$\Delta f = 4A\omega/\lambda P$$

ω is the angular rotation of the Earth.
λ is the wavelength of the light.
P is the perimeter of the ring laser.

The speed of the passing nodes in the ring laser test depends upon the shape of the ring, not the area. In all cases – circle, square, triangle, etc., the velocity of the passing nodes is directly proportional to the rotation rate.

The development of the ring laser has led to a far more accurate method of measuring the Sagnac effect with no moving mechanical parts. Sagnac's interferometer accuracy of 10^{-2} has been improved by 18 orders of magnitude to 10^{-20} by Bilger with a ring laser.

Applications

Synchronizing clocks all over the globe using radio signals must take the rotation of Earth into account. In relaying timing signals with ground stations or satellites completely around the world, the time-keeping must synchronize. Without rotation, the time delay between relay points is determined by the separation distance alone. On the rotating Earth, the receivers move during the signal transit time, affecting the total time delay.

The need to include Earth's rotation for synchronization is called the Sagnac effect.

The Optical Laser Gyroscope uses the temporal difference between forward and reverse beams to measure rotation, a phenomenon that contradicts Special Relativity. Einstein always considered the Optical Gyroscope to be theoretically impossible.

Commentators

Herbert Ives states:

> [if the observer's] apparatus rotates with respect to the stars he will observe a Sagnac effect, if it does not, then no matter how great a relative rotation it exhibits with respect to its material surroundings, there will be no effect.

The key condition is that the equipment rotates relative to the stars. Since Ives doesn't specify that the stars are "fixed," his principle is consistent with Mach. The Sagnac effect is present whether we view the stars as stationary and the apparatus as rotating, or whether we view the apparatus as stationary and the stars as rotating. As it stands, Ives showed that Special Relativity theory cannot explain the Sagnac result. The same etherless Special Relativity theory that explained why the Michelson-Morley experiment detected no terrestrial motion around the Sun would also predict that the Earth should not seem to rotate, there being no ether to rotate in.

Michelson wrote:

> …this result [Sagnac] may be considered as an additional evidence in favor of relativity - or equally as evidence of a stationary ether.

That is, an immobile Earth in a Machian universe.

Note worthy is the fact that no reference by Einstein to the Sagnac tests is known, even though it was done eight years after Special Relativity was published, in addition to the fact that the results bear greatly on the validity of Special Relativity theory. Silberstein remarked,

> As a matter of fact, Einstein himself never entered into the details of this important problem of rotation….In fine, the optical circuit experiment may easily become crucial and fatal for Einstein's theory.

Turner (1979) commented that neither the Sagnac tests nor the Michelson/Gale tests were ever mentioned by Einstein. Post (1967) saw that there was a conflict in Special Relativity theory between the treatment of straight-line motion versus the rotating disc:

To be consistent with the principle of relativity one has to demand that the Sagnac interferometer and the ring laser cannot lead to a fringe shift or a beat frequency if the equipment is in uniform translational motion. The special theory of relativity does not apply to Sagnac because Lorentz transformations are restricted to pure translation. While this saved the situation from formal contradictions, it did leave a disturbing conceptual discontinuity. Why did Galilean kinematics suffice for rotational motion and then fail for pure translation?

Why was Special Relativity theory only applicable to uniform linear relative motion, while Newtonian theory could only explain rotational motion? The scope of each theory was exclusive of the other; neither could describe all types of motion.

Claims and Responses

Claim #1: The Sagnac instrument has no connection with its environment; light speed is independent of the device's surroundings.

Response: The device is a closed reference frame, which however detects its own turning motion, indicating a connection with the environment. This contradiction means that the implication of postulate 2 of Special Relativity theory is incorrect - space is not empty.

Claim #2: Ballistic theories such as Ritz's were tested directly, as the light paths around the ring had different lengths to travel. The detector and mirrors would be moving toward/away from the light. In a ballistic theory, a light photon has particle properties, so its speed depends on the motion of the source, $c \pm v$. Like a bullet fired from a moving gun, the speed of light is combined with the motion of the source, as in Galilean relativity. Ballistic theories predict no shift, that is, the net velocity between the light source and detector was zero, since they were both fixed on the rotating platform. However in the Sagnac experiment a fringe shift effect *was* seen, eliminating any simple ballistic theory.

Response: The reasoning is correct but ignores the extinction effect of the stationary air through which the light passes. Application of ballistic theory to the absorption of the photons by air molecules at rest (on average) leads to an emission of a new photon at $c + 0 = c$. Although the light is emitted from the mirrors at $c \pm v$, the beam speed is converted to the free space value of c when passing through air. Its measurement would then agree macroscopically with Special Relativity theory – the observed speed would always be c. An obvious test of the extinction hypothesis is to employ a vacuum Sagnac interferometer or perform the experiment in space.

Claim #3: In an inertial frame of reference, mirror motion during flight causes the opposite moving waves to be reflected at different places, leading to a net path difference.

Response: Replace all the individual mirrors by one cylindrical mirror. This is equivalent to considering an N-sided polygon in the limit as N ➜ infinity, so the light path is everywhere tangent to the cylindrical mirror. There is now no need for the mirror to rotate at all – opposite moving waves will not be reflected at different positions in space.

Claim #4: The ether cannot rotate around the Earth.

Response: See response above.

Claim #5: But the rotating ring is accelerated circular motion, while c is constant only in inertial frames of reference.

Response: Herbert Ives showed by analysis in 1938 that "the Sagnac experiment in its essentials involves no consideration of rotation," meaning that it is not the rotation that produces the effect. The measured Sagnac effect would be unchanged if the Sagnac interferometer were moved along a chord of a hexagon-shaped light path rather than rotating the entire structure. The effect could thus be produced without rotation or acceleration, confirming that there are linear versions of the Sagnac effect. Operational Global Positioning System technology uses the Sagnac effect to synchronize clocks that may be in any arbitrary state of motion.

Claim #6: The Sagnac effect is independent of the choice of reference frame. An observer co-moving with the ring will find the speed of light tangent to the ring is: $c \pm r\,\omega$ for light moving against or with the rotation

of the ring. Only the case of $\omega = 0$ is inertial. For $\omega = 0$ this frame of reference is non-inertial, where Special Relativity theory does not apply, so the speed of light in this case can vary from c.

Response: This shows that rotation is not excluded in Special Relativity, and exposes the confusion of supporters.

Claim #7: Special Relativity theory does not apply to non-inertial systems, like the Sagnac device.

Response: The non-inertial character of the rotating platform is of no significance since the light travels through free space between the mirrors. The light beam is observed to move rectilinearly, not in a curved path.

Claim #8: Sagnac effect causes a Doppler shift, as predicted by Special Relativity.

Response: There is no Sagnac Doppler shift. If the observer is in the laboratory, there would be a very small second order Doppler effect when observing the moving apparatus, but this is insignificant in affecting the result. There was no Doppler effect at all in the original Sagnac test, because the observations were made aboard the spinning disc, and the observation point was at a constant distance from the point of interference.

Claim #9: Post Sagnac, Special Relativity theorists proposed that the observer being in a rotating frame (non-inertial) made Special Relativity inapplicable.

Response: At radius r the acceleration is a $= v^2/r$ and the difference in observed light speeds is $2v$. By doubling the radius the acceleration is a $= v^2/(2r)$ and the difference in observed light speeds is still $2v$. The speed difference is completely independent of the acceleration. Even when a $= 0$, the frame thus being inertial, the difference is still $2v$. Sagnac's original assessment was correct – the speed of light is dependent on the observer.

Claim #10: This analysis is perfectly valid in both the classical and the relativistic contexts with respect to the axis-centered inertial frame.

Response: The classical result is:

$$\Delta t = 4A\omega/c^2 = 4\pi r v/c^2$$

and Special Relativity theory is:

$$\Delta t = 4A\omega/(c^2 - v^2) = 4\pi r v/(c^2 - v^2)$$

At the non-relativistic speeds used by Sagnac, the second order difference between the two would not be detectable. But there is a theoretical difference.

Claim #11: A clock attached to the perimeter of the ring would record a lesser time, by the factor $\gamma = (1-(v/c)^2)^{1/2}$, so the Sagnac delay would be $[4A\omega/c^2]/(1-(v/c)^2)^{1/2}$. However, the characteristic frequency of a given light source co-moving with this clock would be greater than the axis-centered frame by precisely the same factor, so the actual phase difference of the beams arriving at the receiver is invariant.

Response: One relativist says the perimeter is non-inertial and Special Relativity theory can't be applied. Another relativist says Special Relativity theory and Lorentz transformations can be applied and produce the observed effect. The inherent confusion of Special Relativity theory's principles and application surfaces again.

Claim #12: The Sagnac effect rules out the ballistic theory of light propagation (as advocated by Ritz in 1909), according to which the speed of light is the vector sum of the velocity of the source plus/minus a vector of magnitude **c**.

Response: In ballistic theory/Galilean relativity, the light traveling against the rotation is detected as:

$$(1)\ c_1 = c + v$$

where v is the velocity of the rim. The light traveling with the rotation is detected as:

$$(2)\ c_2 = c - v$$

In Special Relativity theory, light speed is independent of the observer, so the trivial results of the Sagnac experiment should be:

$$(3)\ c_1 = c_2 = c$$

The Sagnac experiment confirmed that (1) and (2) were, in fact, correct, supporting the classical concepts of an absolute rest frame, as Sagnac claimed.

Claim #13: Both the Michelson-Morley experiment and Sagnac are consistent with Special Relativity, since Sagnac found that, in ambient space, the light is propagated with a constant speed, independent of the overall movement of the source of light and optical system.

Response: No. Sagnac found that the light speed observed was affected by the motion of the disc.

Claim #14: The Sagnac effect is a purely "classical" effect. Relativistic effects apply equally in both directions, hence, the higher-order corrections of special relativity cancel out of the phase difference.

Response: This Special Relativity theory commentator says the Classical and Special Relativity theory formula for the time delta are the same, while others say Special Relativity theory has a $1/(c^2 - v^2)$ correction to the classical value. How can these subjective interpretations be considered as objective evidence of a well-understood theory of nature?

Claim #15: The Sagnac effect is based on isotropic light speed with respect to one particular system of inertial coordinates, the axial frame. All other inertial coordinate systems, like the observer on the ring, are related to this one by Lorentz transformations, which are defined as the transformations that preserve light speed. Hence no description of a Sagnac device in terms of any system of inertial coordinates can possibly entail non-isotropic light speed, nor can any such description yield physically observable results different from these.

Response: If the reference frames are reversed and the disc circumference frame is the observer's frame, and the Lorentz transformations give the corresponding distance and time measurements for the axial frame, then why don't the predictions for this model match the Sagnac measurements? The reason is that the axial frame in the laboratory is the preferred Geocentrism frame – the circular motion is not.

Claim #16: The pulses of light are never (let alone always) at the same point in the loop at the same time during their respective trips around the loop in opposite directions.

Response: The pulses traveling in opposite directions must overlap or cross once before completing one circuit.

Claim #17: At any given instant the point of the loop where one pulse is located is necessarily accelerating with respect to the instantaneous inertial rest frame of the point on the loop where the other pulse is located (and vice versa). Only one inertial reference frame can exist on the loop; all the rest are non-inertial.

Response: Circular path implies non-inertial; straight line implies inertial? Circular motion at uniform speed as an inertial reference frame has been questioned when centrifugal force and acceleration are considered. For uniform circular motion there is no component of acceleration parallel to the path in this case; otherwise the speed would change. Tests with various mirrors forming different polygons on a rotating table confirm that the light traveling in a straight line on a polygonal section does not travel at the speed *c* relative to the moving disc. Even Einstein said there is no reason to believe that light traveling in a series of polygonal lines will behave differently from light traveling in one straight line. Many supporters claim that Special Relativity theory cannot be applied to motion in a circle, or on a closed circuit, or to anything but single straight line motion. But Einstein applied Special Relativity theory to exactly those situations in the 1905 basic paper. Einstein (1916) later changed his mind when he launched his General Relativity:

> The word 'special' is meant to intimate that the principle is restricted to the case when K' has a motion of uniform translation relatively to K, but that the equivalence of K' to K does not extend to the case of non-uniform motion of K' relatively to K.

Note well, this is just one example of Einstein's many vacillations that allow relativity defenders to selectively cite Einstein's writings whenever there is a seemingly insurmountable difficulty with Special Relativity.

Claim #18: The two pulses do *not* traverse similar paths from emission to detector (assuming the device is absolutely rotating). The co-rotating beam is traveling slightly farther than the counter-rotating beam *in the inertial sense*, because the detector is moving away from the former and toward the latter while they are in transit.

Response: Introduction of undefined terms is a common ploy in Special Relativity theory explanations. What does "in the inertial sense" mean? If one beam travels farther than the other this means it travels faster. Why is the motion of the detector a problem?

Claim #19: The second-order effects of Special Relativity theory have been confirmed empirically by the Michelson-Morley experiment. Considering the Earth as a particle on a large Sagnac device as it orbits around the Sun, the ether drift experiments demonstrate these second-order effects, confirming that the speed of light is indeed invariant with respect to relatively moving systems of inertial coordinates.

Response: Second order effects were not originally thought to be detected by the Michelson-Morley experiment – the null result. This was Einstein's rationale for proposing Special Relativity theory with an etherless medium for light. Later experiments by Miller and re-analysis of the Michelson-Morley experiment's raw data show a drift velocity of ~ 8 km/s was present, contrary to the postulates of Special Relativity theory. It is a contradiction to say that the ether drift shows the validity of Special Relativity when, in fact, it was based on an etherless space.

Claim #20: In the Sagnac experiment the path around the circumference should be unwrapped into a straight-line path and the Lorentz transformation from the stationary to moving frame applied to this unwrapped moving circumference. This gives the correct fringe shift.

Response: Yes, but it directly contradicts the Goldstein and Misner, Thorne and Wheeler theory prescription for handling accelerations within Special Relativity theory as a succession of infinitesimal Lorentz transforms

Claim #21: No matter how large the disc, it does not approximate a straight line, because there is still some rotation involved. So no part of the Earth qualifies strictly as an inertial frame of reference.

Response: The center of the Earth, presumed to be moving around the Sun but not rotating (the ECI frame – Earth Centered Inertial) is taken as a suitable and perfectly acceptable inertial frame for Global Positioning System measurements, with no operational problems noted. The Hefele & Keating (1972) experiment also claimed that nearby space, co-moving with the Earth, was acceptable as a suitable inertial frame. This is equivalent to the Geocentric frame as far as Earth's movement is

concerned. The non-rotating Earth-centered frame is acceptable to Special Relativity theory adherents as a satisfactory inertial frame of reference. But the surface of the earth (the laboratory) is not considered as an inertial frame for the Bilger laser test, even though there is no relative motion between observer and the ring laser apparatus, and the center of the Earth rotates, during the Hefele & Keating case, by an angle greater by 10,000,000,000,000 than the Bilger test. In the Bilger test there is a rotation that is 5×10^6 smaller than the Global Positioning System case. In the original Sagnac test, the Earth would have turned 2.8×10^{-13} orbital degrees during the test. During a Global Positioning System test around the equator, the Earth would have turned by 10,000,000 times the amount it turned during a Sagnac test. Asserting that Special Relativity theory does not apply to rotation, while simultaneously using it daily in operations such as the Global Positioning System that has seven orders of magnitude greater rotation than the Sagnac experiment, is illogical, and a very narrow and 'just so' manipulation of the meaning of an inertial frame.

The results are the same for spinning discs of any radius; with a disc of arbitrarily large radius, the path shape approximates a straight line. The effect thus applies to all objects moving at constant speed. If the disc is so large that we cannot distinguish, within experimental error, any deviation from a straight line, then the result is applicable to straight-line motion. The deviation from a straight line on a distance such as used in the Michelson/Gale (600m) tests will not be detectable. As the Earth is said to perform all sorts of movements with respect to Sun, galaxy and stars, then technically speaking, Special Relativity theory cannot be applied anywhere on Earth.

Claim #22: The Sagnac device centers around one particular system of inertial coordinates (center of a circle), and all other inertial coordinate systems are related to it by Lorentz transformations.

Response: What happens to the measuring clock when the radius of the circle becomes very large and the clock's velocity small – a limit process? The Sagnac effect still applies and the clock's motion becomes more linear. In this limit process, it is reasonable to treat the moving clock as an inertial reference frame in its own right. Contrary to the constancy of *c* in Special Relativity, the Sagnac effect requires that the speed of light must be either *c* + *v* or *c* - *v*, and not *c*! This limit process shows that Special Relativity theory contradicts itself, as the real measurements are made in the moving clock frame and not at the center of the disc. If only an inertial frame of reference at the circle's center can explain the Sagnac effect, then Special Relativity theory is really Special Absolutivity Theory.

Summary

1. Sagnac modified the Michelson-Morley apparatus to look for the rotation of the Earth within the ether.

2. The light beams are in synchronism when released.

3. The light beams are not in synchronism when they have completed one turn of the apparatus.

4. Any observer on the rotating apparatus, or stationary in the laboratory, will observe identical fringe shifts.

5. The light behaves as if traveling at constant speed relative to the laboratory Geocentric system, oblivious to the spinning table around it. The light does not travel at a constant speed c relative to the observer aboard the spinning table. Moving in the same direction as rotation, it goes slower than c; in the other direction it goes faster than c.

6. Time and distance aboard a spinning disc are identical with a stationary laboratory. They are also identical aboard an object that is moving at uniform velocity in a straight line.

7. The Sagnac effect applies to uniform straight-line motion, just as it does to rotational motion.

8. The Sagnac effect is the result of a non-isotropic speed of light that arises any time an observer moves with respect to the Geocentric frame.

9. The Sagnac results are compatible with a constant velocity of light moving through ether in an absolute frame of reference.

10. The Sagnac equation applies for any shape of circuit.

11. The Sagnac experiment was sufficient proof of spatial anisotropy ($c \neq$ constant) and indirect evidence for the classical Galilean law of velocity addition.

12. Ring laser experiments confirm that light, in small-scale experiments, travels relative to the laboratory – the Geocentric Earth frame.

13. Since the rotation speeds are not relativistic, both classical physics and special relativity can be applied.

14. Special Relativity theory clearly disagrees with the Sagnac results. Sagnac effects are dependent on the velocity relative to the Geocentric frame rather than on the velocity of the receiver relative to the source, as Special Relativity theory predicted.

15. The Sagnac effect is the electromagnetic counterpart of mechanical rotation. A free gyroscope can be used to measure the rotation of the gimbal mounting; a Sagnac interferometer measures its angular velocity with respect to the local inertial (Geocentric) frame.

16. By Mach's principle the Sagnac effect cannot distinguish between whether the Earth actually rotates and the ether is at rest, or the Earth is at rest and the ether whirls around it.

17. The photographic record could be taken from the spinning disc or from the fixed laboratory - the result is the same.

18. Sagnac found a velocity of 13 m/sec caused one fringe shift (one cycle difference in the beam), a speed far below consideration of Special Relativity theory effects.

19. Wang *et al.,* (2003) showed that the Sagnac result is also obtained on a two way linear path, by reversing a light beam sent out on a straight line on a moving platform and measuring the difference in return time.

20. The second order effect forecasted by Special Relativity, for the time dilation aboard a moving object, is far smaller than the first order effect observed in the Sagnac test.

21. The original Sagnac experimental results were not specifically due to rotation. Wang has constructed a Fiber Optic Conveyer experiment that directly verifies that linear motion has the same effect as circular motion, consistent with Geocentric theory.

22. Variations include:
    a. putting the apparatus in a vacuum,

b.   using some other medium than air,
c.   rotating the medium while the mirrors are stationary in the Earth frame of reference,
d.   keeping light source and detector fixed in the Earth frame, separate from the rotating platform,
e.   moving the rotation center away from the geometric center,
f.   changing the shape of the circuit but not the area.

None of these modifications influenced the result.

Geocentric Interpretation

The Sagnac effect shows that the light is not affected by the movement of the source, and that light travels relative to the laboratory, because assuming that the light travels relative to the laboratory gives the correct result in all cases. The laboratory frame is the Geocentric frame. In the case of circular trajectories, Sagnac has shown how the velocity of light varies linearly with the observer's velocity. The absolute velocity of light, *c*, with respect to a fixed earth frame (Geocentrism) is an experimental fact. The results are compatible with all known experiments.

There is an inconsistency, however, in the relativistic *interpretation* of what's really happening locally in the Sagnac device. In Special Relativity theory, each point on the perimeter of a rotating circular Sagnac device is always instantaneously at rest in *some* inertial coordinate system, and according to Special Relativity the speed of light is precisely *c* in all directions with respect to any inertial system of coordinates. Thus the speed of light must be isotropic at every point around the entire circumference of the loop, and hence the light pulses must take an equal amount of time to traverse the loop in either direction.

The beams of light are traveling the same inertial paths through space as they proceed from the source to the detector, whether the mirror platform rotates or not. Yet their time difference is only zero if the platform is not rotating with respect to the Earth – the Geocentric frame. The inanimate unintelligent Sagnac device knows that it is rotating with respect to a special/preferred/absolute frame of reference – so, why don't the scientists observing the apparatus also know it?

The dependence of the Sagnac effect on the enclosed **S**urface relative to the rotation axis recalls the familiar classical electric and magnetic fluxes which are key concepts in Maxwell's laws, *E·***S** and *B·***S.** The question now is, what field is flowing through the Sagnac ring area to produce the fringe shift anisotropy? Sagnac results are an uncontested fact,

but the interpretation is far from that. Special Relativity advocates use an implicit assumption of a universal frame of reference for convenience, but boldly deny its existence when questioned if its use is arbitrary or mandatory.

What is the logical approach? When the Sagnac turntable is at rest, all agree there is no fringe shift. If c is, indeed, constant in all inertial reference frames in Special Relativity, will spinning the whole room, including the light source and detector, around the stationary platform of mirrors change the arrival time of the two beams? Special Relativity theory says: "of course not!" The Sagnac effect says: "yes – if the room was stationary in the lab/Geocentric frame!"

Sagnac developed his equation based on the assumption that an ether existed. Kelly showed that the same result is found using the stationary laboratory. Yet he (and others, like Cahill and Hatch) fail to put the two ideas together into the logical conclusion that, if the universal frame provided by the ether is also supplied by the laboratory (Geocentric) frame, then the universal absolute reference frame is the stationary Earth!

Although there is no universal frame of reference and more than two frames of reference are never theoretically needed, the Sagnac explanation for Special Relativity theory must add a third frame of reference called "proper time." In the third frame, the light beam is traveling a different distance, which is then asserted as the reason the two beams are unsynchronized. But why is there a proper time? Why is not the frame of the emitter or source, or the axis of rotation, capable of giving the "proper" results? The choice isn't convenient or expedient – it's mandatory, and thus absolute! In actuality, most attempts to explain the Sagnac effect consistent with Special Relativity implicitly assume ether's existence, under the guise of a third reference frame or a "proper time."

The Michelson-Morley experimental apparatus designed to detect the relative motion of the Earth and the luminiferous ether has a fundamental flaw that is exposed by the Sagnac effect: the effect of the relative motion does not depend on the length of the optical path, but on the surface enclosed by the optical path, as shown originally by Michelson in 1904 and confirmed by Sagnac in 1913. If the speed of light is a constant for the observer, then, for the observer on the rotating ring, light should take the same time to travel each way and no effect should occur. Sagnac proved that there *is* ether that the light has to pass through, a formidable challenge to Einstein's theory of Relativity that claims there is no need for ether. It is for this reason that the Sagnac experiment is virtually ignored by modern scientists.

Michelson-Gale Experiment

Michelson and Gale showed in 1925 that the Sagnac effect can also be seen if the apparatus is fixed to the Earth, making the Sagnac platform the same dynamically as the Earth itself – the same reference frame of the Michelson-Morley experiment. Unlike the Michelson-Morley experiment, the Michelson-Gale experiment did not produce null results. The observed displacement was closely related to the rotational velocity of the Earth, lending support to ether theories.

Like the Michelson-Morley experiment, Michelson-Gale compared the light from a single source after traveling in two directions over two rectangles of different size. Light in the rectangles reflected off corner mirrors and returned to the starting position. The light exiting the two rectangles was compared on a screen. Michelson-Gale utilized a large rectangular array of pipes and mirrors, with the East-West legs about 7 football fields long and the North-South legs about 4 fields long. This large area would make the equipment sensitive to the Earth's rotation. A calibration loop had the same North-South length, but a very short length in the East-West direction of the Earth's rotation, for comparison of the fringe shifts in the full-size loop.

If ether is dragged rotationally by the Earth, light traveling in the longer rectangle will encounter a different amount of drift than in the smaller one, because the two legs of the longer rectangle are spinning at different speeds, the northern leg moving slower than the southern one.
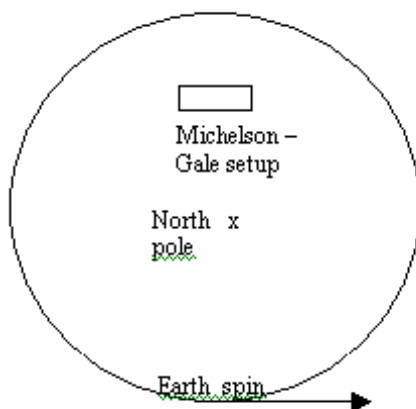
Numerical results can be easily derived by realizing that the equipment is equivalent to the Sagnac experiment, except that the mirror platform is fixed on the Earth, so any rotation detected must be due to the Earth itself. The Sagnac time difference is:

$$\Delta t = 4A\omega/c^2$$

in which the rotation axis is always orthogonal to the mirror platform. As the diagram above shows, the Earth's axis of rotation projects onto the loop of the Michelson-Gale apparatus on the Earth's surface at an angle corresponding to the latitude ϕ. At the equator ϕ is zero and the polar axis is parallel to the Michelson-Gale loop area; there is no delta t for this location. At either pole ϕ is $\pm$ 90°, and the polar axis is perpendicular to the Michelson-Gale surface. This is the maximum value possible, corresponding to the Sagnac value above. At any intermediate latitude the time difference for Michelson-Gale is given by:

$$\Delta t = 4A\omega \, (\sin\phi)/c^2$$

For a rigorous but equivalent derivation of the Michelson-Gale equation, see the corresponding footnote.[293] This exact result is obtained without explicitly invoking an ether, Lorentz transformations or General Relativity.

Claims and Responses

Claim #1: The Michelson-Gale experiment shows that the Earth is rotating with respect to the heavens.

Response:

1. It is only the relative rotation between Earth and cosmos that was detected, hence the Machian universe cannot be excluded.
2. The precision of the experiment could not distinguish a 24-hour solar period (a local effect) from a period 4 minutes shorter (the universal sidereal period).
3. Just as the free mechanical motion of the Foucault pendulum defined a plane of motion relative to the rotating heavens, the free motion of the Michelson-Gale light ring defined a plane of radiation relative to the same heavens.

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[293] http://www.commonsensescience.org/pdf/pdf/light-speed_and_aether.pdf

Claim #2: The experiment was expected to generate a positive result both for entrained ether as well as that due to relativistic effects. The Michelson-Gale result appeared to be a null result, or at least a rather inconclusive one. The average of 269 measurements showed .26 fringes, which is minimal evidence of rotation and the ether, but also not statistically significant.

Response: Detailed analysis of the data clearly shows the periodic nature of the 24-hour effect. Of course, averaging the wave greatly reduces its magnitude. The largest fringe was 0.55. Modern equipment, such as the optical gyroscope, has erased any doubt of its reality!

Claim #3: It was not considered a failure of Einstein's relativity because the rotating Earth is not considered to be an inertial frame of reference. Special relativity does not apply here. General relativity must be used since Special Relativity theory considers this a Sagnac-type of experiment in a rotating (non-inertial) frame of reference.

Response: See the Sagnac experiment responses to the same claim made then, that the environment is non-inertial.

Summary

Michelson-Gale detected the ether moving past the Earth's surface at 2% of the rotation speed. While the Michelson-Morley experiment detected no heliocentric movement, the Michelson-Gale experiment measured either the effect of the Earth's rotation or the ether's rotation around the Earth. As with the Sagnac test, Michelson-Gale data show clearly that *c* is not a universal constant, contradicting Special Relativity.

The assumption of ether needed ever more corrections to explain new and improved experiments. Finally, Einstein eliminated the ether. The derivation above demonstrates that no corrections are necessary. By means of bad assumptions, faulty interpretations and frequent back-tracking, Einstein formulated the Special Theory of Relativity. Creative interpretation of Special Relativity is needed by individuals to apply it to the experiments covered so far, an instability that can be traced to its erroneous underlying principles. Proponents insist on patching up the application of Special Relativity to reality, trying to rescue a doomed theory, rather than examine if the foundation is at fault.

The Hefele-Keating Experiment

Hefele-Keating press release:

> During October 1971, four cesium atomic beam clocks were flown on commercial jet flights around the world twice, once eastward and once westward, to test Einstein's theory of relativity. From the actual flight paths, theory predicted that the flying clocks, compared with reference clocks at the U.S. Naval Observatory, should have lost 40 ± 23 nanoseconds eastbound and gained 275 ± 21 nanoseconds westbound.... Relative to the atomic time scale of the U.S. Naval Observatory, the flying clocks lost 59 ± 10 nanoseconds eastbound and gained 273 ± 7 nanosecond westbound…These results provide an unambiguous empirical resolution of the famous clock "paradox" with macroscopic clocks.

According to Special Relativity, the aircraft moving eastward with the Earth rotation would have more delay than the one moving westward. Compared to the universe, the eastbound aircraft has a slight boost in speed over the westbound, with the observatory clock halfway between the two. For flights eastbound, v has a positive sign (same direction as Earth rotation) so the net shift in time will be negative (aging more slowly). Westbound, the time shift is positive (aging faster).

Gravity Time Shifts

For small changes in the gravitational potential, the reading of the surface clock, T_E, compared to the central standard clock at the Earth's center, T_0, is approximately:

$$T_E \sim T_0(1 + gR/c^2) \tag{1}$$

Referred to the same clock, the airplane clock reading at height h is:

$$T = T_0[1 + g(R + h)/c^2]$$

The difference between the two is:

$$T - T_E = T_0(gh/c^2) \qquad (2)$$

From (1):

$$T_0 = T_E(1 + gR/c^2)^{-1} \sim T_E(1 - gR/c^2)$$

To order $1/c^2$ (2) becomes:

$$T - T_E = T_0(gh/c^2) \sim T_E(1 - gR/c^2)gh/c^2$$

$$= T_E(1 - gR/c^2)gh/c^2 \sim T_E(gh/c^2)$$

comparing a surface clock(T_E) and the plane above the surface (T).

These predict a time difference of 144 nanoseconds eastbound around the world for a flight time of 41.2 hours at 8900 meters. The time shift is positive (aging faster) for both east and westbound flights. The predicted value of 179 ns for the westbound flight of 48.6 hours uses h = 9400 meters.

Velocity Time Shifts

The time dilation expression

$$T = T_0/(1 - v^2/c^2)^{1/2}$$

T_0 is the rest frame "proper time" for the event. For small velocities, T is about:

$$T = T_0(1 + v^2/2c^2)$$

The problem with measuring the difference between surface and aircraft clocks is that neither location is exactly an inertial frame. If we take the center of the earth as an approximation to an inertial frame, (the ECI or Geocentric frame), then a "proper time" can be measured at the center as if the master clock were there. Time measured by a surface clock would be larger than the proper time:

$$T_S = T_0 \left[1 + R^2\omega^2/2c^2\right] \qquad (3)$$

R is the radius of Earth and ω is its angular rotation. The airplane clock would be approximately:

$$T_A = T_0 \left[1 + (R\omega + v)^2/2c^2\right]$$

since h << R. The difference in the times compared to the hypothetical master clock would then be:

$$T_A - Ts = T_0[(2R\omega v + v^2)/2c^2]$$

In the experiment the master clock is on the moving surface, not at the center, where it would be immeasurable. Solving for T_0 in (3) gives:

$$T_0 = Ts\,[1 + R^2\omega^2/2c^2]^{-1} \sim Ts\,[1 - R^2\omega^2/2c^2]$$

and then substituting for Ts in the last equation:

$$T_A - Ts = Ts\,[1 - R^2\omega^2/2c^2][(2R\omega v + v^2)/2c^2]$$

Ignoring the fourth order term in c compared to the second order, and including the lag of the plane clock behind the surface clock, the change of the airplane clock with respect to the ground clock is:

$$T_A - Ts = -T_S[(2R\omega v + v^2)/2c^2]$$

The absolute reference at the center has disappeared, to be replaced by the approximate surface time. Now the times are accessible to measurement. Both gravitational and kinematic time dilation are significant and of comparable magnitude. Hefele-Keating predictions distinguish between the gravitational and kinematic effects, but the aircraft flight data always includes both effects together.

Summary of predictions and results:

Predicted	Time Δ in ns	
	Eastbound	Westbound
Gravitational	144 ± 14	179 ± 18
Kinematic	-184 ± 18	96 ± 10
Net Effect	-40 ± 23	275 ± 21
Observed	-59 ± 10	273 ± 21

Hefele and Keating are credited with confirming time dilation with an accuracy of about 10%, as well as answering the twin paradox. They are said to have proved that a plane's speed and direction affect the real time changes recorded by atomic clocks on the planes. There is no reason given why Special Relativity predictions only work if the Earth's axis is chosen as its reference frame, or why a real permanent change occurs in the final readings of the atomic clocks after returning to rest on the ground.

Technical problems

An engineer, A.G. Kelly, obtained the original 1971 test report from the United States Naval Observatory and discovered that:

- The original data actually did not support the result computed in the 1972 paper.
- The Cesium clocks that were carried varied in time so badly that some of them could vary more than the total supposed results during the time of the test.
- The most stable of the four clocks indicated zero time accumulation/dilation.
- The final published outcome had to be averaged in an extremely convoluted and biased way.
- Even the inventor of the atomic clock, Louis Essen, concluded that the alterations in drift-rates of the clocks made the results useless.
- The accuracy of the clocks would need to be two orders of magnitude better to give confidence in the results.
- The actual test data were not published originally.
- The corrections made by Hefele-Keating to the raw data are unjustified.
- Hefele-Keating took the average of the drift rates before and after a flight to be the drift rate during the flight.

- The Cesium clocks drifted from 2 to 9 ns. per hour, and the rates could vary by as much as 4ns. A maximum possible error of 300 ns in the test overwhelms an expected result of only 40 ns. Note: Atomic clock systems (including Global Positioning System) are now accurate to about 10 ns, at best.
- The clocks were not of equal stability; averaging could not make the test more reliable.
- Under the revised USNO guidelines issued the following year, the Hefele-Keating results would have been rejected as unreliable.
- Although the data graphs are never linear, Hefele-Keating assume that the curves are linear for the moving planes. Non-linear when measured, they magically become linear when not directly measured!
- Time changes of individual clocks are both + and - for both flights.
- Only the linear analysis of the average clock times agrees with Special Relativity.
- Objective analysis shows no significant difference in the moving clock behavior.

Domina Spencer also analyzed the raw data from Hefele-Keating experiment and found rampant technical errors: [294]

- No two "real" cesium beam clocks keep precisely the same time.
- There are systematic rate (or frequency) differences as large as 1 second per day.
- The smooth curves interpolated during flight appear to be entirely unaffected by the plane's motion.
- Data have been subjected to a major smoothing process.
- No data was taken during the east or west bound trips, only before and after.

She interpreted the data to show:

- An entirely different interpretation of the experimental data from Hefele-Keating, which supports the Geocentric paradigm.
- The validity of Universal Time Postulate III: In a coordinate system that is not moving with respect to the source and which is not in rotation, the velocity of light in free space is a constant c.

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[294] http://www.physical-congress.spb.ru/english/ spenser1/spencer1.asp

The Geocentric frame does not move with respect to the surface nor does it rotate.

- The distance between source and receiver is not consistent with the protocol of Special Relativity, which measures distances by equating the space-time interval between source and receiver. This challenges the Minkowski application to Special Relativity.
- Rather than Special Relativity theory Spencer uses the distance from the source to receiver, BOTH measured at the instant t of reception.
- The spherical wavefront center is always at the source (even if the source is accelerated).
- There is no time dilation.
- For a source with instantaneous velocity v, the velocity of light is not a constant c but is $c + v$. The Hefele-Keating data supports Galilean relativity, not Special Relativity.
- Only in a coordinate system in which the source is stationary is the velocity of light equal to c.

Claims and Responses

Claim #1: The determination of time dilation is done in the rest reference frame and not by observers in any inertial reference frame measuring objects/events in another inertial reference frame. Using this single rest frame, Lorentzian transformation disagreements with time and length measurements by observers in different inertial reference frames are eliminated.

Response: Since the single rest frame, the extended Earth axis, is the only absolute reference frame in which Special Relativity theory formulas predict the time changes correctly, this absolute reference frame must be very significant to cause the frequency of the Cesium clocks, thousand of kilometers away, to modify their frequency in response to the direction and speed of the jets carrying them, in preference to all other reference frames. Because the rest reference frame is part of the methodology of Special Relativity, it must logically be a partial cause of actual time changes in these remote atomic clocks. But is it logical that a far distant imaginary axis be a cause of actual frequency changes in atomic clocks, that is, without an intermediate medium to transmit the cause to the effect, namely, the ether?

Claim #2: The Hefele-Keating experiment indicated by means of one clock, #447, that accelerated clocks, moving between events by different

spacetime paths, do not accumulate any net time difference when they are brought together again. If dependable, this says the proper times in all reference frames accumulate at the same rate, independently of space-time paths, and thus support a view that the Special Relativity theory 'proper time' is a universal time rate that is the same for all reference frames.

Response: First of all, if this one clock confirms the conclusion, the other three disprove it. Second, the proper time system used by Hefele-Keating was an unacknowledged absolute Geocentric frame that will predict the observed time differences with other reference frames. This confirms Geocentrism, not Special Relativity.

Claim #3: Hefele-Keating confirmed Special Relativity theory time dilation for both clocks. The accelerated airborne clocks read uniformly less than the non-accelerated Earth-bound clocks readings, an indication that time had been dilated, and a confirmation of relativity, which predicted time dilation for accelerated/decelerated clocks.

Response: Eastbound clocks incurred time dilation – ticking slower than the ground clock, said to confirm Special Relativity. Westbound clocks incurred time contraction – ticking faster than the ground clock, also said to confirm Special Relativity. But dilation/expansion is not the same as contraction/shrinking!

Claim #4: Special relativity predicts the time difference found by Hefele-Keating when the flying clocks returning to the start.

Response: Hefele-Keating said:

> ...consider a view of the (rotating) earth as it would be perceived by *an inertial observer looking down on the North Pole from a great distance.* A clock that is stationary on the surface at the equator has a speed RΩ *relative to nonrotating space*, and hence runs slow relative to *hypothetical co-ordinate clocks of this space* in the ratio...

Note that the timing in the Hefele-Keating experiment was *not* done by "an inertial observer looking down on the North Pole from a great distance"; it was at the U.S. Naval Observatory, which is on the ground, near and spinning with the equator. In Einstein's Special Relativity, where there is no preferred inertial system, relative to *this remote axial clock* the speed of both flying clocks would be *equal*, and the time dilation as well.

But the eastbound clocks lost time and westbound gained time. So we have another clash between observation and Relativity.

Claim #5: Hefele and Keating concluded that these results provide an unambiguous empirical resolution of the famous clock 'paradox' with macroscopic clocks.

Response: Others say the results highlighted the paradox vividly, rather than resolving it. The original twin paradox was independent of path. The Hefele-Keating experiment result puts the focus on the amount of East/West motion. Consequently, aging now depends not just on |**v**| but also the direction relative to longitude and the change in altitude, that is, path dependence, not just the endpoints. One twin *is* older than the other, by the Hefele-Keating experiment. A much bigger paradox – an outright contradiction, in fact – is how this asymmetric result can be explained within either Special Relativity or General Relativity, or any other relativity theory. How can an absolute frame of reference be absolutely needed in a paradigm that says all motion is relative? How can Special Relativity theory become Special Absolutivity Theory, without anyone noticing or acknowledging the illogic?

Claim #6: If a moving clock is brought back to its starting position it should show a difference in the time registered compared to a stationary observer.

Response: No one supporting Special Relativity theory said this before the Hefele-Keating experiment. A few who are immune to logic said so afterwards. A permanent difference in the clocks violates the whole concept of Relativity. The Lorentz transforms would not be reversible if a change in view is made from the ground to the plane and then back again. There has to be something different about the traveling clock that makes it 'tick' more slowly. That difference is its motion through the ether seen from the absolute Geocentric frame.

Claim #7: The traveling clock has to first accelerate to reach a certain speed, and it is this acceleration that 'causes' the slowing down of the traveling clock.

Response: This is one of many excuses put forth by Special Relativity to escape the Hefele-Keating results, that is, one denies that Special Relativity is applicable to the Hefele-Keating experiment. Later tests show the total time difference observed is dependent on how long the clock

moves at constant speed and not on how that speed was reached – the acceleration. If two clocks receive the same acceleration and reach the same velocity, but one travels at that constant velocity for much longer than the other, the two clocks show different times relative to the ground clock. If the time difference was due to acceleration, the Lorentz formulas should be expressed as a function of the acceleration, not the velocity. The time dilation is due to duration of velocity, not acceleration. When time dilation has no connection with the cause of motion (acceleration), the cause must be sought elsewhere – in a universal environment of space, the arena in which all events occur.

Comments

Each atomic clock, even the surface clock, was considered to be in motion relative to the central reference frame. In the original Special Relativity theory of Einstein, the "at rest" reference frame could be taken as any of the moving objects. (Einstein died in 1955, 16 years before the Hefele-Keating experiment.) For agreement with the data, the Special Relativity theory rest clock must be at the center.

The use of an ECI reference frame located on the extended axis of the Earth was based on prior knowledge that the USNO atomic clock would not allow Special Relativity formulas to work with the raw data. It was already known that Special Relativity would only work with a remote absolute reference frame on the Earth axis, such as "a non-rotating point high above the North Pole."

The Hefele-Keating frame chosen was a Geocentric frame, with the distance from Earth assuring that the gravitational potential would not be a factor. Hefele-Keating knew the traveling clocks would be moving non-inertially with respect to a ground clock and the ground clock would be moving non-inertially on the rotating Earth, precluding a highly accurate test for Special Relativity theory. So they switched from the ground clock to a hypothetical (and unobservable) clock located at the center of the Earth. Since the surface clock would be moving at a fairly uniform speed compared to this hypothetical central clock, the time on the central clock could be represented as a fixed offset from the ground station clock, or be absorbed in a re-definition of a second. By this transformation, it was possible to pretend that the ground clock and both plane clocks were all traveling more or less inertially with respect to the earth centered clock. This approach works, not because of the success of Special Relativity theory in this situation, but because Hefele-Keating are forced, in order to obtain correct results, to use the Geocentric system.

When physicists calculate time dilation, they neglect the Earth's spin. According to Hefele-Keating, time differences depend entirely on the absolute rotational velocities of the airplanes. Putting aside Relativity theory, contemporary physicists *prefer* the Earth Centered Inertial frame (Geocentrism) to make their predictions correct *in practice*. Without fanfare, discussion, or explanation, they quite deliberately ignore the reference frames of the non-rotating aircraft and the non-rotating, *non-orbiting* Sun, or even the rotating ground stations. Why? One reason – only the Geocentric worldview works. The emperor – Einstein – has no clothes.

Einstein abolished "absolute time," considering it immeasurable and irrelevant. Physics has since advanced without any way of definitively measuring time in an acceptably objective way. Relative time is counter-intuitive to the understanding of time held by Galileo and Newton. Without this logical base, confusion arises when the common sense of time is replaced by the twisted ideas of Special Relativity. The Hefele-Keating experiment revealed that changes in time depend on absolute speed through space – the vector sum of the Earth's rotation and airplane speeds – rather than on the relative velocities of the clocks, as in Special Relativity.

Only a few space scientists (and so virtually nobody on earth) know that the Earth's ECI/Geocentric frame is always used for near space navigation and for local phenomena, while the solar system barycentric (SBC) frame is used for trans-planetary navigation and deep space phenomena. Even fewer know that, directly or indirectly, explicitly or implicitly, the SBC system values are transformed into the Geocentric frame to get results that agree with the predictions of Relativity. With all calculations buried out of sight in the bowels of computer programs; with the specialized and sophisticated code employed, translatable only by the initiated, this practice can be hidden (and denied), just as a school boy can bury a fudge factor in a sea of lab report data, to get the standard "correct" result.

Despite the dubious protocol and analysis of Hefele-Keating, later experiments using atomic clocks, aircraft, satellites and rockets have proven that time slows down the faster you move. In 1975 Professor Carroll Alley tested Einstein's theory using two synchronized atomic clocks. One clock was flown on a plane for several hours, while the other clock remained on the ground. Upon return, the clock on board the plane was found to be ever so slightly slower that the one on the ground. This was not due to experimental error, and has been repeated numerous times with the same result. This difference in time is even more pronounced today in satellites such as the space station and Global Positioning System.

This is because satellites are traveling at speeds much faster and for much longer periods than possible in an airplane.

Ether Drag Model

Suppose Hefele-Keating had interpreted the results using an ether that doesn't rotate with the Earth and extends high into the atmosphere. This choice of a rest reference frame would work with the formulas and have the correct choice of coordinate system. The ether that is dragged with the Earth's motion comes into direct contact with the atoms in all of the atomic clocks. There is thus a physical connection established between the Lorentzian formulas of Special Relativity and the ether that causes resistance to the atomic motions in the clocks. This is far more logical than the Hefele-Keating remote axial frame that offers no physical cause for its importance or necessity!

In Einstein's Special Relativity theory *any* two moving reference frames could be *directly* compared to each other. In the ether drag theory, two reference frames can only be compared to each other indirectly, by comparison of each to its ambient ether (essentially a local absolute reference frame) and then, calculating their interrelationship *via* the intermediate ether, a two step process. The meaning of ambient ether here is that it fills all space and flows, a dynamic mode, not static.

In the Hefele-Keating experiment, westbound flights fly with the ether wind causing less resistance and running faster than a stationary clock. And vice-versa, for the eastbound flights. The ether theory has no problems with the clock or twin paradox and makes exactly the same predictions as the Hefele-Keating version of Relativity as to whether the clocks speed up or slow down relative to a stationary clock, and by how much. This is true because both the Hefele-Keating rest reference frame and the ether drag reference frame are the same coordinate system – the Geocentric paradigm.

With the ether drag theory, the Hefele-Keating experiment proves the existence of the ether wind. But whether it is the Earth that rotates and drags the ether with it, as stated by Michelson, cannot be determined by Hefele-Keating experiment alone. For the rotation of the Earth through this ether has the same effect as if the Earth were stationary and the ether was moving – a re-discovery of Mach's principle, keeping the Geocentrism option open. In the Geocentrism mindset the ether wind speed detected by Hefele-Keating is the same as the [alleged] rotation velocity of the earth! From an ether perspective, the Hefele-Keating experiment can only be satisfactorily resolved by assuming a universal and absolute reference frame and a medium that transmits light.

(Note: there are two experiments that indicate that not only does *c* vary by altitude (ether density), but also that in the denser ether *c* is faster. Dayton Miller is one, Hefele-Keating the other).

Summary

1. Acceleration during the trip had no effect on the results, only the height and speed of the planes.

2. As also found with Global Positioning System operations, the results were only consistent if the reference clock was in the Earth Centered Earth Fixed frame - the Geocentric frame!

3. Hefele-Keating claim the results support Special Relativity, yet the round-trip in either direction should produce no net time dilation when the clocks are returned to the reference clock and record zero relative motion! If the on-board clock were taken as a reference, then it would show the same results compared to the Earth clock, so each one would be 59 ns slower than the other. This is the unrebutted Dingle paradox of time dilation - a simplification of the famous twin paradox! If A < B then B < A! That such illogical thoughts and defiance of reality can occur among objective scientists is incredible. So confused are the experimenters that they seem quite willing to plug numbers into an Einstein relativity formula, without ever asking if the result makes sense.

4. Not only the experimenters but all the relativity advocates accept this as a confirmation of Special Relativity!

5. These results, confirmed by Global Positioning System observations, actually show the Earth is a preferred reference frame, a surprise to all but the geocentrists! There can only be a permanent change in the time readings if there is an asymmetry, a lack of relativity, an absolute reference frame!

6. There is no doubt that a *deus ex machina mathematica* will be employed to brush this result away from challenging relativity – just as Michelson never even considered the most obvious answer to his 'null' result, that the Earth and the ether were not moving.

7. The success of the experiment depended on using a third reference point called "proper time." Introduction of this extra and required reference

point takes relativity out of consideration because it's simply a euphemism for hidden ether (universal reference frame).

There is no sense in emphasizing the Hefele-Keating errata. Alley and others have confirmed the sense of the experiment by iteration. Satellites afford a better test of time dilation and synchronization of moving objects in near space.

The Hefele-Keating experiment is unique in three ways:

- Two professional experimental physicists performed the design and execution of an important test of relativity with all the care, forethought and intelligence of a high school physics lab experiment.
- Their interpretation, along with other mainstream physicists, that the results confirm Special Relativity, boldly contradicts common sense and the simplest understanding of Special Relativity theory postulates.
- The biggest surprise is that the flubbing of the experimental protocol and the gross misinterpretation of the readings went without comment in the mainstream journals, and were noted only in the physics backwaters, as cited above.

Even more intimidating, perhaps this situation is not unique to Hefele-Keating but may be prevalent in most leading-edge science pursuits, especially where prestige and funding are at stake. This consideration is true not just for Relativity but for cosmology, geology and biology, as well.

Global Positioning System (GPS)

Claim: The Global Positioning System (GPS) is the Earth's only fully functional satellite navigation system. It is a constellation of more than two dozen satellites that broadcast precise timing signals by radio to electronic receivers, which allow them to accurately determine their location (longitude, latitude, and altitude) in real time. The GPS is a marvelous laboratory for testing Relativity theory because the orbiting and ground atomic clocks have differing gravitational potentials and high relative speeds. Their high precision confirms predicted relativistic clock corrections to less than one percent. The Global Positioning System needs universal synchronization of satellites and ground stations; the preferred reference frame is the ECI reference frame.

Response: Note the following:

- Not an experiment, but a technology whose successful daily operations support Geocentric cosmology and challenge Relativity theory dogma.
- All high precision Global Positioning System applications correct for the Sagnac effect, indicating that the speed of light is not always constant to the moving observer. The Sagnac effect in Global Positioning System operations are in conflict with Special Relativity.
- Global Positioning System computations locate moving receivers by including the $\mathbf{v} \pm \mathbf{c}$ Galilean model.
- ECI is the standard technical name for the Geocentric frame.

Further Details

The Global Positioning System is a satellite-based navigation system consisting of a network of 24 orbiting satellites that are eleven thousand nautical miles in space and in six different near-circular orbital paths. The satellites are constantly moving, making two complete orbits around the Earth in just under 24 hours at about 3.6 kilometers per second. The satellite orbits are roughly 25,000 kilometers from the Earth's center, or 20,000 kilometers above the surface, far below the orbits of the geosynchronous or geostationary satellites. The orbital paths of these satellites take them between roughly 60 degrees North and 60 degrees South latitudes.

The satellites contain precise atomic clocks whose rates depend both upon satellite velocity and altitude and are stable to one part in 10^{14} over a day's time, at best accurate to about 10 ns (10^{-8} sec). An observer with a Global Positioning System receiver on the ground, in an airplane, or in a satellite, may determine his precise location by obtaining signals from several satellites simultaneously. The Global Positioning System receiver determines its current position and heading by comparing the time signals it receives from the Global Positioning System satellites and triangulating on the known positions of each satellite.

The positions of the Global Positioning System satellites are predicted from time delay calculations that set the speed of light to a constant value, c. The U.S. Department of Defense uses radar to map the satellites to reference points on the Earth's surface; and correction data is sent back to the satellites every few seconds.
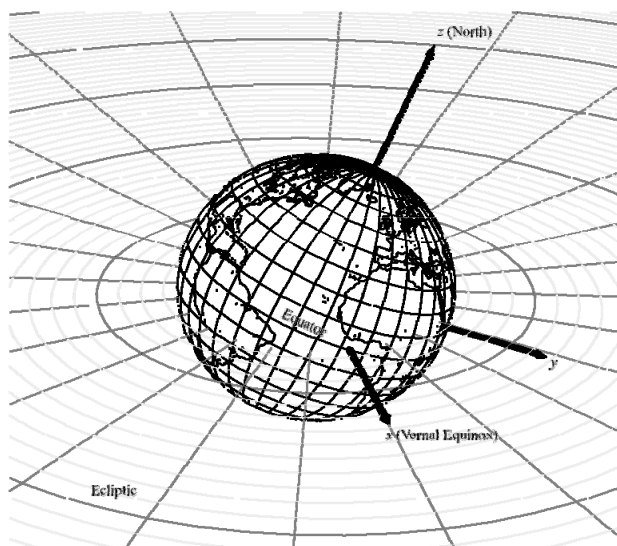
ECI frame[295]

If the frame is Earth-centered but does rotate, it is non-inertial and termed ECEF: Earth-Centered, Earth-Fixed. The clock rates are not adjusted for motion relative to each other but all refer to the Earth-Centered, non- rotating Inertial frame, the ECI frame.

Ephemerides are expressed in the ECEF coordinate frame, which is Earth-fixed. Global Positioning System stations broadcast the satellite ephemerides (schedule of orbit positions) in an Earth-Centered, Earth-Fixed reference frame rotating once every 24 hours. If used without removing the underlying Earth rotation, GPS would be in error, so the ephemerides are transformed to ECI using the Earth rotation rate.

Because of frame rotation, the path of a signal in the ECEF is complex. In the Global Positioning System, synchronization is performed in the ECI frame, which solves the problem of path-dependent inconsistencies. The displacement of a receiver on the surface of the Earth due to the Earth's rotation in inertial space during the time of flight of the signal must also be taken into account. For example, the greatest distance between satellite and receiver occurs when the receiver is on the equator and the satellite is on the horizon.

Correction must also be applied by a receiver on a moving platform, such as an aircraft or another satellite, by an observer in the rotating ECEF

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[295] http://celestrak.com/columns/v02n01/fig-1a.gif

frame. This is the Sagnac effect, the same principle employed by laser ring gyros in an inertial navigation system.

Global Positioning System Clocks

Cesium atomic clocks operate by counting hyperfine transitions of cesium atoms that occur roughly 10 billion times per second at a very stable frequency provided by nature. The precise number of such transitions was originally calibrated by astronomers and is now adopted by international agreement as the definition of one atomic second. To achieve high location precision, the ticks of the atomic clock must be known to an accuracy of 20-30 nanoseconds. Because the satellites are moving relative to and above ground observers, Relativity must be taken into account.

The Global Positioning System is based on the principle of the constancy of *c* in a local inertial frame: the Earth-Centered Inertial (ECI) frame. Time dilation of moving clocks is significant for clocks in the satellites as well as clocks at rest on the ground.

Special Relativity predicts that the on-board atomic clocks should fall behind ground clocks by about 7 microseconds per day because of the slower ticking rate due to the time dilation effect. General Relativity predicts that satellite clocks will seem to tick faster than the surface clocks by 45 microseconds per day. The total relativistic effect is about 38 microseconds per day. This is a huge difference compared to the required accuracy, that is, 38,000 ns as compared to 25 ns, the former being 1,500 times larger.

To compensate for the General Relativistic effect, GPS engineers slow down the satellite clock frequency at pre-launch so that when the satellites are orbiting the clocks will have the same rate as the reference atomic clocks at the Global Positioning System ground stations. A clock whose natural ticking frequency has been pre-corrected on the ground for relativity changes in orbit is a "GPS clock." A Global Positioning System clock can be used to determine local time in the surface frame at any point along the orbit. The satellite clocks are reset in rate before launch to compensate for relativistic effects by changing the international definition of the number of atomic transitions that constitute a one-second interval. With this re-definition, the clocks onboard the satellites run at nearly the same rates as ground clocks.

Global Positioning System receivers have a built-in computer chip that does the necessary relativistic calculations to find the user's location. Since the ground receivers rotate in ECEF, satellite positions change with each measurement. So the receiver must perform a different rotation for each measurement made into some common inertial frame. After solving

the propagation delay equations, a final rotation must be performed into the ECEF to determine the receiver's position. This complexity – where ground and satellites are both moving – is simpler to describe in an inertial reference frame, ECI, centered at the earth's center of mass, which center is moving at constant velocity. For the solar system, an International Celestial Reference Frame (ICRF) is similarly defined, centered at the solar system barycenter.

It can be shown by sample configurations that path-dependent discrepancies in the rotating ECEF frame are inescapable by any practical means, while synchronization in the underlying ECI frame is self-consistent. For the Global Positioning System this means that synchronization of the entire system of ground-based and orbiting atomic clocks is performed in the local inertial frame, or ECI coordinate system.

Claims and Responses

Claim #1: The choice of ECI is arbitrary; any inertial frame can be used in Special Relativity.

Response: This is quite disingenuous. Would it be used if it didn't work? Has not modern physics emphatically asserted that the ECI frame is wrong, that the Earth rotates within a sphere of stationary stars? Why is ECI the only acceptable coordinate system for successful Global Positioning System operations?

Claim #2: All laws of physics are equivalent in any inertial frame.

Response: Yet the comparison of Global Positioning System satellite signal frequencies using their relative motion differs from that obtained using the Geocentric frame, which is known to be valid experimentally. Special Relativity theory proponents claim there is no compulsion in choosing the inertial reference frame most convenient; and in the case of the GPS, this arbitrary choice just happens to be the Geocentric inertial frame. But this is not a matter of indifference, since using a satellite receiver as the observer in Special Relativity theory does not predict the observed frequency shift, but the Geocentric frame does.

Claim #3: The Global Positioning System is 1000 times more accurate than the Miller or the Michelson-Morley experiment, and it rules out any ether wind of more than 12 m/s in any direction.

Response: (1) Dayton Miller and the Michelson-Morley experiment found positive ether results – albeit the Michelson-Morley experiment interpretation was left unrecognized until recent analysis of the original data discovered the opposite sine waves pattern during day and night hours - as expected for ether wind. (2) The Sagnac effect applies to the Global Positioning System; it clearly detects a difference in light speed dependent on the Earth's rotation/ether flow.

Claim #4: Global Positioning System calculations obey the rules of Special Relativity, provided that one undoes the pre-launch clock rate corrections in the satellite clocks and use the Einstein synchronization convention (which Global Positioning System does not do).

Response: But the Global Positioning System becomes practically unusable if one uses Einstein's clock synchronization because clock corrections become time-variable, observer-dependent, and inconsistent between different clock pairs. Every clock would have its own time frame.

Claim #5: By the General Relativity principle of equivalence, a freely falling object in a gravitational field, such as a Global Positioning System satellite, can always be described in its own gravity-free Lorentzian frame. Height of the satellite is irrelevant, since the satellite is in free fall.

Response: General Relativity predicts time is slowed by decreased gravitational potential, so no Sagnac effect should be measured in the absence of gravity, but it is. Conversely, if a Geocentric frame measures an absolute flow of time, independent of local clock measurements but dependent on the clock appointed in Genesis (*i.e.*, the motion of the lights in the firmament), then a Sagnac experiment will measure the angular rotation of the firmament (conventionally assigned to the spinning earth) as an absolute time reference. General Relativity ascribes a change in the rate clocks run to a change in the flow of time. By contrast, the Geocentrism ascribes the rate-change as a result of failing to use the absolute Geocentric frame for time measurements. In other words, one must take into account a frame that is affected by ether density and relative motion through it.

Claim #6: Relativity predicts that clocks run slower in a stronger gravitational field or when moving faster. It is found that these two effects cancel each other for clocks located at sea level. So if a clock at either pole is the standard, a clock at the equator would tick slower because of its relative speed due to Earth's spin, but faster because of its greater distance

from Earth's center of mass due to the flattening of the Earth. Earth's spin rate determines its shape.

Response: The effects are the same with a rotating universe or ether, as per Mach's principle.

Claim #7: Operational data shows that the on-board atomic clock rates do, indeed, agree with ground clock rates to the extent predicted by Relativity. Therefore, we can assert with confidence that the predictions of Relativity are confirmed to high accuracy over time periods of many days.

Response: Although the magnitude of the changes are confirmed, neither the freedom of choice in reference systems nor the Sagnac effect is confirmed!

Claim #8: By the terms of Special Relativity, all inertial frames are equivalent, so the Global Positioning System is calibrated to an "ideal user" in a non-rotating, Earth-centered frame, the simple introduction of a third inertial reference frame.

Response: A new undefined concept, "the ideal user," is introduced. Where and when did Einstein speak of such an idea? The refusal to use any frame (such as the source or observer) cannot be brushed off as a trivial choice. It defies the whole philosophy behind Relativity.

Claim #9: The Global Positioning System operates by sending (coded) clock signals from orbital altitudes to the ground. This takes 80,000,000 ns from the perspective of an atomic clock. The speed of radio signals is the same from all satellites to all ground stations at all times of day and in all directions to within 12 meters per second. The same numerical value for the speed of light works equally well at any season of the year. So the speed of light is constant. So Special Relativity theory is validated.

Response: (1) Except that it ignores the special frame needed – Earth-Centered Inertial/Geocentric frame, which means, if Geocentrism is not used, all Special Relativity theory times are invalid. (2) The speed of light is not constant, but only equal to c in the Geocentric frame. Satellites emit photons at $c \pm v$ relative to the ether.

Claim #10: The Sagnac effect can be regarded as arising from the relativity of simultaneity in a Lorentz transformation to a set of local inertial frames co-moving with points on the rotating earth. It can also be

regarded as the difference between proper times of a slowly moving portable clock and a master reference clock fixed on the ground.

Response: This is very complex when compared to the simple statement of reality. The Sagnac effect occurs whenever there is motion or elevation with respect to the geostatic reference view, the Earth-Centered Inertial frame.

Claim #11: Special Relativity cannot be used to handle the case of objects and observers who are undergoing acceleration (non-inertial reference frames).

Response: Only velocity affects satellite clocks, not acceleration. (1) Cyclotron experiments have shown that, even at accelerations of 10^{19} g, clock rates are unaffected. (2) Consider acceleration with respect to the object's momentary co-moving inertial coordinates at any given instant. The accelerated motion can be considered as a sequence of inertial frames separated by infinitesimal time intervals. Special Relativity applies in each of these co-moving inertial frames, but at each instant the object is accelerating relative to its current instantaneous frame of reference. The object could be moving with a speed v tangentially to a center of attraction toward which it is drawn with a constant acceleration a. The path of such a particle is a circle in space of radius v^2/a, such as traversed by the Global Positioning System satellites. At any given instant the object is momentarily at rest with respect to a system of inertial coordinates, so we can define "proper" time and space measurements in terms of these coordinates. The object's acceleration causes continuous progression from one system of simultaneously co-moving inertial coordinates to another; the effect of this change will be seen in any time or space derivatives. At relativistic speeds, time and space axes are affected, so when the current frame of reference is projected back to the original or starting frame of reference, both time and distance are shortened. For an example, see the relativistic rocket problem in *"Gravitation"* by Misner, Thorne and Wheeler, section 6.2 or see the analysis at http://mathpages.com/rr/s2-09/2-09.htm. *(*3) Goldstein states:

> Consider a particle moving in the laboratory system with a velocity v that is not constant. Since the system in which the particle is at rest is accelerated with respect to the laboratory, the two systems should not be connected by a Lorentz transformation. We can circumvent this difficulty by a frequently used stratagem (elevated by some to the status of an additional

postulate of relativity). We imagine an infinity of inertial systems moving uniformly relative to the laboratory system, one of which instantaneously matches the velocity of the particle. The particle is thus instantaneously at rest in an inertial system that can be connected to the laboratory system by a Lorentz transformation. It is assumed that this Lorentz transformation will also describe the properties of the particle and its true rest system as seen from the laboratory system.

Claim #12: General Relativity says that an object in free-fall is not acted upon by any forces (NB: gravity is not a force in General Relativity; rather, it is caused by space-time curvature) and, hence, defines its own local Lorentz frame. This applies to the entire Earth as well as the Global Positioning System satellites.

Response: The latest new Global Positioning System satellites are capable of inter-satellite tracking, which verifies the Sagnac effect. But the Sagnac effect should not exist in a freely falling frame without gravity (ether in Geocentrism). In fact, Michelson said that the orbital motion of the Earth around the Sun should be detectable in the Sagnac effect with a sufficiently huge ring interferometer covering the orbital path.

Claim #13: Special Relativity/General Relativity expects that the Global Positioning System would require an adjustment for the effect of the Sun's differential gravitational potential.

Response: (1) In the ECI frame used by Global Positioning System, clocks are not, and must not, be adjusted for the gradient of the Sun's gravitational potential. Hence, there is no valid explanation for this phenomenon, which is consistent with Special Relativity/General Relativity. This is very strong evidence that some form of ether theory is valid and that Einstein's Relativity theories are invalid. (2) Since there is only one ether that is not determined by Newtonian gravitation, Geocentrism predicts that the gravitational potential of the Sun has no effect on the Global Positioning System operation, which turns out to be the case. The Global Positioning System clock bias also ignores the effect of the Moon's gravitational potential, supporting Geocentrism and opposing Relativity theory.

Claim #14: The Sagnac effect cannot be used to detect the approximately one degree of rotation per day that is related to the equinoctial precession.

Response: Howard Hayden points out that the above proposition implies a Sagnac experiment using the inter-satellite communication links of the newer Global Positioning System satellites should yield a null result when computed relative to a frame rotating at a rate of once per year. If the abstract notion of time is slowed by decreased gravitational potential in General Relativity, no Sagnac effect should be measured. But if it is due to clocks that slow down as a function of the decrease in gravitational potential and a universal flow of time (independent of local clock measurements), then the proposed Sagnac experiment can be used to measure the angular rotation due to the orbiting Earth. The general theory ascribes a change in the rate at which clocks run to an underlying, more fundamental change in the flow of time. Geocentrism ascribes the clock rate change to an environmental effect – the ether. Universal time is kept by the divinely mandated clock, that is, the motion of the celestial universe itself. It is the clock behavior that is changed, not absolute time. We can still expect to detect the Sagnac effect caused by the ether properties.

Claim #15: Global Positioning System clocks run at a rate determined by their relative velocity.

Response: In fact, the rate at which clocks run must be computed using the clock velocity with respect to an isotropic light-speed frame. This is consistent with the Modified Lorentz Ether Theory (MLET) of Ronald Hatch and with Geocentrism, but not with Special Relativity.

Claim #16: According to General Relativity theory, the frequency of the Global Positioning System signals increase as satellite height decreases.

Response: This would violate the conservation of cycles. More cycles would be detected on the ground than emitted by the satellite. The apparent gravitational increase in energy is not real. It appears to increase only because the standard of comparison (the energy radiated by a similar atom at a decreased gravitational potential) is decreased. The higher frequency of the Global Positioning System clock at its greater gravitational potential is in fact the source of the increased frequency and decreased wavelength of the received signal.

Claim #17: In the rotating frame of reference, light will not appear to go in all directions in straight lines with speed c. The frame is not an inertial frame, so the principle of the constancy of the speed of light does not strictly apply. Instead, electromagnetic signals traversing a closed path will take a different amount of time to complete the circuit.

Response: Rotation is only incidentally involved with the Sagnac effect, which is the result of a non-isotropic speed of light arising any time an observer or measuring instrument moves with respect to the Geocentric isotropic frame. Special Relativity requires that the speed of light always be isotropic with respect to the observer, an erroneous requirement, as Sagnac demonstrates.

Claim #18: The Sagnac effect is caused by acceleration and, thus, is properly handled by the General Theory of Relativity.

Response: The path of the radiation from the Global Positioning System satellite to the receiver clearly follows a straight line. This observation validates the claim that the Sagnac effect is not caused by curvature of space-time, which would curve the light path. As noted elsewhere, acceleration within the Special Theory can be handled by successive infinitesimal Lorentz transformations (Lorentz boosts). If Lorentz boosts are used in the Sagnac experiment, no Sagnac effect can be expected, since the detector is always in an instantaneous inertial frame (with isotropic light speed). The velocity of light arriving at the detector from both directions ought to be the same at all times. But it is not.

Claim #19: Solutions have been offered to the Sagnac puzzle that rely upon ether-drag hypotheses, in which the speed of light is isotropic with respect to the gravitational field or the gravitational potential or the Earth's magnetic field.

Response: Charles M. Hill has shown by comparing Earth-bound clocks in the Sun-centered inertial frame with the millisecond pulses arriving from the Hulse-Taylor binary pulsar that clocks on the Earth have cyclic variations ascribed to the eccentricity of the Earth's orbit around the Sun. Geocentrism attributes this heliocentric view to the ether flow caused by the precession of the equinoxes, the annual North-South galactic motion. The component of this clock variation due to seasonal Milky Way and solar system motion clearly indicates that the Earth does not drag the surrounding ether with it, otherwise there would be no cyclic variations in the pulsar data. With the pulsar data we can now measure the variation in the ether flow.

Claim #20: The Lorentz Ether Theory (LET) says that any inertial frame we wish can be used as the isotropic light-speed frame—we simply cannot tell which frame is the true frame. Whichever frame is chosen as the

isotropic frame, that frame defines an absolute simultaneity and observers moving with respect to that frame see anisotropic speeds of light.

Response: This is the flaw in the Lorentz Ether theory – there is only one universal absolute preferred frame in which *c* is isotropic: the Geocentric/Earth-Centered Inertial frame (ECI).

Claim #21: Stellar rotation must be greater than *c*, for their alleged great distances in the standard model of cosmology.

Response: The possibility of superluminality for Geocentric systems is inherent in Galilean relativity, which has no limit for the velocity of physical objects. The ether's limiting speed of propagation is also subjective at this time.

Claim #22: Nothing can travel faster than light in Special Relativity.

Response: Consider c_g, the speed of gravity – actually, the propagation speed of gravitational changes. Consideration of eclipses and binary star stability indicate that c_g must be at least 2×10^9 times faster than *c*.

Claim #23: Each clock in the Global Positioning System is synchronized *only* to an imaginary clock in the ECI frame, instantaneously co-located with the moving clock, and at a gravitational potential equal to sea level at Earth's poles.

Response: Suppose the clock rates were not biased before launch, but had their basic design rates in orbit. When Einstein-synchronized, the system of satellite and ground clocks would tick at different rates. In any inertial frame chosen, the corrections needed to synchronize with each orbiting clock would be unique to that frame and vary continuously because both clocks are rotating and accelerating. Operating the system would be a nightmare. In the actual ECI frame used in the Global Positioning System, the speed of light is constant only in that one frame, and not in any others. The practical difficulties for GPS in Special Relativity synchronization should have left some engineers wondering why the accepted dynamic model of Special Relativity caused such problems, while an absolute frame, which violates the consensus of professional scientists, provides a natural and unforced practical solution.

Claim #24: The Global Positioning System would work just as well in the Sun-centered or barycentric inertial frame as it does in the ECI frame.

Response: (1) There is a significant omission - the Earth's instantaneous orbital velocity is assumed to be constant in both frames. (2) Because gravity is assumed to be equivalent to 'space-time curvature' in General Relativity, Earth is treated as an inertial frame, even though it is orbiting the sun. Hence, the speed of light will be isotropic in ECI according to the Special Relativity postulate; and clocks will not need to be biased/offset to correct for General Relativity effects. But, of course, they actually do. In the sun's frame, the speed of light would not be isotropic on Earth, since the Earth is moving through the ether. But Poincaré's relativity principle (there is no observable difference between inertial frames) indicates that the one-way speed of light must somehow appear to be isotropic. In order to make the speed of light appear to be isotropic on the Earth, we must bias the clocks appropriately.

Additional Comments

- The ECI standard reference frame is equivalent to the Geocentric frame. The two terms may be interchanged.
- No real-time optical triangulation checks are carried out to verify that the satellites' true positions exactly match their predicted positions. Many don't realize that we do not know the actual positions of Global Positioning System satellites accurately; the ephemeris are based on models.
- In Geocentrism, one reference frame, ECI, is preferred; and speed cannot affect time as measured astronomically, but only the ticking rate of mechanical, electromagnetic, or biological clocks relative to the ECI frame.
- The speed of light is no longer a universal speed limit because astronomical time itself is never affected, either by motion or by gravity, but clocks are affected.
- When Relativity experts disagree, they can't all be right, but they can certainly all be wrong.
- Geocentrism clock behavior allows two clocks to be synchronized by comparing each with the Geocentrism frame using the usual rate formula: $f = (1 - v^2/c^2 - 2GM/rc^2)^{1/2} f_{gs}$.
- Clocks will remain synchronized in all frames when adjusted for the appropriate velocity and gravitational potential effects of the above gauge change.
- For clocks far removed from the Geocentric frame, the gravitational effect becomes negligible; the velocity is always with respect to Earth.

- Relativity isn't hard to understand, it's hard to believe.
- Tests of Relativity with the current Global Positioning System would be overridden by ground signals maintaining the satellite clocks within 1 microsecond of Universal Coordinated Time (USNO).
- Sagnac in 1913, Michelson in 1925 and Ives in 1941 all claimed that their published results were experimental contradictions of Special Relativity because they implied an absolute preferred frame.
- Global Positioning System satellites are being adjusted according to dependencies on the Sagnac effect and the gravitational potential, proven by Pound-Rebka, both of which dependencies do not require Relativity and have nothing to do with time dilation.
- The effect of velocity on clock rate is not consistent with Special Relativity predictions of dependence; but only on relative velocity between source and receiver.
- The 'constant' velocity of light is a fiction based on the illusion of proper time and Einstein's discordant prescription for clock synchronization.

When the velocity of light is measured with the GPS, we find that it is $(c - v)$ or $(c + v)$, in which v is the rotation velocity of the Earth where the cities are located. Since all other particles are measured with additive velocities $(V - v)$ or $(V + v)$ with respect to a moving frame, why can't photons obey that same rule? Initial expectations based on special relativity were that clocks in different reference frames should have different readings and rates. Yet after pre-launch rate adjustment, all satellite clocks in all orbits remain in step with all other system clocks without further adjustment, as long as the master clock is Geocentric.

It is now widely believed that no experiment is capable of verifying these postulates, even in principle, because they become identically true – a tautology – if one adopts the Einstein clock-synchronization method. They are absolutely false if universal time is used, as in the Global Positioning System synchronization convention. Simply put, GPS uses universal time because it works!

In Special Relativity, any speed greater than c proved impossible because time ceases to advance for any entity traveling at the speed of light. In Geocentrism, the Galilean transform puts no limit on speed – recall that the speed of light in the Sagnac experiment for the co-moving beam was $c + v > c$. The upper limit for c would seem to be determined by the ether properties, which are yet to be fully explored.
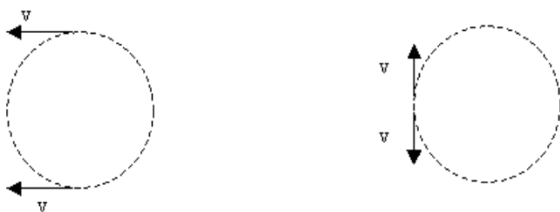
In the Global Positioning System and the Geocentric frame, possible receiver motion during the signal downlink time from satellite to receiver must be considered for correct navigation results. In the Global Positioning System context, this downlink effect is called the "one-way Sagnac effect" and is attributed to the rotation of the Earth. The critical factor is the position of the satellite at the time the signal was transmitted and the position of the receiver at the time of its receipt. The path the receiver actually followed during the downlink time is unnecessary; the time depends only on the end-points of the path.

The GPS depends on relativity in 2 ways:

1. Source velocity (Global Positioning System satellite) and receiver velocity (ground device) affect the satellite and receiver clocks.
2. The gravitational potential affects satellite and receiver ground clocks.

Velocity Impact on Clocks

The Global Positioning System satellites' clock rate and the receiver's clock rate are not adjusted as a function of their velocity relative to one another, but relative to the chosen frame of reference - the Earth centered, non- rotating, geocentric inertial frame. By the analysis of hypothetical counter-rotating Global Positioning System satellites, Special Relativity theory can be shown to be in conflict with reality.

Counter Rotating Satellites

Above, the relative velocity is zero; at right it is 2*v*. In one half orbit the relative velocity of the Global Positioning System satellites would cycle from 0 to 2*v* and the relativity factor, gamma, would vary from:

$$1 \text{ to } (1 - 4v^2/c^2)^{1/2} \text{ to } 1$$

From either satellite, the general computed frequency f of a signal f_0 between them should be:

$$f = f_0(1 - v^2/c^2)^{1/2}$$

or a change in frequency in each quarter orbit of:

$$\Delta f = \ 0 \text{ to } 2 \ (v/c)^2$$

Note well: When the satellites pass each other, Special Relativity predicts a frequency change four times as great as above, while the Geocentric system predicts no change in frequency. In a system of 12 satellites in different orbital planes, synchronization management becomes horrendous. Yet this is what Special Relativity requires, if the Geocentric frame is not the rest frame. Special Relativity seeks to avoid this embarrassment by claiming that the speed of light is constant for both the observer and receiver if the Global Positioning System uses the Geocentric frame. This answer disingenuously claims the option of choosing the inertial reference frame that is most convenient; and in the case of GPS, this arbitrary choice is the Geocentric inertial frame. But this is not a matter of indifference, since using any GPS spacecraft or ground station as the observer in Special Relativity *does not predict the observed frequency shift*, only the absolute Geocentric frame does.

Direct Global Positioning System operational evidence supports the following: Whenever a frame is chosen that coincides with the Global Positioning System satellites, experiments show that the speed of light observed is *not* isotropic, that is, the same in both directions for the observer or receiver. This is a direct contradiction of Special Relativity, which teaches that *c* is always constant relative to the observer. Likewise, Special Relativity's ineffective attempts to explain the Sagnac effect arise from the choice of a reference system that is not geostatic. The Global Positioning System's operational data indicate that the rate at which clocks run must be computed using the clock velocity with respect to a Geocentric frame.

Gravity Impact on Clocks

The Full Gauge theory:

If Special Relativity's gamma or scale factor is generalized by gauge scaling to include the influence of a gravity field/potential, as suggested by Ron Hatch, then:

$$S = (1 - v^2/c^2 - 2GM/rc^2)^{1/2}$$

then the comparative clock rate is:

$$f = Sf_{gs}$$

where f_{gs} is the clock rate at the reference level, the Earth's surface.

The reference frame for v and $\mathbf{r}$ is the Geocentric system. There is no correction for the Earth's "rotation," and the scaling measures the ether effects in a non–geostatic frame. This simple extension of the kinetic energy as the total energy, including the potential energy of gravity, explains the anisotropic Global Positioning System observations of c (and other experiments covered here) without resorting to curved space or the staggering complexity of solving the General Relativity field equations. In fact, we propose that a future theoretical research project investigate the elimination of Special Relativity and General Relativity entirely by this simple scale change and show that all General Relativity "proofs" are supported by the S gauge transformation above (in the Geocentric frame, of course).

The S gauge factor, applied to three Global Positioning System experiments, shows that clocks run slower the lower they are in the gravitational field.

1. A Global Positioning System ground station clock at Colorado Springs runs faster because of its near mile-high elevation than if it were located at sea level.
2. Global Positioning System tracking stations confirm that all clocks at sea level in a Geocentric frame run at the same rate. Note that a clock at sea level at the equator runs at the same rate as a polar sea-level clock, even though it is at a greater distance from the center (equatorial bulge), which should be a higher gravitational potential.
3. The eccentricity of the Global Positioning System's orbits causes the satellites to move up and down in the gravitational field. When the satellite is near perigee, it has a faster speed; and Special Relativity theory indicates that the clocks should run slower than normal. But near perigee the satellites have a lower (*i.e.*, more negative) potential in the Earth's gravitational field that, according to General Relativity, should also result in a slower clock rate. The effects of different orbit motion and distance have precisely the same magnitude and sign, so they combine.

The requirement that the gravitational potential of the sun and the moon not be applied to Global Positioning System clocks using ECI gives very strong support to Geocentrism and ether theory. Unfortunately, physics has become a religion and Einstein has been accorded the status of a "god of Science". To question his theories has, up to now, been anathema.

The situation has become even more contentious for space probes and GPS satellites. The 1971 JPL document containing the equations used to model round-trip and one-way signals between a space probe and the Earth employed a Sun-centered isotropic-light-speed frame in which the probe and the detector (or observer) on the Earth are clearly moving. The JPL equations show that the speed of light was not assumed to be isotropic with respect to the observer. Instead, when a signal was in transit from the probe to the earth, it included the motions of the Earth observer, that is, Earth's spin, orbital velocity, and even the Earth-Moon barycentric motion. Although none of the engineers admit it, these equations ignore Special Relativity theory postulate II (isotropic light speed relative to the observer or sensor) and use the additive Galilean formula!

In the Hefele-Keating experiment, adjustment had to be made for the faster rate of clocks at the altitude of the aircraft on which they were carried. Shapiro showed that the gravitational potential of the sun causes radar signals reflected back from Venus and Mercury to be delayed when they are almost directly opposite the Earth in their orbits. All these experiments support the use of the gauge factor S in the Geocentric frame for gravitational effects on clocks.

Anderson, Bilger and Stedman make the following statement:

> The final suggestion of Michelson, that the orbital motion of the Earth around the Sun be detectable in a sufficiently gargantuan ring interferometer, is not consistent with general relativity: a freely falling point object (the whole Earth in this context) defines a local Lorentz frame.[296]

If General Relativity interpretation were correct, no Sagnac effect should be measured in this global inertial frame. But if a Geocentric frame measures an absolute flow of time, independent of local clock measurements, then a Sagnac experiment can be used to measure the

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[296] "Sagnac effect: A century of Earth-rotated interferometers," by R. Anderson, *et al.*, *American Journal of Physics*, 62(11), November 1994, p. 977.

angular rotation of the firmament (apparently and conventionally assigned to the orbiting Earth).

Sagnac and Special Relativity

Global Positioning System synchronizing of clocks around the globe using radio signals must take into account the Sagnac effect, since the stars move during the transit time of the signals to the ground station. The path of the radiation from the GPS satellite to the ground station receiver follows a straight line but is affected by the cosmic rotation, as Michelson and Gale showed. There is no centrifugal acceleration at the ground station, since that frame is GC/ECI. Special Relativity erroneously requires that the speed of light always be isotropic with respect to observers and the Sagnac effect exposes that error.

Sagnac and General Relativity

The published General Relativity results applied to Global Positioning System operation (assuming they have been properly derived) are in conflict with Special Relativity to the extent that they do not give isotropic light speed with respect to the moving observer. All high precision Global Positioning System applications correct for the Sagnac effect, indicating that within General Relativity the speed of light is not always seen as constant by the moving observer.

Ether

Special Relativity assumes the apparent equivalence of inertial frames is real. It uses that assumption with a universal *c*, to derive length contraction and clock slowing. Ether theories use clock slowing to show that the equivalence of all inertial frames and common universal speed of light is only apparent/phenomenological. Motion with respect to the ether and its density causes the difference in clocks compared to the absolute timepiece.

Using the Global Positioning System satellite relay system, electromagnetic signals have been found to travel slightly faster around the planet from west to east than from east to west. This implies that a weak etherosphere – the local firmament – actually moves west to east, counter to the main stellar rotation, which is east to west. If we assume this near zone ether/firmament is responsible for the mysterious westerlies in the

temperate zones, then this ether must have zonal motions similar to the global patterns of air circulation, as modified by solar heating and convection.

From the Sagnac analysis, Global Positioning System satellites would be affected by sidereal period fluctuations ranging from 0 ns (orbits perpendicular to ether flow) to 16 ns (orbits parallel to ether flow). However, fluctuation changes to their clocks could be interpreted as small variations from circular orbit, and so the effects can be masked. Other experiments besides the GPS can test the difference of synchronization between clocks, like the North-South displacements of clocks.

New York and San Francisco are approximately on the same latitude (40° 44' vs. 37° 52'). Radio signals sent directly between New York (N.Y.) and San Francisco (S.F.) using the Global Positioning System, as illustrated above, have a Sagnac delay of 14 ns for the E to W counter-rotational path across longitudes. This can be compared with a radio signal sent from New York to a satellite over the North Pole (N.P.) and re-transmitted to San Francisco. By correcting for additional delays from the greater transmission distance and re-transmission delays, we observe that the 14 ns difference now disappears, since rotation no longer affects the light speed. Another perspective is that the Sagnac area enclosing the angular velocity ω for the North Pole path is zero. In theory, the radio signals could be replaced by atomic clocks transported along the same path, but along the ground.

Time difference depends on path

But will the clock increase its rate because of a kinematic effect – the tangential velocity of rotation decreasing at higher latitudes? No, since it has been shown that the shape of the Earth's geoid is such that gravity potential difference between pole and New York is exactly the same for the loss of rotational velocity *v*. Both light/radio signals and physical clocks used for synchronization give an identical zero correction for the polar route. Both methods give 14 ns difference for the direct path across country.

The Geocentric description of all the above is based on replacing the rotating Earth with a rotating ether. The lack of temporal change when moving from NY to the pole is a result of the ether/firmament always terminating on the surface. Two clocks in San Francisco and in New York will be in perfect synchronization if the polar route is used. But a radio signal westbound from NY to SF is faster than this by about one millionth (10^{-6}) of the total transmission time. A signal eastbound from SF to NY is about one millionth slower. This demonstrates the velocity of light with respect to an observer resting on the Earth surface is $c + v$ from NY to SF and $c - v$ from SF to NY. One must conclude that the velocity of light is isotropic with respect to a frame in which the Earth is at rest/non-rotating, which, in this case is the polar route! The velocity $c \pm v$, measured from a rotating frame, is viewed as a velocity $\pm v$ due to any linear motion through an ether flow, when measured from the absolute Geocentric system. Galilean relativity in a Geocentric frame of reference is the proper frame in which to compute dynamical physics.

The constant *c* of Special Relativity theory means that the distance from NY to SF is smaller than the distance from SF and NY – an absurdity to rational thinkers. The velocity of light is different in any frame moving with respect to the Geocentric Earth coordinate system. This difference is even programmed into the Global Positioning System computers for correct operations. We cannot escape that the experimental velocity of light with respect to a Geocentric moving observer is $c \pm v$.

In agreement with the rotating Mössbauer experiments, a reasonable ether theory would also predict that clock speed (or the speed of the gamma ray source or detector) through the ether affects the frequency. Ruderfer points out that the transit time effect and the clock effect would cancel each other so that a null result would be expected even in the presence of an ether drift. In spite of this correction experimenters continued to claim that it proved ether's non-existence.

The Lorentz Ether Theory (LET)

Two valid alternatives to the special theory are consistent with experimental evidence: Lorentz Ether theory and Geocentrism. Lorentz Ether theory incorporated both the Poincaré relativity principle and the Lorentz transformations, taking ether as the point of reference. Einstein added the equivalence of all inertial frames, eliminating the need for the luminiferous ether and making the Lorentz transformations reciprocal. The second *postulate* of Special Relativity makes **c** independent of not only the source speed (also true for waves in any medium, like water, air and ether), but also independent of the observer's/detector's speed. The frame defined by the Cosmic Background Radiation (CBR) is assumed to be the absolute ether frame for the Lorentz Ether Theory, but just any arbitrary frame for the special theory. This view is said to be supported by the moon's much reduced aberration compared to the Bradley value for the stars – appropriate to its small speed through the CBR compared to the stars. In Lorentz Ether Theory, speed relative to the CBR causes clocks to slow and rulers to contract, but in Geocentrism, speed relative to the spinless Earth causes clocks to slow. Modern versions of Lorentz Ether theory hold that the preferred frame is not universal; rather, it coincides with the local gravity field of each celestial object.

Modified Lorentz Ether Gauge Theory (MLET)

Ronald Hatch has extensive experience in satellite navigation and communication systems, especially on GPS projects.[297] Hatch, a former president of the Institute of Navigation and current Director of Navigation Systems Engineering of NavCom Technologies, is one of the world's foremost experts on the Global Positioning System. In Hatch's proposed alternative to relativity, MLET, the local gravity field of each celestial object serves as the "preferred Lorentz frame." The ether is not isotropic but varies locally with each object's gravity, thus losing its claim to being universal or absolute. This theory agrees with General Relativity to first order in v/c, but corrects many astronomical anomalies that General Relativity cannot without ad-hoc assumptions. Historically, de Sitter, Sagnac, Michelson, and Ives all concluded from their own experiments that Special Relativity was falsified in favor of the Lorentz theory (LET). MLET predicts that on the Moon or planets their surface defines the reference frame in which c is constant. In Geocentrism, only the Earth has this property and is a true absolute frame.

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[297] http://www.egtphysics.net/author/ronh.htm

Global Positioning System Synchronization with Sagnac

The Sagnac effect has an important influence on GPS. It would be highly desirable to synchronize clocks in the ECEF frame. But this is prevented by the Sagnac effect. Inconsistencies occurring in synchronization processes conducted on the Earth's surface by using light signals, or with slowly moving portable clocks, are path-dependent and can vary by many dozens of nanoseconds, too large to tolerate in the Global Positioning System. Thus the Sagnac effect forces a different synchronization strategy.

The Global Positioning System procedures for synchronizing clocks around the globe using radio signals must take into account the Sagnac effect, since the receiver moves during the transit time of the signal. The Global Positioning System engineers need the "Sagnac correction" in their computer program to calculate the exact GPS time, in addition to the relativistic corrections applied to offset the satellite clocks. As we have already seen, the Sagnac effect is itself inconsistent with the Special Relativity. The Sagnac effect is not a direct result of rotation or acceleration. It simply occurs any time the receiver is moving with respect to the Geocentric frame. If the receiver is moving in the Geocentric frame, the speed of light is not constant; and the Sagnac effect is simply the adjustment for the variable c. The experimental evidence is clear that it is invalid to perform instantaneous Lorentz boosts to simulate acceleration in Special Relativity to keep c constant with respect to the Sagnac phase detector. The Sagnac effect on Global Positioning System signals in transit proves that Special Relativity "magic" does not keep the light speed constant relative to the moving receiver. That Lorentz boosts are invalid is also supported by the aberration of the light from binary stars.

There is a measurable difference between Geocentrism and Special Relativity. The Sagnac effect clearly argues in favor of the Geocentrism. The Sagnac effect measures the inertial/rotational effect of space – the ether/firmament – on the counter-rotating light beams. The area dependence, A, in the Sagnac time shift:

$$\Delta t = 4A\Omega/c^2$$

measures the amount of firmament enclosed by the light paths. The possible different rotations represented by Ω include all those observed in the heavens:

- solar
- sidereal

- lunar
- equinoctial precession

Rotating Mössbauer Experiments

Unbiased analysis of the rotating Mössbauer experiment would have led to a conclusion opposite to that reached in the majority of experiments. Substantial independent experimental evidence exists that a moving clock (in the Geocentric frame) always affects the clock frequency. The null result of the rotating Mössbauer experiments actually implies that an ether drift must exist, or else the clock effect would not be canceled and a null result would not be present. The experiments actually favor Geocentrism rather than Special Relativity, which is completely opposite the testimony given in textbooks on the subject.

The GPS is very similar to the rotating Mössbauer experiments with two differences:

- Ranges are the measured results in the Global Positioning System, not frequencies.
- The sources (GPSystem satellites) are rotating independently of the observers (ground receivers rotating with the Earth).

Universal time clock

Some relativity proponents as well as some dissidents have pondered the method of capturing absolute or universal time with a physical device – that is, a clock. They suggest that:

- The rate of coordinate time would be determined by atomic clocks at rest at infinity.
- A real absolute clock would always use the same time rate, remote from and independent of local motions of source and observer. The observers would always look at this absolute clock, with a telescope if necessary.

How far have we wandered from Scripture. Although the advocates above have not recognized it, their "clock at infinity" is the heavenly clock we were given on Day Four in Genesis, the sun to rule the day and the moon and stars to rule the night. This celestial clock satisfies all the conditions required:

- Observable by anyone on earth, day or night
- Its perpetual motion never runs down
- Local terrestrial motions have no effect on it

Twin anti-paradox in Geocentrism

In Lorentz Ether theory and Geocentrism, the answer to the twin paradox is simple: the Earth's stationary frame constitutes a preferred frame. So the traveling twin always comes back younger, and there is no true reciprocity of perspective for any frames that are not equivalent to Geocentrism. Part of the problem addressing the twin paradox is the many different mutually incompatible solutions offered within Special Relativity. But all the solutions claiming to be consistent with Special Relativity involve changing inertial frames for the return trip of the traveling twin. The solution to the twin paradox in Geocentrism requires the ECI frame as the absolute frame. If we never change frames and calculate clock changes on the rocket using:

$$f_t = (1 - v^2/c^2 - 2GM/rc^2)^{1/2} f_{gs}$$

then the slowing of the rocket's clock or, equivalently, decreased aging of the rocket twin compared to the Earth twin, will be observed by integrating the clock rate above over the actual rocket path. There will always be a cumulative greater aging of the Earth twin, hence, there is no paradox.

The Ives-Stilwell Experiment

The experimental apparatus allowed the observation of fast moving positive hydrogen ions in two directions, with and against the motion of the particles; the observations being made simultaneously by the use of a mirror in the tube. The displaced Doppler lines observed correspond to motion toward and away from the observer – a shift of the center of the displaced lines with respect to the undisplaced line. In a glass tube ionized hydrogen atoms were created by passing a high-voltage spark through hydrogen gas.

Ives-Stilwell equipment[298]
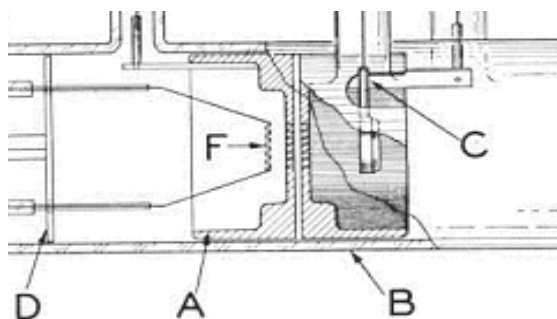
-F, A, B are electrodes
-C is a mirror to reflect horizontal light back to the source
-On the right side of the tube is a spectrograph.

Hydrogen atoms ionized by the spark between electrodes **F** and **A** are accelerated towards the negative **B** by a high voltage between **A** and **B**. Hydrogen ions combine in flight with free electrons and radiate light in all directions with wavelength characteristic of the energy level difference:
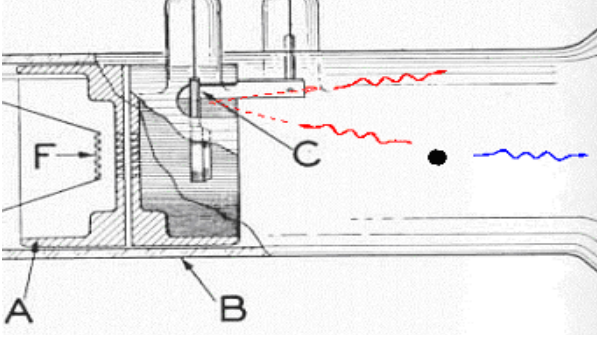
$$\lambda = 4860.09 \text{ Angstroms.}$$

Ives-Stilwell operation
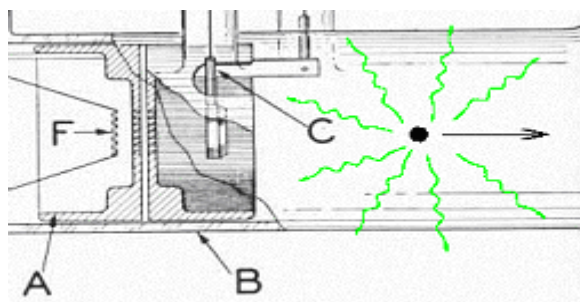
Some light rays emitted by the ions move directly toward the spectrograph (black arrow above). Others move to the left, striking mirror **C**, and reflecting toward the spectrograph.

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[298] N.E. Ives and G.R. Stilwell, J. Opt. Soc. Am., 28, 215-226 (1938).

There are two types of rays detected, the light directly from the source ions (to the right of black dot), and indirectly from the mirror (to the left of black dot).

Transverse Doppler Effect Theory

An ingenious way to see the transverse shift is by using two-photon spectroscopy. Two oppositely directed photons whose energy totals the excitation energy of a transition, are simultaneously absorbed by an atom. The first-order Doppler shifts are exactly opposite and cancel, leaving no first-order effect at all. For a moving atom the second order effect may be detected. Even the very tiny difference between ordinary and relativistic Doppler effects would cause a perceptible change.

Relativity theory interpretation

In classical wave optics, the direct and reflected wavelengths, λd and λr, are

$$\lambda_d = \lambda(1 - v/c) = \lambda - \lambda v/c$$

$$\lambda_r = \lambda(1 + v/c) = \lambda + \lambda v/c$$

Relativity theory predicts:

$$\lambda_d = \lambda(1 - v/c)\gamma = \lambda(1 - v/c)(1 - v^2/c^2)^{1/2}$$

$$\sim \lambda(1 - v/c)(1 - v^2/2c^2) \sim \lambda(1 - v/c + v^2/2c^2) = \lambda - \lambda v/c + \lambda v^2/2c^2$$

Likewise,

$$\lambda_r = \lambda(1 + v/c + v^2/2c^2) = \lambda + \lambda v/c + \lambda v^2/2c^2$$

The sum of the two is computed:

$$\lambda_d + \lambda_r = 2\lambda + \lambda v^2/c^2$$

The first order terms cancel, allowing the second order relativistic term to be measured, a clever example of experimental technique.

Geocentric interpretation

Ives-Stilwell showed that the frequencies of radiating ions depended on their motion. The ions emitted at a specific frequency regardless from which frame they were observed. It seemed clear to Ives that nature needed a preferred frame, whose absolute motion would determine the ion frequencies. Otherwise, how would the ions know how often to radiate? It is all in the interpretation, the eye of the beholder. Relativists say the Ives experiment confirms Special Relativity, while Ives says it refutes Special Relativity and supports Lorentz Ether theory.

Claims and Responses

Claim #1: The experiment shows that the frequency of the moving sources is reduced and given by

$$f = f_0 \, (1 - v^2/c^2)^{1/2}$$

a classically unprecedented Doppler effect that is characteristic to Relativity only.

Response: The transverse Doppler effect is not predicted by Newtonian physics, but it is so predicted by those alternatives to Relativity theory which provide for time dilation with the g factor, which is virtually all of them. Specifically, Geocentrism uses the scale factor S to confirm the Ives-Stilwell result.

Claim #2: In 1963, Walter Kundig performed a simple experiment on the transverse Doppler shift. A rotating turntable with a central radiation source and detectors on the rim guaranteed that the relative motion is always transverse. The change in frequency detected was due solely to time dilation, agreeing with Special Relativity theory to 1%.

Response: All that can be said is that the frequency change was due to the effect of time dilation, Special Relativity theory being just one possible theory to explain the results. The results of the experiment are therefore inconclusive in distinguishing Relativity or absolute motion theories.
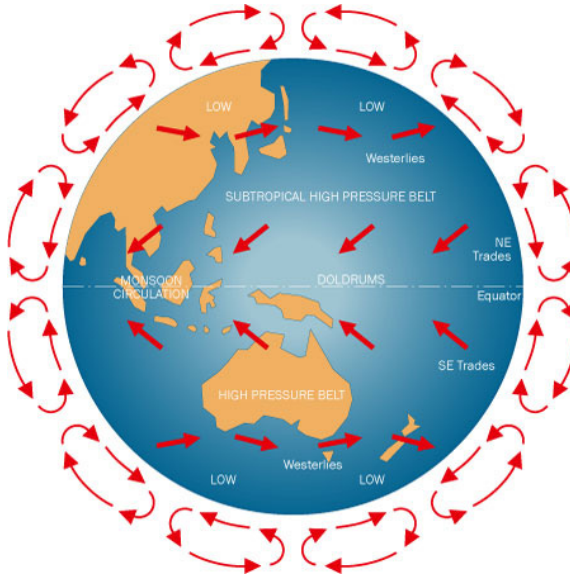
Atmospheric Circulation is Anti-Geokinetic

The conventional model:

Global air circulation can be explained in a two-step model. The first starts with three simplifying assumptions:

- The Earth is not rotating in space.
- The Earth's surface is composed of similar materials.
- Solar heating and loss of infrared radiation cause a temperature gradient of hot air at the equator and cold air at the poles, forcing warm air away from the equator toward the poles.

Air at the equator is lifted vertically by convection and convergence. It is then drawn to the poles by the
thermal gradient. At the poles, the air cools and sinks to the surface to complete the flow cycle.

Now, let's change the first assumption to allow the Earth to spin in space. If so, planetary rotation would cause the development of three circulation cells in each hemisphere rather than one.

The Coriolis Force

Coriolis force causes upper air that is moving from the equator to deflect zonally from west to east at latitude 30°, which is the subtropical jet stream. The Coriolis effect also creates the Northeast Trades (right deflection) and Southeast Trades (left deflection). Surface air moving from the subtropics towards the poles is diverted by Coriolis acceleration to produce the Westerlies. Between the latitudes of 30° to $60°$ North and South, respectively, upper air winds blowing toward the poles are influenced by Coriolis forces to flow west to east, the polar jet stream. The dominant cause of west to east winds is clearly the Coriolis force.

Aerodynamic inertia should cause upper level winds to move opposite to rotation, east to west, with the greatest speed at the equator, where the tangential speed is the greatest (1054 mph), but zero at the poles. Surface air at the equator should be dragged along at the tiny boundary layer at the same rotational speed as the equator, but should increase in speed relative to the surface with increasing altitude, finally approaching 1054 mph (relative to the surface, not an inertial frame).
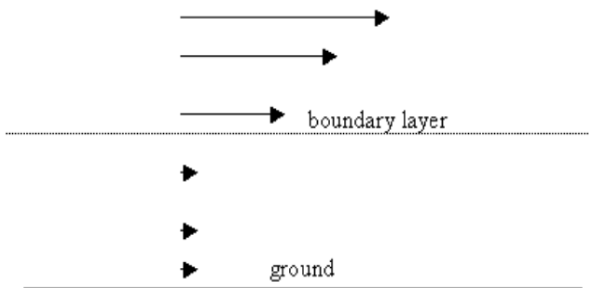
Wind profile with rotating earth and boundary layer

For an observer in an inertial frame far from the earth's rotational effects, the upper air would be stationary, the equator moving at 1054 mph. For a ground observer the surrounding air should be stationary and the upper air moving at 1054 mph. Let's see what sense this makes, if any:

A miniature version of the air circulation in cross-section can be seen when stirring a cup of coffee and then adding a few drops of cream. Or the satellite view of a hurricane reveals the same basic vortex pattern. The

resulting principal atmospheric circulation winds should be east to west, the characteristic inertial motion of an Earth rotating from west to east underneath the air.

To understand the effect of rotation, set a solid ball spinning in a fluid as a model of the interaction of atmosphere with Earth. There should be a boundary layer at the surface with vortex lines spiraling out until the air is stationary with respect to an inertial system – the fixed stars (or the center of the Earth). The high altitude velocity profile with latitude angle *lat* should be:

$$v(lat) = 1054 \text{ mph cosine } (lat)$$

The velocity should exponentially increase with altitude at the equator from 0 to 1054 mph.

Based on the conventional Hadley cycle and Coriolis force model:

- If there is a jet stream anywhere it should be east-to-west, at the equator, but it is not.
- There is a Northern hemisphere mid-latitude west-to-east jet stream, but that is the wrong location and the wrong direction.
- There is a Southern high-latitude east-to-west jet stream, which is the wrong location.
- The highest steady winds at altitude anywhere seem to be about 50 knots, way below the rotational predictions.

Hence, it seems that the Earth is not rotating, but variable winds are caused by thermal and pressure gradients. Rotation only seems to be discussed in theory regarding the secondary Coriolis side effect, not the main feature, that is, the transition from an accelerated to an inertial frame. Remember, the Coriolis force is not unique to a rotating Earth; the same inertial forces would be present if the universe rotated around an immobile Earth. Mach's principle is still in effect, as always. But how can inertial winds of 1054 mph not play a significant role in a predictive model of terrestrial air patterns? It seems that no matter which choice for the atmosphere one takes – that it turns with or does not turn with the Earth – it defies either logic or observation.

If we are on a rotating Earth with non-viscous air subject only to gravity (*i.e.*, the atmosphere is *not* coupled or bound by any forces to turn with the Earth), then we would experience tremendous wind problems, in which the spinning Earth encounters the full weight of the atmosphere. (NB: The atmosphere weighs more than 4 million billion tons.) The minor thermal differences between poles and equator would be wiped out by the

blast of west-to-east air, that is, the collision of free air and the spinning Earth.

Conversely, if we are on a rotating Earth and somehow this atmosphere is turning with us, what is the coupling mechanism that enables it to do so? It must have some link to provide the torque to continue the coordinated rotation of the Earth with its wrapper of air. Would not a co-turning atmosphere and Earth mean nothing else could move the air? Otherwise, is not the air acting as a solid, not a gas? No one has proposed a mechanism for this connection of the supposedly spinning Earth to the supposedly spinning air that is so strong that the atmosphere is forced to spin along with Earth, though otherwise it is free to move anywhere that gravity permits! We easily demonstrate the air's freedom every time we walk through it or breathe it. Yet, we are told, the air obediently follows the Earth as it twirls through the heavens.

Perhaps other planets with atmospheres can resolve this. Venus is virtually spinless; it rotates once every 243 days, with a paltry 5 mph equatorial surface speed. The upper atmosphere should be calm, but that is not the case. The wind pattern follows the spinning ball in a fluid model, with 200 mph east-to-west winds at the equatorial high altitudes, decreasing with increasing latitude and decreasing altitude, as expected, in fact, on Earth! Are there two jet streams, in opposite directions in each hemisphere, like Earth? No. High in the atmosphere the winds decrease with latitude, as the rotation model predicts. It is one big jet stream at altitude, tapering off away from the equator.

Note these words from an unusually forthright planetary meteorologist:

> Although much is known about wind patterns at Venus on a global scale, still more is unknown. It has been proposed that any planetary atmosphere is a chaotic system, meaning that there exists an underlying order about the system which, if understood, could result in accurate predictions of its details even on a small scale. However, this underlying order is unknown even for our planet, and still less is known about the Venusian atmosphere. Until that underlying order is known, the best course of action in attempting to model an atmosphere is to assume that its characteristics are truly random on all but the most global of scales.

Even this open admission of ignorance in global atmospheric physics is too conservative. We have seen that even the gross movements of the global air circulation cannot be reconciled with the rotation of the Earth

underneath it. Except for stronger winds of 28,000 mph, Jupiter resembles Venus at the equator, as well as its absence of distinct jet streams. Saturn has rings as well as surface zones. Winds in the zones can be three times those of Jupiter, greater than 75,000 mph! But these two planets rotate 2.5 times faster than Earth's alleged rotation, yet the equatorial winds on Jupiter and Saturn are as much as 1,000 times faster than on Earth! The whole area of rotational effects on planetary wind circulation is very puzzling. In all the references consulted, no one seems concerned about the huge gulf between theory and reality – a hallmark of modernism.

Summary of Data and Experiments

S = supported, D = disproof,
N = neutral or does not apply

Notes: "S" for an experiment does not necessarily indicate a proof or confirmation. All empirical evidence is inductive, increasing the probability of the theory's validity, but never excluding future improvement or even abandonment. "D" in any column for a theory requires responses to remove it, otherwise there is no rational reason to maintain a paradigm that cannot explain one or more experimental results within its scope. Only experimental evidence and common experience are investigated below. Theory is discussed as it pertains to the experiment. The first row is the consensus proposed by scientific opinion, which is often far from unanimous – especially in the interpretation of results by relativists. This also holds for the summary columns. The second row of each experiment is the geocentric view.

Foucault Pendulum, 1851

Proposal: If a simple pendulum suspended from a long wire swings along a meridian, the plane of motion seems to turn clockwise in the Northern Hemisphere and the reverse in the Southern Hemisphere. This shows the axial rotation of the earth around the poles. A Foucault pendulum precesses clockwise with an angular frequency of $\omega\sin\theta$, where θ is the latitude and ω is the angular frequency of the Earth's rotation.

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: The assumption underlying this experiment is that the effect seen can only be caused by the Earth's rotation with respect to the stars. Mach's principle proves otherwise; relative rotation will cause the same result. Note that the period is sidereal, showing it is the stellar motion, not the sun, that causes the pendulum's rotation. The periodic energy source needed to sustain motion is typically an EM device. The motion is thus contaminated - not solely due to forces of gravity and inertia, but also of the EM field, which must be compensated for.

Summary: Geocentric = S, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Sagnac, 1913

Proposal: To detect the relative motion of the ether, Sagnac placed the Michelson-Morley apparatus on a constantly rotating turntable. He detected a clear non-null result – light speed depended on rotation – evidence for ether. The light source (a flashlight), the measuring device (an interferometer) and the photographic recording plate were all fixed to the rotating disc. An observer on the disc thinks that the light has completed one revolution of the disc ($2\pi r$) at velocities of $c \pm v$ in the two opposing directions.

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: Sagnac shows that light speed does *not* remain constant relative to the motion of its source or observer/detector. The reasons given for this contradiction to Special Relativity in turn contradict Special Relativity. The proof of ether and disproof of Special Relativity theory is purportedly denied using General Relativity theory to arbitrarily add a universal reference frame ("proper time"), which is exactly what ether is!

Summary: Geocentric = S, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Michelson, Gale, Pearson, 1925, 1929

Proposal: A variation of Sagnac's test on a much larger scale that detected the Earth's rotational motion, consistent with an ether medium. The aim was to find out whether Earth's rotation effects light speed near the Earth. The outcome: the angular velocity of Earth is confirmed within measuring accuracy. The measured shift was 230 parts in 1000, with accuracy of 0.5%. The predicted shift was 237 parts in 1000.

Summary: Geocentric = D, Heliocentric = N, Ether = S, Special Relativity = S, General Relativity = N

Geocentric Response: Everyplace that Earth's rotation is mentioned in physics texts can be replaced by ether rotation around an immobile Earth, by Mach's principle. The significance remains debated to this day, but the

planetary Sagnac effect is now measured by ring laser gyros and taken into account by the Global Positioning System.

Summary: Geocentric = S, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = N

Ives, Stillwell, 1938

Proposal: Classic experiment that measured the transverse Doppler effect with sufficient accuracy to confirm time dilation for moving atoms – that velocity slows the rate of a moving atomic clock. This first experimental proof of time dilation measured the Doppler-shifted frequencies of an emission line from hydrogen ions in parallel and reverse directions.

Summary: Geocentric = D, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response: Ives argued from this result that ions radiated at frequencies determined by absolute, not relative, motion, because they had to pick a specific frequency in which to radiate. This directly supports the ether theory and geocentrism indirectly.

Summary: Geocentric = S, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = N

Hefele-Keating, 1971

Proposal: Atomic clocks depend on rotation of the Earth. Atomic clocks flown around the world exhibit changes that agree with relativity predictions to 10%. Total time differences from general and special relativity effects were predicted to be +275 ns westbound and –40 ns eastward. The vast majority of scientists think it is irrefutable evidence of time dilation and relativity.

Summary: Geocentric = D, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = S

Geocentric Response: Rotation observed indicated a preferred reference system. Why did the H&K test cause a real and permanent physical change in the readings of the traveling atomic clocks? If the Lorentz transformation changes in length and time were a mere phenomenon of the

relative motion, then when the relative motion ceased, so would the changes. But it was not so.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = D

Global Positioning System, 1993

Proposal: Global Positioning System (GPS) – the Earth's only fully functional satellite navigation system. Global Positioning System needs universal synchronization of satellites and ground stations; the preferred reference frame is the ECI reference frame. Satellites broadcast precise timing signals to ground receivers to determine their location accurately. Relativity is tested by the orbiting and ground atomic clocks at varying altitudes and high relative speeds.

Summary: Geocentric = D, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = S

Geocentric Response: The Global Positioning System's daily operations support Geocentrism and challenge Relativity dogma. All high precision GPS applications correct for the Sagnac effect, indicating that the speed of light is not always constant to the moving observer. The Sagnac effect in the GPS operations are in conflict with relativity theory. GPS computations locate moving receivers by including the $v \pm c$ Galilean model. ECI is the standard technical name for the Geocentric frame.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = D

Global Air Circulation

Proposal: Global air patterns are explained by thermal heating and the Coriolis force, which deflects air rotating with the Earth to form west to east airflow.

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: Let's generalize the vortex motion of tornados, hurricanes, typhoons and cyclones to the whole atmosphere itself. We would think that the rotating Earth would drag along the air right at the

surface, but the lack of friction and viscosity of air, plus its inertia, would make the air stream behind the ground's motion, form as swirls of cream in a coffee cup. At the equator, which spins at 1054 mph, there would be a rapid change in the wind profile, from zero on the ground to 1054 mph at high altitudes. Testing our belief with anemometers we are surprised to learn, however, that the equatorial winds are quite docile, random and calm, even at heights. Only the sun's heat, as it crosses the sky (literally), provides gentle breezes. Using Galilean reasoning we might say: Aha! There's no atmosphere! Moderns, having made great advances in natural understanding, we laugh and say, incredibly, that the whole atmosphere co-rotates with the Earth, as if the air were solid! Theists, with a geocentric mind, say with Scriptural simplicity: "Of course there is no wind – the Earth is fixed forever. It was God who told us so.

Summary: Geocentric = S, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Part 2: Does the Earth Revolve?

Geocentrism says only the Earth doesn't move; the rest of the cosmos does. Anti-geocentrism (AGC) says the Earth moves. There are 3 modernist anti-geocentric claims:

(a) Rotation claim:
(b) Heliocentrism Claim: Earth moves around the Sun every year.
(c) Linear claim:

Part 2 covers the heliocentric claims that the Earth has an absolute and unique orbital motion around the immovable sun, the center of this system.

The Geocentric tenets are:

1. The foundations of the Earth do not move.
2. The sun, moon and stars (including planets) move.

The most vocal claims against geocentrism are usually centered on the optical phenomena known as parallax and aberration. It will be important to establish the difference between these often confused terms before putting to rest any merit to the idea that they disprove geocentrism.

The ellipse patterns formed by parallax and aberration are similar and, indeed, are superimposed for nearby stars. But the two stellar effects can be separated, as discussed below in heliocentric terms.

Because of the yearly change in position of the Earth, the direction in which a star is observed changes annually, as indicated above-left by the 4 months on the Earth's orbit. Unlike aberration, the parallax angle is proportional to the ratio of the diameter of the Earth's orbit to its distance from the star. Bradley observed a different periodic variation in the apparent position of stars, reflecting changes in the *velocity* rather than in the *position* of the Earth over the course of a year. This aberration effect is illustrated above right, where the star is so far away that its parallax is unobservable. The actual monthly star positions (ellipse above) correspond to the observed monthly star positions on the ellipse below, with arrows indicating the direction.

The variation on the right cannot be due to parallax, since it lags behind the variation one would expect on the basis of parallax by roughly three months. In the diagram, the angle between the direction of light with aberration ($v \neq 0$) and without aberration ($v = 0$) is θ, the aberration angle. The tangent of θ is proportional to the ratio of v, the velocity of the Earth

in its orbit around the sun, and to *c*, the velocity of light. The tangent is small, so the angle θ itself can be used instead, but the angle is still considerably larger than that of parallax.
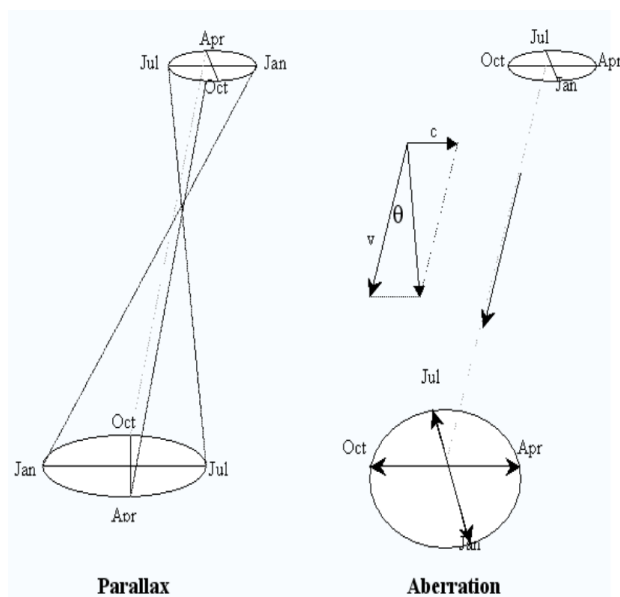
Parallax and aberration differences

Summary

There are three notable differences between the ellipses of parallax and aberration:

1. The aberration ellipse is much bigger: (20.5 arc-seconds vs. < 1 arc-second).
2. The aberration major axis is the same for all stars: 20.5 arc-seconds but the parallax major axis depends on the star's distance.
3. The phase is different. In parallax the image is 180° away from the image, in aberration it is 90° away. Alternately, when the sun and star have the same longitude, then the *longitude* shift is zero with parallax but the *latitude* shift is zero with aberration.

Parallax versus Stellar Aberration

Introduction to the concept: A review of basic logic is required in anticipation of what is to come.

Consider a basic syllogism, where **C** is the **Cause** and **E** the **Effect**.

- o (1) If C is true, then E is true
- o (2) C is true
- o (3) Then E is true

What if E is true?

If E, the effect, is true, no conclusion can be drawn about the cause. If one were to conclude that C is true because E is true, this would be the fallacy of cause-effect reversal. E could be true for other reasons than C. However, denial of the effect *does* imply the cause is not true. That is, if E is false, then C is false. This is valid reasoning.

The second preparation needed for the study of Stellar Aberration is a simple demonstration.

"c" is the rain drop speed, a model for the speed and direction of starlight rays for stellar aberration. We will model the light rays at speed *c* from a star as raindrops, first as falling vertically, then at a slant, as above.

A simple model of stellar aberration[299]

[299] http://www.maths.abdn.ac.uk/dept/einstein/Bradley .jpg

Consider an umbrella held in the rain to create a dry cylinder of air for the person holding the umbrella. When the man is standing, the umbrella is held vertically with no wind (above left), but otherwise tilted into the wind when he runs (above right). The umbrella must be tilted when the man is standing but the wind blows the rain at a slant (above right with man standing). Note that the umbrella is tilted to the right if the holder is standing and the wind is from the right, or the holder moves to the right with no wind. The tilting depends only on the relative motion of umbrella and rain.
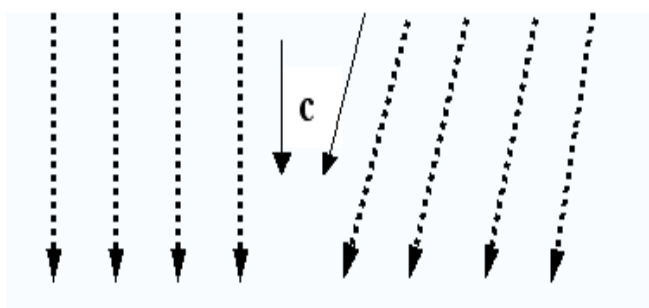
To keep the person holding the umbrella dry in a vertical rainfall, he will do one of three things:

1. Hold the umbrella vertical.
2. If walking straight ahead, tilt the umbrella forward
3. If walking in a circle, keep the umbrella tilted forward - the top of the umbrella will also move in a circle.

To keep the person holding the umbrella dry during a slanted rainfall, he will do one of two things:

1. Hold the umbrella at the same slant as the rain.
2. If the rain is falling like a tornado vortex, keep the umbrella tilted into the rain.

For the telescope and light rays (bottom, left and right), instead of an umbrella and rain, the same logical protocol applies.

Now for stellar aberration: In 1728, a physicist named James Bradley found that his chimney telescope showed aberration circles 20 arc-seconds in size. Every star's position consisted of these tiny annual loops, flat at

the equator, largest at the poles. It was understood to be caused by the orbital motion of the Earth in the same way as vertically falling raindrops appear to fall diagonally when viewed by a man walking in a circle.

Stellar aberration of light (also *Bradley or astronomical aberration*) is an apparent motion of the stars describing elliptic orbits yearly, according to the latitude of the star. The star is never seen at its true position; it appears to be displaced onto an aberration ellipse. The aberration is measured in arc seconds (″), where one degree is 60 arc minutes (′) and an arc minute is 60 arcsecs.

There are two other types of aberration, *diurnal* and *secular*, but only *annual aberration* is relevant here. Annual aberration is the component of stellar aberration resulting from the motion of the Earth about the sun.

The true path of light from a star is along the straight line from the star to the observer. However, because of the component of the observer's velocity in a direction perpendicular to the direction of the star, the light seems to be traveling at an angle to the true star direction. To observe a star, the central axis of a telescope must be tilted as much as 20.5″ (seconds of arc) from the true star direction, depending on the star's direction compared to the direction of the Earth's supposed orbital motion. The orbital motion makes the stars appear to move in ellipses in the sky. All these have the same semi-major axis, 20.5″ of arc, known as the constant of aberration. The tangent of the constant of aberration is equal to the ratio of the Earth's orbital speed to the speed of light.
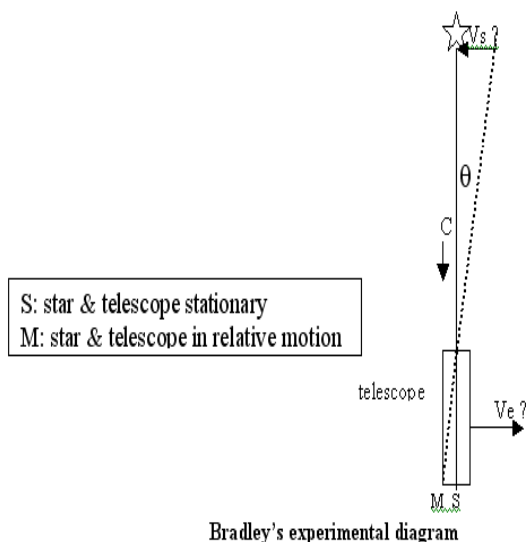
$$\theta = \arctan(x/y) \sin(\text{latitude angle})$$

Bradley attributed the stellar aberration he observed as due to Earth's orbital velocity of 30 km/s relative to Newton's inertial space. He concluded that the experimental determination of the aberration constant gave the ratio of the velocities of light and of the Earth. Since the velocity of the Earth is known in the heliocentric model, the velocity of light can be found. At this time the speed of light was only estimated. The orbital velocity of the Earth is about 1/10,000 the speed of light, so the annual aberration of a star near the ecliptic is 1/10,000 of a radian toward the west (-20.5"), directly opposite to its apparent motion along the ecliptic. The aberration of light causes the positions of other stars off the ecliptic to be displaced from their average position by less than 20.5". This discovery was motivated by the search for stellar parallax but totally unexpected.

Bradley found the following:

1. The major axis of any aberrational ellipse is always parallel to the ecliptic.
2. The major axis is equal to the ratio of the velocity of light to the velocity of the Earth.
3. The semi-major axis, the constant of aberration, is 20.4955 arc seconds.
4. The minor axis depends on the latitude, being the product of the major axis by the sine of the latitude.

S: star & telescope stationary
M: star & telescope in relative motion

Bradley's experimental diagram

As seen above, aberration displacement from S to M could be due to:

(1) the motion of the Earth (Ve ≠ 0 and Vs = 0).
(2) the motion of the star (Vs ≠ 0 and Ve = 0).
(3) a combination of both (Ve ≠ 0; Vs ≠ 0).

The reasoning of Bradley, a heliocentrist, was similar to the umbrella in the rain, except in this case, the umbrella (and its dry cylinder underneath) was the telescope and the rain was now the light ray from the star. Hence, Bradley reasoned:

1. If Earth moves in vertical starlight, the telescope will need to be tilted (if C then E).
2. The telescope does need tilting (E is true).
3. Thus, the Earth moves (C is true).

This is the fallacy of: "Effect implies cause"!

If the stars and their light were moving (like wind-blown rain), then the telescope would need to be tilted. Thus, there are at least two possible causes, not one. This fallacy is a modern cosmology favorite, along with misrepresentations of geocentric explanations.

Aberration models

Neo-Tychonic view

Stellar aberration is star motion centered on the sun as viewed from Earth, hence, there is no aberration in stellar motion as seen from the sun. The aberration is due to the apparent shift in the stellar positions that are centered on the sun. This is a parallax effect due to the change in position of a reference point.

The Tychonic view

Posits that parallax, following Van der Kamp, is really stellar aberration. The objection to this view, however, is that parallax cannot be the cause of aberration because of the phase difference between the two optical effects. As such, the original Tychonic view would fail to explain aberration; the phase difference in the two phenomena rules out parallax.

Original Bradley Model

All stars had the same parallax, 20″. Those at the ecliptic poles made circular orbits, and those near the ecliptic just oscillated back and forth, as expected. Were all the stars therefore at the same distance, about 10,000 radii of the Earth's orbit, which is about 1 light day away? Did he rediscover the roof of the firmament, to which the stars were attached, and behind which was heaven? No, the phase of the star's orbit was 90° behind the Earth's position in its orbit. To be parallax the positions should be 180º out of phase.

Nevertheless, Bradley's view is in contradiction to the modern view, known as *Relativistic Aberration*. In the Relativistic version, the apparent angular displacement of the observed position of a celestial object from its geometric position, caused by the finite velocity of light in combination with the relative motions of the observer *and of the observed object*. But in

Bradley Aberration, the apparent angular displacement of the observed position of a celestial body results from the motion of the observer.

Relativity says the *v* to be used in the *v*/*c* x sin(lat) formula is the relative motion between star and Earth, which can be a substantial percent of *c*, according to red shift interpretations. But Bradley says the *v* must be in the heliocentric frame, so it is always 30 km/s.

Ironically, most astronomers believe these contradictory positions are both correct! The first is used to uphold Special Relativity; the second to disprove Geocentrism! The real fact is that both are wrong. The aberration is an intrinsic motion of the deep space firmament. Having a yearly period implies a connection to the ecliptic planar motion of the same period.

On Telescope Limits

Point-like sources separated by an angle smaller than the angular resolution cannot be resolved. A single optical telescope has an angular resolution less than one arc-second, but Earth-based astronomical observations and atmospheric effects make attaining this very hard. The highest angular resolutions can be achieved by interferometry: the *Very Large Telescope Interferometer* is intended to achieve an effective angular resolution of 0.001 arc-seconds. Hubble's angular resolution is 0.05 arc-seconds.

Conflict with Relativity

The theory of relativity says that events observed using light depend on the relative velocity between the source of light and the observer. At the time of the Bradley experiments, this principle was unknown. It would not be discussed until almost two centuries later, by Poincaré, and then formalized by Einstein in 1905. Bradley understood the measurements of the star Gamma Draconis as due to the proper velocity of the Earth around the sun. Earth's orbit around the sun made stars appear to be shifted in the direction of the Earth's motion. But again, Bradley's interpretation is contrary to Special Relativity, but is rarely noted in modern articles attempting an aberration disproof of Geocentrism.

In modern physics, it is generally claimed that stellar aberration occurs when there is a relative motion between a source of light and an observer, so the motion of the Earth is not absolute, but relative. This idea is based on Einstein's Relativity Principle, but it is not compatible with experimental observations. If relative motion of the stars is used in the Bradley formula, all the stars would be required to have a tangential velocity of 30 km/s, despite their radial distances varying from four light

years to billions of light years. Geocentrists wait with eager anticipation how modern science is going to explain this anomaly.

Aberration and Ether

There are systematic differences in the fine details of the constant of aberration and in standard star positions as determined at different observatories, which might be explained by a variation in ether drift due to differences in the local coefficient of drag. The drag at any given station may depend upon altitude, local topology, man-made structures and the distribution of large land-masses, such as mountain ranges.

Bradley's results make perfect sense in an ether-filled universe. The effect could be caused by the ether flow or density variation between the star source and the Earth. The light speed changes while traversing the ether medium, bending according to the ether's properties and hitting the Earth at an angle, moving the image position of the star so as to form an annual ellipse. For example, stars on the equator have no observed North-South aberration component, so the ether flow in the space projected out from the equator has only an East-West flow.

Another valid interpretation is that the ether has no net effect on the starlight, but what is observed is, in fact, reality, the actual intrinsic elliptical motion of the stars. The only reason to discard this alternative is Occam's razor, which makes a subjective human judgment about the beauty and simplicity between two possible conclusions. Occam's razor sees complexity as an obstacle to human understanding, which it is, but excludes Revelation as a valid source of knowledge and is ignorant of God's perfect simplicity. Having no parts, God finds nothing complex. To Him all things are simple.

We take all of the aforementioned as a reasonable summary of the current status of the physics of aberration, except that we deny any kind of holistic or wholesale terrestrial motion and affirm the ether's motion around a stationary Earth.

Now we will answer the point-by-point contentions raised by modern cosmology's view of stellar aberration:

Claims and Responses

Claim #1: Stellar aberration is due to the velocity of the Earth in its annual orbit about the sun, that is, the deflection of a celestial object toward the observer's motion due to Earth's velocity relative to inertial space. This experiment validates other proofs of the heliocentric model.

Response: Note here that the sun apparently defines the motion of "inertial" space, although this is not stated explicitly. The first sentence expresses the belief of Bradley and contradicts the relativity of motion claimed by Special Relativity by using "inertial space" as an absolute reference for the Earth's orbital motion. Overall, heliocentrists offer no indisputable proof for their view. The allusion to geocentric disproofs is empty. Modern physics has only a few alleged disproofs, but postures as though there were many. The Galilean arguments for the phases of Venus, the moons of Jupiter and the tidal flows support both heliocentric and geocentric views, as already noted. The planetary motions measured by Brahe and interpreted by Kepler express a single possible model of the observed motions, without excluding the possibility that the Earth is not a planet (wanderer) in this system but a fixed location for observation. Newton's belief in absolute space opposes the Special Relativity theory accepted by modern physics. Heliocentrism and Relativity will always be in metaphysical conflict, though this is rarely, if ever, acknowledged.

Claim #2: Bradley based his theory on the assertion that Earth's speed is 30 km/s around the sun in order to derive the 20.5" arc aberration figure for each star. This required taking a third object, the sun, as fixed. But Einstein, in 1905, established that any point of reference can be used and the laws of physics will not be compromised.

Response: Therein is the conflict: the sun must be taken as at rest to derive the correct aberration angle, says Bradley. But Relativity says that such an assumption would make the sun an absolute reference object, which Einstein discounts. To be consistent with Special Relativity, only the relative velocity between the source star and the Earth can be employed. Moreover, this must include the radial component of the relative velocity. Why, then, do science textbooks still use Bradley's derivation, which has been disproven for 100 years? Or is it Relativity that is in error, and the sun is at rest? How can the annual aberration of starlight still be based on an average speed of only 30 km/s with respect to the sun, when modern measurements like the Cosmic Microwave Background dipole show the whole solar system is moving at 400 km/s?

Claim #3: Bradley's explanation of aberration disproves geocentrism.

Response: In actuality, Bradley's explanation flagrantly violates Relativity theory:

- by ignoring the relative motion between source and observer, star and Earth.
- by making the sun the absolute frame of reference.

Ironically, the conflict between Bradley and Relativity has been conveniently classed as a non-issue by modern physicists, apparently by a gentleman's agreement that discrediting Geocentrism is more important than logical consistency. Observations of aberration are said to show that, in contradiction with Special Relativity, stellar aberration does not depend on the relative motion between the source and the detector but exists only when the detector is moving. Why do textbooks explain the results solely when the observer is moving?

Claim #4: Aberration depends only on the speed of the receiver/viewer.

Response: Then it is asymmetric, while relative motion is symmetric. What would explain the fact that, while the observational data on stellar aberration are compatible with a moving earth, the symmetric description, when the star (and not the observer) possesses the relative transverse motion, does not apparently lead to observations compatible with predictions?

Claim #5: Light aberration does not depend on the distance of stars, only on transverse velocity of detector/observer.

Response: It is then impossible to create a converse model, that is, where the Earth is immobile and stars are moving, as everyone on Earth perceives. Relativity says there should be such an alternative model. Why is this contradiction ignored?

Claim #6: Annual stellar aberration proves that light has a finite speed, and that the Earth is moving around the sun. This is inconsistent with a simple model of light in an ether which is dragged along by the Earth, because the ether and light would move along with the telescope. It is consistent with Special Relativity.

Response: Stellar aberration is cosmic motion centered on the earth – an intrinsic annual motion of all the stars produced by the firmament, superimposed on the higher order motions of diurnal rotation and yearly precession of the equinoxes. Scientifically, parallax cannot be the cause of aberration, because of the phase difference between the two optical effects. Scripturally, aberration cannot be caused by the Earth's motion because

the Earth has no motion. The Bradley solution of v/c x $\sin(lat)$ arbitrarily uses the alleged orbital speed of the Earth, implying the sun is at absolute rest. Then there should also be an additional smaller nightly component to stellar aberration due to the rotation speed, and a much larger component due to the motion of the solar system around the Milky Way, as detected by the Cosmic Microwave Background dipole, which contradicts the sun's lack of motion. So the Bradley formula is impotent.

Summary

The *Bradley* formula for aberration angle is:

$$\theta = \arctan v_{to}/c$$

where v_{to} is the transverse velocity of the observer relative to the star. For the Earth, this is always its orbital velocity, +30 to -30 km/s.

In *Special Relativity* the formula is:

$$\theta = \gamma \arctan v_{tr}/c$$

where $\gamma = 1/(1 - v^2/c^2)^{1/2}$ and v_{tr} is the transverse velocity of the relative motion between source and observer.

The gamma term causes a third order change in the angle, which is already very small, of order v/c. It can safely be ignored in computations. The difference between the two equations is basically the reference frame for the velocity.

- For Bradley, the frame is fixed; it is always the sun – an absolute that is contrary to Relativity theory.
- For Special Relativity, the frame is relative to the source–observer motion.

So, if Special Relativity advocates are consistent, they should reject Bradley's theory. But then their main argument against Geocentrism would be nullified! What do the heliocentrists do? Judging from current practice, use whichever viewpoint fits the current discussion, and ignore the contradiction.

Diurnal Aberration

This is referred to in the literature as if it were an observed and established fact. But no clear documentation of its unambiguous measurement can be found. The measurement of small angles in astronomy, such as the maximum 0.3″ for diurnal aberration when close to the horizontal plane, is difficult and tenuous because of the atmosphere and other influences. The accuracy of star and sun positions is ~ 2″ and all planet positions and the Moon are known to 10″. So the measurement of the diurnal aberration has probably never been made, awash in the error of other unknown or uncompensated effects. Why, then, is it described in textbooks as being consistent with stellar aberration, which has been measured?

Binary Stars

The aberration of a binary star system would logically seem to vary as the faster star in orbit changes its direction compared to the Earth's velocity in relation to the sun. For binaries with a period of a few years or less, the Earth and the orbiting star are constantly changing their relative velocity, which should imply a corresponding variation in the aberration angle of the star viewed from Earth. But this is not so. Both stars exhibit the same aberration as if they were separate single stars.
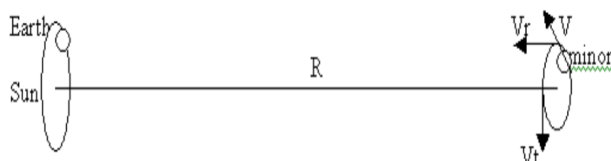
Binary stars anomaly

Heliocentric view of binary system

The radial motion V_r of the binary minor star above can be measured by its red shift. The maximum value of V_r is the same as the maximum value of V_t, the transverse velocity, when the minor star is moving perpendicular to the line of sight. The Doppler shifts of binary stars indicate their radial velocity, but this same velocity when tangential to the view from Earth does not produce the expected change from the normal stellar aberration. The predicted aberration for fast moving binary stars is never seen. Only the usual aberration of their center of mass motion is observed from Earth, the same value as for single star systems. The

negative result contradicts the assumed dependence of aberration on relative motion. Logically, the claim that the Bradley aberration is due *only* to the relative motion between a source of light from a star and an observer on Earth is invalidated by the absence of aberration effects in binary star orbital motion.

Attempts to explain the absence of aberration in binary star motion using Special Relativity have not succeeded thus far. To the modern mind, this seems to eliminate all possibilities, as Geocentrism is not included in the running.

Binary Doppler Spectroscopy

Claim: Stellar aberration depends on the relative velocity between source and observer, as Einstein maintained.

Response: Then each component of a spectroscopic binary star would have significantly different stellar aberration, contrary to observation, which shows each component has the 20″ aberration of a single star. Aberration of the individual star motion within the binary system would cause distortion of their observed elliptic orbits, but this does not happen. Only the Bradley aberration of their center of mass motion is observed from Earth.

Mathemagic

Mathematics has often been abused and misused by Relativists. Advocates often obfuscate rather than illuminate by surrounding a Relativity theory application in obtuse mathematics. A fog of misunderstanding is cast over the Relativity interpretation rather than the light of knowledge for which mathematics was intended. It is instructive to see a case in point at a Web site intended to support Relativity theory with mathematics.[300] In the section titled "Stellar Aberration," a formal proof is presented asserting that Relativity theory correctly predicts the binary star aberration as single stars. The relationship derived is not coordinate-invariant (covariant), so its results cannot be generalized for other boundary conditions. In other words, the result depends on the initial choice of time and space values. Only for the specific choice of conditions is the relationship true; any other choice leads to disproof of the Relativity theory aberration formula. The example is patently fallacious, as it employed unique initial conditions that resolved the problem only for that

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[300] http://www.mathpages.com/

particular choice of boundary conditions, but predicted nonsense for any other choice. This mathematical equivalent to special pleading requires careful analysis to uncover its errors. It leads one to suspect that it was buried in equations to hide its flaws.

Ether

Any motion of the ether or variation in its optical density between the star and the Earth would affect light waves traveling between them. Stellar aberration seemed to call for a completely fixed ether before the binary star anomaly was observed. The binary aberration anomaly could logically be an effect due to the local ether properties surrounding the binary system, in addition to, or in replacement of, the relative transverse velocity dependence.

As with the single star aberration, another valid interpretation is that the ether has no effect on the star light, but what is termed aberration is, in fact, observed is reality, the actual elliptical motion of the stars – the Geocentric model.

Planetary aberration

We will attempt to follow the logic of this type of aberration as presented by current scientific beliefs.

For the stars, the transit time is at least four years, so the time of flight correction is impossible to compute, thus travel time delay is ignored for stellar aberration. Under the assumption of a constant *c* (Special Relativity postulate #2), the transit delay within the solar system can be found if the distance is known (from independent reasoning). But the application of aberration theory to the planets leads to conflicting predictions, just as with the stellar case:

Bradley: Predicts the heliocentric speed of Earth of 30 km/s will produce a constant 20.5″ aberration on any and all planets.

Special Relativity: predicts the varying relative speed between Earth and the observed planet will determine the aberration. For example, the relative speed between Earth and Mars will vary from 0 to 65 km/s, producing 0 to 43 arc seconds shift over the years. For both of the above, the transit time delay has the same geometry as the aberration diagram, so both cause the same angular change that lags behind the true position of the object.

Ephemeris computation: To calculate the aberration and transit delay, the actual position and speed of a planet must be known – the ephemeris. In lowest order, the parameters are given by Newton's/Kepler's laws. The knowledge of the exact motion to detect aberration effects requires knowing all the influences on the orbit, including perturbations by neighboring planets and moons. This reduces the precision to 0.1 arc minutes or 6 arc seconds. Telescopic accuracy is a few arc seconds, thus, the aberration should be seen. Planetary aberration for Mercury (assuming we knew an accurate ephemeris) would be different than aberration for Jupiter (assuming the same).

Interestingly enough, the determination of aberration within the solar system, not in deep space, is now said to be impossible, because no one really knows the real location of any planet. We only know their apparent positions, the direction they appear to be as we look at them. If we knew where they were – the actual position – we would know the deflection of aberration. If we knew that, we would know where they are. But we don't know either requirement, exactly, or exactly enough.

Unlike stellar aberration, planetary aberration has not been directly measured, but inferred in building some ephemeris, such as the almanac table. This is an interesting admission. If some ephemeris include aberration in their computations, then how can they be used in an experimental verification of the same aberration? As several astronomers have pointed out, the error produced in planet orbits by perturbations of other solar system objects, and even by their own moons, exceeds the aberration correction. This is a roundabout way of saying we really don't know where the planets should be with enough accuracy to determine their aberration.

Here is the puzzle that results: the planets are much, much closer than the stars, and are subject to the well-tested gravity law of Newton. So how can we know exactly where the remote stars are, but not where Venus and Mars are, or should be? Is this another elephant in the living room? For the purposes of measuring aberration, how can we be so certain of the location of the stars, which are up to billions of light years away, but not the location of our solar system neighbors, mere light minutes away? Does that make sense?

Ephemeris only predicts the apparent positions of planets and is unconcerned with their actual locations. Let's reveal the implications. Many believe that NASA and the Jet Propulsion Laboratory make detailed flight plans based on their precise knowledge of celestial mechanics, but this is merely a modern myth. Spacecraft make numerous course adjustments during flight by dead reckoning in space and commands from ground stations.

Almanacs, such as Starpath, say they correct for planetary aberration, but what theory do they use? If Bradley is followed, they would use 30 km/s, the orbital speed of the detector. Then the correction would be the same for all planets, 20″. This is clearly a measurable size, so this cannot be it. What of Relativity's appeal to the relative speed of the Earth–planet system? If so, then why was the Earth-star relative motion not put into use when calculating stellar aberration?

The topic of aberration is such a tangle that it deserves the careful attention of objective and logical analysts to establish what, in fact, is fact and what is fiction. We must be ready to accept that only the former is true.

Moon Aberration

The relative speed of the Earth-moon pair would be the combined rotation speed of Earth and the orbital speed of the moon: only about .5 km/s – about .7 arc seconds of aberration angle, which is not really measurable. Yet the Earth-moon system together is said to be flying around the sun at 30 km/s, so that is the speed to use, when the moon is full or new. So the Bradley aberration angle is expected. Yet this is prior to 1980. Since then, the Cosmic Microwave Background dipole interpretation (and others) have determined the speed of the solar system is about 380 km/s, which is now the correct velocity to use (so we think)! But this speed will produce an aberration angle almost 13 times greater than the Bradley prediction: 4′ 20″. Double this to include the transit delay yields 8′ 40″, which is easily detectable.

Experiment:

When a Lunar Laser Ranging experiment is performed, a laser beam is first aimed at the moon toward retro-reflectors placed on its surface previously by astronauts. The retro-reflectors have an ingenious design, which always reflects the captured beam exactly back along the path of the incoming ray. If any light beam strikes the reflector surface, it will return on the same path; there's no deviation in direction, no correction angle. (See patent for a '**velocity-aberration correcting retroreflector satellite').**[301]

During the time it takes this laser beam to travel to the moon and back (about 2.5 seconds round trip), both the Earth and moon (as part of the solar system) move about 948 km towards the Leo group (474 km while

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[301] http://www.freepatentsonline.com/5474264.html

the beam is headed to the moon and 474 km while the beam is headed back to Earth). Since the retro-reflector sends light back to its point of origin, and because the returning beam is only 20 km wide when it returns, the returning laser beam should miss the telescope (that launched the laser beam) by at least 928 km (948 km minus 20 km). This is because both the Earth and moon have moved 948 km towards Leo while the laser beam was in flight. But, in fact, the laser beam is detected by the same telescope that sent the laser beam originally! Thus, the Earth's own moon does not experience aberration as the distant stars do. Why?

Satellite Links: Technical background

The operations of GPS satellites and others have found that the aberration constant obeys Bradley's formula, if the relative speed of satellite and ground station is used for the transverse velocity. The 5.8″ aberration observed is the same for ground-to-satellite laser signals, or the reverse, indicating that the roles are reversible and the speed of relative motion is the cause. At this point we can eliminate the sole dependence of aberration on the motion of the observer (Bradley's contention) or on the motion of the source stars alone. The velocity aberration angle of a satellite depends on the ratio between its relative transverse velocity and the laser beam velocity (or speed of light). The transverse velocities known today usually correspond to deviation angles in the range of approximately 1 to 10 arc seconds, or speeds of 1.5 to 15 km/s.

Satellite Test of Aberration

Since aberration is independent of the distance between source and observer and the speed of the source, a laser beam calibrated on Earth to hit a target should exhibit an aberration angle when aboard an Earth satellite. According to NASA, near-Earth artificial satellites are usually computed in the geocentric system (ECEF) and do not require the usual correction for aberration in this system. Doesn't that imply that the geocentric system is inherently superior and preferable to the rotating Earth model for predicting the actual location of artificial satellites, and by extension, possibly also for all celestial motions? If not, why not?

Earth Aberration

An experiment may prove that a light source on Earth has no aberration: a beam of light from a light source passes through very small holes in a number of plates standing in a row. The beam will be blocked 12

hours later if there is an aberration caused by the rotational velocity of the Earth. Of course, if the Earth is not spinning, there will be no aberration.

Fresnel Ether Drag

Arago observed that the Earth always seems to be "at rest" in the ether. Fresnel used a drag factor to explain the difference between the absolute ether of Arago, unaffected by material motion, and a non-existent ether. This solution said that, in a moving transparent medium (water), the ether carrying the starlight is dragged along with the medium, like a boat in a river. The drag coefficient described how strongly a moving material medium "dragged" the ether. Fresnel drag is a change in the speed of light passing through a transparent moving medium, a change proportional to the refractive index and velocity of the medium. The Fresnel drag factor is:

$$1 - 1/n^2$$

for a transparent medium of refractive index n. The speed of light in the medium n has an additional speed due to the ether dragged along with the medium:

$$c' = c/n + v(1 - 1/n^2)$$

In general, 19th century physicists were strongly convinced there was an absolute ether; the dragged ether was denied. The absolute ether was at rest while all cosmic objects moved through it. Only if the Earth is at rest in the absolute ether can light travel with equal speed in all directions (isotropically). If the Earth is moving in the absolute ether, the speed of light cannot be isotropic.

Wilhelm Veltmann, in the early 1870s, showed that the Fresnel coefficient must be applied individually to each frequency of light. That is, dispersion was present, a drag dependency on wavelength. Transparent bodies have to drag along different amounts of ether for different colors of light.

The Fresnel drag effect had empirical credibility - it is solidly established by experiments. By the start of the 20th century, Fresnel drag not only explained refraction but also reflection, diffraction, and interference experiments. What it lacks is a common sense interpretation for its underlying physical mechanism for partially coupling matter in motion with ether.

Fresnel drag needed to be appended to the immobile ether concept if this theory was to explain optical experiments to first order in v/c and the

Earth were to be at rest in this immobile ether. But many physicists were unhappy that the ether was so little affected by matter. The focus from this time to the present (where the Cosmic Microwave Background is the present reference for immobility) was obviously on a stationary ether, not an immobile Earth. The immobile Earth had been discarded as an option historically, but erroneously, as we have seen so far based on Bradley aberration. Faced with a disproof of heliocentrism and confirmation of geocentrism, scientists desperately strove to find an escape path. At this time in history, the only known way of reconciling stellar aberration with wave theory was Fresnel's partial dragging. This *ad hoc* remedy gave heliocentrism a temporary reprieve, but still the question of geocentrism or heliocentrism was not resolved. The logical conclusion left at this point was: either geocentrism or heliocentrism is possible, if ether drag exists.

Claim: An objection raised against Fresnel's ether drag model is the apparent distinction between two kinds of ether, a universal kind unaffected by matter, as though impervious to this type, and a second kind carried along by transparent media.

Response: But a dual ether (or a fluid ether and a rigid plenum, more accurately) is just the conclusion drawn from the Genesis exegesis of Day 1 and Day 4 and modern experiments.

George Stokes

In 1845, Stokes attempted to account for stellar aberration on the basis of a moving Earth dragging along ether in its vicinity, in addition to the consideration of how the wave fronts of stellar light change direction when encountering the Earth's 'etherosphere.' The light ray really is deflected during its passage through the ether, not apparently. Stokes needed an alternate account of aberration because he disbelieved the hypothesis of an immobile ether.

Fresnel realized that polarization could be explained easily in the wave theory if light consists of transverse rather longitudinal waves, such as sound. To support the transverse mode, ether needed enough stiffness to supply the transverse forces opposing the distortions produced by the waves. The ether, if it simulated a mechanical system, had to be a solid. This picture of the ether conflicts with an immobile ether unaffected by the motion of matter. It was more intuitive to assume that matter was the cause of the ether drag. Stokes became the champion of this view by proposing a "Silly Putty" model of the ether. Ether behaves as a rigid solid for the high frequencies of light and as a fluid for the slower motion of celestial bodies

traversing it. At the Earth's surface, the ether will be stationary with respect to it. This more realistic model of the ether was a more complicated explanation of aberration.

Stokes differed from Fresnel's partial drag theory. He interpreted stellar aberration as an ether that was totally, not partially, dragged along next to the Earth. The wave fronts of starlight change direction after entering the Earth's etherosphere. Stokes' ether was an incompressible (implies c is constant) and irrotational fluid with no viscosity to produce drag. The velocity of the ether and an object matched at the object's boundary. Incoming plane waves were tilted by the ether flow by the same amount as stellar aberration. Lorentz found that Stokes' assumptions self-conflicted, because the velocity of a potential flow past a sphere does not match the sphere's speed at the boundary. Stokes had assumed the ether flow relative to the Earth was zero at the Earth's surface; the aberration angle θ is given by:

$$\sin(\theta) = \sin(\delta) \, |V_s|/c$$

where δ is the declination of the star and V_s its velocity, as observed. The flow velocity is parallel to the surface, but it is non-zero, and can vary widely. Changing Stokes' assumptions, such as making the ether compressible to achieve zero surface velocity, introduces effects that predict a different aberration angle. Conclusion: Stokes' theory of a completely dragged ether was unsuccessful.

Faraday Rotor Generator (1831)

A homopolar generator/Faraday disc consists of a conducting flywheel rotating with constant angular velocity ω in a constant magnetic field **B** perpendicular to the plane of the disc. A conducting frame makes conducting contacts with the center and a point on the periphery of the disc. Three tests are performed:

Test #	Copper disc	Magnet	Current ?
1	rotates	fixed	Yes
2	fixed	rotates	No
3	rotate together	rotate together	Yes

Faraday's classic law of electromagnetic induction states that it is the relative motion of the circuit and the magnet that generates a current.

According to this view, test 1 and 2 should produce a current and test 3 should produce none.

Lorentz Force

All free electrons in the conduction band of the copper disc that move through a magnetic field experience a Lorentz force of $F = qv \times B$, where v is the velocity of the electrons. This force is perpendicular to both the velocity of the electrons, which is tangential, and the magnetic flux, which is normal to the disc, and is therefore radial. The conduction band electrons, then, move radially and create a current if the circuit is complete through the slip rings.

When the disk spins without an external return path, electrons collect along the rim and leave a deficit + charge near the axis. The charge separation is proportional to the magnetic field and the rotational velocity of the disk, but independent of any rotation of the magnet. The amount of polarization is determined by the absolute rotation of the disk relative to an inertial frame. The relative rotation of the disk and the magnet plays no role.

Claims and Responses

Claim #1: If the magnetic field is provided by a permanent magnet, the generator works regardless of whether the magnet is fixed to the stator or rotates with the disc, the Faraday paradox.

Response: But as usual, the question is: "velocity relative to what?" If the velocity relative to the magnet is assumed as the cause of the Lorentz force, then the explanation contradicts Special Relativity, in which it is impossible to tell whether a uniform magnetic field is moving or stationary. This assumption would also imply that rotating the magnet and not the disc would cause a current to flow, which is not what has been observed.

Claim #2: The correct interpretation of the *velocity* of the electron is that it is relative to the apparatus parts, the sliding contacts and the external circuit. These laboratory objects act as the inanimate observer in Special Relativity. The velocity of the electrons in the lab frame must be used for congruence between theory and reality.

Response: But the lab frame is none other than the geocentric frame!

Claim #3: Faraday discovered that the magnet and disc could be cemented together and rotated conjointly, if the magnet were the same shape as the disc. The same voltage was measured with sliding contacts that touched the center and edge of the conducting disc, as when the magnet was fixed and the disc rotated alone. Was relative motion unnecessary for the generation of electricity?

Response: Note that when the copper and magnetic discs are cemented together, they both move relative to the Earth – the geocentric frame.

Claim #4: After many years, Faraday concluded that when a magnet is rotated, its magnetic field remains stationary.

Response: Stationary with respect to what? If it is the Earth or laboratory frame, then this confirms the geocentric theory! If the Earth were really rotating, all the metals in it would be generating induced electromotive forces as they passed through the Earth's own static magnetic field. And induced currents would be created wherever a complete circuit exists. But where are all these self-induced effects, which should be seen if the Earth rotates?

Parallax (1838)

Flush with the discovery of a great advance in technology (the lever!) Archimedes was emboldened to say:

> *Give me a lever long enough, and a prop strong enough, and I can singlehandedly move the world.*

This aphorism has at least two shortcomings:

1. It boasts that the world can be moved, in direct conflict with the Scriptures: Psalm 104:5: *He set the earth on its foundations; it can never be moved.*
2. His logic also failed, in that he assumes he would have an immovable place to stand, to operate the lever.

Those who propose stellar parallax as a proof of heliocentrism and a disproof of geocentrism make the same false assumption.

Parallax can be demonstrated by placing your index finger in front of your nose and then alternately closing each eye. Either the finger or the

background will seem to move, depending on your focus. But, of course, there is no real motion, only a shift in viewpoint relative to a reference point or line – your finger. This is a simple example of parallax, the shift in position of an object due to motion relative to a fixed reference line. We shall see that the whole crux of the parallax disproof of geocentrism hinges on knowing what line is truly fixed. The knowledge of what is the actual motion is impossible without a known fixed point.

Top: Heliocentric view of parallax
Bottom: Geocentric view of parallax
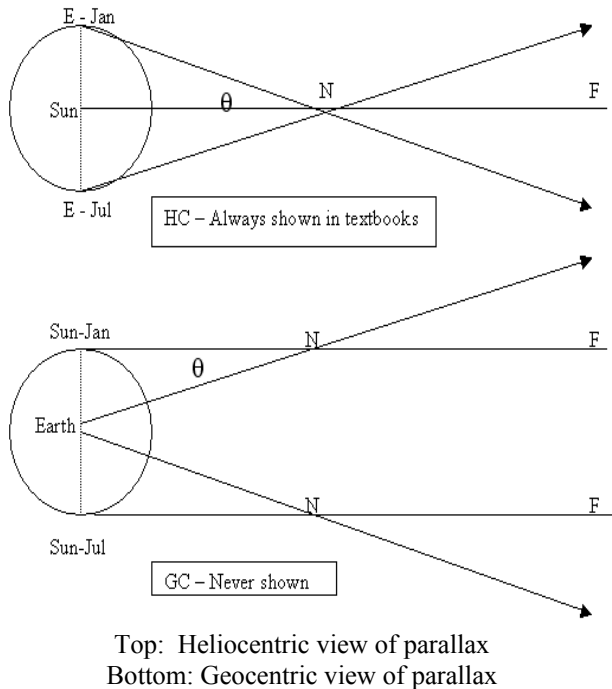
In 1838, astronomical instruments were precise enough for Bessel to first measure a parallax angle for a nearby star after six months of observation. He was the first to use parallax in calculating the distance to a star. Parallax would provide the first accurate measurement of interstellar distances, implying that 61 Cygni had a parallax of 0.314 arcseconds, which, given the diameter of the Earth's orbit, indicated that the star was ~3 parsecs or 10 light years away. His interpretive heliocentric diagram is shown below. It is always shown in science books as proof of the sun's centricity. And so it is, if, in beginning the analysis, one assumes that the sun is the fixed reference point. But this is the fallacy of *petitio principii* (begging the question) or assuming true what has yet to be proven.

Measurements of parallax by a viewer from the sun would show none, according to modern science.

The bottom diagram is a classic original, never shown in mainline science books, never even discussed as a possibility. So your eyes are two of only a few that have seen it - an equally valid alternative to the heliocentric diagram, including the size of the parallax angle, with the (a) sun (b) near star (c) far star alignment the same in both views.

In the diagram below, we sight along a near (N) star at a far (F) star from Earth (E) and see F move up. What is the inference?

E	N	F ⇧	1
E	N ⇩	F	2
E	N ⇩	F ⇧	3
E ⇧	N	F	4
E ⇧	N ⇩	F	5
E ⇧	N ⇩	F ⇧	6
E	N ⇩	F ⇩	7
E ⇩	N ⇩	F	8
E ⬑	N ⇧	F	9
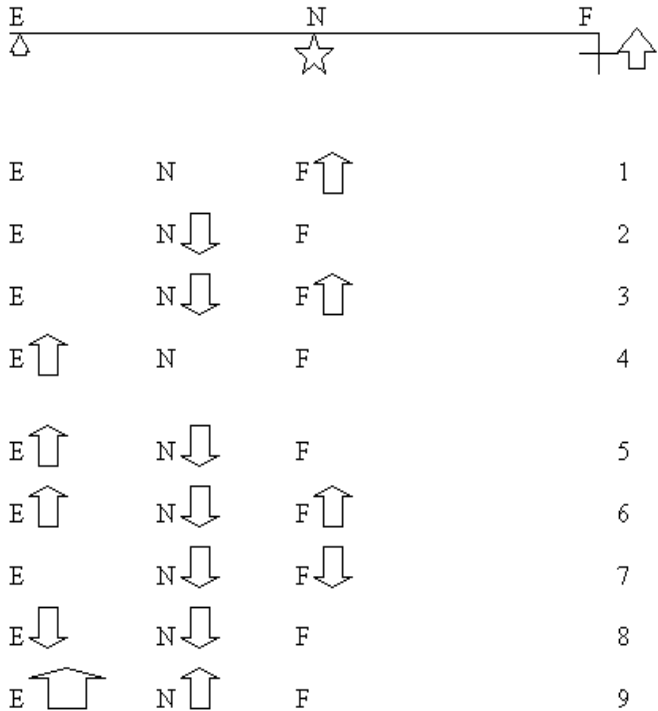
From Earth, any of these 9 rows of different object motions above will look like the Far star moved up, including row 7, where F actually moves down when N does likewise. It is clear from this chart that the true state of motion critically depends on knowing what is fixed, the fiducial reference. The apparent shift in parallax can only be real if the fixed point is known independently. In the case of the Earth, the independent source affirming it is fixed is biblical Revelation. The same source affirms that the sun moves.

Dominique Arago

In 1810 Arago attempted to measure the extent to which photons would be refracted by a glass prism at the front of a telescope. He anticipated that there would be different angles of refraction due to the different velocities of the stars and the motion of the Earth at different times of the day and year. Contrary to this expectation, he found no difference in refraction between stars, between times of day or between seasons, only ordinary stellar aberration.

He also considered the refraction of light from the same star over the course of a year. Changes in the orbital velocity of the earth with respect to the star would presumably produce changes in the relative velocity of the Earth and the starlight. Arago observed no such effect on the refraction of the starlight.

Claim: Arago viewed stellar aberration through a normal lens and through a thick prism with a very different index of refraction. Again, he found no difference. Both experiments imply that the speed of light is independent of the motion of the source.

Response: They both also allow that the observer on Earth has no motion.

Fully Dragged Ether

The experiments demonstrated Earth's movement does not influence optics near the surface. One implication is that the ether is immovable with respect to the Earth (the total ether drag hypothesis). Together star aberration and Arago's experiments show that:

- the ether dragging caused by the Earth is relative only to the Earth but not the whole solar system.
- the range of the dragged ether must be small
- the ether has a pressure/density gradient.
- c is anisotropic.
- every cosmic body could have an ether lens that distorts light paths, as in General Relativity.

With regard to the last point, all we have is proof of the ether effect on Earth. Extending this result to other cosmic bodies is speculation, not

science. In 1818, Fresnel added the drag coefficient to the immobile ether to account for Arago's result.
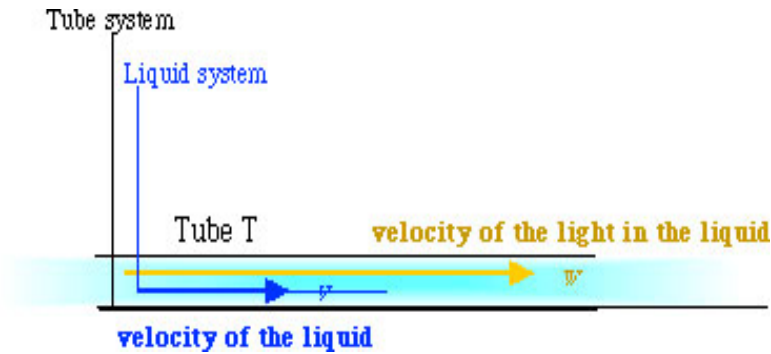
A telescope set up on Earth can be focused on a star that is in the direction the Earth is traveling. Two of the light beams from the star are focused at a point P within the telescope. Since the telescope and observer are moving with a velocity of 30 km/s, the observer's eyes will arrive at point P at the same time as the light beams, and the observer will see the star in focus. But 6 months later, with the same focus, the situation will be entirely different, since the Earth will be on the other side of its orbit. Now the telescope will be traveling away from the star with the same velocity. It was predicted that the observer's eye will no longer be at point P when the light beams arrive there – the star will be out of focus. A telescope that was originally in focus on a distant star should be out of focus six months later. Scientists did not measure the expected out-of-focus effect. This Arago *out of focus effect* has never been found. Besides a full dragged ether explanation, the geocentric theory of a motionless Earth also fits.

Armand Fizeau

Experiment description: In 1851, Fizeau devised an experiment to measure Fresnel's drag factor. The Fizeau optical interferometer was devised to measure very small differences in time or distance. The drag coefficient of Fresnel:

$$f = 1 - 1/n^2$$

corresponds to a fringe shift of :

$$\delta = 4n^2 f v L/(\lambda c)$$

λ being the wavelength of the light, v the flow speed of the water and L the path length. Fizeau recorded a shift of $\delta = 0.23$ interference lines implying a empirical drag factor of $f = 0.48$. From $f = 1 - 1/n^2$, $f = 0.43$. Within a 10% error, Fizeau confirmed Fresnel's drag factor.

Special Relativity predicts no ether but does predict that c in a moving medium differs from the speed in the rest medium, consistent with the Fresnel drag coefficient. Fizeau's experiment found that the velocity of light in a liquid is smaller than that in vacuum, depending on how dense the liquid is.

The Fizeau Theory

Fizeau used interferometry to determine how the speed of a moving liquid affects the speed of light. Light travels in a motionless liquid with a velocity w with respect to the liquid. According to Special Relativity, this speed does not depend on the liquid's motion relative to the tube T. The liquid then moves with a velocity v relative to the tube.
Theoretical analysis of Fizeau experiment[302]

In a transparent fluid at rest, the phase velocity of light, $w = c/n$, is isotropic and inversely proportional to the fluid's index of refraction, n. If c is parallel to the velocity of the fluid v, then w is the *observed* speed of light in the moving fluid. According to Special Relativity's rule for addition of velocities, we have:
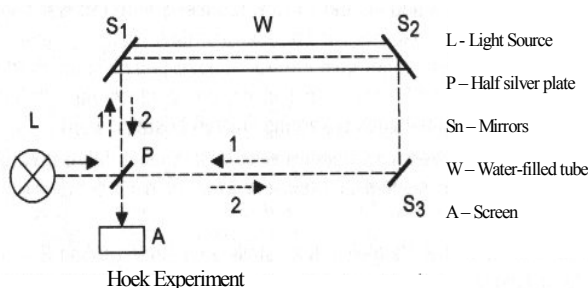
$$w = (u + v) / (1 + uv/c^2)$$

$$\approx c/n + vf$$

The coefficient $f = (1 - 1/n^2)$ is known as the Fresnel drag coefficient. As such, f will be 0 if the motion of the liquid had no influence on c. It will be 1 if light was entirely "carried" by the liquid, as sound is. What is actually observed is *partial* dragging. Although Fizeau's relation can be derived without resorting to the principle of relativity (Lorentz did so), Einstein considered it an excellent experimental test of Special Relativity. Unfortunately, the denial of multiple causes for observed results (except, of course, for Special Relativity's interpretation) is one of the key factors in current scientific rhetoric.

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[302] Copyright © Soshichi Uchii

Martinus Hoek 1868

In 1868, Hoek tried to detect the Earth's absolute orbital speed and improved on the accuracy of the Arago experiment. The experiment was similar to Fizeau's, but simpler in concept and easier to explain in the absence of ether.

Hoek Experiment

L - Light Source

P – Half silver plate

Sn – Mirrors

W – Water-filled tube

A – Screen

As shown in the figure above, the Hoek interferometer sent light opposite ways around a closed path, the top part of which included a tube filled with water, which was expected to partially drag the ether. By rotating the apparatus through various angles, and observing the manner in which the interference patterns shift, one can determine the degree to which the ether is constrained by the water due to the motion of the Earth in its orbit.

The fringe pattern did not change at all for any orientation. Each of the rays took the same time to traverse the square circuit. If c is light's speed in air, c_1 the speed in water, n the index of refraction $= c/c_1$, ϕ is the Fresnel drag coefficient, d the distance S_1S_2 or S_2S_3, time is distance/speed and v is the water speed:

$$d/(c_1 + \phi - v) + d/(c + v) = d/(c_1 - \phi + v) + d/(c - v)$$

Solving for ϕ to first order in v/c yields Fresnel's relation:

$$\phi = (1 - 1/n^2)\, v$$

Hoek's analysis assumed partial drag of ether. The setup size and time of observation are small, so the Earth's orbital motion is virtually linear and inertial during the experiment. In the experiment's rest frame, no

fringe shift is expected, even if the device is rotated. But the orbital speed of 30 km/s should perceptibly drag the ether with the water. If there is no ether to drag, $\phi = 0$, and the etherless solution is obtained, consistent with Special Relativity.

So strong was (and still is) the bias against an immobile Earth that the obvious interpretation of the result is not:

$$\phi = 0 \text{ (zero), but}$$

$$v = 0 \geq \phi = (1 - 1/n^2)v = 0$$

where $v = 0$ because the Earth's "orbital" speed is 0 (zero)!

George Airy (1871)

George Airy, 150 years after the Bradley aberration measurements, built a water-telescope to prove the ether theory and measure absolute motion for the Earth. His expectation was to get some change in the effect of astronomical aberration, since water seemed to partially drag/transport a light beam in Fizeau's experiment. Did aberration occur inside the telescope? Did the ether-drag in water change the aberration angle? If *c* is less in water than air, would aberration in an air-filled telescope be different than in a water-filled telescope? Would refraction of starlight from air to water be different than normal aberration predicted? None of these things occurred, and a null result meant that aberration was the same for air and water media. This null result is usually explained as ether-drag effects caused by the water. But the experiment showed that the light was deflected by ether *before* entering the telescope! Otherwise, it shows that there is no shift in light and the sources are moving in aberrant ellipses!

In actuality, if the Earth was actually moving, the beam should deflect more; if the starlight were moving, there should be no change. Water slowed down the speed of the light inside the telescope, yet Airy found no need to change the telescope angle.

In this sideview of the water telescope, the new path of the aberrated starlight should be *WV*; the result was actually *AV*, the same as the air telescope. Think of the telescope like an empty pipe, tilted so that starlight hits the center of the bottom edge. Adding water will only slow the light down, not change its direction. If the pipe is actually moving while the beam is inside the pipe, slowing down the beam would necessitate tilting the pipe to hit the center bottom edge. Obviously, the starlight was already coming in at the aberration angle, since the water's refraction had no effect. In effect the water's high refractive index made visible the smaller

Fresnel drag of the ether, showing there was no drag of ether or water due to telescope motion. This inferred that the stars were moving relative to a stationary Earth, not that the Earth was moving relative to the 'fixed' stars. When starlight slows down in the water, it still hits the telescope bottom at the same place as in air because its deflection occurred prior to its entry into the telescope. If the telescope were really moving, it would move further sideways while the slower light is inside the telescope, causing a greater deflection than with air.
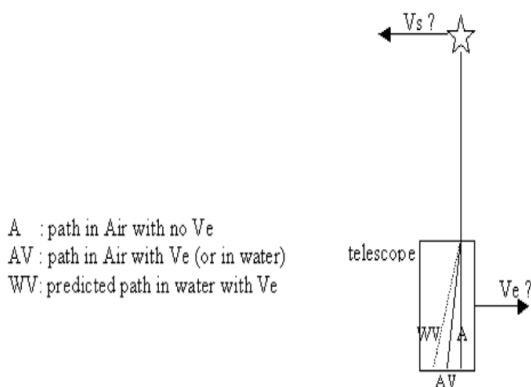
Science claims to be logical and rational, while religion is not. The following syllogism demonstrates what the Airy experiment logically concludes.

(a) If the Earth moves, the water telescope will need additional tilting
(b) But the water telescope does not need tilting! (effect is false)
(c) Thus, Earth does not move! (so, cause is false)

This is valid logic: if the effect is not present, neither can the cause be present. For if the cause were present, so would the effect. But supporting the geocentric model is unacceptable to the prevailing modernist ideology. In fact, this experiment was called "Airy's failure," because it contradicted the heliocentric metaphysics. The term "Airy's failure" gives psychological insight to the thoughts of the experimenters during this era. Earth motion with respect to ether was universally expected as the only outcome. Both this experiment and the Michelson–Morley experiment were thought to be dead-ends to understanding reality until Einstein rescued physical theory by ignoring the evidence for Geocentrism and ether, opting instead for Special Relativity, which gave a mathematical solution at the expense of logic.

Summary

Looking at stars, if the Earth is moving, or if the star is moving and the Earth is at rest, the relative motion of the telescope and the light traveling down the telescope would be sideways relative to the telescope. The telescope must be tilted to keep the light from hitting the side. This is familiar to astronomers. It is commonly called *aberration*. When the water-filled telescope reduces *c* to 77% of *c*, only motion of the Earth, not the star, should affect the amount of additional tilt required on the telescope. Airy thought he needed to tilt his water-filled telescope more than the air-filled telescope to see a star. He did not. The starlight was already coming in at the correct angle, so no change was needed. This demonstrated that it was the stars moving relative to a stationary earth and not the fast orbiting Earth moving relative to the comparatively stationary stars. If the telescope were moving, he would have had to change the angle. If the water-filled telescope had to be tilted more than the empty telescope to see the star, it would mean that the Earth was moving (around the sun).

Conclusion: Aberration is independent of the local medium. In fact, Airy's failure was a [unrecognized] geocentric success; the results were consistent with an immobile Earth.

Michelson-Morley (1887)

The Michelson-Morley experiment is a landmark event in the history of physics. A stationary ether had been proposed to support the transmission of light through space. The experiment was intended to verify the motion of the Earth around the sun through the static ether. But it was said to have failed to do so, since the speed of light apparently did not depend on the reference frame in which it was measured.

The interpretation of the results are still actively being discussed, over a century after the fact. And the results of similar experiments since then have led reasonable people to ask of the null result, "But, just how null is null?"

The Michelson-Morley experiment null result was rather astounding and not explainable by the then-current theory of wave propagation in a static ether. Efforts to save the ether theory included ether-drag or entrainment, which would reduce the expected effect from a rigid ether.

The Earth's gravitational field dragged the ether around with it in such a way to eliminate the ether's effect.

Another attempt was the Lorentz-Fitzgerald contraction hypothesis, which claimed that everything contracted in the direction of travel through the ether, without providing any explanatory mechanism or independent empirical proof. It was thought that Michelson-Morley obtained a null result due to this contraction, which neutralized the ether's effect on light. However, the Kennedy-Thorndike experiment in 1932 eliminated Lorentz-Fitzgerald contraction as a viable option.

The interpretation that the medium drags/entrains the ether with only a part of the medium's velocity was questioned after Wilhelm Veltmann demonstrated that the refractive index, n, in Fresnel's formula depended upon the wavelength of light. The ether could not be moving at a speed that depended on wavelength – a dispersive property – if it was required that ether have no dispersion, as some did. In any case, the idea of a simple rigid ether was dealt a serious blow. However, positive results for the presence of ether in various theoretical forms were claimed by Dayton Miller, Sagnac in 1913, and Michelson and Gale in 1925.
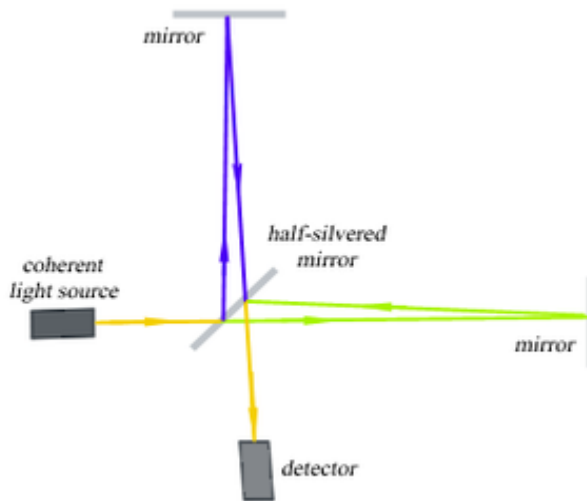
A Simple Model

The simplified Michelson-Morley experiment test procedure was equivalent to putting your hand in the water to test for motion of a boat. If the boat is moving through still water, or if there is a current outside a boat tied up at a dock, you will feel the water flow. If the speed of the boat is v_b in a lake, then in a river with current v_r the boat's speed will increase by v_r headed downstream and decrease by v_r headed upstream:

$$V_{up} = v_r - v_b$$
$$V_{down} = v_r + v_b$$

This is the Galilean velocity transformation of simple addition/subtraction of relative velocities. Heading directly across the river will cause the boat's actual motion to drift downstream, due to the push of the water flow. Using this boat-water model, Michelson and Morley sought to measure the difference in length (and time) in the analogous motion of light (the boat) through different directions of the ether wind (water current). As they understood it, with the apparatus fixed to the Earth as it orbits the sun, the direction of the equipment would change direction through the ether every six months.
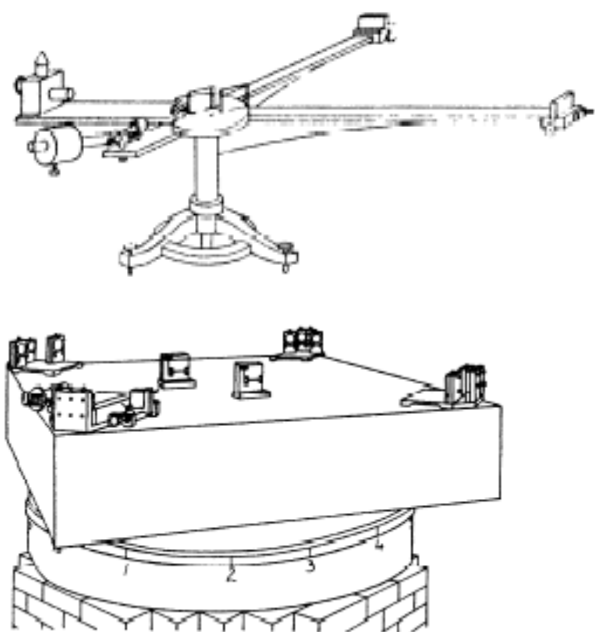
Description:

Shielding of the apparatus by this interior location and a short light-path diminished the effect of the ether, as Dayton Miller showed. A small but practically "null" result was virtually guaranteed by using this experiment protocol. The apparatus was located in a closed room in the basement of a stone building, isolated from thermal and vibrational effects. Building the apparatus on top of a huge block of marble, floating in a pool of mercury, reduced vibrations further. The sensitivity was about 1/100th (0.01) of a fringe. Each full rotation of the device in the mercury pool made each arm parallel to the ether wind twice and perpendicular twice, yielding a sine wave output. If the wind were solely from the Earth's solar orbit, the wind would fully change E-W directions during a 12-hour period. The yearly cycles would be seen as a change in wind speed.

Interferometer schematic[303]

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[303]   http://upload.wikimedia.org/wikipedia/en/thumb/d/d7   /Interferometer.png/ 300px-Interferometer.png (Licensed under GNU 1.2).

Interferometer layout[304]
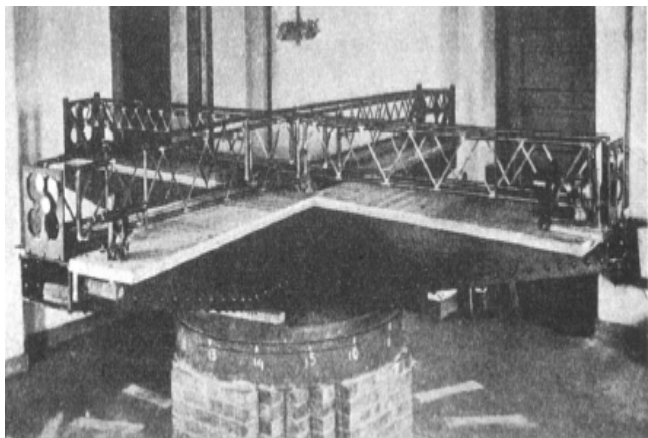
Michelson interferometer[305]

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[304] The Ether-Drift Experiments and the Determination of the Absolute Motion of the Earth, Dayton Miller, (Reviews of Modern Physics 5, 203-242 (1933)).
[305] *Ibid.*

Comparison of ether drift velocity: Michelson/Morley/Miller[306]

Interference fringes as seen in the interferometer[307]

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[306] *Ibid.*
[307] *Ibid.*

Open air experiment at Mt. Wilson[308]

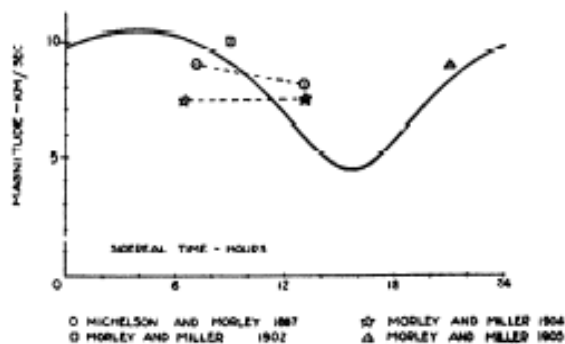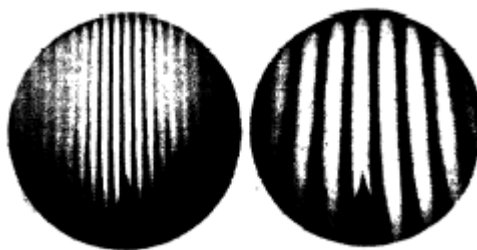A light beam is directed at an angle of 45 degrees at a half-silvered, half transparent mirror *A*. The split beams reflect off mirrors *C*, *D* back to the half-silvered mirror, are merged at *A* so a telescope at *O* views the 2 overlapping quarter-intensity beams together. If there really is an ether wind affecting the light, the overlapping beams should arrive at slightly different times, since their path lengths are different. One path was up and down the ether stream, the other across it. Rotating the whole apparatus in various directions on a turntable would find the maximum effect, corresponding to being aligned with the ether stream. This would also eliminate systematic errors in the path lengths.

The interferometer can be calibrated by moving mirror *D* a small distance *d*. The change in distance can then be measured by counting *m*, the number of bright fringes in the intensity pattern. The difference in path length is 2*d* and the wavelength of the monochromatic light is λ. For the maximum fringe signal detected,

$$2d = m\lambda$$

The optical path length between the mirrors also depends on the refractive index **n** along the path. If **n** and **p** are the atmospheric index of refraction and pressure and **Δp** the change in pressure along the path from the initial pressure to its current value:

$$m = (n - 1) \times (2\,d/\lambda)\cdot (\Delta p/p)$$

so

$$2d = m\lambda p \quad \Delta p/(n - 1)$$

For gases with indices of refraction very close to one, the denominator will be very small, and the fraction very large. This refractive correction was not used by Michelson-Morley and wasn't even realized until a few years ago (see Cahill). The small fringe shift measured must be multiplied by the large refractive correction, making the ether drift hundreds of kilometers per second, in agreement with Cosmic Microwave Background dipole observations and other modern versions of the Michelson-Morley experiment.

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[308] *Ibid.*

Analysis:

If the interferometer is at rest, or there is no relative motion of Earth through the ether, then the travel time t for both arms will be twice the distance L between mirrors divided by the speed of light c.

$$t = 2L/c$$

If there is a relative velocity v then the apparatus will move while the light is in transit between mirrors, as seen below. There will now be a difference between the time to cross the ether and the time to go back and forth along it. If the light is moving upstream in the ether, then it should take longer than to go the same distance downstream. For the path <u>along</u> the ether flow:

- with the ether: speed $= c + v$
- against the ether: speed $= c - v$
- time t' to return to the beam splitter

$$t' = L/(c - v) + L/(c - v) = L\,[(c - v) + (c + v)]/(c^2 - v^2)$$

$$= 2Lc/(c^2 - v^2) = (2L/c)\,/(1 - v^2/c^2) \sim (2\,L/c)(1 + v^2/c^2)$$

For the path <u>across</u> the ether flow:
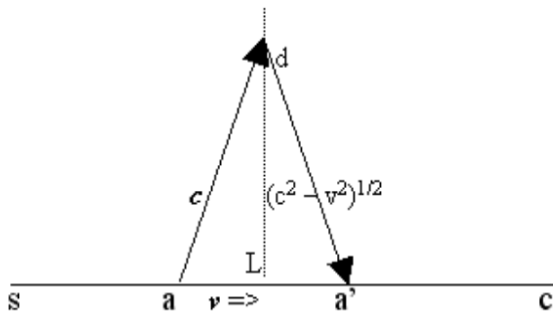
The beam path with an ether cross wind

The speed of the light beam along L is found from the Pythagorean theorem:

$$c'' = (c^2 - v^2)^{1/2} = c(1 - v^2/c^2)^{1/2}$$

The time to traverse ada$'$ is:

$$t'' = 2L/v = (2L/c)(1 - v^2/c^2)^{1/2} \approx (2L/c)(1 + v^2/2c^2)$$

Then the travel time difference between the two paths seen at the interferometer is:

$$\Delta t = t' - t'' = (2L/c)(1 + v^2/c^2) - (2L/c)(1 + v^2/2c^2) = Lv^2/c^3$$
$$\text{If } \Delta t = 0$$

constructive interference will form a bright spot. If $\Delta t = \lambda/2$ = half a wavelength, a dark spot will form by destructive interference. In general the number of complete periods, N, by which the two waves interfere, is:

$$N = \Delta t/T = Lv^2/(Tc^3)$$

The period of the monochromatic light wave is the inverse of the frequency: $T = f^{-1}$. Michelson rotated the device 90° to interchange the path lengths and double the fringe shift for the total path difference between the two rotated perpendicular axes. This is the distance difference traveled by light between the parallel and transverse ether direction for a 90° interferometer rotation:

$$\Delta N = 2Lv^2/(Tc^3)$$

Results

Michelson-Morley expected to see a difference in the interference patterns for the two perpendicular orientations of the interferometer, showing that light traveled at different speeds in different directions. Assuming heliocentrism, and a rigid ether at rest, a shift of 0.4 fringe was expected for the Earth's orbital speed of 30 km/s = 1/10,000 of c. Fringe shifts should be observable if ΔN is around $0.01 - 0.02$ fringe. They found that the fringe shift was much less than expected, < 0.01, but not quite null. Later experiments measured larger effects.

So no ether wind was detected (In the analogous model above: no water flow felt on the hand). Instead of discovering the properties of the ether, the Michelson-Morley experiment found one-fortieth of the expected fringe effect and one-sixth of the expected velocity. With the

exception of Dayton Miller, future Michelson-Morley type results returned what is considered a "null" result. Lorentz recognized that the Miller results, whatever their cause, did not quite tally with versions of Special Relativity. Einstein concluded that the results should be dismissed as experimental error. As interpreted since, the Michelson-Morley experiment is considered to be the first strong evidence against the theory of a luminiferous ether. This opened the door to the wild mathematical speculation divorced from experimental proof so rife in theoretical physics today.

Experimental Errors

The Michelson-Morley type experiments that followed showed a small positive velocity, too small to show the presence of ether wind, sometimes within the error limits, sometimes not, but never exactly zero. The original Michelson-Morley experiment showed a small consistent ether wind – never exactly zero – but well within the devices' capability to detect. But then preconceptions twisted the reported results. Miller outlines how Michelson-Morley actually averaged the day and night readings in 1904 when the results were published! What happens when you average two sine waves that are perfectly out of step? Miller also argued that there was little possibility of detecting an ether wind since it was almost completely blocked out by the laboratory walls or by the apparatus itself. He realized that if matter, or a magnetic field, had any interaction with a fluid-like ether, there would be an entrainment effect, ruling out a basement lab site.

Many questions have been raised even to this day about the experimental protocol and what exactly Michelson-Morley were measuring. The results of many similar Michelson-Morley type experiments shows the measurements are never zero, but average about 3% of the expected values. The post Michelson-Morley experiments, especially the meticulous work of Dayton Miller, supported the geocentric origin of this small but persistent non-null result.

Theoretical Errors

Michelson-Morley found a "null result," a term much abused and misused. It doesn't mean no motion was detected, but only that the measured result could not confirm the hypothesis of an ether, at the precision used in the experiment. In other words there was a lack of proof, not a disproof, of the existence of ether. The null result was unexpected, even though the effects were: (a) not measuring OWLS – one way light

speed – but TWLS – two way light speed, as the difference between the two trips, and (b) the effect was of second order in v/c.

Michelson-Morley experiments have only been performed in terrestrial laboratories, where the gravitational field and the magnetosphere of the Earth and other ambient factors are always present. A repetition in space will remove these local features and allow a universal conclusion. This is also true of similar experiments dependent on ether motion or density. Many exotic experiments have been conducted in space, but those that might test Einstein's postulates have never been done, yet. (NB: A positive result from the current test of General Relativity theory, called Gravity Probe B, will not only support frame dragging, but also many ether theories.)

Modern Interpretation

Science was at a crossroads. Either Geocentrism was to be accepted as true or a new anti-geocentric paradigm had to be introduced to replace Heliocentrism. The impasse was broken with Special Relativity theory, which opted for the following:

- c is constant
- no preferred reference systems, like Heliocentrism or Geocentrism.
- All motion is relative.
- no need for ether
- Lorentz contraction of lengths
- clocks run slow.

The development of Special Relativity derived the Fitzgerald-Lorentz contraction from the invariance postulate, and was also consistent with the apparent null results of most experiments (although not with Miller's long-term seasonal effects). Today Relativity is generally considered the solution to the Michelson-Morley null result. Ritz's emitter or ballistic theory was also consistent with the results of the experiment, also not requiring ether, but it predicted wild gyrations of binary star light due to arrival time differences as they orbit each other. Interferometer observations of normal behavior seemed to rule out the ballistic theory, until it was rescued by the extinction model.

Four possible explanations were offered, three by Michelson, to explain the null Michelson-Morley outcome:

1. The Earth is fixed in the ether: Although obvious, Michelson still excluded this from his list of possible options! This is clear

evidence of the anti-geocentric mindset of science at this time. Heliocentrism had been promoted as true since Galileo's time but still had not been logically proven. The evidence points to Geocentrism, but modern science denies it, and keeps denying it, no matter what the evidence placed before them.

2. There was no ether drag, as the ether was forced to move with the Earth. There were at least two strong problems with this option:

    a. conflicts with other drag experiments.
    b. A big consistency problem: the Airy failure had been resolved with a dragging effect through the ether!

3. Light speed was constant with respect to the source

    a. There were at least one strong problem with this option: conflicts with other experiments on the properties of light.

4. An *ad-hoc* offering: distances shrink (Lorentz contraction) along the motion's direction. This also presented problems:

    a. There was no other independent evidence for this alleged contraction
    b. It must be universal for all types of material, air, water, steel, etc.
    c. No underlying mechanism to explain or implement it was proposed.
    d. Contradicts the Sagnac effect, which shows no shrinkage of lengths.

Geocentrism's Response

The anti-geocentrism posture was probably never more evident than in Michelson's strained effort to avoid concluding the Michelson-Morley experiment showed the Earth at rest, including a shrinking of size in the moving frame! But this was a conclusion that a child could have reached. The 'null' result left the heliocentric folks in a real bind.

• If there's no ether, then there's no Fresnel drag to explain away Airy's failure, and Geocentrism becomes the logical choice.

- If there is a fixed and absolute ether, the experiment should detect the relative motion of the Earth around the sun through it, but no proof of orbital motion was found!

The obvious conclusion was that no motion was detected because the Earth is fixed! Note that we cannot suppose in advance anything about the motion of the Earth. At Galileo's time, for example, experiments like Michelson-Morley's would prove that the Earth was stationary, since that was the dominant worldview. Today, Geocentrism is always the simple option overlooked.

Summary

Some say the Michelson-Morley experiment is the keystone on which the second postulate of Special Relativity is based. This null result is the basis for justifying time dilation and the host of other paradoxical properties of relativity. Most say the result was within the error of the mechanism but this is not true in Dayton Miller's experiments or in the light of all the modern evidence since. The Miller and Michelson-Morley type experiments had very significant and reproducible non-null results.

One of the apocryphal aspects of the Michelson-Morley experiment is the fact that the readings plotted out to a sinusoidal wave with a single rotation periodic effect, exactly as expected of the ether wind. Moreover, the wave's phase was exactly opposite at night, as expected for a reading on the other side of the Earth.

Even with questionable construction, location and extremely low precision, there was definite proof of ether's existence all the way back in 1887, with only 6 hours of observations!

Conclusions

Ruling out the existence of ether from either the Michelson-Morley or Miller experiments seems to be illogical in the extreme. Almost all other Michelson-Morley type experiments are performed in some sort of metal container in basements and other obstructive situations. Using the concept of entrainment totally invalidates all of their subsequent results.

The ether theory virtually died with the acceptance of Special Relativity. Einstein said that the Galilean transformation was only a low velocity approximation to the truth. By applying the Lorentz transformation to all inertial reference frames, he alleged that not only physics laws remained covariant but also c was invariant. The null results were now expected and the usefulness of the single universal ether frame

vanished. Now location in space or time was not absolute, but depended on the observer's location and speed.

As for the ether, having no proof of existence is not the same as a proof of non-existence. Of the many paradoxes of Relativity, one relates directly to the ether. Einstein simultaneously proposed that in Special Relativity there is no ether, yet in General Relativity space is curved yet empty! Although Special Relativity theory ignores ether, General Relativity theory does not, but uses "curvature of spacetime" as a euphemism for a space that affects matter. For example, look at one model of "spacetime" filled with a structure called the "spin foam." Similar to ether, the foam uses a privileged reference frame and thus is not Lorentz invariant, but which is a required symmetry of Special Relativity. It disagrees with the Michelson-Morley experiment. Yet this is a credible modern theory, having the blessing of General Relativity theory to forgive its clash with logical consistency.

Modernists claim that ether makes it much harder to remain consistent with all of the relevant modern experiments in physics. This premise hangs on rejecting an immobile Earth, a possible causative agent in ALL experiments investigated so far. Modern science dismisses many conflicts and inconsistencies with the mantra, "out of sight, out of mind." Contrary evidence to the relativity theory paradigm is treated not as a challenge, but with contempt. Scientific ignorance is bliss. Fortunately, some objective physicists are only now realizing, from other astronomical evidence, that a viable possibility to explain the Michelson-Morley experiment is that the Earth is stationary, the focus of the whole universe. Yes, the dreaded word - geocentrism.

Oliver Lodge (1892)

Aberration and ether drag:

A uniform ether flow causes no aberration, which only depends on observer motion, according to Bradley. Ether drift has no effect on terrestrial surveying results. Although the ether drifts, it must be uniform everywhere, with no boundary between ether in two different states of motion. At such a boundary the light beam would change direction and appear to lag behind the true position, in proportion to the boundary-ether difference, as compared to a light beam not crossing the boundary. Such a negative aberration has not been seen.

If matter has no interaction at all with a frictionless inviscid ether (*i.e.*, no ether drag), then aberration will not occur. The persistent motion of the Earth or planets over time through a viscous ether shows that any ethereal

viscosity, if it exists, is beyond detection now. Energy lost to the ether would slow planetary motions down, is not observed.

Interference and refraction experiments were performed by Fizeau, Hoek, Jasmine, Mascart, Maxwell, Fresnel, Arago and Airy. None of the results implied an ether stream moving over the Earth's surface. The theory of astronomical aberration would be hopelessly complex if ether were dragged across the starlight before entering or inside the telescope.

Lodge's experiment:

If ether does not drag matter with it, is the reverse possible - that matter drags ether? Will a substantial mass disturb the ether? Lodge used large steel disks spaced apart and mounted on a rotating platform, with four mirrors positioned as in the Sagnac experiment to produce interference effects between counter-moving light beams. The difference was the large spinning frame that supported the mirrors. Lodge supposed the steel mass would drag the ether enough to be detectable. His first attempt showed a substantial fringe shift, thought to prove the existence of "matter drag" of the ether. But when the rotation sense was reversed, the fringes shifted in the original direction – the fringe shift was due to the change in air density and refractive index *n* due to the motion of the steel plates! Lodge also used charged plates to produce an electric field in the gap containing the light beam, and also iron magnets instead of steel. Still no fringes were noted when the spurious shift due to the change in refraction properties of air was eliminated (with much difficulty). The result was summarized as:

> the velocity of light between two steel plates moving together in their own plane an inch apart is not increased or diminished by so much as 1/900 (0.0011) part of their velocity.

Result:

Oliver Lodge performed experiments on the propagation of light near rapidly moving steel disks to test Stokes hypothesis that moving matter drags the ether with it. No such effect is observed.

Trouton-Noble (1903)

The experiment was based on a suggestion by George FitzGerald that a charged parallel-plate capacitor moving through the ether should orient itself perpendicular to the motion, by experiencing an impulse when it is charged or discharged. Like the earlier Michelson-Morley experiment,

Trouton and Noble obtained a null result: no motion relative to the ether could be detected. Trouton suggested that a turning force couple on a carefully insulated charged condenser moving through the ether might be detectable. This also produced a null result.

This null result was repeated in experiments by Chase in 1927 and Hayden in 1994. Such experimental results are now thought to be consistent with Special Relativity, to reflect the constancy of the speed of light and the absence of any absolute rest frame (or ether).

Experiment details:

In the experiment, a parallel-plate capacitor is charged and suspended by a fine torsion fiber. If the ether theory were correct, the change in Maxwell's equations due to the Earth's motion through the ether would lead to a torque causing the plates to align perpendicular to the motion. The electromagnetic energy of the condenser will have its lowest value if the plates are perpendicular to the direction of motion. Trouton concluded that the turning couple will try to put the plates at right angles with impetus from the velocity of the ether. The charged condenser moves through the ether with a velocity in the X-direction with its plates parallel to the direction of motion. If the plates are oppositely charged and edge effects are ignored, there will be a constant electromagnetic field between the condenser plates, and no field outside. When a condenser is at rest in the ether, there is only an electric field.

When moving through the ether, there will also be a magnetic field. The electric field **E** points across the plates; the magnetic field **B** caused by the charge motion is perpendicular to both **E** and **v**. There would be no **B**-field if the condenser were moving with plates perpendicular to the velocity. The energy to create the magnetic field was thought to come from a decrease in the kinetic energy of the condenser, which would be detected as a decrease in speed.

Trouton tried to get the torsion balance to oscillate in its resonance frequency by charging and discharging the condensers at intervals corresponding to the free period of swing of the apparatus. He did not find any effect. But Special Relativity says that Maxwell's equations are invariant for all frames of reference moving at constant velocities, so no torque is predicted (a null result). The experiment is very difficult to control – small effects due to external electric and magnetic fields make it difficult to separate a positive from a null result.

Geocentrism's Response: Only light and gases show ether effects; the experiment was incapable of achieving ether detection unless a charged gas is used between the plates.

Trouton-Rankine (1908)

Fitzgerald and Lorentz had independently proposed a contraction to explain the null result of the Michelson Morley experiment. Lorentz showed that this hypothesis, along with proper time, made Maxwell's equations and the Lorentz force law invariant in a moving frame, in agreement with Special Relativity.

In Special Relativity, the Lorentz-Fitzgerald contraction is not detectable in a co-moving frame. Trouton and Rankine saw that a contraction of the object in the moving frame should be measurable in the object's rest frame. To measure this effect was the experiment's purpose.

Because the Lorentz-Fitzgerald contraction is only in the direction of motion, from the point of view of the absolute ether frame the length of the resistance coils depended on their angle with respect to their ether velocity/drift. The resistance in the rest frame should change as the device was rotated. However careful measurements showed no change in resistance.

In 1908, Trouton and Rankine measured the change of resistance of a wire when oriented from parallel to transverse to the ether drift. They used a Wheatstone network for precise resistance determination. A Wheatstone bridge is a clever measuring setup used to measure an unknown resistance by balancing two legs of a network circuit. The bridge was balanced when the wire in two of the coils was at right angles to the ether drift and then the whole assembly was rotated through 90 degrees and the change of balance was tested. Every conceivable precaution was taken, but still there was only a negative result.

After rotating the bridge by 90^0, Trouton and Rankine calculated the equivalent resistance by taking into consideration the Fitzgerald contraction. If the Fitzgerald contraction existed, since the resistance is directly proportional with the length, Trouton expected to see a change in resistance given by the derivation that follows.

Analysis:

The resistance of an elliptical wire of length l, resistivity ρ, area S and axes a, b is:

$$R = \rho l/S = \rho l/\pi ab$$

For motion along the wire axis the length l contracts according to Lorentz to become:

$$l' = l/\gamma \qquad a' = a\gamma$$

so l contracts, a expands and b is unchanged, because it's perpendicular to the motion. The equilibrium resistance:

$$R' = \rho l/\gamma \pi a \gamma b = R/\gamma^2$$

For motion along the elliptical axis a:

$$l' = l\gamma \quad a' = a/\gamma$$

At 90 degrees the resistance is:

$$R'' = \rho l\gamma/\pi(a/\gamma)b = R\gamma^2$$

The change in resistance due to rotation in the ether wind causing Lorentz contraction is:

$$\Delta R$$

$$= R(\gamma^2 - 1/\gamma^2)$$

$$= R[1/(1-v^2/c^2) - (1-v^2/c^2)] \sim R[\ 1 + v^2/c^2 - (1 - v^2/c^2)]$$

$$\Delta R \sim 2Rv^2/c^2$$

This resistance change can be precisely measured with the Wheatstone bridge setup. After rotating the balanced bridge by 90^0, the bridge should become unbalanced by an amount ΔR. Trouton and Rankine observed a near-zero deflection, *i.e.* a deflection several orders of magnitude smaller than predicted by theory. This experiment marked the end of the Lorentz-Fitzgerald contraction theory. The experiment has been re-enacted several times with the same results and higher precision.

Conclusion:

This test showed that, if the Lorentz-Fitzgerald contraction existed, it was not measureable in the rest frame of the object. This experiment has

been re-enacted several times by Chase and Tomaschek at a higher precision with the same results.

Kennedy-Thorndike (1932)

Kennedy-Thorndike specifically tests whether **c**, the speed of light, depends on the velocity of the laboratory. Special Relativity states that the speed of light is the same no matter how fast an observer is traveling. The experiment monitors the oscillations of a light source as it accelerates and decelerates from the combined motions of rotation and orbital revolution. By making one arm of the experiment much shorter than the other, a change in speed of the Earth would cause changes in the travel times of the light rays, from which a fringe shift would result unless the frequency changed by the same amount. One arm was very long and placed north-south. Opposite ends of the experiment were thus at different rotation velocities due to their slightly different latitudes, so the length contraction would not cancel out for east-west motion. As no significant fringe shift was found, the experimenters concluded that time dilation occurs as predicted by Special relativity: "the conclusion to be drawn is that the frequency of a spectral line varies in the way required by relativity." Without the time dilation, the Lorentz contraction hypothesis is unable to explain the null result from this experiment.

Special techniques:

Several unique protocols were used in this experiment:

- The apparatus was kept at temperature constant to 0.001° C over several seasons.
- Fringes were photographed.
- It used a fixed laboratory to look for diurnal and seasonal variations as it moves along with the Earth's spin and orbital motion.
- Its mirrors were modified to include a half-wave "step," eliminating the possibility of a standing wave pattern within the apparatus.
- It had precision of 1/1500 fringe or ¼ degree in phase angle
- It employed the first actual vacuum interferometer
- a null result implies the estimated ether drift was $v < 24$ km/sec.

An entrained ether was discounted by the experimenters:

> In view of relative velocities amounting to thousands of kilometers per second known to exist among the nebulae, this can scarcely be regarded as other than a clear null result.

This statement serves to illustrate how deeply ingrained were both the Big Bang model and the concept of a static ether.

Hamar (1935)

Instead of passing through a static and unmoving ether, massive objects at the Earth's surface may drag some of the ether along with them, making it impossible to detect an ether wind. Hamar intended to cause an asymmetry in any proposed ether wind. If there was any ether wind at all to be detected, the leg of the interferometer with containing lead should have experienced less ether wind than the other leg. Hamar's expectation of the results was that:

a) In an experiment without lead blocks, both arms would be equally affected by ether entrainment.
b) In an experiment with lead blocks in place on one arm, only one arm would be affected by ether entrainment.

The reported result concluded, even with the lead blocks in place, the fringe displacements were equal to the ones without any lead blocks. This was presented as proof against the ether-drag hypothesis.

Interpretation:

Because differing ideas of "ether drag" existed, the meaning of the experiment depends on each version of the hypothesis. There are two main levels of drag that have been proposed:

(a) Partial entrainment by any object with mass, as taught by Fresnel and Arago.
(b) Partial entrainment at larger, perhaps even global magnetic field level, as believed by Michelson and Miller.

Frisch-Smith (1962)

This was a demonstration of time dilation carried out by Frisch and Smith in 1962. Because a mechanical clock could not be accelerated to a

speed close to the speed of light, they chose to observe the decay rates of *mu* mesons (muons), *i.e.*, cosmic-ray fragments.

Cosmic rays carry extremely high energies into Earth's atmosphere from beyond the solar system. When a ray strikes an atom in the atmosphere, it creates a cascade/shower of high-speed particles, including muons. Once a muon is created, its lifetime is a statistical variant, depending on its probability of decay, expressed as a half-life. Muons have a half-life of 1.523 millionths of a second. In each half-life, half of the remaining muons decay to other particles. Reasoning in reverse, if the number of muons created is known, and then the number at some later instant is counted, then elapsed time in the muons' inertial frame can be computed.

Frisch and Smith set up their apparatus on Mount Washington in New Hampshire at 6265 feet above sea level, where they detected an average of 563 muon decays per hour. The flight to sea level takes 6.3918 microseconds, which spans 4.197 consecutive muon half-lives. If time in the muons' frame were not dilated relative to the lab frame, then that flux of muons would drop from 563 per hour on Mount Washington to about 31 per hour at sea level. If the muons' time is dilated, then the Lorentz factor for a relative speed of 99.52% of light speed equals 10.22, which expands the muon half-life to 15.565 microseconds. The muon flow would shrink at sea level to 423 per hour. Data was then collected at 10 feet above sea level. At this location muons were measured at an average rate of 408 per hour vs. the theoretical rate of 423/hr.

Conclusion: Since the muons are travelling nearly the speed of light, their internal clock is slowed by the amount accounted for by Einstein's special relativity so that more reach sea level than otherwise expected. Muons generated in cosmic-ray showers decay in dilated time.

Geocentrism Analysis:

- In all inductive (empirical) proofs, the understanding is that positive examples only support a theory. Only a deductive proof from an outside body of knowledge – like theology – can assert the truth. Time dilation supports but does not prove Special Relativity.

- Special Relativity is not applied correctly in the standard analysis above. The focus is on time dilation, but Lorentz transformation symmetry requires a corresponding length contraction in the other frame, and Lorentz contraction is simply ignored. The two known values are in different reference frames: the half-life is known in the meson rest frame; the altitude at which decay occurs is known

in the ground rest frame. For the speed of mesons the gamma factor is 10.22, so the contracted altitude is 613 ft in the meson's frame – see table below.

Frame	Half life	Average range
Meson	1.523 usec	613 ft
		⇓ ⇑
Ground	15.565 usec	6265 ft

The claim that the meson will not reach the ground is empty, if the Lorentz contraction of altitude is considered. The ground is only 613 ft away! So the mesons will reach the ground at the rate observed, whether seen from the meson view or from the ground. There is no paradox. But it is expedient to ignore this, in order to focus on the time dilation alone.

- Other experiments show Lorentz contraction doesn't exist. The argument above is thus moot, but important in deconstructing the Special Relativity argument favoring time dilation.

DePalma Spinning Ball Drop

A ball spinning at 27,000 RPM and a non-spinning ball were catapulted side-by-side with equal momentum and projection angle. In defiance of all who reject the ether as realistic, the spinning ball actually weighed less, and traveled higher than its non-spinning counterpart. Those who attribute this to an aerodynamic or atmospheric effect, please note that it works just as well in a vacuum. Also note, this effect has since been verified by other [enlightened] researchers.

The decrease in weight of the spinning ball – anti-gravity – can explain why the spinning object goes higher and falls faster than the identical non-rotating control. Current thinking is that there is no special interaction between rotation and gravity. The behavior of rotating objects is simply the addition of ether energy to whatever motion the rotating object is making.

Is this a harnessing of torsional ether waves by rotation? Both balls draw energy into themselves from an unseen source, but the rotating ball absorbs more of this ethereal energy than its counterpart – energy that would be manifest as gravity, moving down into the Earth. With a decrease in torsional ether above the ball, there is a slight decrease in gravity, the ball gets slightly lighter. Needless to say, this effect defies standard theories.

Gyro Drop

A fully enclosed, electrically driven gyroscope is released to fall freely under the influence of gravity. The elapsed time taken to fall a measured distance was photo-timed, with the rotor stopped and then spinning. The gyroscope fell along its axis. Power leads for the rotor were disconnected just prior to release.

With 97% statistical confidence, the difference in the fall rate for the spinning and static balls is not due to chance.

	Static	Rotating
Acceleration (ft/s^2)	32.1549	32.2619
Delta acceleration	.1070	
Equivalent force difference	.38oz / 7.23lbs = 0.33% weight loss	

Quantum Red Shifts, Tifft (1984)

William Tifft noticed a curious relationship between a galaxy's shape (Hubble type), brightness, and red shift. Coma Cluster galaxies configured themselves along sloping bands in a red shift vs. brightness diagram. Several well-studied galaxies, including M51 and NGC 2903, exhibited velocity breaks, or discontinuities, or jumps – like steps on a stairway – at their nuclei which tended to be around 72 kilometers per second, independent of galaxy selected. Later on, smaller velocity jumps inferred from the red shift breaks were found: 1/2, 1/3, or 1/6 of the original 72 km/s value. The formal confidence levels associated with these quantum results are extremely high.

Tifft's initial suggestion was that galaxy red shifts take on preferred or "quantized" values. Were red shifts analogous to atomic energy levels, a repetition in the macro world of features in the micro world? Why wasn't this obvious pattern noted before? Two reasons: (a) Precision was insufficient, (b) If the pattern was not expected, there's no reason to test for it.

Further evidence was needed. Binary galaxies physically correlated with one another can test for red shift quantization. The red shifts from their mutual orbital motion should be a smooth curve; there should be no jumps. But disparate analyses find the red shift differences between galaxy

pairs are quantized rather than a continuum, discrete rather than analog. They cluster near multiples and factors of 72 km/s. Visible-light spectra was used first, but was not sufficiently precise for confidence. A 1980 radio survey of binary galaxies made in the 21-cm emission of neutral hydrogen provided the assurance of precision. Red shift quanta were grouped around 72, 144 and 216 km per second, a very unlikely coincidence. It now seemed that wherever the effect was sought, it was found. Statistical experiments over the entire sky, rather than galaxy pairs, were needed, but are much more difficult to carry out.

Dwarf irregular galaxies spread across the sky were next selected for surveying and statistical analysis. The dwarfs displayed an extraordinary clumping of red shifts into discrete bins of 24 km/s, 1/3 of the original 72 km/s interval. The likelihood that such clumping would randomly occur is just a few parts in 100,000, $< 10^{-4}$.

Next, galaxies in the Fisher-Tully catalogue that showed large amounts of rotation and interval motion (the opposite extreme from the dwarf irregulars) were studied. The galaxies' red shifts again were discrete, but this time hovered around 36 km/s, 1/2 of the basic 72 km/s spacing. The inescapable conclusion was that at least some galaxy types all over the sky have quantized red shifts that are simple fractions of 72 km/s.

Astronomers have now confirmed that numerical values of galaxy red shifts are 'quantized' into distinct levels. Hubble's law treats red shifts as proportional to the galaxy distances, so the distances also fall into groups of concentric spherical shells around us. Since the shells are about a million light years apart, our distance from the center must be much less than that, to avoid visual mixing. The probability of this occurring by chance is incalculable.

$$\Delta\lambda/\lambda \quad = \mathrm{H}r/c$$

H is the Hubble constant, empirically derived, with wide interpretative range. Its current value is 75 km/s per Mpc (Megaparsec). This is the famous Hubble law, which says that red shifts tend to increase in proportion to distance. Hubble and Slipher said the wavelength shifts were Doppler shifts, produced entirely by the relative velocity v of the source and Earth. For non-relativistic speeds, the wavelength shift given by the Doppler formula is:

$$\Delta\lambda/\lambda \sim v/c$$

which implies that

$$v \sim \mathrm{H}r$$

In models of Einstein's theory of General Relativity that include an expanding space, such as the Big Bang, light from distant stars would stretch more than from nearby objects, so Big Bang red shifts would increase with distance. Theoretical physicists (cosmologists) hold that the Hubble relation represents a Big Bang expansion red shift of all space, not a Doppler shift. The additional proper motion of the star is a Doppler shift. But experimental physicists (astronomers) choose to describe red shifts with velocities equivalent to a Doppler shift, with a single value, not two. This practice has long confused the public, the media, and even the astronomical community into thinking of the red shifts as being caused only by velocities of the objects. The persistence and prevalence of this confusion is not hard to fathom, since it can be reinforced by emphasis in standard textbooks and press releases. The distinction is rarely made. It does benefit, however, those who need flexible interpretation of red shift data to prove or disprove a specific issue. Perhaps Relativity theory refers to the relativity of interpretation.

In summary, then, galaxy red shifts are approximately proportional to velocity and distance as expressed quantitatively in the Hubble law. Ground telescopes show quantization at least out to medium distances, of the order of 100 million light years. The Hubble Space Telescope shows similar clustering of red shifts out to distances of billions of light years. In 1996, Tifft showed that Milky Way motion in the cosmic microwave background (CMB) frame must be compensated for: 560 km/s in a direction south of the constellation Hydra. In this Cosmic Microwave Background rest frame, red shift groups have much greater definition. Smaller levels like 2.6, 9.15, and 18.3 km/s become evident. Validity of the data is no longer questioned, but an explanatory theory has not been found – in modernist physics, that is.

Why do the red shifts of particular types of astronomical objects only take on certain values, suggesting that the objects are on shells concentric around the Earth, implying the location of the Earth is special? No modern cosmology models explains this periodic grouping of galaxy red shifts around discrete values across the span of the universe. This is no minor anomaly.

Claims and Responses

Claim #1: The universe is a huge spherical resonant cavity, tuned to the Cosmic Microwave Background wavelength, with nodes in between

galaxies, which are the maximum of the Cosmic Microwave Background standing waves.

Response: Then why are there not resonances in the ether flow?

Claim #2: If the Doppler shift is rejected, the accepted interpretation of the red shift, then the distance to galaxies is unknown, because the Hubble Law is invalid. If the red shift is entirely or partially non-Doppler and not due to cosmic expansion, then it could be an intrinsic galactic property, such as mass or luminosity. Each galaxy may have a state specific to itself, like the characteristics of individual humans. Relatively little blurring in the quantization means any real motions must be small compared to the internal state. Galaxies would have little relative motion, sitting static in the universe instead of expanding.

Response: It is rejected because the main pillar of the Big Bang is the Hubble red shift, proportioned to distance and recessional velocity. This crisis cannot be permitted.

Claim #3: Gravitation creates clusters of galaxies with similar red shifts.

Response: But then the clusters should be independent, not coordinated across the visible universe.

Claim #4: A quantum red shift operator theoretically will create discrete eigenvalues of a wave equation.

Response: But if it is a wave equation, what is waving? If a quantum operator, why a cosmic scale, when quantum mechanics has always applied to the microworld. And what is the physical mechanism behind the mathematics?

Claim #5: Those scientists who believe in quantized red shifts represent a very small minority.

Response: How many are aware of the effect, and have researched its claims and implications? Hardly any.

Claim #6: Some scientists hold that causes of uneven patches of matter are due to a fluctuation of the Big Bang spatial explosion, large-scale structures and local clustering can mimic the appearance of red shift quantization.

Response: But this is nothing but grasping at the wind, as we have seen with inflation, dark matter, dark energy, multiple universes, etc.

The Geocentric View

Contemporary science contends galaxy red shifts are seen from a moving platform, the Earth. Local Doppler red shifts would be imposed on the red shift readings taken directly from the telescope. There is the orbital motion of the planet, the motion of the solar system (the sun), the Milky Way, and the Local Group – all with separate speeds and directions through space. This set of motions, incompletely known, would have to be subtracted from each red shift motion to eliminate the grand procession of the Earth and the groups to which it belongs. But subtraction or correction is only done for the first two motions – the orbit around the sun and the solar motion around the galaxy center, the galactocentric frame of reference! The Milky Way motion and the motion towards Leo were unknown at the time and were not taken into account, yet they represent the largest component of the Earth's motion – about 600 km/s! This is huge compared to the levels observed – as low as 12 km/s. Are we to believe that from all other locations in the universe we will observe this same quantum red shift by embracing the rule of uniformity – the cosmological principle? How can the red shifts exhibit the quantum breaks without any further data massaging for the largest motions? Unless, of course, the motions of the Earth are fictitious!

If Earth were not central, arcs of each shell would be seen with varying red shifts. In geometry, concentric circles can have but one center. All quantum red shifts indicate that the Earth is the center of this incredible phenomenon. Any other location would break the quantum levels, smearing them out, as was expected prior to the discovery by Tifft.

Geocentric Theory Summary

The basic premises are:

1. Red shift spacings correspond to groupings of distances
2. Galaxies are located in concentric shells around us
3. This effect could not be accidental.
4. Red shift jumps strongly support the view that we are the physical focus of the universe.

The Red Shift Anomaly (1990)

Claim: Red shift data interpreted according to the Big Bang standard model asserts that most star systems are radially receding from Earth; some in deep space are doing so at speeds close to (more than half) the speed of light. Over a six-month interval, stars on the ecliptic will show a radial velocity variation of about 60 km/s, which is due to the Earth's 30 km/s orbital speed. The Earth's rotation and revolution are removed from the computation and the observed radial velocity is specified relative to the sun, the heliocentric radial velocity. The radial velocity is easy to obtain from a spectrograph and the precision is independent of distance, unlike proper motion and parallax.

Response: All physics discussions base the redshift anomaly on the premise that the Earth is moving around the sun. As described above, computations are transformed to the heliocentric system, with the intent of eliminating the Earth's motion from the data. This only serves a counter purpose if the Earth is stationary in space. The heliocentric corrections give motion to the Earth it doesn't really possess, and from those erroneous "corrections," which are based on a false premise (*i.e.*, the Earth is moving), is generated a false conclusion.

If the heliocentric correction were applied, the only way the annual red shift variation could be tested (NB: tested, not speculated) would be to put a measuring device at the sun's location and record the Doppler shift from any given star. That this is a practical impossibility is no problem for the modern physicist, since empirical tests are replaced by pure thought – gedanken experiments. The proof is unfalsifiable.

Finally, even if the redshift could be measured from the sun's location, all that would tell us is the relative motion between the sun and the star. The shift would be exactly the same, regardless of whether it is the sun or the other star that is stationary, or even if both are in motion.

Cosmic Megawalls (1990)

Observations are made of galaxy redshifts within a cone of observation 7 billion light years long and centered on the Earth. The analysis relies on the modernist Hubble law – that red shifts are truly indicative of distance.

Mirabel and Rodriguez Superluminal Galactic Source (1994)

Apparent velocities greater than *c* (superluminal) have been inferred for radio-emitting components in a number of distant quasars and active

galactic nuclei. The central object emits jets of subatomic particles from its poles; in these jets the rapidly moving material was tracked. The components were moving from the center at rates greater than *c*. The accepted explanation: plasma clouds were ejected in opposite directions from the core at speeds close to *c*; relativistic effects led to the apparent superluminal motion. But analysis of deep space objects introduces many potential errors of assumption.

Mirabel and Rodriguez saw the first superluminal motion ever detected in an intragalactic source. The source is ejecting matter in a similar process but on a smaller scale than that seen in quasars. Using Very Large Array (VLA) technology, they discovered that a small, powerful object in our own cosmic neighborhood is shooting out material at nearly the speed of light. After accounting for direction, the material appears to be traveling faster than *c*, superluminal motion, prohibited by Einstein's second Special Relativity theory postulate.

Relativity's View

Seeing a visibly-superluminal expansion or motion of a distant object does not necessarily imply that anything actually exceeds *c* locally. If a subluminal object is moving at a small angle along the line-of-sight it can appear to be going faster than light, but is not. This is different from any uncertainties in distance scales.

A remarkable ejection event was seen where the object shot out material in opposite directions. The core remained stationary, while the approaching bolide was apparently moving at 125 percent of the speed of light. After correcting for relativistic effects, they conclude that the ejected material actually is moving at 92 percent of light speed, more than 171,000 miles/second. This event ejected a mass equal to one-third that of the Moon with the power of 100 million suns.

Claims and Responses

Claim #1: Thirty years ago superluminal motion was used as evidence against quasars having deep space distances. Today most physicists believe that velocities greater than *c* are optical illusions and involve no physics which contradicts the theory of Special Relativity.

Response: Exactly what is acceptable evidence of speeds greater than light speed, if all visual proof is dismissed as illusions – ESP?

Claim #2: The superluminal explanation is a light travel time effect. Any light from glowing matter moving close to head-on towards Earth at nearly

c will take a shorter time to travel as it nears Earth. If you don't correct for this decreased time the light speed will be overestimated. In other words, if you calculate how fast that blob is moving, assuming that it is moving perpendicular to the line between you and the galaxy, and you underestimate the time interval by ignoring the fact that it is also moving towards you, then you will get a speed which can be many times the speed of light.

Response:

1. Whether the source is moving toward, away from, or tangent to our sight line, Special Relativity theory says the observer will always measure *c* as constant. So it makes no difference.
2. This is a good example of how Relativity theory turns reason upside down. If an object approaches Earth at a small angle, it will appear to be moving much slower than it actually is, because only sideways/transverse motion is visible. The logic above argues that the object is moving much slower than it seems!
3. If time is shortened, so are the distances, by Lorentz contraction and the foreshortening by perspective in # 2

Binary Star Precession (1995)

Six analyses of the orbital precessions of the planet Mercury, the moon, the major satellites of Jupiter, Saturn, Uranus, and four binary stars have been done to examine whether classical Newtonian tidal effects may completely account for excess precession, eliminating a key proof for General Relativity.

Analysis of Binary Star Precession

1) For two binary stars, DI Herculis and AS Camelopardalis, General Relativity predicts double the measured orbital precessions.
2) The orbital period decay of binary pulsar PSR1913+16 has been attributed to energy lost via gravitational wave radiation, a General Relativity effect never detected in other experiments. This decay could also be a classical propagation speed of gravity several million times the speed of light, as Van Flandern has convincingly argued, using the lack of gravitational aberration in astronomy. Such a speed would vitiate Special Relativity and General Relativity theory.

3) Classical tidal effects with a speed of gravity several million times the speed of light in a Euclidean 3D space and time reasonably explains the empirical orbit precessions and decays.

Orbital precession comparison

Binary Stars	Gen. Relativity	Actual
DI Herculis	2.35 degrees	1.05 degrees
AS Camelo	26.8 degrees	15.00 degrees

Propagation Speed of Gravity

For a speed of gravity equal to the speed of light in classical physics, the radial distance can change significantly. Applying equal speeds and Newton's law to the Earth-sun eccentric orbit yields a decay of 15 seconds per year, and a decrease in major axis of 30 miles per year. Neither of these orbital changes are measured. If gravity's speed is three million times the speed of light, the axis would only shrink about 0.6 inches per year.

Aspden Effect (1995)

An Adams motor with a magnetized rotor and no electrical power input is started on no load by a drive motor and brought up to operating speed of 3250 rpm, then runs steadily at that speed for two minutes. With a machine rotor of 800 gms, its kinetic energy and that of the drive motor is less than 15 joules, contrasting with the 300 joules needed to spin up from rest.

After five minutes or more, the machine is stopped, but can be restarted up to speed in the same or opposite direction with only 30 joules, only 10% of the original effort, provided that the machine is not stopped more than about a minute. This totally violates all known laws of physics. It is ten times easier to spin the magnet once it has already been spinning. (The term for this is *hysteresis*, a memory of prior physical states).

Energy within the magnet seems to continue "spinning" inside even when the magnet is not moving (similar to stirring up a glass of water and then removing the stirring rod, while the glass itself remains still). It will take less energy to stir up the water in the glass again if you wait less than a minute before trying. So it certainly appears that this energy in a magnet is in a form of fluid motion, possibly spiraling in a vortex, like the water example.

The experimental evidence is that there is something that is:

- spinning,
- invisible,
- having energy of motion,
- occupying the space within the machine rotor.

This "something" has an effective mass density 20 times that of the rotor, but spins independently and takes several minutes to decay/wind down, while the motor itself comes to rest in a few seconds. Various machine configurations tested indicated two dependencies:
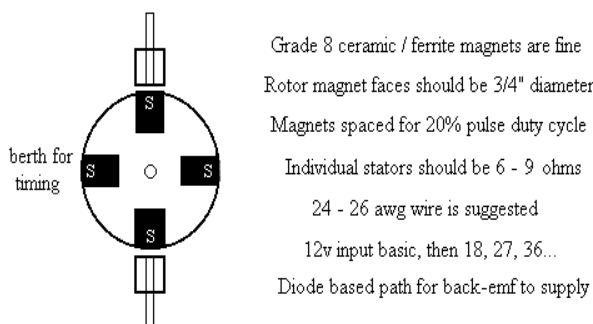
- time of day
- compass orientation of the spin axis.

One machine with weak magnets showed evidence of gaining magnetic strength with each test, as if permanently absorbing the ether energy.

Another separate experiment consisted of a reversible D.C. motor running in a clockwise sense for two or three minutes, drawing from the power supply, but then spontaneously slowing down, stopping, and then reversing rotation and rapidly gaining speed, as if counter-clockwise was the preferred sense of rotation. It was running well clockwise, with no external influence given to change direction.

The basic motor used by Aspden consists of a central rotor either all north out, or all south out, and high resistance coils.

The Basic CD Motor Configuration

Grade 8 ceramic / ferrite magnets are fine
Rotor magnet faces should be 3/4" diameter
Magnets spaced for 20% pulse duty cycle
Individual stators should be 6 - 9 ohms
24 - 26 awg wire is suggested
12v input basic, then 18, 27, 36...
Diode based path for back-emf to supply

berth for timing

Aspden rotor motor[309]

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[309]http://upload.wikimedia.org/wikipedia/en/e/e8/ Cdmotor2.gif

Aspden ether principles:

1) Extraction of energy from the ether does not violate the first law of thermodynamics, conservation of energy, if energy flows from ether to matter. If the ether delivers energy to run the motor, eventually that borrowed energy is returned to the ether by generating heat and radiation.
2) Existence of the ether was not disproved by Einstein. Special Relativity only says it is not necessary; General Relativity theory disguises it as "space-time curvature," while moderns call it "the vacuum."
3) Ether has been measured in laboratories. The ether was probably first detected by Sagnac in 1908, the experimental source of the modern ring laser gyro. How can the speed of a laser beam traveling a circuit inside an optical instrument detect rotation of that instrument, unless the beam is keeping a fixed speed relative to something inside that instrument that does not share its rotation? That something is the ether!
4) Its existence was not disproved by the Michelson-Morley experiment. Michelson was trying to sense the Earth's motion through the ether, but violated the Miller condition for minimal ether shielding.
5) The ether reveals its existence when we have rotation, as in the Adams motor.

Marinov: The Self Accelerating Plasma Tube (1996)

Motor operation:

A cylindrical magnet is cut along one of its axial planes and the one half is turned up-side-down (the magnetic forces themselves do the rotation). Around this magnet there is a channel filled with mercury in which the copper ring floats. After sending a large current from the battery, the ring begins to rotate without any external mechanical stimulation.

Generator operation:

Mechanically rotate the copper ring clockwise and it will generate power in the same direction of current flow. Marinov has demonstrated and proved this in his tests. There is no opposing torque to the direction of rotation and the device is said to be self-accelerating. As long as power is

drawn from it, it will power itself. Friction will easily stop the self-accelerating process, due to the low torques generated.

Atmospheric rotation:

The Earth's magnetic field has the same shape and properties as Marinov's cylinder magnet. The sun constantly supplies a current of charge via the solar wind, the same as Marinov's battery. By analogy the Earth's ionosphere will act like the copper ring and rotate as long as the electron flow is present – that is, constantly. The ionspheric motion, in turn, will drive the lower stratosphere and troposphere to produce their observed circulation patterns. An event supporting this idea was the unexpected vaporization of the tether used to connect two artificial satellites, an indication of a large current flow. Was it tapping into a huge energy reservoir that drives the global air circulation? The plasma tube has no mechanical parts; if friction can be reduced sufficiently, even the smallest amount of torque on the gas plasma will accelerate it.

Casmir Force (1997)

The Casimir force is counter-intuitive but well understood. In quantum mechanics, all fields, in particular electromagnetic fields, have fluctuations. At any given moment their actual value varies around a constant, mean value. Consider the gap between two plane mirrors as a cavity. Casimir realized that when two mirrors face each other in a vacuum, vacuum fluctuations exert radiation pressure on them. On average the external pressure is greater than the internal pressure, causing mutual attraction by the Casimir force.

All electromagnetic fields have a characteristic spectrum containing many different component frequencies. Inside a cavity, where the field is reflected off the walls of the container, the field is amplified if integer multiples of half a wavelength can fit exactly inside the cavity. This wavelength corresponds to standing waves or a "cavity resonance." Any other wavelengths suppress the total field. Vacuum fluctuations are suppressed or supported depending on whether their wavelengths correspond to a cavity resonance or not.

Radiation pressure of the electro-magnetic field increases with energy and frequency. At a favorable frequency radiation, pressure inside the cavity is greater than outside and the mirrors are repelled. At an unfavorable frequency, the inside radiation pressure is less than outside and the mirrors attract. Large wavelengths cannot fit between mirrors only

microns apart, so the large wavelengths are suppressed, and also the inside radiation pressure compared to the outside pressure.

The force, *F*, is proportional to the cross-sectional area, *A*, of the mirrors and increases 16-fold every time the distance, *d*, between the mirrors is halved:

$$F \sim A/d^4$$

Two mirrors with an area of 1 cm^2 separated by a distance of 1 μm have an attractive Casimir force of about 10^{-7} N – about the weight of a water drop. At separations one hundred times smaller and about a hundred times atomic size the Casimir effect produces 1 atmosphere of pressure.

Summary

Two metal plates isolated in a vacuum are pushed together because the zero-point vacuum field pressing against the outside of the plates is a little stronger than that against the inside. The existence and intensity of the Casimir force have been experimentally verified many times in the 50 years since Casimir's revelation.

Claim: The presence of conducting metals and dielectrics alter the energy of the electromagnetic field in the Casimir effect.

Response: Since the energy depends on the shapes and positions of the conductors and dielectrics, the Casimir effect matches the characteristics of the ether, which is affected by the type, size and location of ambient objects, as Miller and others have shown. Is the modern quantum vacuum-field nothing more than the ancient ether?

Magnetic Memory, Roth (1997)

A magnetic torsion beam was suspended and balanced at its center. A strong magnet is then placed on a table with one pole facing the suspended torsion beam to attract it. After five days the magnet can be moved a considerable distance from the balanced torsion beam but the beam will still be attracted as though the magnet was still there. Note: The magnetic torsion beam is simply a bar magnet hanging on a string.

Interpretation:

If a magnet stays in one place long enough, it can cause the ether flowing through nearby objects to move in a certain preferred direction

instead of in any random direction. Just the presence of the magnet close by provides the extra energy to keep the ether flowing.

With respect to this property of the ether, it acts like a siphon. Once the water flow is started in a siphon, atmospheric pressure will keep the flow going until the container at higher level is emptied into a lower level container. There is greater atmospheric pressure on the surface of the water compared to the smaller pressure at the hose end.

By analogy, if magnetism is an ether flow, once started through a local area of space, it can continue with the same force even with the starting magnet farther away. It is as if a temporary ether current is created in the fabric of space – certainly an atypical property of magnetism.

Wang Superluminality (2000)

In Wang's experiment, a pulse of light passed through a small cell filled with specially treated cesium gas. A light beam traveling through the cell has two different velocities, a velocity for the individual light waves in the beam and a group velocity for the entire beam. Some light waves in the beam can actually travel backward, reversing the front and back edges momentarily. Different parts of the beam can leave the gas cell at different times, creating the effect that parts of the light beam have left the cell before other parts even entered.
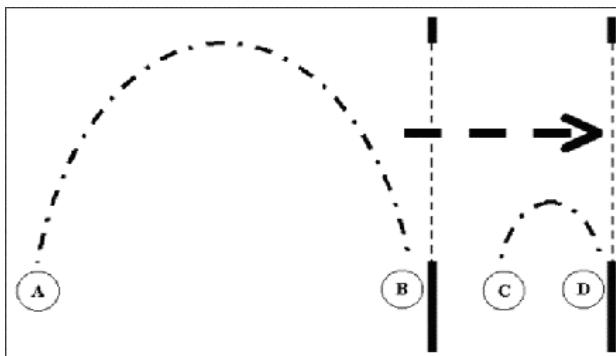
Wang experiment[310]

B-A are front and back edges of initial pulse
D-C are front and back edges of transmitted pulse
Height is light intensity, vertical dashed lines outline the Ce cell

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[310]   http://www.metaresearch.org/home/Viewpoint/archive/ 010824FTL/FTL% 20Light%20Pulse.gif

- B and A are timed when entering the center slit in figure above, moving to the right
- D and C are timed when entering the right exit slit.
- The front edge B-D moves at *c*.
- The back edge A-C is timed moving faster than *c*.
- C actually exits the cesium cell before A enters it!

Before the trailing edge of the pulse had fully entered the cell it was detected 60 ft beyond the cell. This is bi-location, existence in two separate places at once, equivalent to traveling 300 times faster than light, according to Wang.

Problems:

- Light jumping forward in time implies an effect before its cause – a philosophical violation of causality.
- The clash with Einstein's theory of Relativity which asserts *c* is isotropic and no object or information can travel faster than *c*.
- Italian physicists have also succeeded in breaking the light speed barrier, propagating microwaves at 25% above normal light speed c, supporting superluminality. Possibly the most important evidence that the physical world may not operate according to many of the accepted beliefs of Relativity.
- Aroused fierce debate over its meaning, interpretation and consequence for current beliefs.

Alternate explanations:

- pulses get distorted when passed through any media other than a vacuum
- Wang's interpretation doesn't tell the whole story; it can be interpreted incorrectly.
- even if such a beam can be proved faster than *c*, it would not be able to carry any information.

Holger Müller (2002)

Müller made use of two devices known as "optical cavities," two mirrors held at a constant distance, pointing in different directions. A set of standing light waves in a chilled cavity was monitored over a 190 day

period, more than 1/2 of the Earth's orbit, altering the velocity of the equipment by a net change of 60 km/sec.

The round-trip time of a light beam between the mirrors is a direct measure of the speed of light perpendicular to the mirror surfaces. If *c* were to vary with lab speed, then the constant comparison of the standing waves to a highly stable atomic clock would fall out of resonance with the cavity. Any dependence of this speed on direction would be evident when the cavity is rotated.

To avoid errors caused by temperature effects and material aging processes, cavities were made from a pure sapphire crystal, virtually immune from aging, and operated at the temperature of liquid helium, near absolute zero. Being made of sapphire, the cavity has very little thermal expansion at a temperature of 4° K.

Using advanced laser techniques for reading the cavity round-trip time, a new limit on possible violations of light propagation isotropy was established. The latest experiment is part of a whole new generation of Relativity tests. The stability of the resonance frequency produced a three-fold improvement in precision over past experiments. A 100-fold improvement in the near future is anticipated.

Protocol Precautions:

- relies solely on Earth's rotation – no turntable vibration.
- avoids the systematic effects associated with active rotation
- overcomes the creep of room temperature resonators made from glass ceramics, *e.g.*, ULE (UltraLow Expansion)

Comments:

The experimental care taken in this experiment is impressive, but futile, if intended to detect the influence of the ether on *c*. Lessons learned long before have been forgotten. The experimenter's text below indicates the missteps taken: solid silica and sapphire crystal; and vacuum-sealed, instead of a gaseous medium.

At the core of the experimental setup is an optical cavity fabricated from fused silica (L = 3 cm, 20 kHz line width) which is continuously rotated on a precision air bearing turntable. Its frequency is compared to that of a stationary cavity oriented north-south (L = 10 cm, 10 kHz line width). Each cavity is mounted inside a thermally shielded vacuum chamber.

The apparatus diagram, although only a schematic, indicates the clutter of support and ancillary structures used in a vain attempt at accuracy. It is also a safe assumption the experiment was performed in a laboratory, buried in the bowels of a building. Can sunlight be detected in a windowless cellar? What value would be placed on a null result of $< 10^{-15}$ for sunlight detection, if the cellar shielded the detector from the sun? Would we say there is no sunlight, because the experiment was done in darkness? Modernists should review the Miller experiment of 80 years ago.

Quasars in galaxies (2004)

NGC 7319 is a Seyfert 2 galaxy with a small red shift of 0.0225, shrouded with heavy dust clouds that obscure the bright, active nucleus. Big Bang theory understands red shift as proportional to distance – the larger the red shift, the farther the object must be. Another Big Bang belief is that red shift measures velocity – the larger the red shift, the faster it's receding from us.

The Big Bang's Hubble law places the quasar billions of light years beyond the galaxy, because of its much larger red shift. Yet the galaxy is opaque, so it must be near the dust surface or even in front of it! There is also a bright triangular jet of disturbed gases, with the wide end on the galaxy nucleus and the thin end pointing at the quasar. The gas turbulence indicates that something large and powerful has been ejected from the nucleus. The region near the quasar is glowing with extra emission lines from ionized gases. The only candidate for the ejecta is the misplaced quasar.

Halton Arp has been gathering Big Bang discordant redshift evidence since the late 1960's. He has found 20 ultra luminous X-ray sources (like the quasar pictured above) that also have red shifts much higher than the galaxy to which they are physically connected. So, if astronomy were a logical science, wouldn't this evidence mean the end of the Big Bang? The paper was barely noted when presented to the American Astronomical Society meeting in January 2004. As of April 2006, it still awaits the heavy editing recommended by the peer review committee. Isn't it time for Big Bang theory to retire? Shouldn't astronomy be an adventure in the discovery of truth rather than cutthroat competition for funding?
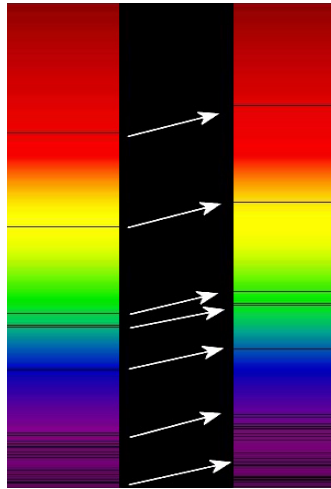
Redshift of optical spectrum in a distant supercluster(right),
as compared to the Sun (left).[311]

Description:

Redshift surveys include the first, the CfA Redshift Survey, 2dF Galaxy Redshift Survey, Sloan Digital Sky Survey and DEEP2 Redshift Survey. The Big Bang theory defines the size, the shape and the age of the universe as an expanding sphere 78 billion light years in diameter and 13.7 billion years old. Faith in Hubble's law has distorted most of the distances to galaxies, quasars, and gamma ray bursts.

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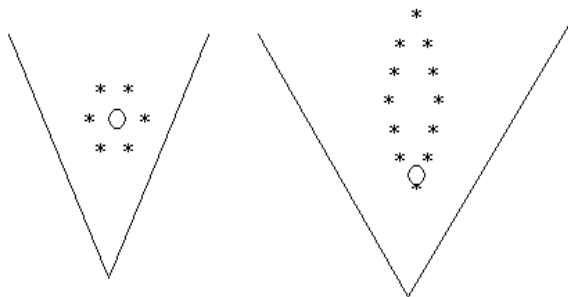
[311]http://upload.wikimedia.org/wikipedia/commons/thumb/1/14/Redshift.png/ 200px-Redshift.png.Licensed under GNU 1.2.

Red shift survey slices: Arp and Big Bang models of the universe

Halton Arp's research shows that redshift cannot be a linear measure of distance. The diagrams above each show a slice of the sky, with Earth always at the center. Arp's view (left) is matched with the Big Bang (right). The size of the dots represents the galaxies' size, but the redshift is inversely proportional to size, *i.e.*, the large central galaxy has the lowest redshift. At the edges are the quasars, the high redshift objects. The Big Bang image at the right shows the distortion of the galaxy cluster produced by Hubble's law, that is, a circle/sphere in reality becomes an elongated bubble. Every cluster in the sky forms these fingers of God aimed at us from everywhere in the sky.

Without the Hubble distortion, the age and size of the universe is unknown, because we can't project backwards in time to the Big Bang explosion. Most objects are closer than once thought, but now there is no universal yardstick. We are back on square one; all is unexplored and up for grabs. At least we know what is not true: the Big Bang.

Claims and Responses

Claim #1: The *Fingers of God* effect that causes clusters to be elongated toward the observer is caused by a Doppler shift associated with the peculiar motion of the cluster galaxies. Gravity in the cluster causes large velocities that change the redshifts of the galaxies. The Hubble Law relationship is affected, leading to inaccurate distance extrapolation.

Response: When it suits the Big Bang model, redshift data is taken as one number. When a single number presents a problem for Big Bang, then the redshift is split into a cosmic component for the expansion of space and a proper component within the expanding space for the object's velocity. The reasoning above adds a third meaning to the redshift mix – cluster gravity – another escape hatch when geocentrism is implied. More additions are expected in the future.

Claim #2: A similar illusion, the Kaiser effect, is caused, not by random internal motions of the cluster, but by coherent motions of galaxies collapsing towards the cluster center during assembly. This affects the largest scale structures.

Response: See prior comment.
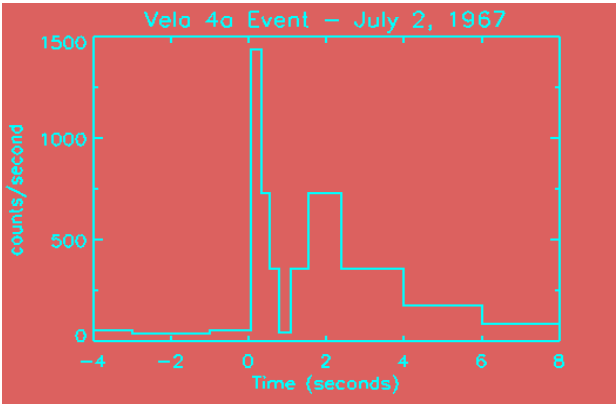
Gamma ray bursts (2006)
Intensity pattern of first Gamma-Ray Burst[312]

Gamma-Ray Bursts (GRBs) were discovered by accident forty years ago. The Vela satellites were developed to monitor nuclear test ban treaties. Their sensors watched for brief x-ray and gamma-ray flashes, the telltale signatures of nuclear explosions. The Velas did find flashes of gamma rays, as designed, but they were coming from deep space. Data plotted (see above) show that the gamma count rate sharply jumped from the cosmic gamma-ray bursts. These phenomenal bursts of radiation originated from the observable ends of the known universe. Dramatic though the discovery of Gamma Ray bursts was, there is nothing particularly rare about them since they were, and continue to be spotted at a rate of around one a day.

Gamma Ray Bursts are of extremely short duration and fall into two categories; one lasts less than a second, the second about 30 seconds.
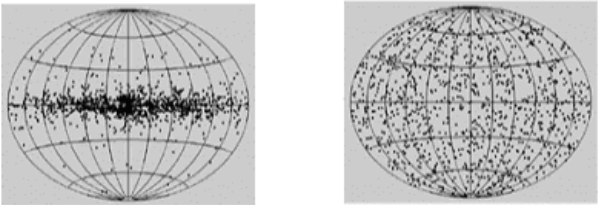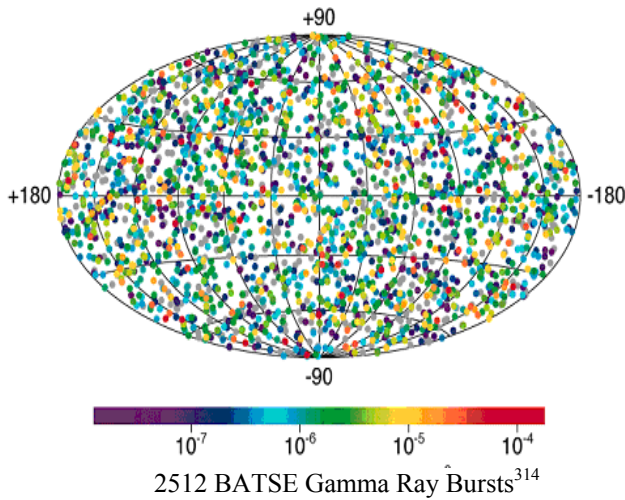

Expected   Observed

Distribution of Gamma Ray Bursts in the Sky[313]

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[312] http://antwrp.gsfc.nasa.gov/apod/image/0007/firstgrb _vela4.gif. Credit: R. Klebesadel, I. Strong & R. Olson (LANL), Vela Project.

313

2512 BATSE Gamma Ray Bursts[314]

If Gamma Ray Bursts were from the Milky Way, then the furthest and faintest ones would be seen towards the Galactic plane and center. BATSE satellite surveillance found that every category of Gamma Ray Burst, whether chosen by flux, fluence, hardness, duration, or any other parameter, is distributed isotropically.
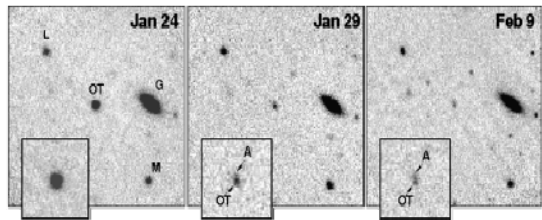
Evolution of a Gamma Ray Burst (NASA)

In the January 24 image, the flash of the optical transient (OT) associated with the Gamma Ray Burst dominates the host galaxy image (A); by January 29, the galaxy has been resolved from the OT. The February 9 image shows the OT fading.

Although a Gamma Ray Burst only lasts for a few seconds, the afterglow can linger for weeks or even months. The afterglow follows a descending path of energy loss, through X-rays down to radio waves.

[313] http://www.astronomy.csdb.cn/heasarc/docs/objects/ grbs/grb_distributions.gif
[314] http://agile.gsfc.nasa.gov/Images/objects/heapow/ transients/batse_bursts.jpg

Because the afterglow is much longer-lived than the initial explosion, it may be studied at leisure, without time pressure. By watching the fading of the optical remnants of GRBs, astronomers concluded that the explosions were embedded in faint galaxies.
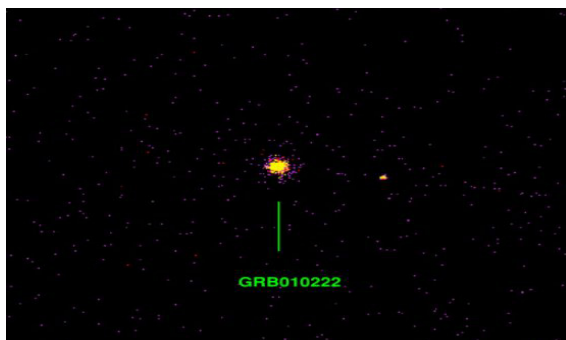
GRB010222: Gamma-Ray Burst, X-Ray Afterglow [315]
Credit: L. Piro (CNR) et al., CXC, NASA

A fading afterglow in a false color image is shown from the Chandra X-ray Observatory. GRB010222 was visible for only a few seconds at gamma-ray energies, but its afterglow was observed for days by x-ray, optical, infrared and radio instruments. The x-ray glow, hours after the initial explosion, suggests an expanding fireball moving at near light speed hitting a wall of relatively dense gas. The cosmic blasts may be hypernovae – the death explosions of very massive, short-lived stars.

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[315]http://heasarc.gsfc.nasa.gov/Images/objects/heapow/
transients/chandra_grb010222.jpg
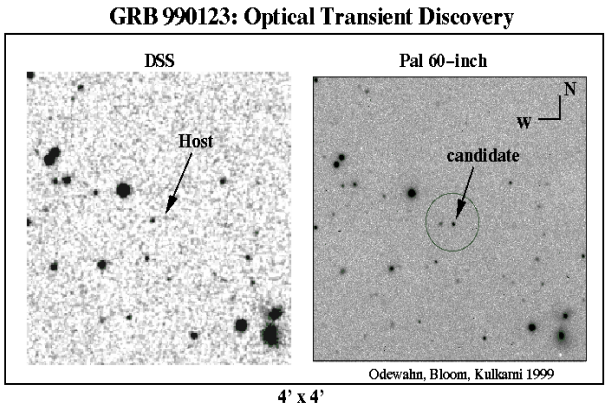
Galaxy And Gamma-ray Burst[316]
Credit: Courtesy J. S. Bloom
(Caltech-CARA-NRAO GRB)

GRB Afterglow[317]

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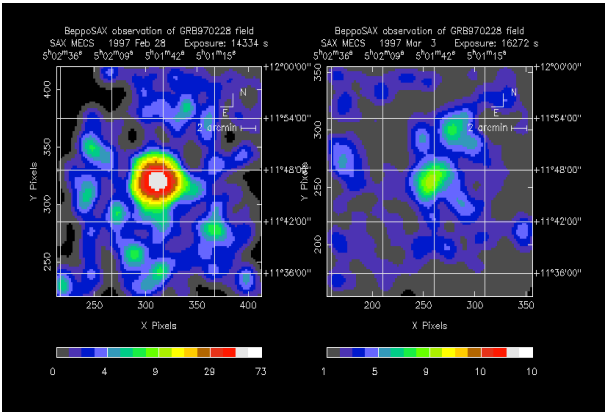
[316]http://antwrp.gsfc.nasa.gov/apod/image/9901/ grb990123_compare.gif
[317]http://bepposax.gsfc.nasa.gov/bepposax/first/ grb_970228.gif

GRB 990510: Another Unusual Gamma Ray Burst[318]
Credit: J. Kaluzny (Warsaw U. Obs.)
et al., 1-meter Swope Telescope
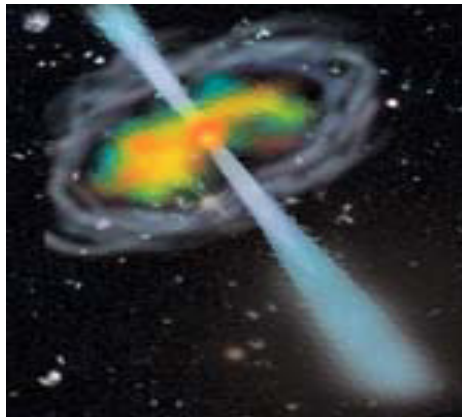
Conception of a Gamma Ray Burst beam[319]

A beamed explosion is directed like a flashlight, while an isotropic explosion is dispersed outward like the emission from a light bulb. It appears to dim much more rapidly than isotropic light. If gamma-ray bursts are beamed, the energies we are seeing are less than thought, but that also means there are more of them that we don't see. If the explosions are beamed in just one direction, only those observers located along the path of the beam would see them. That means there could be gamma ray

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[318]http://antwrp.gsfc.nasa.gov/apod/image/9905/ grb990510_lc1.jpg
[319]http://agile.gsfc.nasa.gov/Images/objects/grbs/ grb_art_small.jpg

bursts exploding all the time, but because the beams are focused in other directions we don't see them. Regardless of whether or not we see the beams of gamma rays, we would still be able to see their afterglows, because afterglows are always isotropic. So, if we find afterglows without seeing the initial bursts, this would prove Gamma Ray Burst explosions are beamed. This is not the case. Afterglows are always associated with Gamma Ray Bursts; Gamma Ray Bursts are isotropic – not focused.

Gravitomagnetic London Moment (2006)

Scientists have measured the gravitational equivalent of a magnetic field for the first time in a laboratory. The effect is much larger than expected from General Relativity.[320] Martin Tajmar and colleagues have measured a new effect, named the Gravitomagnetic London Moment, with a ring of superconducting material rotating up to 6,500 times a minute. Spinning superconductors produce a weak magnetic field, the so-called "London moment." The new experiment tests whether a gravitomagnetic field will appear in the spinning superconductor. Small acceleration sensors placed close to the spinning superconductor recorded an acceleration field outside the superconductor that appears to be produced by gravitomagnetism.

This experiment is the gravitational analog of Faraday's electromagnetic induction experiment in 1831. It demonstrates that a superconductive gyroscope is capable of generating a powerful gravitomagnetic field, the gravitational counterpart of the magnetic coil. Although it is just 100 millionths of the acceleration due to the Earth's gravitational field, 10^{-4}g, the measured field is a shocking one hundred million, trillion, times larger (10^{14}) than Einstein's General Relativity predicts. The researchers were reluctant to believe their own results:

> We ran more than 250 experiments, improved the facility over 3 years and discussed the validity of the results for 8 months before making this announcement. Now we are confident about the measurement…

…says Tajmar, who hopes others will verify the results that challenge current Relativity theory thinking.

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[320] http://physorg.tradepub.com/?pt=cat&page=_INTL

Summary of Data and Experiments

S = supported, D = disproof,
N = neutral or does not apply

Notes: "S" for an experiment does not indicate a proof or confirmation. All empirical evidence is inductive, increasing the probability of the theory's validity, but never excluding future improvement or even abandonment. "D" in any column for a theory requires responses to remove it, otherwise there is no rational reason to maintain a paradigm that cannot explain one or more experimental results within its scope. Only experimental evidence and common experience are investigated below. Theory is discussed as it pertains to the experiment. The first row is the consensus proposed by scientific opinion, which is often far from unanimous – especially in the interpretation of results by relativists. This also holds for the summary columns. The second row of each experiment is the geocentric view.

Galileo, Jovian Moons, 1609

Proposal: His observations showed four moons were actually orbiting around Jupiter. Here was incontrovertible proof that the Earth was not the center of the Universe.

Summary: Geocentric = NA, Heliocentric = NA, Ether = NA, Special Relativity = NA, General Relativity = NA

Geocentric Response: Geocentrism would only be disproven if Jupiter or its moons were stationary. This is instructive in showing the difference between revealed Geocentrism and the human fallible models that try to implement Geocentrism.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Galileo, Venus Phases, 1609

Proposal: Venus cycles through a complete set of phases, just like the Moon. Venus is never very far from the sun so in the Ptolemaic system Venus should always be in crescent phase as viewed from the Earth because it can never be far from the direction of the sun which always lies

beyond it. Since Venus did not go around the sun, we would never see all sides of it. But the Copernican model does account for the phases.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: Again, a fault in a particular model of Geocentrism does not disprove it, but shows the model needs correction. Venus orbits the sun in both Copernican and Tychonean models, but the sun orbits the Earth only in Tycho's model, consistent with Geocentrism.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Galileo, Tidal Flow, 1609

Proposal: Just as water sloshes back and forth in a swinging container, Galileo reasoned that the Earth, as a giant vessel spinning on its axis, might cause the seas to rise and fall twice a day. The tidal motions of the Mediterranean offered proof that the Earth moved.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: Even modernists reject this theory, attributing the tides to the Moon's motion around the Earth. (The only motion with which Geocentrism and modern physics agree is the motion of the Moon around the Earth.) Caution: Even here the lunar cause of tides may be only be indirect; the ether flow varies with latitude, which is the direct cause of the two tidal bulges!

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Stellar Aberration, Bradley, 1727

Proposal: Annual aberration proves that light has a finite speed and that the Earth is moving around the sun. This is inconsistent with a simple model of light as waves in an ether which is dragged along by the Earth; it is consistent with Special Relativity.

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response: Bradley's formula explaining aberration is based on a Copernican model, which conflicts with the Relativity paradigm. Neither is correct in the geocentric model, where stellar aberration is intrinsic to the motion of all the stars, not an apparent optical effect caused by terrestrial motion. It is similar to the higher order motions of the sun and moon and planets, their actual or proper motions undistorted by deviation from geometrical optics.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Diurnal Aberration

Proposal: Diurnal aberration is caused by the velocity of the observer on the surface of the rotating Earth. It depends on the local time and location of the observer. Much smaller than that of annual aberration, it is only 0.32" at the equator, where the rotational velocity is greatest.

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response: Just like the annual aberration, the daily pattern is caused by the motion of the ether, not N-S but the principal daily E-W motion. Both are ether effects.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Binary Star

Proposal: Doppler shifts of binary stars indicate their radial velocity, but this same velocity when tangential to the view from Earth does not produce the expected corresponding stellar aberration. During the period of the orbiting star in a binary system, that star should oscillate due to aberration, using the relative velocity between the source and the Earth. The smaller star in binary systems generally has velocity components much larger than the Earth's orbital velocity.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response: If the aberration is due to relative motion, there should be a very large stellar aberration seen from Earth, 10 and even 100 times larger than the amplitude observed by Bradley. This aberration from those fast moving stars is totally absent, even if the relative velocity with respect to Earth is very large. All these observations contradict the principle of relative motion. Bradley even deduced the Earth's velocity around the sun, contrary to this cherished principle.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Planetary Aberration

Proposal: Planetary aberration of any solar system object is the combination of the aberration of light due to Earth's orbital velocity and light-time correction due to a planet's distance from earth. Both are determined at the instant when the object's light reaches Earth. The prediction for individual planets is uncertain.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: The computations are greatly confused by the antagonism between the Bradley and Special Relativity theories. Discussion of experimental results are hard to find.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Solar Wind

Proposal: The solar wind is a stream of charged particles, mostly protons and electrons, emitted by the sun's surface. On the average, it appears to come not directly from the sun but 4 degrees behind the sun's position, due to the orbital velocity of the Earth. In the frame of the Earth the solar wind appears to move as if it had the Earth's velocity, but in the opposite direction.

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: The solar wind aberration can be explained simply by reversing the words "solar wind" and "Earth" above. Why do the followers of Special Relativity never want to use the static Earth possibility, which viewpoint Special Relativity allows as much as a moving Earth?

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Motion of the Moon

Proposal: Refers to the motion of the moon as seen from Earth. Like the sun, the moon is not an astronomical point source, with an ill-defined limb. What speed should be used for lunar aberration computation? The Bradley value of 30 km/s, the orbital speed of the detector on earth? The relative speed of the Earth – moon system?

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: Well, it does not matter. They are both wrong. Lunar laser ranging (LLR) experiments (bouncing laser beams off retro-reflectors placed on the moon by astronauts) shows there is no aberration. The moon is really where it appears to be. Why no lunar aberration? It is almost as though the Earth weren't moving, but Who would ever say that?

Summary: Geocentric = S, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = D

Satellite to Star

Proposal: For Bradley the aberration would be a constant 20". For Special Relativity the periodic motion of the LEO orbit satellite adds a ± 5", so the aberration varies from 15" to 25", as observed.

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response: But what about the motion of the solar system and galaxy at hundreds of km/s? Why are these motions ignored, though much greater than orbital motions? Special Relativity ignores what doesn't fit. The geocentric model explains the 20" stellar aberration of Earth as the actual intrinsic motion of the stars (or an ethereal effect). The satellite contribution of 5" is a true aberration, correctly predicting the stellar aberration when seen from a satellite (Hubble).

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Satellite Downlink

Proposal: Its speed is 8 km/s and period is 97 mins, which is 18 times the Earth's rotation. For Bradley, downlink signals from Hubble should have an aberration at the ground stations of 20", just as the stars do. For the relative motion of 8 km/s [not the heliocentric system used for the stars] the aberration formula for equatorial motion (latitude angle = 0) predicts $\theta = v/c = 8/3 \times 10^{-5}$ km/s $\sim$ 5", in good agreement with the measured and easily visible aberration of 5.8"

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response: The downlink should only have the travel time delay. There is no aberration for the geocentric model. For a LEO orbit of 8 km/s, the delay deflection should be about 5.3 arc sec, in good agreement with 5.8" measured.

Summary: Geocentric = S, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Satellite Uplink

Proposal: Shows the same aberration for laser signals sent ground to satellite or satellite to ground. A patent for a 'velocity-aberration correcting retro-reflector satellite.'[321]

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = S, General Relativity = N

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[321] http://www.freepatentsonline.com/5474264.html

Geocentric Response: The satellite in motion at 8 km/s should receive an aberrated signal from the stationary Earth of 5.3", again in agreement with the measured uplink aberration.

Summary: Geocentric = S, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Earth Aberration

Proposal: As always, Bradley predicts 20" aberration for objects seen on Earth from Earth, since neither source motion or distance affects Bradley aberration. 0" is actually observed. Special Relativity predicts 0" from the relative motion of surface objects.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response: Geocentrism predicts 0" aberration for surface object motions much less than *c*.
Summary: Geocentric = S, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Fresnel, 1818-1830

Proposal: The first quantitative proposal to measure ether properties. Fresnel proposed that substantial material bodies might carry some of the hypothetical ether along with them. Fresnel ether dragging by massive objects was based on a coupling constant that modified the speed of light in transparent media.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: At this time in history the only known way of reconciling aberration with wave theory was Fresnel partial dragging. The 'ad hoc' remedy of Fresnel drag gave heliocentrism a temporary reprieve, but still the question of geocentrism or heliocentrism was not resolved.

Summary: Geocentric = NA, Heliocentric = NA, Ether = N, Special Relativity = N, General Relativity = N

George Stokes

Proposal: Stokes proposed a "Silly Putty" model of the ether that behaves as a rigid solid for the high-frequencies of light and as a fluid for the slower motion of celestial bodies. At the Earth's surface, the ether will be stationary. A realistic model of the ether but more complicated.
Stokes differed from Fresnel's partial dragging theory by interpreting stellar aberration as due to an ether that was totally, not partially, dragged along next to the Earth.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = N, General Relativity = N

Geocentric Response: Stokes' theory of a completely dragged ether was unsuccessful.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Faraday Rotor Generator

Proposal: Faraday found there is an induced current if a conductor and a magnet are joined together and rotated, having no relative motion. He resolved this paradox by saying the lines do not rotate when the magnet does. In the inertial laboratory frame, the axis of the magnet is at rest when the magnet rotates: in the same reference frame, also Faraday's lines of magnetic force are at rest.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response: Faraday's law does not apply to this machine. There is no changing magnetic flux. The conventional resolution of the paradox follows the usual path; it ignores the simple observation that motion measured with respect to a spinless Earth has special significance. The geocentric theory solves the Faraday paradox as well as the contrived special cases of mainstream physics.

Summary: Geocentric = S, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Geometric Parallax

Proposal: As the Earth moves over huge distances in orbiting the sun, nearby fixed stars are seen to move more, relative to the farther ones, as can be seen from a moving car. Parallax is smaller than aberration; it required waiting for telescopes to improve before stellar parallax caused by the Earth's orbiting of the Sun could be detected by Bessel in 1838.

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: This is the first false "proof" of heliocentrism, which is often cited as disproof of Geocentrism. Despite the simplicity with which these claims can be refuted, it survives today even among modern cosmologists who should know better. Parallax is fine for determining distances, but for finding a fixed point it is worthless.

Summary: Geocentric = S, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Arago, 1850

Proposal: Arago looked for the expected change in focus of a refracting telescope due to Earth's motion around the sun. This is first order in v/c if one assumes light is fully dragged by the lens. Arago compared the focal length of light from a particular star at six-month intervals. The Earth's motion should alternately add and subtract the Earth's orbital speed to the speed of light, but there was no difference.

Summary: Geocentric = N Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: The null result is consistent with geocentric theory. It is due to null motion of the Earth

Summary: Geocentric = S, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Fizeau, 1851

Proposal: Fizeau measured the speed of light in moving materials. Light was dragged through moving water; fringes observed due to motion of the

water agrees with Fresnel's drag formula. No effect seen, due to the motion of the Earth, is interpreted as very strong evidence for ether dragging. The Fresnel drag coefficient is solidly established by experiments, and is consistent with Special Relativity to within experimental limits.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = S, General Relativity = N

Geocentric Response: No effect due to the Earth's motion could obviously mean that the Earth is not in motion. Why invent a counter-intuitive concept of the immovable ether being dragged by matter? If anything makes sense it would be the ether dragging matter, not the reverse. Lorentz derived the Fizeau result without using relativity; the Galilean transformation also derives it with a variable *c*. Several causes can be given for the Fizeau result.

Summary: Geocentric = S, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Hoek, 1868

Proposal: An interferometer experiment with one arm in water. Greatly improved the accuracy of Arago's experiment, replacing the telescope with a terrestrial source and a square (ring) interferometer with one side in water and three in air. The null result is consistent with Arago's result, Fresnel's drag coefficient, and Special Relativity.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = N
Geocentric Response: No fringe effect was seen at all, and no explanation given for a result so contrary to Fizeau's. As in many other tests, the ether's existence is rejected, instead of accepting a motionless Earth.

Summary: Geocentric = S, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Airy, 1871

Proposal: Another test for ether's presence. Does a telescope filled with water cause an image shift? Does the stellar aberration angle change if the telescope was filled with water? No! George Airy tested whether water in

a telescope would cause the light to bend (refract) at a larger angle. If the Earth was actually moving, the beam should deflect more; if the starlight were moving, there should be no change.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = N, General Relativity = N

Geocentric Response: Another false disproof of Geocentrism – Airy's failure showed deflection happened outside the telescope: (1) Due to the ether in space between Earth and star, (2) The deflection originated in the source => the stars inherently move in aberrant ellipses. So the star was moving and not the Earth. "Airy's failure" failed to prove that the Earth revolves about the Sun. No evidence compels us to believe the Earth is spinning.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = N, General Relativity = N

Michelson-Morley, 1887

Proposal: In 1880 Maxwell hinted the absolute velocity of Earth in the "luminiferous ether" that carried electromagnetic phenomena may be optically detectable. Michelson-Morley tried to detect the motion of the Earth through an absolute space – the ether. The famous null result was interpreted as showing a single "universally fixed" ether does not exist; either space moves with the Earth (ether drag), or there is no ether. Stokes' dragging became the standard model. The failure became significant in promoting the acceptance of Einstein's theory of Special Relativity, that physics laws only require the motion of the Earth relative to other matter, not relative to an ether.

Summary: Geocentric = D, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: The null result includes the rational option of the Earth being at rest. The refusal to even consider the possibility that this was true, and that Galileo and all science for centuries had been wrong, disproves the posture of modern science being objective. Even the null result wasn't really so, as Miller and others showed in later tests. There were daily and annual variations that have great importance for geocentric theory, as we shall see.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = N

Oliver Lodge, 1892

Proposal: In response to ether drag/entrainment, Lodge noted that the effect is undetectable around rapidly moving celestial bodies like planets. He verified experimentally that even in very close spaces the ether is not entrained by its surroundings when they are put into rapid motion.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: Geocentric theory of the ether includes the slight drag of free particles (gases) in the ether flow. Ether drag by matter is rejected as confusing cause and effect. So the Lodge experiments do, indeed, support Geocentrism.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = D

Trouton-Noble, 1903

Proposal: The Trouton-Noble experiment attempted to detect motion of the Earth through the luminiferous ether. This classic experiment is regarded as the electrostatic equivalent of the Michelson-Morley optical experiment, though achieving the necessary sensitivity may be impossible. It looked for a torque induced on a charged capacitor due to its motion through the ether. Its null result is consistent with Special Relativity.

Summary: Geocentric = D, Heliocentric = S, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: The effect of ether flow on charges bound in a solid is most likely undetectable, based on studies by Cahill on the need for gases with enough degrees of freedom to respond to the motion. To be compliant with the Miller comment on the Michelson-Morley experiment, this experiment is best done at altitude in the open. As an ether test, this experiment is a non-starter.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Trouton-Rankin, 1908

Proposal: Spelled the end of the Lorentz-Fitzgerald contraction hypothesis by achieving an incredible sensitivity. Regarded as the electrical equivalent to the Kennedy-Thorndike experiment, it was designed to measure if the Lorentz-Fitzgerald contraction of an object in the absolute ether produced measurable effects in the object's rest frame. This test showed that, if the Lorentz-FitzGerald contraction existed, it was not measurable in the rest frame of the object.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D
Geocentric Response: Geocentrism is rooted in reality; the results are what are expected. There is no need of mystical contraction of matter in the direction of motion, with no explanatory physical mechanism. The mystery is why anyone would reject a static Earth in favor of the bizarre Lorentz contraction hypothesis.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Zurhellen, 1914

Proposal: Binary star observations determine that the speed of light is not dependent on movement of the source to 10^{-6}. This is evidence against ether drag if each binary component has its local ether shell with its alternating effect on c. Also, shell distances are minute compared to star-Earth distances. Evidence for the lack of longitudinal additions to the velocity of light by the radial motion of the source.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = S

Geocentric Response: No, ether drag supports Geocentrism. Special Relativity predicts an active aberration effect produced by the motion of the source in its rest frame, the barycenter of the binary system. Bradley aberration is caused by absolute motion of the Earth around the sun. Yet standard physics attributes aberration to their relative motion, supported by exclusive authorities such as Einstein and Pauli. This experiment fails to support relativistic predictions for transverse motion of the source.

Summary: Geocentric = S, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Kennedy-Thorndike, 1932

Proposal: Kennedy-Thorndike used an interferometer with arms of different lengths and not at right angles. A null result is obtained, consistent with Special Relativity, implying length contraction and time dilation. Apparatus was fixed to the Earth, forcing co-rotation. No diurnal or seasonal variation was seen. Also a Special Relativity test to verify time dilation: no phase shifts will be detected in Special Relativity while the Earth moves around the sun, while such would result from length contraction alone.

Summary: Geocentric = D, Heliocentric = S, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: Special Relativity is verified because time stretches and lengths contract to produce the null? A better option is *terra immobila* and ether flow, with no wild speculations about space and time needed. With the Trouton/Noble test, Kennedy/Thorndike eliminated Lorentz contraction as a viable option. The test was doomed at the start by bad choices: enclosing the equipment from the ether, and, fatally, using a vacuum interferometer that precludes an ether-matter interaction. With such fundamental faults, Kennedy/Thorndike should be ignored.

Summary: Geocentric = S, Heliocentric = D, Ether = N, Special Relativity = D, General Relativity = D

Hamar, 1935

Proposal: A complete Michelson-Morley experiment with one of the interferometer arms placed between two massive lead blocks. If ether were dragged by mass, the blocks would cause a visible effect. Ether dragged by the mass was not detected; again the null result was found.

Summary: Geocentric = D, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: The ether was already reduced by the building housing the laboratory; additional partial shielding would not be measurable. The theoretical principle is sound, but it should have been

done outside, so that ether could be measured with and without the lead blocks

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = N

Townes, 1958

Proposal: Townes, one of the co-creators of the first maser, replaced the light source in the Michelson interferometer with a ruby maser and repeated the Michelson-Morley experiment. The upper limit on drift, including any possible experimental errors, was only 30 m/s = $10^{-7}c$

Summary: Geocentric = D, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: The faults of the Michelson-Morley experiment remained – The criteria of Miller for a high and unobstructed location and of Cahill for a refractive gas.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = N

Frisch-Smith, 1962

Proposal: Shows that radioactive decay of mesons is slowed by motion. Mesons live longer by time dilation – a confirmation of Special Relativity.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response:

- Time dilation is common to many alternate theories
- It neither proves Special Relativity theory uniquely nor conflicts it.
- Special Relativity theory is not applied correctly in the analysis, since Lorentz contraction is ignored.
- Other tests show Lorentz contraction doesn't exist.
- If time dilation is true, the best current thinking of Geocentrism is the S gauge scale factor of Hatch.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = D

Trimmer, 1974

Proposal: The first *c* test with lasers. Repeats Michelson-Morley experiment with accurate lasers and a triangle replacing the square Michelson-Morley path. Included tests of entrainment by placing one leg in glass. Ether drift now reduced to 0.025 m/s = $10^{-11}c$

Summary: Geocentric = D, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: The laser only reduced the probability of ether detection. Use of vacuum or solid media in the optical path violates the gas media requirement.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = N

Brecher, 1977

Proposal: Repeats 1914 Zurhellen experiment with X-rays from binary pulsars. For x-rays and gamma rays, the extinction distance is much larger than the distances to many binary star systems, allowing a test of DeSitter's proposal. Observations put a limit on the source-velocity dependence of $c < 2 \times 10^{-9}$.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: Other than the extinction test and use of high energy electro-magnetic waves, the results mirror prior testing with light. See Zurhellen 1914.

Summary: Geocentric = S, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

DePalma Spinning Ball Drop, 1977

Proposal: DePalma took two steel balls and catapulted them into the air at equal angles, with an equal amount of force. The only difference was that

one ball was rotating 27,000 times per minute and the other was stationary. The rotating ball traveled higher into the air and then descended faster than its counterpart, which violated all known laws of physics.

Summary: Geocentric = N Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Geocentric Response: Mainstreamers usually ignore this effect, or ridicule its violation of the laws of Newton and Einstein. With so few investing time to verify and understand the effect, its location in the physics closet is understandable. Primitive ether theories now proposed will no doubt be improved, but more eyes and minds are needed, not abuse from the paradigm-huggers.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Gyro Drop, 1977

Proposal: Observations of interaction of gravitational and inertial forces on a falling gyroscope reveal a slight enhancement of inertia by the gravitational field. A rotating mass will fall more rapidly, with greater acceleration than an equivalent non-rotating mass.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Geocentric Response: Further support for the DePalma spinning ball results.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Quantum Redshifts, Tifft, 1984

Proposal: Tifft found that galaxy red shifts take on preferred or quantized values. Analogous to the energy levels within atoms, there was a periodic grouping of galaxy red shifts around discrete values across the span of the universe.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Geocentric Response: There are no modernist cosmology theories that can account for this architecture of the universe around the Earth, one of the simplest and strongest proofs of geocentrism.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = D

Redshift Anomaly, 1990

Proposal: The annual change in Doppler shifts we see in stars near the ecliptic is one proof that Earth orbits the sun; the wavelengths go back and forth each year, changing slightly to red as we move away from a star and then to blue when we're on the other side of our orbit moving toward the star.

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response: Is this an urban legend? Where is the data? No references are given for the significant detailed sky survey required, nor can one be found by research. More significantly, by mathematically subtracting the Earth's motion, the reverse effect is accomplished. If the Earth is actually at rest, the "heliocentric correction" will corrupt the data with false motions of rotation and revolution. The red shift anomaly is a paragon of false reasoning – fixing something that isn't broken!

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Cosmic Megawalls, 1990

Proposal: The universe is crossed by at least 13 vast 'walls' of galaxies, separated by about 420 million light years, according to researchers. The walls are spaced in a very regular way that current theories of the origin of the universe cannot explain.

Summary: Geocentric = N, Heliocentric = D, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: The same inference can be drawn here as with the Tifft red shift quantum, except the scale is much bigger. The inference?

The Earth is enclosed by shells of galaxies and is the focus of the universe. The same weakness is also present here – reliance on the Hubble law.

Summary: Geocentric = S, Heliocentric = D, Ether = N, Special Relativity = N, General Relativity = N

Hils-Halls, 1990

Proposal: Repeat of the Kennedy-Thorndike and Brillet-Hall experiments, with lasers fixed to the earth for better stability. Found there was no shifting > 2×10^{-13} m/s. Year long observations put a limit not only on anisotropy, but also on variations in different inertial frames and universal motions. No annual variations of the round-trip speed of light were found in different directions or for the different inertial frames occupied by the Earth.

Summary: Geocentric = D, Heliocentric = S, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: As with Brillet-Hall, the experimental precision means nothing if ether detection is eliminated by use of a vacuum path. This is a protocol defect common to most modern ether tests – the vacuum interferometer.

Summary: Geocentric = S, Heliocentric = D, Ether = NA, Special Relativity = D, General Relativity = D

Mirabel-Rodriguez, 1994

Proposal: In 1994, a galactic speed record was obtained with the discovery of a superluminal source in our own galaxy, the cosmic X-ray source GRS1915+105. Several blobs were seen to expand in pairs within weeks by about 0.5 arc seconds.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Geocentric Response: An unanswered challenge to the constant *c* of Special Relativity, coming from our own galactic neighborhood. No excuse here for the distortions caused by deep space. The relativity explanation is typical – *ad hoc* and contrived.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Binary Star Precession, 1995

Proposal: A key proof of General Relativity theory is the excess perihelion advance of Mercury. Each century, Mercury's orbit precesses 43 arcsec farther than Newton's equations predicted. Einstein's calculations, using General Relativity theory, accounted for the excess precession, matching the observations exactly. The effect was caused by Mercury's motion through the spacetime curved by the sun.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = D

Geocentric Response: General Relativity fails the precession test outside the solar system. It predicts precessions about double the measured precessions. General relativity can hardly be general, if it only predicts orbital precession in the solar system, but fails for binary stars. Even the solar system proofs for General Relativity have always been subject to controversy, searching for proof below the experimental signal-to-noise level. A slight asphericity in the sun's shape can cause the observed precession with only classical physics.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = D

Aspden Effect, 1995

Proposal: This experiment involved a gyroscope whose wheel was highly magnetic. The energy required to spin up to maximum speed was 1000 joules. For up to 60 seconds after the gyroscope stopped rotating, it would take ten times less energy to return it to the original velocity, only 100 joules. Aspden's gyroscopes would retain their hidden energy for a full 60 seconds. Ether energy flowing through a magnet is the Aspden effect.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Geocentric Response: Another experiment denied by modernists, connecting ether to rotation. Like a glass of water being stirred up with a spoon, the rotation of the gyroscope would cause the ether in the flywheel

to spiral, to continue inside the wheel even when the gyroscope was stopped. The torsional ether energy is harnessed by the powerful magnetic flywheel. That there are frauds and charlatans involved in the ether/free energy enterprise is undeniable, but how does that differ from mainstream science?

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Marinov Plasma Tube, 1996

Proposal: A cylindrical magnet is cut along an axial plane and one half is turned upside-down (the magnetic forces themselves do the rotation). Around this magnet is a trough filled with mercury in which a copper ring floats. A current from the battery causes the ring to rotate. Working either as a motor or a generator, there is no opposing torque to the direction of rotation. While power is drawn from it, it will power itself.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Geocentric Response: Another experiment tapping into the torsional energy of the ether. What is lacking is an integration of all these ether/free energy results into a coherent ether model.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Casimir Effect, 1997

Proposal: The attractive force between two surfaces in a vacuum was demonstrated by Hendrik Casimir over 50 years ago**.** Two mirrors facing each other in empty space are mutually attracted to each other by the vacuum electro-magnetic field. The Casimir effect is due to resonance of all-pervasive energy fields in the intervening space between objects. Since the Casimir force falls off rapidly with distance it is only measurable for small separations; it's the most famous mechanical effect of vacuum fluctuations.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Geocentric Response: The ether can account for the Casimir effect by recalling the shielding effect displayed in Michelson-Morley type experiments. Greater ether density outside the mirrors than inside would force them together – an ether-based Casimir force. No quantum vacuum is required, only the ether properties already discovered.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Magnetic Memory, 1997

Proposal: Donald Roth discovered that, after first placing a fixed magnet close to a hanging magnet to attract it, then moving the magnet much farther away from the hanging magnet after five days, the magnet still attracted the hanging magnet the same way. This simulation of memory and amplification by ether is known to the Russians as "vacuum structuring."

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Geocentric Response: This shows another face of the ether –

- a relationship with magnetism.
- a retention of magnetic locations.
- the ability to redirect ether flow.
- the ability to intensify magnetic effects.
- proof that magnetism is a movement of energy outside the magnet itself.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Wang Superluminality, 2000

Proposal: Lijun Wang shocked the scientific community in 2000 with the results of a one-way speed of light test that measured propagation speeds of 310 c by supplementing and extending prior quantum tunneling experiments. Light pulses were accelerated to up to 300 times their normal velocity of 186,000 miles per second. In his test interpretation light will arrive at its destination almost before it has started, leaping forward in time

and severely violating causality. Special Relativity's postulate of constant *c* is disproved, if the experiment is valid.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Geocentric Response: Six years before, superluminal speeds were found in double galaxies. Now the same is found in terrestrial lab tests. This is one more step in the decline of Relativity and the ascent and restoration of Geocentrism.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Holger-Müller, 2002

Proposal: Promoted as the most precise experimental test to date of one of Special Relativity's central principles of *c* isotropy, the same value in every direction. This modern Michelson-Morley experiment using optical resonators found that Special Relativity theory passes with flying colors: *c* does not depend on its direction to within 1.7 parts in 10^{15}, a precision about three times better than the best previous experiment.

Summary: Geocentric = D, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: Miller's results, which suggested that in order to detect anisotropies in the speed of light, the interferometer needed to be surrounded by as little matter as possible, and located at a high altitude, were ignored in subsequent tests of the isotropy of the speed of light. Müller would have benefited greatly by recalling the experiment of Miller.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = N

Quasars in Galaxies, 2003

Proposal: One Big Bang tenet takes red shift proportional to distance, *i.e.*, the larger the red shift, the farther the object must be. Another Big Bang belief is that red shift measures velocity, *i.e.*, the larger the red shift, the faster it's receding from us.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: Galaxy NGC 7319 has an embedded quasar that is visually in front of it, but far behind it, according to the Big Bang's Hubble law. What are you going to believe, scientific speculation on the cause of red shifts or your own eyes?

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Redshift Survey Surprises, 2002-2006

Proposal: A redshift galaxy survey maps a sky section to measure the redshift of objects within the section. Applying Hubble's law to the redshifts allows conversion of the data to distances from Earth. Adding angular position data maps the 3D distribution and large-scale structure of the visible universe. The Great Wall, a huge complex of galaxies over 500 million light-years wide, dramatically illustrates what redshift surveys can detect.

Summary: Geocentric = N, Heliocentric = D, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: Not so dramatic, if the Hubble law's weaknesses are considered. Sloan shows hundreds of super clusters and "Great wall" structures. Huge clumps and dark voids stretch out along our line of sight from Earth; galaxies line up in filaments pointing at us – the "fingers of God". The simplest answer is to discard the Hubble formula and find a reliable distance indicator.

Summary: Geocentric = S, Heliocentric = D, Ether = N, Special Relativity = N, General Relativity = N

Gamma Ray Bursts, 2006

Proposal: Gamma-Ray Bursts (GRB) are uniformly distributed across the sky, not along the Milky Way plane. They originate far outside of the Milky Way galaxy with enormous energies, detectable across the entire observable universe. Gamma Ray Bursts come from the hottest, fastest, densest, or most powerful objects ever seen. A burst will last anywhere from 0.01 to 1000 seconds, the brightest source in the gamma-ray sky,

sometimes brighter than the whole gamma-ray sky! Gamma Ray Bursts occur randomly in time and sky direction. Gamma Ray Burst energy is channeled into narrow jets, detected only if aimed along our line of sight. The energy output is 10^{43} watts — 1,000 times brighter than quasars and one hundred quadrillion times more intense than the sun.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: The remote distances, if true, imply Earth is the Gamma Ray Burst focus. GRB's are so intense they could easily be seen even deeper in space, but they are not seen. They mark the boundary of a finite universe. Hubble's law is used to place Gamma Ray Bursts in deep space, but their distance (and energy) are greatly overestimated. Arp's studies discredited the Hubble law: the Gamma Ray Bursts are not as far and energetic as first believed. No after glows are seen without seeing Gamma Ray Bursts first, implying GRBs are not focused in a beam.

Summary: Geocentric = S, Heliocentric = D, Ether = N, Special Relativity = N, General Relativity = D

Gravito-Magnetic London Moment, 2006

Proposal: Just as a charge in motion creates a magnetic field, so a moving mass generates a gravito-magnetic field. In Einstein's General Relativity, this effect is negligible. But this experiment finds otherwise – the effect is much larger than General Relativity expects.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = D

Geocentric Response: Two elements should grab our attention in modern experiments: magnetic fields and rotation. Past items in this chapter have shown that a torsional ether field produces anomalous effects when the two factors above are present. It is too early to venture a complete ether theory; more experimental conditions need to be explored. But this experiment will probably be one of the key tests in cracking the code of the ether.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = D

Polar Ice Caps

Proposal: If the sun revolved around the Earth every 24 hours, it would melt the polar ice caps.

Summary: Geocentric = D, Heliocentric = S, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: An argument heard from the newly or poorly instructed in physics. Apparently the geocentric model means the sun circles only the equator, oblivious to the fact that the geocentric model is what is seen from Earth! The angle made by the sun on Earth is the same in both models, independent of which is moving.

Part 3: Does the Sun-Earth System Move through Space?

There are 3 modernist anti-geocentrism claims:

(a) The rotation of the Earth
(b) The revolution of the Earth around the sun
(c) **The sun and Earth participate in the straight line motion of the celestial clusters**

This section covers the claim that the Earth is moving in a straight line as part of some cosmic group: the solar system, the Milky Way galaxy, the Local Group of galaxies or some higher group.

We start with the Sagnac experiment which first established relative ether motion. The experiments continue up to the latest discoveries based on laser interferometry and analysis of the Cosmic Background Radiation spectrum.

Key ether drift experiments have been revisited by:

- Munera (1998)
- Cahill (2000)
- Allais (1970-2003)
- Galaev (1998)

For experiments not performed in vacuo or with a solid transparent medium, further analysis shows three common features:

1. the definite existence of the ether ➜ non zero fringe shift
2. motion of the ether at less than 10 km/s, from the raw data
3. motion of the ether at less than 10 km/s, from the raw data
4. the direction of the ether flow perpendicular to the ecliptic (the orbital plane of the Sun and planets)

The experimental results are typically cast as "null," since the scientists were seeking a phantom – an orbital velocity of 30 km/s, when there is no orbit for Earth. The most recent series are those conducted in

the Ukraine, using microwaves (1998/99) and optical interferometer methods (2001/2002) (Galaev).

OWLS vs. TWLS

A two way light speed (TWLS) test occurs when light has to be reflected back on itself to complete a measurement over a set distance. This masks any anisotropy effect by making it a second-order test of v/c. The Michelson-Morley experiment requires sufficient precision to sense $(v/c)^2$, but a one-way (OWLS) test would be first-order and involve sensing v/c.

Vacuum Interferometers

Vacuum-mode interferometers have found increasing popularity in modern experiments. Their consistency in obtaining null results for ether drift detection and thus supporting Special Relativity theory may be one of the reasons for this. No one (except Cahill) seems to have asked why gas interferometers consistently detect small speeds of 10 km/s or less, while vacuum versions find no ether motion. An absolute reference frame is indicated by gas interferometers. A theory explaining this must embrace refraction effects to be successful.

Solid Medium Interferometers

The value of refractive index n in transparent solids is much greater than in gases, leading to the obvious consideration of using solid-state fibers as the light path medium in interferometry. But this extension overlooks the most significant difference between gas and solid – the degrees and types of kinetic freedom. Gas has the most freedom and least resistance to ether effects, as already seen. But atoms in a solid lattice are restricted severely to modes of material vibration about a cell center. We would expect from this (crude) reasoning that light speed would not be affected as much, or at all, compared to propagation of phonons in the transparent fiber. Null results for light speed changes are the theoretical expectation, but a clever experimenter should be able to devise a test for changes in phonon speed or wavelength that are induced by the ether motion. Until a valid theory for ether effects in solids is developed, or more sensitive technology, solid medium tests will have the same status as the vacuum type of interferometry – ineffective for measuring ether drift.

Dayton Miller

To test the ether drag hypothesis, Miller repeated the Michelson-Morley experiment by moving it from a Cleveland basement to higher ground on Mount Wilson, where ether drift should be stronger. Miller's data was far more precise and prolific than the Michelson-Morley experiment. His larger apparatus used a 50x telescope, allowing magnified readings down to hundredths of a fringe, though readings were typically recorded in tenths. To detect anisotropies in the speed of light, the interferometer needed to be surrounded by as little matter as possible, and located at a high altitude – a precaution ignored in many modern ether tests, such as the Brillet-Hall and Müller experiments. Detection of an ether wind was virtually impossible if it was almost completely blocked out by surrounding structures like the laboratory walls or the apparatus itself. To avoid the ether wind being blocked by solid walls, he used a special shed with thin walls, mainly of canvas. Miller argued that basement locations, or interferometers shielded with opaque wood or metal housings, yielded the most tiny and insignificant effects, while those undertaken at higher altitudes and in less dense structures yielded more readily observable effects.

Michelson-Morley versus Miller

A total of over 200,000 individual readings were made, from over 12,000 individual turns of the interferometer, undertaken at different months of the year, starting in 1902 and ending in 1926. The Michelson-Morley experiment of 1887 involved only six hours of data collection over four days with only 36 turns of their interferometer. Even so, Michelson-Morley originally obtained a slight positive result that has been systematically ignored or misrepresented by modern physics. The Michelson-Morley experiment was performed in a basement, violating almost all of Miller's rules for ether detection and avoiding material dragging. Miller thought shielding of the apparatus by this interior location slowed down the movement of the ether. A small but practically "null" result for any similar Michelson-Morley type was virtually guaranteed. Michelson and Morley's "null" result appears to have been conducted in ignorance of Miller's work and protocol caveats. They seem to have been unaware of Miller's conclusion that the ether wind can best be detected in the open.

Miller's analysis showed that the Michelson-Morley experiment did, in fact, contain a systematic sine wave of readings as expected of an ether drift. The commonly accepted null result is only arrived at by assuming a

specific direction for the ether wind, combined with disregard for thermal effects. When daily temperature drift is factored out and no wind direction assumed, the 1887 Michelson-Morley experiment shows a fringe shift approximately equivalent to the 10 km/s found in Miller's experiments. Concerning the Michelson-Morley experiment Dayton Miller concludes that:

> The brief series of observations was sufficient to show that the effect did not have the anticipated magnitude. However, and this fact must be emphasized, the indicated effect was not zero; the sensitivity of the apparatus was such that the conclusion, published in 1887, stated that the observed relative motion of the earth and ether did not exceed one-fourth of the Earth's orbital velocity. This is quite different from a null effect now so frequently imputed to this experiment by the writers on Relativity.

Geocentric Response

Miller consistently measured a small positive effect that varied with each rotation of the device in a sidereal day and on a yearly basis. This effect was only ~10 km/s instead of the expected ~30 km/s from the Earth's orbital motion through a rigid stationary ether. The reduction was attributed by Miller to partial dragging of ether. The Fitzgerald-Lorentz contraction derived from Special Relativity invariance of *c* was consistent with the apparently null results of most Michelson-Morley experiment types, but not with Miller's observed seasonal effects. Miller's concern about the experiment's ambient conditions was justified, but not because ether was dragged by the environment.

In Geocentrism:

1. The Earth doesn't move in the ether vortex surrounding it
2. Genesis testifies that the firmament only exists above sea level, so the Earth's surface forms its boundary.

A few years after Miller's death his work was reportedly refuted by Shankland, a personal friend and great admirer of Einstein, but recent objective work by Maurice Allais has proven the allegations false. Miller's experiments were found to have no fundamental error; observations all show a positive periodic displacement of the interference fringes, as of an ether drift. The effects were shown to be real and systematic, beyond any further question. Miller had better knowledge of these experiments than

any commentator/critic. Nevertheless, the opinions of armchair scientists from the sidelines tend to be more credible than the views of those actually involved daily in the research. The current image of science is a kind of democracy where agreement signifies truth while disagreement is taken to imply incompetence, or bias, or political interference.

Einstein and Miller

Einstein personally played a part in dismissing Miller's work, knowing that supporting it would end his Special and General Relativity theories. He felt Miller's results could be dismissed as experimental error. In 1926 Miller told the press:

> The trouble with Professor Einstein is that he knows nothing about my results....He ought to give me credit for knowing that temperature differences would affect the results. He wrote to me in November suggesting this. I am not so simple as to make no allowance for temperature.

Cosmic Ether Drift

The experiments yielded systematic periodic effects that pointed to an identifiable axis of cosmic ether drift, though of a variable magnitude, depending upon the season, time of day, density of materials shielding or surrounding the apparatus, and altitude at which the experiment was undertaken. Ether properties explain all these variable dependencies. When plotted against sidereal time, they produced:

> a very striking consistency of their principal characteristics...for azimuth and magnitude... as though they were related to a common cause...The observed effect is dependent upon sidereal time and is independent of diurnal and seasonal changes of temperature and other terrestrial causes…a cosmic phenomenon.

Since the measurements were made at different times of day, and at different seasons, their amplitude would vary, but the direction of the ether-drift would shift only to the same average points along a sidereal azimuth. Measurements were latitude-dependent as well, and when analyzed, revealed a common sidereal cosmological axis of ether-drift.

Miller concluded that the Earth was drifting at about 10 km/sec towards an apex in the Southern Celestial Hemisphere, towards Dorado,

the Swordfish, right ascension 4 hrs. 54 min., declination of -70° 33', in the middle of the Great Magellanic Cloud and 7° from the southern pole of the ecliptic. He assumed the Earth was moving through a partially entrained ether which reduced its velocity from 200 km/sec in space, to about 10 km/sec nearer to the surface. This experimental result agrees with the concept of partially entrained ether but not with Special Relativity theory.

Independent averages for the four epochs provided by Miller (February = -10° west of north; April = +40° east; August = +10° east; September = +55° east), together yield a grand mean displacement 23.75° east of north. This is very close to the Earth's axial tilt of 23.5°, a correlation hardly coincidental.

Summary of cosmic drift results:

- Maximum velocity occurs at around 5 hours sidereal time and minimum velocity occurs around 17 hours sidereal.
- The movement and direction of ether drift past the interferometer was towards Draco near the northern pole of the ecliptic (17 hours RA, Dec +68°).
- Efforts to correct for mechanical and thermal artifacts never eliminated the observed periodic sidereal variations, which persisted throughout the experimental work.

Data Analysis
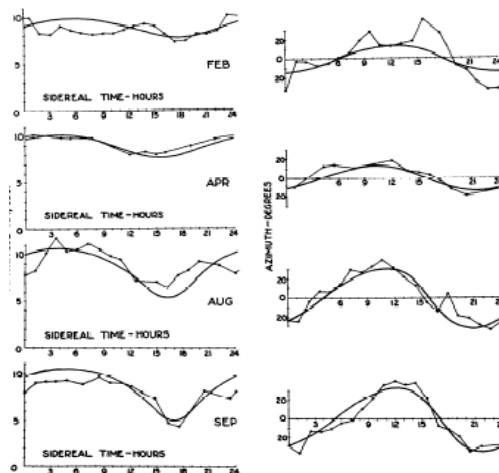
Periodicity of Global Ether-drift,
Dayton Miller 1925-26.

The above-left chart shows a definite periodic curve for four separate months, measured at different sidereal times. The heavy line is the mean of all four epochs. The above-right chart plots the azimuth for the same data with apparent visual periodicity. This demonstrates the detected axis and periodicity of ether drift is the same for different times of year, but is only recognizable visually in a sidereal view. There never were any periodic effects seen in civil time coordinates, as expected from daily thermal effects arising from solar heating.
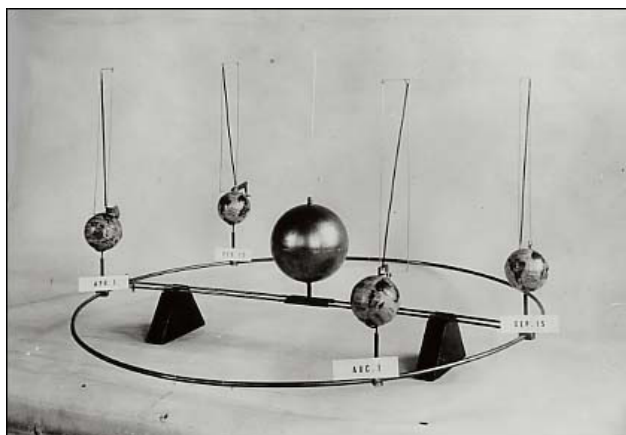
Miller's Earth-Sun model, measured at four seasons, for the cosmic ether-drift axis, approximately normal to the ecliptic plane

Analysis by Maurice Allais

Maurice Allais performed a statistical analysis of the thousands of interferometer measurements of Dayton Miller and found a corresponding periodicity with the sidereal day, the equinoxes and other celestial events. According to Allais:

- Michelson and Morley results were not null, invalidating both Shankland's report and Special Relativity.
- Anisotropy of light was seen as variations in light speed with direction, implying an underlying universal frame.
- Determination of day of year was possible with terrestrial measurements – for example, in a sealed room.

- The Earth's cosmic translation velocity had a computational error in direction.
- Fringe variations have a sidereal period.
- Fringe extrema coincide with the equinoxes.
- The data has a high confidence level and statistical significance.
- No distinction exists between Earth's rotation and translation, as Special Relativity asserts.
- Both rotation and translation are detectable.

Illingworth

Munera revisited the data, getting V_e = 3.1 km/s. For helium k^2 = 0.00007, greatly reducing sensitivity, but providing the first experiment to use a gas other than air, as was done in the Michelson-Morley experiment and Miller. The dependence on refractive index was now testable, albeit in hindsight 80 years later. The correction factor for helium is 118, so V_{ae} = 368 km/s, in the ballpark of the Michelson-Morley experiment and Miller ether velocities, as corrected for refractive reduction.

Joos

Joos concluded that the small interferometer fringe shift showed a speed of only 1.5 km/s. The corrected speed for fringe shift with helium refraction is 433 km/s.
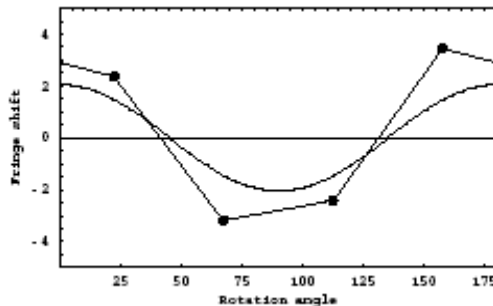
Comparison of Joos data with
theoretical Miller curve[322]

NB: The ether has a yearly cycle centered on the galactic North pole!

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[322] http://xxx.lanl.gov/PS_cache/physics/pdf/0312/0312 082 .pdf

Pound-Rebka

Definition: Principle of Equivalence:

Experiments performed in a reference frame with constant acceleration are equivalent to the same experiments performed in a non-accelerating reference frame in a gravitational field where the acceleration of gravity, g, equals the intensity of gravity field. This implies that the gravitational mass used in Newton's universal law of gravitation is identical to the inertial mass in Newton's second law, *F = ma*. Also, because photons have momentum, they have inertial mass and gravitational mass. Photons should be deflected when crossing radial gravity lines and impeded when moving opposite to gravity. The last implication is tested by looking for a gravitational redshift, as Pound-Rebka did.

Description:

The last of the classical tests of General Relativity to be verified in 1959. It uses the redshift of light moving in a gravitational field to test if clocks do run at different rates at different altitudes. The frequency of photons emitted by two iron (Fe^{57}) sources were compared at a fixed location twenty-two meters apart. The source was mounted on a speaker cone vibrating at 10 Hz to mechanically drive the source up and down slightly. By measuring the variation in detection rate of the Fe gamma rays while the source vibrated, the velocity difference between source and detector that compensated for the gravitational frequency shift could be found. By reversing direction to also measure the frequency shift of rising gamma rays, the difference between the rising and falling effects was measured – only a few parts in $10^{15.}$ This represented the pure gravitational effect. An ingenious experimental design.

Analysis:

According to the principle of equivalence from General Relativity, acceleration of a radiating source produces the same frequency effects as a corresponding gravity field. Thus the expected shift in radiation frequency in a gravitational field can be related to the relativistic Doppler shift experienced from an accelerating light source. The maximum source velocity *v* is $<< c$; the frequency of the gamma source at rest is f_0.

For a moving source the Doppler formula for detected frequency f is:

$$f = f_0(1 + v/c)$$

The time to reach the detector is:

$$t = L/c$$

and the speed is:

$$v = at = a(L/c) = gL/c$$

by the principle of equivalence. The detected frequency is now:

$$f = f_0(1 + v/c) = f_0(1 + (gL/c)/c) = f_0(1 + gL/c^2)$$

so:

$$\Delta f = f - f_0 = gL/c^2$$

The variations of $v(t)$ affect the frequency f according to the strength of gravity g. In Special Relativity:

$$E = mc^2 = hf$$

And the gravitational potential energy at reference radius r_0 is:

$$U = -GMm/r_0$$

where f_0 is the reference frequency of the gamma rays. At altitude h:

$$U = -GMm/(r_0 + h)$$

$$= -GMm/r_0(1 - h/r_0)$$

$$\approx -GMm(1 + h/r_0)/r_0$$

At this height the difference in energy is:

$$\Delta E = \Delta U = h\Delta f$$

$$= -GMm/r_0 - (-GMm/r_0 - GMmh/r_0^2)$$

$$= GMmh/r_0^2 = mgh = h(f_0 - f)$$

f is the frequency at h, so:

$$\Delta E = mgh = Egh/c^2$$

$$= 14.4 \text{ KeVg} \times 22.6 \text{m}/c^2$$

$$= 3.5 \times 10^{-11} \text{eV}$$

Comparing the energy shifts on the up and down paths gives a predicted relative difference of:

$$(\Delta e/E)\text{down} - (\Delta e/E)\text{up}$$

$$= 2(3.5 \times 10^{-11} \text{eV})/14.4 \text{ KeV}$$

$$= 4.9 \times 10^{-15}$$

The measured equivalent is:

$$(5.1 \pm 0.5) \times 10^{-15}$$

The Pound-Rebka experiment <u>did not</u>:

- demonstrate a constant speed of light. If c decreases by only 7.35 $\times\ 10^{-7}$ m/s in the 22 meters above the Earth, the same effect as observed would be seen in the frequency drift. This test alone cannot prove or disprove this possibility.
- show how space and time were unified.
- solve the action at a distance question - the existence of an ether or not.

The results are inconclusive; what it proved was the energy of a photon will change as a function of gravity or equally possible, as a function of the cause of gravity, *i.e.*, ether. When the change in c is calculated from the Hatch gauge scale, we find:

$$V = c\ (1\text{-}2gh/c^2)^{1/2} \approx c(1 - gh/c^2)$$

This predicts the same change in c, 7.35×10^{-7} m/s, and frequency, 4.92×10^{-15}, as was measured in the Pound-Rebka test, as long as the coordinate system is geocentric and "h" is measured from the surface.

Claims and Responses

Claim #1: The gravitational interaction occurs within a four-dimensional space-time continuum that cannot be illustrated by diagrams and can only be understood in terms of very complex Riemannian geometry. Gravity causes "space-time" to curve in a way that cannot be pictured. As the photons move through this curved space, the curvature causes them to be redshifted and blueshifted.

Response: There are no experimental measurements that could serve as evidence for "the space-time continuum," – a ruler-clock? Belief in General Relativity theory permits (and prefers) mental measurements (gedanken experiments) over physical observations.

Claim #2: Only an observer in free fall, who is weightless and feels no acceleration or gravity, is in an unbiased reference frame.

Response: This contradicts the freedom to choose the inertial reference frame of Special Relativity. If General Relativity theory requires a frame in free-fall, then it is no longer a theory of relativity but absolutivity, since all frames are not equivalent. Satellites satisfy the free-falling condition, yet GPS will not operate if the satellites are used as the time standard!

Jaseja Experiment
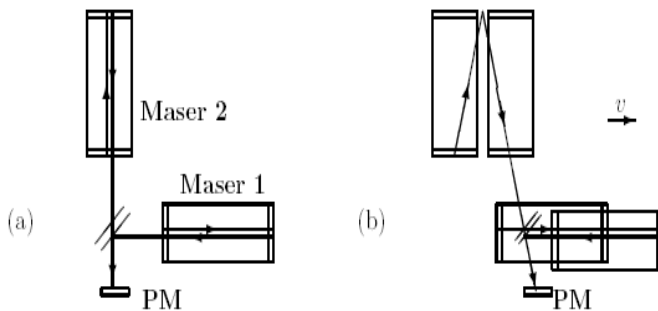
Layout to measure beat frequency between two optical masers: (a) both at absolute rest, (b) top in absolute motion at velocity v. PM is the photomultiplier detector.

This double maser apparatus is essentially equivalent to a Michelson interferometer, measuring the ether effect to order v^2/c^2. Rotation through 90° produced repeatable variations in the frequency difference of about 275 kHz, an effect attributed to magneto-restriction in the Invar spacers due to the Earth's magnetic field. Observations over some six consecutive hours produced a minimum in the frequency difference of about 3 kHz superimposed on the 275 kHz effect.

Frequency delta after a 90^0 rotation
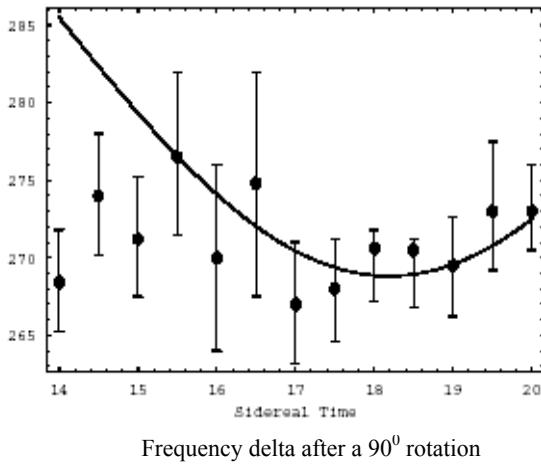
Geocentric analysis

Seen above, 275 khz is the average frequency shift over time which shows a local drop of 3 khz at 18 hour star time. This is interpreted favorably with the Miller velocity direction, but caution in comparison with regard to Miller's data is warranted here, because of the small fringe size, and the adjustment for orbital velocity and sun ether flow effects. The resonant frequency v of each maser is proportional to the reciprocal of the out-and-back travel time. Cahill finds the difference between the frequencies of maser 1 and 2 is:

$$\Delta f = 2(f_2 - f_1)$$

In terms of the refractive index n, the rim rotation speed v and the frequency before rotation, f_0,

$$\Delta f = (n^2 - 1)f_0 v^2/c^2 + \text{higher order in } v/c$$

In Newtonian physics one neglects the refractive index effect, so:

$$\Delta f = f_0 v^2/c^2$$

similar to the classical analysis of the original Michelson interferometer. The very small size of the ether motion fringes results mainly because the n value of the He-Ne gas is very close to one.

Spinning Mössbauer Effect

The spinning Mössbauer experiments use a one-way light path to confirm isotropy of light speed. They are strong evidence in support of Special Relativity by validating the claim of isotropic light speed in every inertial frame by showing that there is no detectable ether drift in the laboratory.

Geocentric Response

Only in 2002 was the Michelson-Morley experiment principle of operation understood; its proper analysis leads to rejection of Special Relativity in support of Geocentrism. Vacuum interferometers are worthless for detecting ether drift. Only a Michelson interferometer in gas-mode can detect absolute motion.

The Mössbauer effect is both a source and detector of very precise gamma ray frequencies, making it a useful tool to directly detect an ether drift. Experimental setup consists of gamma ray source and detector on a spinning disk, with the light path across either the radius or diameter of the disk. The light direction can be reversed by switching the location of source and detector. Ruderfer gave the transit time across a spinning disk to second order in $1/c$, as:

$$\tau = L/(c-V_{ae}\cos\theta)$$

$$= L/c(1- (V_{ae}\cos\theta)/c) \sim L(1 + (V_{ae}\cos\theta)/c)/c$$

$$= L/c + LV_{ae}\cos\theta/c^2$$

Δt = the transit time
L = the distance between source and detector
c = the speed of light
V_{ae} = the local ether frame velocity
θ = the angle of the light path relative to the local ether velocity

The time derivative of τ is:
$$d\tau/dt = LV_{ae}\sin\theta \,(d\theta/dt)/c^2$$

Then:
$\Delta f/f \approx \Delta\tau/dt \approx d\tau/dt = LV_{ae}\sin\theta \,d\theta/dt$

which represents the change in detected frequency compared to source f

For the two cases are considered:

  (1) The source located on the spinning rim and detector at the center, as done by Champeny
  (2) the source located at the center and the detector on spinning edge, as in Turner-Hill

L dq/dt is the tangent speed of the rim, V_t, so:

$$\Delta f/f = V_t V_{ae}\sin\theta/c^2$$

If there is no ether drift, there is no frequency drift. Otherwise the frequency change is given by this formula. However, both Ruderfer and Hayden[323] have shown that the frequency change due to ether wind is canceled by an equal and opposite transit time effect, *i.e.*, the delay of the beam in moving from source to detector:

$$V_t V_{ae}\sin\theta/c^2$$

The bottom line: the spinning disk experiment using the Mössbauer effect is incapable of detecting any ethereal motion, as the effect is masked by another effect of motion.

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[323] Ruderfer, Martin, (1961) "Errata First-Order Terrestrial Ether Drift Experiment Using the Mössbauer Radiation," *Physical Review Letters*, Vol. 7, No. 9, 1 Nov., p 361. Hayden, Howard C. (1992) "Rotating Mössbauer Experiments and the Speed of Light," *Galilean Electrodynamics*, Vol. 3, No. 6, Nov.

Geocentric view

Reginald Cahill has revisited the Michelson-Morley experiment, for a fruitful re-analysis of the underlying theory. For the difference in travel time between the two Michelson-Morley legs, and explicitly including air refraction using $V = c/n$ for the speed of light in air, he finds:

$$\Delta t = 2Lv(1 - v^2/c^2)^{1/2} / (V^2 - v^2) - 2L/(1 - v^2/c^2)^{1/2}$$

$$= 2Lc(1 - v^2/2c^2 + O(v/c)^4)n^2 (1 + n^2v^2/c^2 + O(v/c)^4)/nc^2$$
$$-2Ln(1 + n^2v^2/2c^2 + O(v/c)^4)/c$$

$$\approx 2Ln(1 - v^2/2c^2 + n^2v^2/c^2 - 1 - n^2v^2/2c^2)/c$$

$$\Delta t = n(n^2 - 1) Lv^2/c = k^2Lv^2/c$$

defining the corrected $k^2 = n(n^2-1)$ to make comparison with the classical prediction of Newtonian optics that $k^2 = n^3$. For a vacuum interferometer $n = 1$, so all Michelson-Morley type experiments will never detect a time dilation! Classical theory says $n = k = 1$ in vacuum, and the time difference will be:

$$\Delta t = Lv^2/c$$

The relationship $k^2 = n(n^2-1)$ tells us that the:

- ether can only be detected with gas of $n > 1$.
- best medium for this experiment would have a high index of refraction, like chlorine in the following table.

Helium	1.000036
Hydrogen	1.000140
Water vapor	1.000261
Oxygen	1.000276
Argon	1.000281
Air	1.0002926
Nitrogen	1.000297
Carbon Dioxide	1.000449
Chlorine	1.000768
Perfluorobutane	1.0014

Index of refraction *n* for common gases

However, this would also increase the photon absorption and reduce the beam intensity. Cahill notes that in transparent solids a more complex phenomenon occurs; ether drift effects either do not occur in them or are not yet detectable. The index of refraction for air is $n = 1.0002926$, so $k^2 = n(n^2 - 1) = 0.0005852$, accounting for the small fringe shifts observed by Michelson-Morley. Michelson and Morley did indeed see ether-induced fringe shifts, contrary to conventional science wisdom, as analysis of their data shows. Their measured value of about 8 km/s was reduced by $k = 0.0005852^{1/2} = 0.0242$. To restore the actual value divide by k gives Vae ≈ 330 m/s for Michelson-Morley and ≈ 410 m/s for Miller's drift velocity.
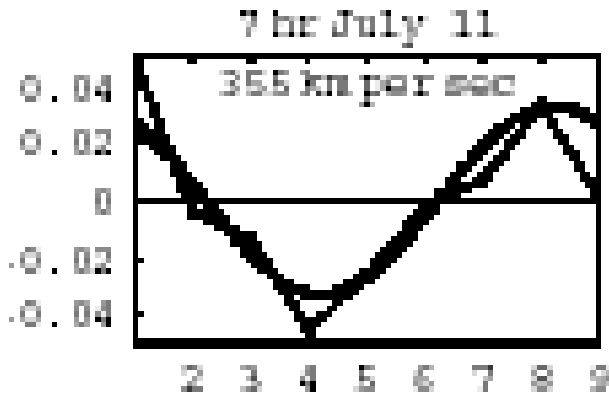
Sample Michelson-Morley data after refractive and thermal drift corrections

In general, the ether velocity V_{ae} can be found from the experimental velocity V_e via:

$$V_{ae} = V_e(n(n^2 - 1))^{-1/2}$$

Recall that 8 km/s was smaller than the presumed orbital speed of 30 km/s. The updated result (after over a century!) was:

- absolute motion had been detected as fringe shifts of the correct form
- k^2 was 0, not 1, a flaw in classical theory.
- the speed of light was relative to a direction in space

It seems counter to intuition that such a small deviation from the refractive index of vacuum (such as .0002926 for air) can have such a huge effect on the detected ether speed. But it becomes more sensible when considering the exquisite optical precision of the interferometer, capable of measuring a partial wave over paths meters long.

Shapiro Venus Radar (1969)

Cyclic variations:

Already in 1961 a hint of the future periodic Cosmic Microwave Background dipole fluctuations was seen in the Venus radar data. For some reason the content has been classified by the military, so a full analysis of the motions may never be done. Is the daily cycle really sidereal and pointed, like the Cosmic Microwave Background dipole, in the direction of Leo? The question remains: is the speed of light in interplanetary space subject to systematic variations in time? This may be the start of an anomaly that just won't go away.

Shapiro proposed measuring the time delays between radar pulses sent through the sun's gravity field toward Venus and measuring the return time of the echo. Using the MIT 120-foot Haystack antenna, Shapiro conducted the test in 1966 and 1967 that confirmed radio waves slowed in the gravitational field of the sun. When the Earth, sun, and Venus are most favorably aligned, the expected time delay, due to the passage close to the sun, would be about 200 milliseconds. The test was successful.

Time delay:

In General Relativity, the travel time of any electromagnetic signal can be affected by gravitational time dilation. General Relativity theory predicts a time delay which increases when the photon passes nearer to the sun due to the time dilation while in the sun's gravity potential. Observing radar reflections from Venus just before and after its eclipse by the sun gives 5% error with General Relativity predictions.

Conflict in Findings:

Shapiro has presented the radar data as consistent with Einstein's General Relativity. Yet Shapiro admitted the published radar analysis showed very large improbable variations in the calculated value of the astronomical unit AU (the mean distance between Earth and Sun) that

were far larger than the maximum estimated errors. Bryan Wallace claims all calculations by Shapiro were based on the constant *c of Special Relativity*; the Galilean model *c + v* wasn't even tested. A complete data evaluation comparing *c* and *c + v was never done,* assuming that there is nothing wrong with the Einstein General Relativity model!

When plotted, the AU contained cyclic variations: a daily component, a 30-day lunar component, and a component related to the relative orbital velocities of Earth and Venus. The daily variation was not identified as solar or sidereal. The variations fit the expectations if the speed of light was *c + v*, and the calculations were erroneously based on *c*. Before the 1960s, the AU had an uncertainty of as much as 170,000 miles because it was only measured by triangulation. With radar, the distance to Venus was precise to 1.5 km., the only important variable being the relative value of *c* in space.

A data analysis based on a constant *c* showed the center of Venus at different distances from Earth at the same time. Data analyzed by Shapiro's own research group also presents evidence against the constant *c* theory of Special Relativity using different ground stations.

Wallace's analysis of the 1961 Venus radar data showed a much better fit to the Newtonian particle *c + v* model than for the Special Relativity *c* model, but he was hampered by limited access to the full set of radar data. He wondered how the radar data can be consistent with General Relativity if there are variations far larger than possible when the observing time is changed.

Daily variations will not be evident if readings are taken at the same time each day, yet that is what the released data showed. Shapiro said *c* was constant based on a constant observing time and a single radar station out of three.

Wallace noted:

> The 1961 interplanetary radar contact with Venus presented the first opportunity to perform direct experiments of Einstein's second postulate of a constant *c* in space. When the radar calculations were based on the postulate, the observed-computed residuals ranged to over 3 milliseconds of the expected error of 10 microseconds from the best [general relativity] fit the Lincoln Lab could generate, a variation range of over 30,000%. An analysis of the data showed a component that was relativistic in a c + v Galilean sense.
>
> …JPL reported that significant unexplained systematic variations existed in all the interplanetary data, and that they are forced to

use empirical correction factors that have no theoretical foundation.

The Russians are typically open to reporting and reacting to anomalies in existing theories. From a Soviet journal:

> … the discrepancies between the actual position of Venus and the position calculated on the basis of the existing theory of motion of the planets at different inferior conjunctions have different characters.…An analysis of the data presented shows that the differences between the measured and calculated delay times have different dependence on the time in the different conjunctions and reach 3500 microseconds, which when converted to the distance from the Earth to Venus comprises 500 km.

Supporting evidence for Wallace comes from Ronald Hatch, who finds that the NASA equations for interplanetary navigation follow his Modified Lorentz Ether Theory (MLET) rather than Special Relativity:

> There is a large disjoint between the Special Relativity theorists and the experimentalists. The Special Relativity theorists continue to claim that the speed of light is automatically the velocity c and isotropic with respect to the moving observer or experiment. But the Special Relativity experimentalists do what is necessary to explain and make sense of the measurements. The equations for tracking and navigating the interplanetary probes developed by the Jet Propulsion Laboratory (JPL) for NASA clearly follow the MLET template.

It is therefore imperative that systematic, high precision speed of light experiments be performed in Earth orbit and interplanetary space. No such experiments have been carried out yet.

Brillet-Hall (1979)

A He-Ne laser is servo-stabilized to maintain a fixed reference length using a Fabry-Pérot etalon. L is the length of the Fabry-Pérot etalon – the distance between end mirrors. The etalon and laser can rotate. The light frequency transmitted axially in that rotating frame is compared with a static reference laser. Any length change of the etalon or change in c should produce a matching change of frequency of the rotating laser, using

the static stable laser as the standard reference. The test is repeated with the laser placed parallel to the Earth's motion, then at 90° to the motion. The same formulas for parallel and perpendicular transit time in an ether flow are used, but the precision is greatly improved by using monochromatic light and a precise standard. The difference in length predicted by the Lorentz contraction is tested via the servo-stabilization of the etalon length L. Brillet-Hall report a null result after rotation: no change in transit time or L.

Simplified operation:

A laser stabilized with an Fabry-Pérot etalon (a bouncing photon clock) is rotated to various positions and compared to an atomic clock's rate, a laser stabilized to a methane line.

Results:

The null results of the Michelson-Morley experiment lead to the claim of an asymmetric distortion in space and time. The aim is to verify Einstein's hypothesis that there is an asymmetric distortion of space (or matter) when the frame is moving. Brillet-Hall reported the final result as a null ether drift of 0.13 ± 0.22 Hz, which represents a fractional frequency shift of $(1.5 \pm 2.5) \times 10^{-15}$. For the orbital velocity of 30 km/sec, this result is a million times smaller than the ether model prediction. The 370 km/sec. velocity of the solar system with respect to the cosmic background radiation gives an ether model prediction 100 million times larger than the Brillet-Hall limit.

Geocentric analysis

Now accepted as an accurate confirmation of the Michelson-Morley "null" result, it seems to ignore Miller's criteria for open space around the equipment to optimize ether detection. Their bulky temperature-controlled Fabry-Perot interferometer had little chance of success. A residual 17 Hz signal (out of $\sim 10^{15}$ Hz) was thought by analysts to be due to the rotation of the Earth. Brillet and Hall only noted it was fixed in the lab frame and therefore could not be of cosmic origin. But if it was fixed in the lab frame, how could it have a 24 hour solar period?! The analysis has shown the existence of two ether drift components: (a) An annual component of size 16 m/s and period one year; (b) A larger daily 190 m/s velocity having either a solar or sidereal cycle. They made measurements every 12 hours, which means the result was phase–dependent. If the samples were taken at

the zero crossings of the ether flow sinusoid, the sine wave would appear null.

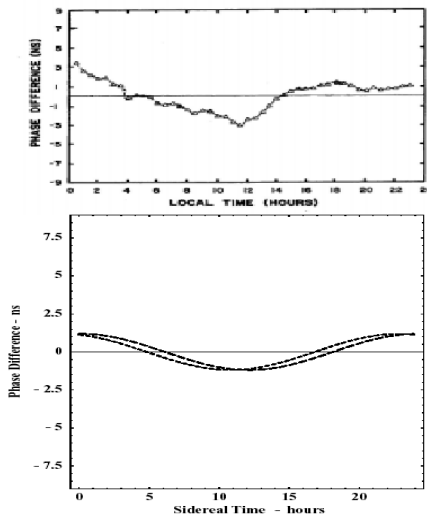### Torr and Kolen (1981)

Torr and Kolen sent a 5 MHz signal along a 500-meter nitrogen gas-filled coaxial cable orientated east-west   to measure the one way light speed variation. The signal was sent between two synchronized Rb atomic clocks and its phase change monitored. They inferred that *c* could vary in a one way measurement by as much as 1%. Phase differences of 8 nanoseconds or 0.04 wavelengths were found that had an [alleged] spurious dependence on the time of day. Analogous experiments using optical fibers give null results for the same reason, apparently, that transparent solids in a Michelson interferometer also give null results, and so behave differently from coaxial cables.

Their "null" result means that they could not sense what they were looking for, the 400 km/s motion through space as detected by the Cosmic Background Radiation, just as the "null" Michelson-Morley experiment meant that the 8 km/s reading was not the 30 km/s orbital speed Michelson-Morley were seeking. In hypothesis testing, a "null" result doesn't mean that nothing was found. There is a definite projection of the absolute motion velocity onto the east-west cable. Torr and Kolen did observe that the round trip-time remained constant within $0.0001\%c$, but variations in the one-way travel time were observed, as shown below by the data points.
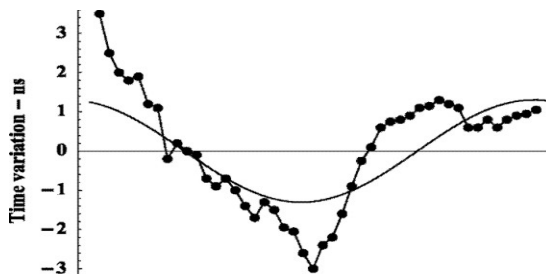
Variations in travel times (ns) of an RF signal sent down a 500 m. of coaxial cable facing East-West. Predicted cosmic velocity (curve) is 433 km/s toward (5.2 hr, -72^0).

The theoretical predictions for the Torr-Kolen experiment for a cosmic speed of 433 km/s in the Miller direction (5.2 hr, -67°) and the results of the Torr-Kolen experiment are seen below to be in remarkable agreement.

Upper is experiment data for ns variation in transit time via 0.5 km E-W cable ; bottom is predicted curve for 417 km/s in the direction (RA:17:5 hr; Decl: 65°) Results are for a typical day.[324]

Torr and Kolen reported the same fluctuations in both magnitude, (1-3 ns), and time of the maximum variations in travel time, as did DeWitte a decade later, in his sentinel experiment. These one-way results are not predicted by Einstein's theory. This is another confirmation of absolute motion and a mysterious direction in space.

Silvertooth (1986)

Silvertooth used a configuration similar to the Sagnac experiment, adding a sensor capable of measuring the standing wave node spacing that is dependent upon the direction relative to the ether flow. He measured the standing waves formed by light beamed in opposite directions using two lasers. One of the lasers was phase modulated with respect to the other, creating phase conjunctions measured with a special photomultiplier detector. If the apparatus table is rotated in an E-W direction when the constellation Leo is on the horizon, there is a phase difference of 0.25 mm. When rotated 90° (N-S) the detector outputs remain in phase. The

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[324]http://www.mountainman.com.au/process_physics/ HPS14.pdf   Fig.16

detectors also remained in phase in the E-W direction when Leo is 6 or 18 hours from the horizon. With a wavelength of 0.63 μm (He-Ne) the velocity was 378 km/s, in reasonable agreement with the Müller's results in the NASA-Ames U2 radiometer tests.

Analysis:

This is not a confirmation of the Miller experiment because Silvertooth's velocity vector points in a different direction than did Miller's. Silvertooth also calculated a velocity of 378 km/sec, versus Miller's estimate of 200 km/sec.

NASA discovered that the motion of our solar system causes a slight Doppler shift in the spectrum of the CMB. This anisotropy indicates that the heliocentric frame moves toward the constellation Leo with a velocity of 390 km/sec, in excellent agreement with Silvertooth's findings. But Silvertooth published his results before the COBE satellite discovery.

Just as Sagnac's experiments showed c is not constant in rotating frames of reference, Silvertooth's experiment shows that c also fails to apply to light moving in a straight line. Silvertooth claimed that two way light speed tests, such as Michelson-Morley, would always cause cancellation of the velocity difference in c each way. But Cahill has shown that the refractive correction for a gas medium causes a true difference in the two opposite paths through the ether.

There are no references to Silvertooth's papers or his two experiments in the mainstream scientific literature. Unless this challenge to Relativity theory is met, the logical conclusion would be that motion can be detected by pure electromagnetic means and that Einstein's theory of Special Relativity is false.

Claims and Responses

Claim #1: The Earth moves in space with an absolute velocity. The value of this velocity (378 ± 19 km/sec) matches the independent astronomical determination of the Earth's motion relative to the cosmic background radiation (365 ± 18km/sec).

Response: The other unexpressed possibility of interpretation is that the ether is moving against the Earth, which is at rest, not the Earth moving through the ether. At all times he found a preferred direction pointing to the constellation Leo, traveling at a velocity of 378 km/sec.

Claim #2: Silvertooth's theory, method and/or data are erroneous

Response: Critics have to explain why other ether experiments sensibly measured the same velocity – speed and direction.

DeWitte (1991)

Two sets of atomic clocks in two buildings located close to a North-South line were separated by 1.5 km. Two 5MHz radio frequency signals were sent in both directions through two buried coaxial cables linking the two locations. Digital phase comparators measured changes in propagation times of the radio frequency signals in both directions for 178 days; long term drift was very linear and reproducible. The phase changes displayed a clear sinusoidal waveform with a consistent sidereal day period for the duration of the experiment.

Theory:

Let the projection of the absolute velocity vector **v** onto the direction of the coaxial cable be v_P. Then the phase comparators reveal the difference between the propagation times in the N-S and the reverse S-N direction. The analysis for the time difference without considering a Fresnel drag effect:

$$\Delta t = L/(c/n - v_p) - L/(c/n + v_p)$$

$$= 2Ln^2 v_p/c^2 + O(v_p^2/c^2) \sim 2t_0 n v_p/c$$

$L = 1.5$ km is the length of the coaxial cable and $n = 1.5$ is the refractive index of the cable dielectric, so the signal speed is about $c/n = 200, 000$ km/s. $t_0 = nL/c = 7.5 \times 10^{-6}$ seconds is the one-way radio frequency travel time when the horizontal ether flow $v_P = 0$. Then, for example, a value of $v_P = 400$ km/s would give $\Delta t = 30$ns. Being first-order in v/c, relativistic effects of second-order in v/c can be ignored. This advances experimental technique beyond the two-way light speed of Michelson-Morley type experiments.

DeWitte's new type of absolute motion experiment measured 400 km/s that, significantly, agrees with the re-analysis of prior gas interferometer tests based on the refractive index effect. Measured values of velocity V_m were corrected and properly scaled using $V = V_m(n^2-1)^{-1/2}$
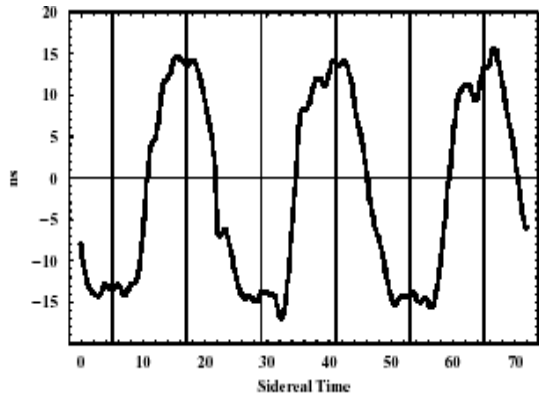
Variations in twice the one-way travel time in ns, for an radio frequency signal to travel 1.5 km through a North-South coax cable. The sidereal time for maximum effect - ~17 hr (or ~5 hr) - agrees with the direction found by Miller and by Jaseja. Plot shows variation of some 28 ns over 3 sidereal days.
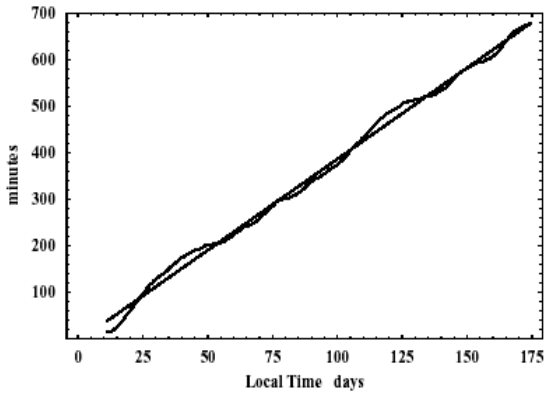
Drift of cross over time between max and min transit time variation plotted against the solar time for half a year. The slope of the least-squares fit is 3.92 min per day, while the difference between solar and sidereal day is 3.93 min/day.

Sidereal day:

A sidereal day measures the time for a star overhead to return to its exact position, just as a solar day is the time for the Sun to return to its position. Anything related to solar motion will generate data that synchronizes with a 24 hour day exactly, not one that is 236 seconds shorter. Because of the 4 minute difference between the two types of day, there will be 1 extra sidereal day after a year; 1 year = 365 solar days = 366 sidereal days.

Analysis:

The detected signal leads the sun by the same amount the stars do! So the time variations are correlated with sidereal time and not local solar time. The effect is certainly cosmological and not associated with any daily thermal effects, which in any case would be very small for a buried cable. Miller had also compared his data against sidereal time and found his data also tracked sidereal time and not solar time.

The sidereal dependence of the Dewitte readings is incomprehensible in the world of Relativity. A sidereal period can only be attributed to the motion of the Earth relative to the cosmos, requiring an absolute reference frame, which Einstein said does not exist. Neither Special Relativity nor General Relativity could or would ever predict a sidereal day effect.

The reaction of the physics mainstream journals has been silence, when such a paradigm-crunching discovery should objectively be making headlines on the covers. A sidereal period implies relative motion of the Earth and the universe. DeWitte detected an absolute reference frame that Einstein said did not exist.

A sidereal variation in the velocity of light means the very foundations of physics as currently believed have a fundamental error that must be corrected. A rotating cosmos would also challenge another science icon, the Big Bang. Objective science journals could have published the results, disclaiming his interpretation, unless they also could disprove his data. Since 1991 no one has analyzed DeWitte's results in the technical press or even attempted to replicate his data.

Some interpret the DeWitte data by concluding that the Earth is rotating once every sidereal day. They say he detected a second reference frame to which the Earth is subject, other than the geocentric frame itself. Whatever affects, phase shifts in copper wires with a sidereal pattern must be related to the motion of Earth in open space. But Mach's principle still holds – the Earth can just as well be at rest while the stars rotate. There is no need for a second frame. The geocentric model is an equally valid analysis of the DeWitte results.

CMB dipole (1996)

The hot Big-Bang model has become the standard cosmology of modern physics. The cosmic microwave background is a 2.725 Kelvin thermal spectrum of black body radiation that fills the universe, a remnant of the birth. It is isotropic to roughly one part in 100,000; the standard deviation is only 18 μK.

The Cosmic Microwave Background radiation is a snapshot of the universe when these photons of formation last scattered. At that time the opaque universal plasma finally cooled down enough to become a transparent gas of neutral atoms. As the Universe expands it cools, and so we see the background radiation as microwaves, coming from all directions. The Cosmic Microwave Background served as a cosmic Rosetta stone, for those days 13 billion years ago.

The mapping of the Cosmic Microwave Background was expected to reveal the small random temperature variations caused by star and galaxy formation 300,000 years after the expansion began. Analysis of the COBE data by Smoot et al., exposed a large (relative to the 2.725° K monopole) anisotropic dipole amplitude of 3.358 milliK, assumed to be due to our velocity with respect to the Cosmic Microwave Background. Good agreement with the DMR and FIRAS dipole results was evidence that the COBE dipole detection was not due to systematic uncertainties in the equipment.

COBE temperature graphics
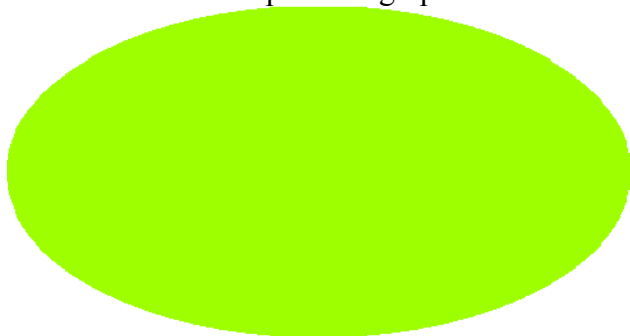
The CMB monopole[325]

The CMB's original temperature map of the sky showed a remarkable universal smoothness, a constant temperature of T_0 =2.725°K, symbolized by gray (green) above.

In 1992, satellite telescopes (*e.g.*, COBE), 500 times more sensitive than prior telescopes, revealed a faint pattern in the CMB sky spectrum when viewed from galactic coordinates, as shown below.

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[325] http://map.gsfc.nasa.gov/ContentMedia/dmr_0_s.gif
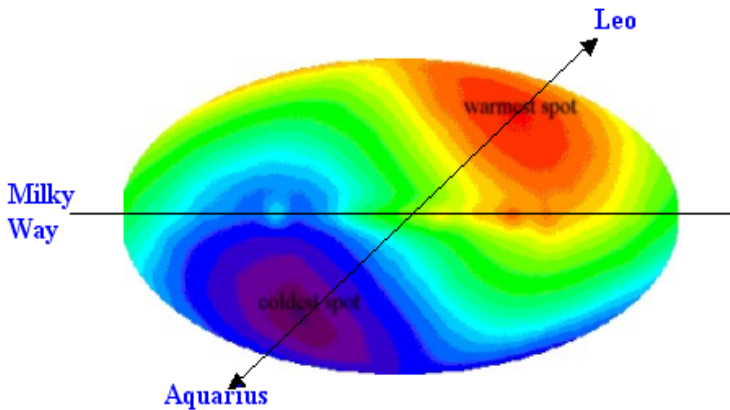
The CMB dipole[326]

A dipole anisotropy was now seen, with the hot pole in red in the direction of Regulus, and the cold pole in purple at lower left in the opposite direction. The red part of the sky is hotter by $(v/c) \times T_o$, while the blue part of the sky is colder by the same amount. The inferred velocity is $v = 370$ km/sec, the velocity of the solar system relative to the observable universe. The direction is (RA: 11hr. 12mn. Decl: -7.06°). Radiation in the Earth's direction of motion appears blueshifted (higher frequency) and hotter, while radiation on the opposite side of the sky is red shifted and colder. The Local Group moves at about 600 kilometers per second relative to this primordial radiation, a high speed that was initially unexpected - its magnitude and direction are still unexplained.

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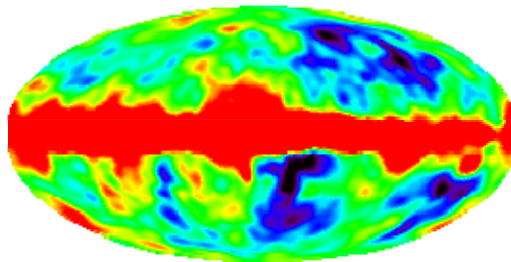
[326] http://map.gsfc.nasa.gov/ContentMedia/dmr_1_s.gif

CMB sky minus the dipole[327]
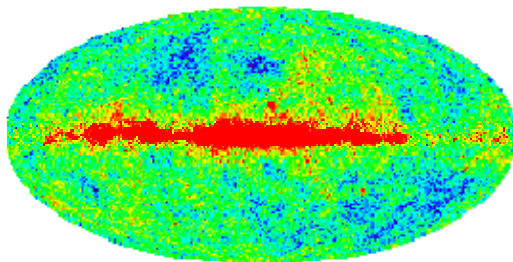
The full CMB sky at high resolution[328]

The full map of the sky is shown above, including all mK fluctuations. The Milky Way is located at the equator in this galactic reference system. The color details are tiny temperature differences of an incredibly even microwave radiation filling the universe, now at a frigid 2.73 degrees above absolute zero temperature. A high resolution view of the temperature details is shown below, with slight temperature fluctuations which vary by only millionths of a degree.

Geocentrism Outline

The Cosmic Microwave Background is considered the most conclusive piece of evidence for the Big Bang by current cosmology. It is the isotropic radiation bath that permeates the entirety of the universe. Accidentally discovered in 1964, it was soon determined that the radiation was diffuse, emanated uniformly from all directions in the sky, and had a temperature of approximately 2.73 Kelvin. It is now explained as a relic of the evolution of the early universe.

In the Big Bang theory, as the universe expanded and cooled, there came a point when the photon radiation decoupled from the matter. The radiation cooled and is now at 2.73 Kelvin; it matches the blackbody curve for that temperature very closely. Although it is considered to be unequivocal proof for the so-called Standard Big Bang model, in actuality:

- This is another example of the 'effect implies cause' logical fallacy: if a cause *C* produces an effect *E*, then *E* does not necessarily produce *C*. In other words, finding one cause for an

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[327] http://map.gsfc.nasa.gov/ContentMedia/dmr_2_s.gif
[328] http://map.gsfc.nasa.gov/ContentMedia/map_model _2_s.gif

effect does not exclude other possible causes for the present 2.73° K temperature.

- The parameters of the Big Bang model can be adjusted to fit any temperature. The predicted temperature was as high as 50° K before the Cosmic Microwave Background discovery. The claim of uniqueness would be impressive if stated before 1964, and after the parameters had been chosen.

Abuse of the Doppler effect

The Doppler effect holds for either source or observer (or both) in motion, a phenomenon truly based on relative motion. Relativity supporters abuse this simple fact when interpreting the Cosmic Microwave Background dipole as motion through space in Leo's direction by the:

- Earth
- Solar System,
- Galaxy,
- Local Group of galaxies or
- Some other arbitrary celestial grouping.

.

For if the Cosmic Microwave Background dipole arises from the Doppler effect, as claimed, it can just as well be taken that the cluster around Regulus is the source of the motion, approaching Earth. The choice of Earth moving toward Regulus is one of many options of relative motion allowed by the Doppler theory. It is ironic that a Geocentrist has to point out to Relativists that they are abusing a principle based on relative motion, by ignoring the valid geostatic option.

Claims and Responses

Claim #1: Although the universe as a whole has no center and no edges, our observable universe's edge is the cosmic microwave background. We are moving (slightly) with respect to that edge.
Response:

1) With no edges the universe would be infinite and unchanging, as only finite things can change. If an infinite universe changed, it could not have been infinite originally. We are surrounded by change/motion, so the universe cannot be infinite.
2) If the universe has no edges how can the Cosmic Microwave Background be the edge - an edge that doesn't exist?

3) General Relativity models claim that the Big Bang universe is expanding into nothingness, an expansion not into space but creating space as it expands. This space curves back on itself so there is no center or edge (NB: I hope that's clear to everyone). There is no experimental proof of this model, created from nothing by very fertile imaginations.

4) Big Bang interpretation notwithstanding, our speed relative to the Cosmic Microwave Background is nowhere near the speed of light, and so we must be very close to the expansion center. Even the Big Bang shows the universe to be geocentric!

Claim #2: The Cosmic Microwave Background could only have arisen from the very hot, dense conditions that existed in the early Universe.

Response: There are many logical sources for a universal background of electromagnetic radiation described in cosmology literature, some from the period before the Big Bang model was promoted, some from explanations of Olber's paradox. The principal counter argument is based on the scattering of the light produced by all the universe's stars. Over time the scattered waves would be reduced to 2.7° K, the temperature of the universal container, which Geocentrists apply to the water above the firmament (Genesis 1:6-9).

Claim #3: The 3mK dipolar temperature variation across the sky arises from the motion of the solar system with respect to the rest frame defined by the Cosmic Microwave Background.

Response: (1) If the Cosmic Microwave Background fills the universe then its rest frame must be the absolute frame forbidden by Relativity; (2) Solar system motion? See abuse of Doppler effect.

Claim #3: COBE even detected the annual variation due to Earth's motion around the sun - the ultimate proof of Copernicus' hypothesis.

Response: Other ether detection experiments – from Milller to DeWitte – have two distinct variations:

- A primary one with period of a sidereal day
- A secondary one with period of one year.

It is the secondary dipole variation that is referred to here, lending Cosmic Microwave Background support to the results of the other

investigations. For Earth's motion around the sun, see abuse of Doppler effect.

Claim #4: The COBE 30 μK pattern displayed the creation of stars and galaxies in the early stages of the universe. It provided the first evidence for the density inhomogeneities from which all structure in the universe originated, confirming the Big Bang model.

Response: If the above were true, there would be:

- no clear dipole pattern, as seen in reality.
- a correlation between the observed density irregularities and the present structure of the universe. No such correlation has been published in the physics mainstream press.

Claim #5: The Cosmic Microwave Background dipole shows that we are traveling very fast through the universe. There is the motion of our Local Group of galaxies relative to the Cosmic Microwave Background photons, the motion of our Galaxy relative to the Local Group as a whole, the motion of the sun round the galaxy, and the annual motion of the Earth round the sun. If you were to believe that we are genuinely at rest in a special place, then you would have to decide where that rest place is.

Response: That makes velocity a matter of personal choice, and thus meaningless. In effect, the term "velocity" has no meaning in cosmology if it can be chosen to be anything. Also, see abuse of Doppler effect.

Claim #6: A plausible explanation for this observed large-scale anisotropy in the pattern of Cosmic Microwave Background radiation is that the radiation is isotropic on a large scale in the medium through which it is propagated and the solar system is moving through the medium with a velocity of .0012 times the speed of light through the medium. This velocity in the general direction of the star Regulus would cause Doppler shifts in the observed Cosmic Microwave Background radiation that would result in the observed dipole presence.

Response: But what of the contradictory interpretation of universal redshift recession? Why isn't the Big Bang recession of galaxies at much greater speed than the dipole speed detected in the Cosmic Microwave Background? What makes the cosmic expansion speeds invisible? Perhaps an objective view is that:

- The galaxies are not receding but are basically at rest in a radial direction
- The Earth is at rest, and the Regulus group is approaching us.

Claim #7: 1) The dipole effect is the result of the movement of our Earth, solar system, and galaxy through the universe; similar to the change in pitch of a sound as you ride by the source in a car or train. Specifically, the Cosmic Microwave Background temperature is 6.706 mK brighter in one direction of the sky than it is in the opposite direction as measured by the COBE mission. (2) Dipole effect caused by the Doppler effect of the Earth's movement in the Cosmic Microwave Background reflects the directional movement of the Milky Way.

Response: See abuse of Doppler effect.

Claim #8: There is a slight imbalance in the recession speeds of distant galaxies. In the direction of the constellation Leo they are not receding as fast as in the other direction.

Response: We are told the recession speed is dependent on distance, so there is a wide distribution of expansion speeds for remote galaxies. How does the Cosmic Microwave Background pick out only the Leo dipole speed, which is much less than the deep space recession speeds?

Claim #9: Special Relativity theory is not complete; it was replaced by General Relativity theory circa 1915.

Response: We can conclude, then, that:

- Special Relativity theory cannot be used for cosmology.
- General Relativity theory did not extend Special Relativity to accelerated frames and gravitational fields, as most others claim.

Claim #10: In General Relativity, when you get a solution to the Einstein equations that defines a spacetime, then typically that spacetime has a preferred frame and you can determine an absolute velocity. The metric which normal working cosmologists use, the Friedman-Robertson-Walker metric, has a built in absolute rest and a notion of absolute velocity. In an expanding universe there is a preferred frame, or class of preferred frames (there is no preferred origin).

Response: A revealing re-write of Relativity, which now does not allow a free choice of reference systems, but uses models with absolute speeds. Without a preferred origin, we know how fast we are going, but not where we are?! Apparently all the content and meaning can be changed in Relativity, but never the name itself. The greatest obstacle to discovery is not ignorance, but the illusion of false knowledge.

Claim #11: The crucial assumption of Relativity is that there are no reference frames where the laws of physics are different. Yet there is a reference frame where the Cosmic Microwave Background is at rest. You could call this the rest frame of the universe, but observers in that reference frame have no 'privileged' view of the universe and there is nothing any more 'absolute' about the velocity of an object with respect to that frame than with respect to any other reference frame. No experiment done in the Cosmic Microwave Background rest frame would yield a different result than the same experiment done in any other reference frame. All the laws of physics operate exactly the same as they do in the Earth rest frame, or any other reference frame.

Response: Yet another view of what Relativity and rest frame mean. Although almost all believers in Relativity say they subscribe to the Einstein brands of Special Relativity and General Relativity, each seems to have an individual interpretation of the meaning and application of Relativity to experimental results. These interpretations are usually divergent. The above argument claims that all frames are equivalent (and does not even restrict the choices to inertial frames), but ignores the testimony of the Cosmic Microwave Background dipole, that is, that there is a preferred orientation in space, as seen from Earth.

Claim #12: If the Earth were the focal center of the universe the Cosmic Microwave Background would show no dipole effect, as it too would revolve around the Earth.

Response: The Cosmic Microwave Background dipole is usually interpreted as caused by the motion of the Earth at 370 km/s through the Cosmic Microwave Background toward Regulus. But the data itself indicates that the Regulus direction is an energy source, the hottest spot in the Cosmic Microwave Background spectrum of the universe, a possible source for the ether flow that causes the effects we now term gravity and the periodic motions of the heavens. The source acts as a beacon as the sky rotates each (sidereal) day.

Claim #13: The variation in the universe's temperature shows how the matter and energy of the very early universe (300,000 years of age) were distributed. In order for the mass of the universe to be clumped together nowadays in galaxies and galaxy clusters, theory requires that the early universe be non-uniform. The COBE discovery revolutionized cosmology by giving us rich information about the initial conditions of the universe.

Response: What the COBE Cosmic Microwave Background dipole revealed to us was not anything about the universe's start, but rather it:

- Disproved the cosmological principle of large-scale homogeneity.
- Challenged the foundations of the Big Bang theory.
- Established a universal energy source and direction in space.
- Was totally unexpected and still unexplained by theorists.
- Established that the universe has an absolute reference system, debunking Relativity theories and crying out for new paradigms for explanation (or the revival of pre-Copernican beliefs).

Summary

In Special Relativity, there is no special linear velocity determined by the laws of physics, per se, but the velocity of the cosmic microwave background radiation is considered special, and a sophism intended to ignore the stark collision with Special Relativity theory. A firm statement is made (*e.g.*, no absolute reference frame) followed by an immediate exception (*e.g.*, the Cosmic Microwave Background) which is hedged (*e.g.*, it could be a preferred frame [but which Relativity theory forbids]). This logical tangle sets the scene for accepting a contradiction within the Relativity paradigm – the Cosmic Microwave Background as a universal absolute rest frame.

Nodland, Ralston (1997)

In 1997, Nodland and Ralston measured astronomical polarization of light from galaxies from various distances and directions. Analysis of the data indicated that the universe seemed to have an optical axis: it rotated the polarization direction of linearly polarized light! This cosmic polarization had an optical axis parallel to the direction Aquila-Earth-Sextans. Could the universe be rotating?

In the standard cosmic model, the universe is expanding symmetrically from its Big Bang origin and space has no preferred direction. Light moves

isotropically, coming from any direction. However, polarization measurements from distant radio galaxies that emit strongly polarized waves similar to synchrotron radiation showed a rotation of the polarization plane that was proportional to the propagation distance as projected along a fixed direction in space. The magnitude of the polarization was empirically found to be:

$$Kr \cos\theta$$

where K is a constant, r the distance from Earth to source, and θ the angle from line of sight to the equator. The rate of rotation of the polarization plane depends on the angle between the direction of travel of the polarized wave and a fixed direction in space, pointing approximately toward the constellation Sextens from Earth. The closer to parallel of the direction of straight-line travel of the wave with this fixed direction, the greater the rotation of the polarization plane of the wave. The amount of polarization rotation is also proportional to the distance traveled.

The rotation claimed was truly small: one period of polarization rotation completed in about ten billion (10^{10}) years. The signal was detected in the microwaves emitted by distant radio galaxies and separated from common Faraday rotation produced by magnetic fields in the intervening space. The results represent an analysis of electromagnetic radiation data that has been compiled and published by several independent research groups since the 1980s. Polarization measurements of electromagnetic synchrotron radiation emitted by distant radio galaxies were studied. Extensive computer aided calculations indicates that this radiation exhibits an unconventional rotation of its polarization plane. The effect is small, and is masked by other polarization rotation effects. The polarization rotation depends systematically on the angle between the radiation's direction of travel and a fixed direction in space, indicating electromagnetic anisotropy.

Birefringence:

Does the universe behave like a special type of optical crystal in which light in one direction acts differently from light in a different direction? Radio waves from distant galaxies must pass through random magnetic fields and cosmic plasma composed of ions and electrons. The Faraday effect predicts the polarization of the radio waves (the orientation of their electric fields) will rotate slightly on their way through space. The effect is proportional to the magnetic field strengths and ion densities, as well as the square of the wavelength.

Claims and Responses

Claim #1: The infinite anisotropy axis running through Aquila, Earth and Sextans only represents a *direction,* a *vector* in space. Any other axis – possibly vastly remote from Earth, Sextans and Aquila – parallel to the anisotropy axis shown here, will suffice in defining the anisotropy vector. No particular *location* in space, like the location of Earth for example, is relevant - only *directions* are relevant.

Response: The observations from Earth indicate that the axis passes through, and is centered on, the Earth. Maintaining that the line is a vector representing an infinite set of parallel lines in the Sextans-Earth-Aquila direction is a mathematical statement without experimental support. Observation of the polarization far from Earth would be needed to confirm the claim above.

Claim #2: A local effect of the Milky Way galaxy might account for our correlation.

Response: The correlation is seen for large redshift/distances ($z > 0.3$) but not at small distances where $z < 0.3$. This effectively rules out a local effect.

Claim #3: Strong galactic magnetic fields might generate non-random polarization directions, or upset the Faraday-based compensations. There would also have to be a distance dependence for this preferred orientation.

Response: But the correlation is observed over the entire sky; any explanation like this requires a highly unlikely conjunction and cooperation between remote objects at large angles of separation. A study of polarization rotation data for 160 galaxies points to a mysterious angular dependency across the sky, as if the universe had an axis. This anomaly challenges some sacred icons in physics, for example:

- there is no preferred motion in space – in direction or speed.
- space itself is isotropic (the same in all directions) or
- homogeneous (the same in all places).

Summary

Nodland and Ralston do not suggest rotation as a possible explanation, saying it may be the vacuum of space twisting the electric fields of the

radio waves to polarize them in transit. Without using the word "ether" itself, this statement is essentially the contention of the Geocentric theory – that the firmament causes all the heavenly motions we see, even the smallest details. It was found that the universal torsion fields [here read ether flow] produce rotation of particles as they travel, are not evenly distributed, but rather form a cosmic axis through space. The closer a particle is to this cosmic axis, the more rotation is produced. For one who is unencumbered by modern cosmic speculative theories like the Big Bang and the Cosmic Uniformity Principle, the simplest explanation would be a real axial rotation of everything in a finite universe. Of course a cosmic axis is anathema to Big Bang theorists because it implies a center and an edge to the universe. In contrast to the drawn-out two-year peer review process given to the Nodland-Ralston paper, the criticisms in reply were almost immediate and seemed a bit desperate in their dismissal of the careful investigation. Is it coincidence that the constellation Sextans stands for the *sextant,* the ancient instrument by which mariners would navigate? Or that Aquila is a messenger from Heaven – the mythological Eagle leading souls to immortality.

Several authors (*e.g.*, Birch, Obukhov-Korotky-Hehl and Kühne) have dared to use a cosmic rotation model to explain the results, but try to maintain the standard cosmic view using General Relativity. Rotation of the polarization of an electromagnetic wave would be an effect of the cosmic rotation and spacetime curvature, which also accounts for other image characteristics like size, shape and orientation.

Pain and Ralston later used a larger data set and found that isotropy was definitively eliminated. The direction was slightly adjusted from the original report to be at: [R.A. = (0h, 9m) ± (1h, 0m), Decl. = -1° ± 15°]. This puts the polarization axis on the vernal equinox line, which is the line in space connecting the sun with the Earth when day and night are of equal length. Axis parameters concordant with the axis parameters in Nodland and Ralston have been found to coincide with the Cosmic Microwave Background dipole direction by Kuhne and by Bracewell-Eschelmann.

There seems that the statistical analysis is pointing out two directions of polarization:

1. The Cosmic Microwave Background dipole direction toward the Leo-Virgo clusters, independently determined by COBE.
2. A new direction in the ecliptic plane along the equinox, which will be confirmed by analysis of higher Cosmic Microwave Background multipoles.

The data does not lie. Objective physicists are now being dragged, albeit reluctantly, in the direction of truth. We interpret the galactic polarization data as indicative of sources that are geocentric: symmetric around AND centered on the Earth!

Tegmark CMB quadrupole, octopole (2005)

What are multipoles? Multipole vectors are a mathematical representation of the Cosmic Microwave Background sky in expanded spherical harmonic coordinates yielding evidence for statistical correlation of multipoles with spatial anisotropy (preferred cosmic directions). Note that the origin of the spherical expansion is the Earth. This is the tool chosen to analyze the Cosmic Microwave Background spectrum. Graphic representations shown below for lowest multipoles:

l	Name
0	Monopole
1	Dipole
2	Quadrupole
3	Octopole
4	Hexadecapole
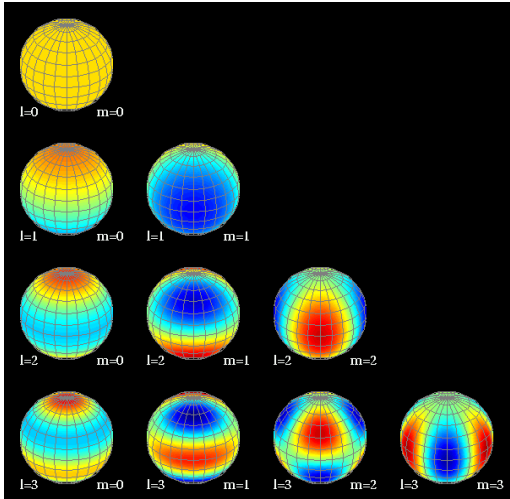
Clem Pryke (pryke@aupc1.uchicago.edu)
Cosmic Microwave Background multipoles for l = 0 to 3 and m <= l

Overview:

The multipole vector framework was applied to full-sky maps derived from the first year Wilkinson Microwave Anisotropy Probe (WMAP) data. The Wilkinson Microwave Anisotropy Probe appears to show something amiss with the standard model of cosmology, as it takes the sky temperature from 1.5 million kilometers in space. "Inflation plus cold dark matter" is the working hypothesis for how structure formed in the universe. The precise shape of the angular power spectrum depends not only on the underlying inflation model, but also on cosmological parameters such as the Hubble constant, the mass density and the composition of the dark matter. The 2500 or so independent multipoles that can be measured have enormous potential to determine cosmological parameters and to test theories of the early universe.

Cosmologists think the tiny variations were imprinted when matter began to clump together under gravity as the Big Bang cooled. Hotter patches were once denser regions, cooler patches were once less dense. The density variations began as quantum vacuum fluctuations during the universe's first moments and which were blown up by inflation, a period of accelerated Big Bang expansion. These random quantum variations should be found in the broad cosmic features of the Cosmic Microwave Background as random and patternless, with no specific identification of local objects or structures.

After correcting for the dipole's Doppler effect, it was found that the temperature of the galactic plane (coming from our galaxy) is slightly warmer than the rest of the universe. This represents the higher pole contribution to the Cosmic Microwave Background temperature map.

In 2005, Magueijo and Land found an alignment in the cosmic microwave background. The large-angle (low-) correlations of the Cosmic Microwave Background exhibit several statistically significant anomalies compared to the standard inflationary cosmology. The quadrupole plane and three of the octopole planes are very closely aligned. Three of these planes are orthogonal to the ecliptic, and the normals [vectors] to these planes are aligned with the direction of the Cosmic Microwave Background dipole and with the two equinoxes. The remaining octopole plane is orthogonal to the supergalactic plane. All these alignments have confidence levels > 99%. In fact a comparison with 100,000 random skies populated by Monte Carlo methods shows each correlation is unlikely with 99% confidence. The hot/cold spots in each pattern seemed to line up along the same direction, contrary to the random distribution assumption. Magueijo called this alignment "the axis of evil."

Analysis:

1. The near vanishing of the two-point angular correlation function at angular separations greater than about 60 degrees, related to the low amplitude of the quadrupole contribution ($l = 2$ spherical harmonic) in a spherical harmonic expansion of the Cosmic Microwave Background sky. The real significance of this low value compared to the predictions of the Big Bang is now contested by mainstream scientists.
2. The ecliptic line moves between hot spots and cold spots over a third of the sky, avoiding the octupole extrema over the rest.
3. Deviation from the predicted bell-curve distribution. The quadrupole-octupole correlation is statistically excluded from being possible in a Gaussian random isotropic sky.
4. The quadrupole spectrum is almost the same as the dipole spectrum.
5. The quadrupole and octupole are aligned.
6. The octopole is unusually planar - the hot and cold spots of the octopolar anisotropies lie nearly in a plane.
7. The quadrupole-octopole correlation is excluded from being a chance occurrence in a Gaussian random statistically isotropic sky with high confidence.
8. Three of the four octopole normals lie near the ecliptic plane.
9. Three of the four planes defined by the quadrupole and octopole are nearly orthogonal to the ecliptic.
10. A chance alignment of the normals with the ecliptic plane is excluded at > 99% copn.
11. The three normals near the ecliptic also lie very near the axis of the dipole.
12. The dipole axis lies close to the equinoxes.
13. Three of the normals align with the equinoxes.
14. Four of the normals are orthogonal to the ecliptic poles.
15. Three of the four planes defined by the quadrupole and octopole are nearly orthogonal to the ecliptic.
16. A north-south ecliptic asymmetry – the three extrema in the north are visibly weaker than those in the south.
17. Planarity of the quadrupole-plus-octopole.
18. The planes defined by the octopole are nearly aligned with the plane of the Doppler-subtracted quadrupole.
19. Three of these planes are orthogonal to the ecliptic plane, with normals aligned with the dipole (or the equinoxes).
20. The fourth octopole plane is perpendicular to the supergalactic plane.
21. The ecliptic threads between a hot and a cold spot of the combined Doppler-subtracted-quadrupole and octopole map.

22. The ecliptic separates the three strong extrema from the three weak extrema of the map.
23. A deficit in large-scale multipole power exists between the north and south ecliptic hemispheres.
24. The $l = 4$ to 8 multipoles are very unlikely to be correlated (< 1%) with $l = 2$ and 3.
25. Most low multipoles of the near Galaxy are far from the Cosmic Microwave Background multipoles, removing the Milky Way structure as a reasonable cause of the observed Cosmic Microwave Background correlations.
26. The presence of preferred directions in the multipoles seems to extend beyond the octopole to higher multipoles, with an associated mirror symmetry

All 26 of these anomalies contradict the standard picture of the universe and have no explanation.

Dipole-filtered CMB Map[329]

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[329] http://lambda.gsfc.nasa.gov
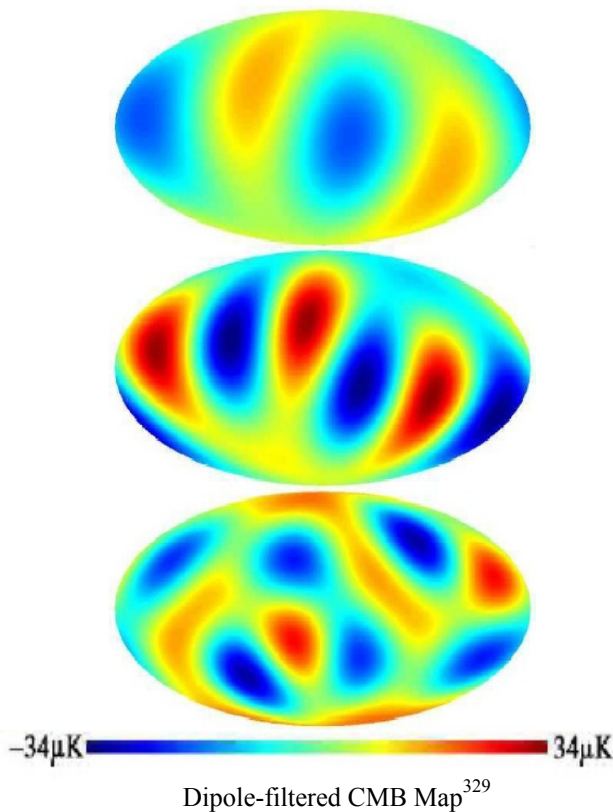
The quadrupole (top), octopole (middle) and hexadecapole (bottom) components of the dipole-filtered CMB map on a common temperature scale. The quadrupole has low power; both it and the octopole have a common axis, the Galaxy plane. Significant features of the diagram above:

1. Both the quadrupole and the octopole have their power suppressed along a particular axis between the two, roughly towards (-110°, 60°) in Virgo.
2. How significant is this quadrupole-octopole alignment? The probability is only about 1.6% of an accidental chance alignment.
3. The quadrupole magnitude is low with a suspicious alignment. A generic quadrupole has three orthogonal pairs of extrema (two maxima, two minima and two saddle points). The actual Cosmic Microwave Background quadrupole has its strongest pair of lobes near the Galactic plane.
4. Filtering the galaxy contribution primarily affects the quadrupole, removing a large fraction of its power. Other poles are affected slightly.
5. The saddle point is close to zero, implying a preferred axis in space where the quadrupole has no power.
6. The observed quadrupole is the sum of the cosmic quadrupole and the dynamic quadrupole due to our motion relative to the Cosmic Microwave Background rest frame. The latter should be subtracted when studying the cosmic contribution.
7. The overall octopole power is large, having a preferred axis along which power is suppressed, the same axis as the quadrupole.
8. In contrast, the hexadecapole acts like an isotropic random field, with no intrinsic direction detected.
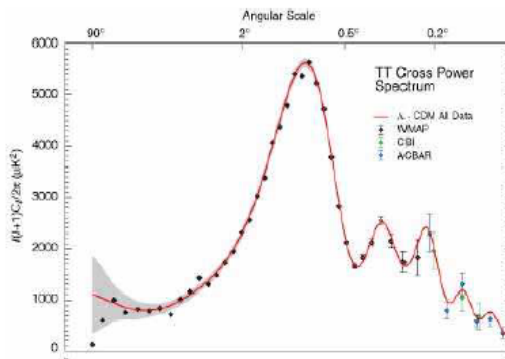
WMAP angular power spectrum of CMB temperature fluctuations.[330]

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[330] http://lambda.gsfc.nasa.gov

The separation angle plotted at top is conjugate to the multipole number l : $\theta \sim 180^0/l$. This multipole plot does not agree with theoretical predictions for an infinite Euclidean space (curved line), but deviates from theory for low multipoles < 4.

Music Analogy:

Just as the sound vibrations of a drum may be expressed as a combination of its harmonics, so fluctuations in the cosmic background radiation may be expressed as combinations of the vibrational modes of space itself. When the level of fluctuations is plotted as a function of angle, we find a characteristic of spatial geometry over all time. The position of maxima in the angular spectrum is described by their wave number or mode $l = 180°/\theta$, where θ is the angular distance in the sky. The lowest mode - the dipole or $l = 1$ mode - is undetectable, swamped by the far stronger dipole. The first observable mode, the $l = 2$ or quadrupole mode, was seven times weaker than the predictions for a flat, infinite universe. The octopole or $l = 3$ mode was also less than the expected value by a factor of about two-thirds. For higher modes up to $l = 900$, corresponding to angular scales of just 0.2°, the Wilkinson Microwave Anisotropy Probe data are fairly consistent with the standard model. But the distribution of temperature fluctuations is not fully isotropic and the fluctuations are distributed differently on different angular scales. The unusually low amplitudes of the quadrupole and octopole modes means that long wavelengths (*i.e.* temperature fluctuations over large angular scales) are missing, possibly because space is not big enough to sustain them, like vibrations of a string fixed at both ends, where the maximum wavelength is twice the string length. In a stringed musical instrument this would mean that the low bass notes would be missing. Only with a very long string, of "infinite" length, would all harmonics be fully represented.

The straightforward geometrical explanation of the power spectrum implies that we live in a finite space that is smaller than we currently observe. There is also evidence that the shape of the spectrum might reflect local conditions because there are differences between northern and southern galactic hemispheres and the largest fluctuations are in the solar system plane.

From Dr Max Tegmark, of the University of Pennsylvania, CMB analyst:

> The entire observable Universe is inside this sphere, with us at the **center** of it….We found something very bizarre; there is

some extra, so far unexplained structure in the Cosmic Microwave Background… We had expected that the microwave background would be truly isotropic, with no preferred direction in space but that may not be the case. The octopole and quadropole components are arranged in a straight line across the sky, along a kind of cosmic equator. That's weird… We don't think this is due to foreground contamination. It could be telling us something about the shape of space on the largest scales. We did not expect this and cannot yet explain it.

Interpretation:

The undersized multipoles for $l < 4$ (low multipole cutoff) indicate that the universe is cut-off at large distances, which means a cosmos that is finite in space! It cannot be bigger than now observed in the Cosmic Microwave Background sky.

The correlation of the normals with the ecliptic poles suggest an unknown source or sink of Cosmic Microwave Background radiation. If it is a physical source or sink in the inner solar system, it would cause an annual temporal modulation or appear in polarization maps. So we must look deeper into space.

Physical correlation of the Cosmic Microwave Background with the equinoxes is hard to explain, since the Wilkinson Microwave Anisotropy Probe satellite has no knowledge of the inclination of the Earth's spin axis. Whence these correlations?

The correct explanation of these unexpected Cosmic Microwave Background correlations is currently not known. There are four possibilities:

(1) There is a systematic error (an error in the data analysis or instrument modeling).
(2) The source is astrophysical (*i.e.* an unexpected foreground).
(3) It is cosmological in nature (*e.g.* an anisotropic universe with nontrivial topology).
(4) The observed correlations are a pure statistical fluke.

A statistical fluke can be eliminated, based on the high confidence levels and the varying independent data sets and analysts. If indeed the $l = 2, 3$, Cosmic Microwave Background fluctuations are inconsistent with the predictions of standard cosmology, then one must reconsider all Cosmic Microwave Background results within the standard paradigm which rely on low l's.

Suggestions for the cause of the preferred $l = 2, 3$ axis:

(1) A feature of a non-trivial cosmic topology. For example, a universe with a football or doughnut/torus shape, the symmetry axis being the observed direction.
(2) Anisotropic Big Bang expansion, i.e, different speeds in different directions.
(3) Intrinsic cosmic inhomogeneity, basically, the ether as a euphemism.
(4) The universe is really rotating, making the rotation axis different from other directions.

Geocentrism

The cosmological principle assumes that the universe is the same in all places and directions; otherwise, it would be impossible to solve Einstein's equations. If this assumption is wrong, the standard Big Bang model of cosmology would be unusable.

The Cosmic Microwave Background octupole and quadrupole components were expected to form no pattern at all, but the results were anything but random. If the multipole vectors of the quadrupole and the octopole are correlated with the ecliptic poles, the axis at 90° to the solar system plane and with the dipole direction, then this suggests that the large wavelengths/low frequencies are missing because we are seeing the influence of the solar system environment, not the global properties of space. And we see these missing features because of our privileged position in the center of space. As might be expected from past history, despite these totally unpredicted and unexplained anomalies, the Cosmic Microwave Background data is regarded as a dramatic confirmation of standard inflationary cosmology! In fact, the axial correlation between multipole harmonics has been dubbed the "Axis of Evil." The combination of a complete lack of any known systematic error, and long odds against random alignment that has earned the low-alignment anomaly this nickname. Why is the axis called "evil"? Because it represents a return to the forbidden days of five centuries ago, when all science was geocentric/geostatic. It is the plain indication of an inherently inhomogeneous and anisotropic universe.

If its causes are of both deep space and local origin, the explanation might be found in an interaction of local structures with the deep space source(s) of the ether. Conventional physicists assume the dipole comes from the solar system motion through the Cosmic Microwave Background rest frame. Not being of cosmic origin, they subtract the Cosmic

Microwave Background dipole moment from computations of all other multipoles. This throws the baby out with the bathwater. The dipole is 1000 times stronger than any other pole; it points to the source of the Cosmic Microwave Background.

The largest signal in the Cosmic Microwave Background anisotropy is the dipole, 3.346 mK in the direction (l = 264, b = 48) in galactic coordinates. This is attributed to the motion of the sun at 370 km/s with respect to the rest frame defined by the Cosmic Microwave Background. The solar motion implies the presence of a kinematically induced Doppler quadrupole. This is an artifact of the antigeocentric premise: if the multipole hot spots indicate the ether source(s) in the cosmos then the multipoles have nothing to do with the kinematics of matter. Doesn't anyone realize that the universal Cosmic Microwave Background has local axial and planar symmetries only when viewed from Earth? Doesn't any scientist on this planet realize that it isn't a planet? When will our stiff-necked scientists bow their heads and acknowledge the elephant in the living room, the emperor with no clothes?

The tiny and tall,
The big and the small,
The Lord God Almighty,
He alone made it all!

**Galaev (1998)**

A tube is placed into a gas stream perpendicular to the stream direction. With no pressure drop across the tube the gas inside the tube will be static. The tube is rotated 90° so the gas stream is along the tube axis, causing a pressure drop and gas motion.
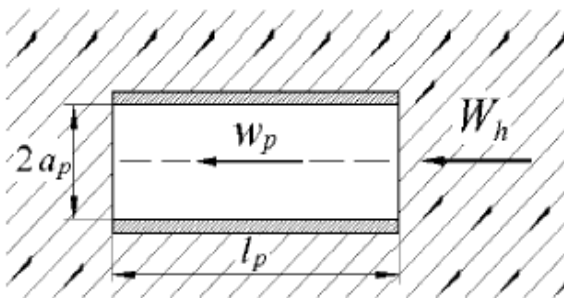
Tube and gas flow parallel[331]

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[331] http://home.t01.itscom.net/allais/blackprior/galaev /galaev-2.pdf Fig 1.

W_h is the horizontal ether speed component outside the pipe, W_p inside the pipe, a and l_p are the pipe's radius and length. The ether flow is shown as slanting thin vectors. The metal tube walls have major ether-dynamic resistance, when the ether flow is normal to the tube axis, the interior ether flow is minimal. The ether velocity caused by the horizontal velocity, W_h, creates the ether flow in the tube, having mean velocity W_p. The tube is a channel for the ether stream that will be treated by the laws of viscous liquid hydrodynamics. The time to reach steady-state conditions depends on the kinematic ether viscosity, the tube size and the velocity of the exterior gas stream. The gas stream in the tube is almost uniform, with a sharp reduction to zero in a thin boundary layer near the wall. With a light beam inside the tube, and another outside in the exterior ether flow, turning the tube at a right angle will form an interference pattern, after stabilization, by combining the two beams. See below.
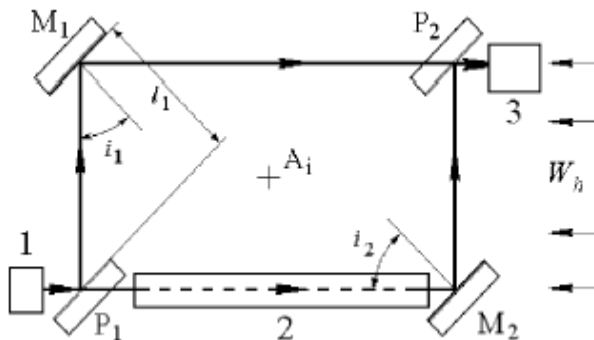
Optical interferometer layout Source 1; tube 2; eyepiece 3; P_1, P_2 half-silver mirrors; M_1, M_2 full-silver mirrors; A_i rotation axis; l_1, i_1, i_2 as shown above[332]

Key principle: Since the ether velocity changes from 0 to maximum with a 90° rotation, the phase of a light wave should also change according to the time variation of the ether velocity $Wp(t)$. The phase offset will be proportional to the ether exterior velocity and the stabilization time will

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[332] http://home.t01.itscom.net/allais/blackprior/galaev /galaev-2.pdf Fig 3.

define the ether kinematic viscosity. The light beam is divided by P_1 into two beams, which combine at P_2 with a phase difference:

$$\phi = 4\pi l_1 (\cos i_1 - \cos i_2)/\lambda$$

By geometry, the phase difference between the two beams is proportional to the small difference in the ether velocity inside the tube, $W_p(t)$, and outside, W_h :

$$\Delta\phi = l_p(W_h - W_p)/\lambda c$$

The maximum phase shift occurs when the internal ether velocity Wp is zero, maximum $\Delta\phi = l_p W_h/\lambda c$. Zero phase difference occurs when the ether velocities are equal inside and outside the tube. Solving the last equation for W_h,

$$W_h = \lambda c \, \Delta\phi_{max} /l_p$$

Substituting in the $\Delta\phi$ equation :

$$W_p = \lambda c /l_p(\Delta\phi_{max} - \Delta\phi)$$

The ether kinematic viscosity is calculated to be 7.06×10^{-5} m^2/sec; the measured value is 6.24×10^{-5} m^2/sec. This is within the range of real gases: $CO_2 = 7 \times 10^{-6}$ m^2/sec, He $= 1.06 \times 10^{-4}$ m^2/sec .

Summary of the result types:

- horizontal ether velocity W_h.
- a daily record of the ether drift velocity:
    - in each stellar day.
    - daily course averaged during the year by month - W_h (S).
    - averaged for all measurements - W_h (S).
- mean-square deflection W_h from its mean value σ_w .

The confidence interval of the measurements is 0.95. Over a year 2322 readouts were performed.
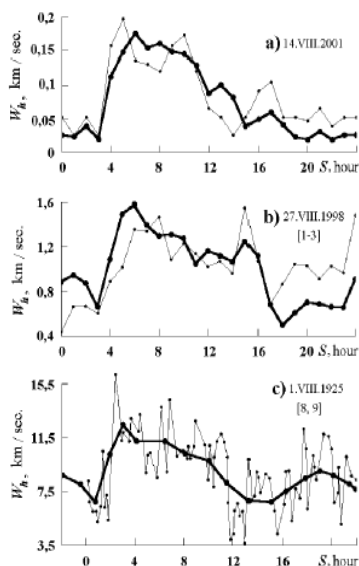
Diagram of four ether experiments all performed at various locations with three different interferometers over a period spanning 76 years – optical of order v/c in 2001, radio waves of order v/c in 1998, optical of order v^2/c^2 in 1925.

Each chart depicts ether velocity variation W_h within a stellar day in September.[333] The similarity in all three patterns varying over different locations, years, equipment and protocols is undeniable. The differing ether drift magnitude in each chart is caused by the corresponding altitudes of each interferometer: 1.6 m; 42 m; 1830 m, respectively.

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[333] http://home.t01.itscom.net/allais/blackprior/galaev/ galaev-2.pdf Fig 8.
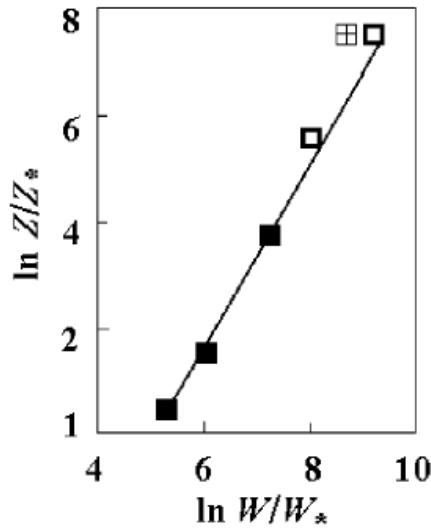
Normalized dependence of the ether velocity on altitude. W is the ether velocity at the height Z. Data points are from Galaev, Miller and Michelson experiments.[334]

The ether velocity increases linearly with the altitude, contributing to the many null results found around sea level. At ether velocities of 200-400 m/sec, second order effects are virtually undetectable. Second order sensitivity to the ether drift is 6 powers of ten lower than first order. The four experiments independently support the linear dependence of ether speed with height.

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[334]http://home.t01.itscom.net/allais/blackprior/ galaev/galaev-2.pdf Fig 9.

Mean daily record of the ether velocity[335]
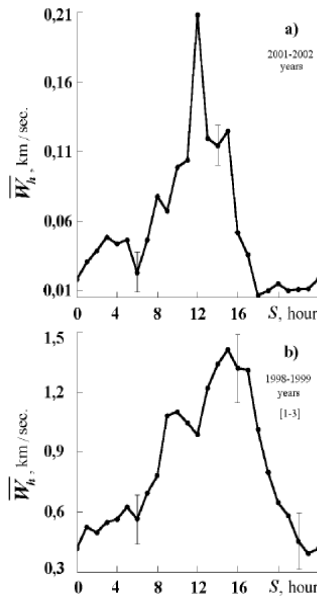
There is an annual as well as daily sidereal variation. Both parts of the diagram have similar features to the ether velocity variation within a day. Differences in the two shapes can be caused by viscous ether flow interaction with the local structures and terrain. In the top chart the ether drift velocities are smaller because of the lower altitude. Ether speed exhibits periodic changes over a stellar day, implying a cosmic origin for the ether. Since the speed of light *c* depends on the motion of its carrier, *c* will also fluctuate with a period of one stellar day. Light speed will also depend on its direction in the ether and increase with altitude above the Earth's surface.

Highlights:

- The ether drift data refuted a stationary medium.
- The Earth's orbital ether drift around the Sun at 30 km/sec was not detected.
- The comparison of the suspected ether drift results with other experiments, compensating for latitudes and heights above sea level, finds them in agreement.

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[335]http://home.t01.itscom.net/allais/blackprior/galaev/ galaev-2.pdf Fig 10.

- Annual reproducibility: Systematic measurements in months of the year matching the same months of past experiments compare favorably to the corresponding results of these past experiments.
- The old experiments that are second order in v/c are 10,000 times less accurate than modern experiments that are first order in *v/c*.
- Atsukovsky estimates the sound velocity in ether to be 10^{21} m/sec, which exceeds the speed of light by $> 10^{12}$ -- more than a trillion times faster.
- The daily variation of fringe pattern corresponded those variations measured in prior experiments within a 24-hour time frame.
- Measurements with radio wavelengths show a rather small horizontal ether component during part of a day.
- Interferometer measurements are proportional to a vertical velocity gradient for the ether motion near the Earth's surface. This gradient value is proportional to the ether drift velocity (to first order).
- Horizontal ether velocity changes measured in the same month of any year have similar variation within a day.

The primary comparison is with Miller's 1925 Mt. Wilson investigation, so a summary follows.

The Miller experiments

Location	Altitude	Ether drift km/sec
Cleveland	265 m.	3
Mount Wilson	1830 m.	10

Miller ether direction coordinates:
[RA 17.5 hr, dec + 65°]
compared to the ecliptic North pole:
[RA 18 hr, dec.+ 66°]

Miller concluded the ether flow has a galactic (space) origin and the speed was more than 200 km/sec, but he could not explain decrease from 200 to 10 km/sec.

Premises:

Ether originates in space with a vertical velocity gradient near the Earth's surface due to ether viscosity. The mean value of the maximal

gradient equals 8.6 (m/sec)/m. The change of ether drift boundary layer with height is due to the relative movement of the solar system and the ether near the Earth's surface. Note: not due to the Earth's rotation! The analysis will use Galilean relativity: light speed for the observer is the velocity relative to the ether plus the ether velocity with regard to the observer.

Experimental problems:

Miller showed that null result Michelson-Morley experiments running inside hermetic metallic chambers diminish the ether they were trying to measure. Mt. Wilson was done in an open structure; Miller recommended minimal shielding for success in ether detection. But later experiments using resonators, masers and Mössbauer effect again used massive metallic chambers or lead shields for gamma ray protection - a common instrumental error of these experiments. Michelson's two-way interferometer of the second order is insensitive to the ether streams and too sensitive to the environment.

Four factors affecting the ether flow were distinguished:

1. Anisotropy: depends on light beam direction relative to the solar system and the ether flow.
2. Altitude: above the Earth's surface/sea level, caused by surface interaction with the viscous ether flow.
3. Cosmic: variation period of one stellar day, caused by a cosmic (galactic) source.
4. Hydro-aerodynamics ➔ ether-dynamics: motion of the viscous gas-like ether within the confinement housings, caused by solids interacting with the ether. The height effect is partially dependent on ether dynamics.

Ether properties:

- a material medium, responsible for electromagnetic wave propagation.
- similar to a viscous gas.
- metals have major ether-dynamic resistance.

Ether viscosity:

Viscosity measurement is of particular interest, as the experimental data for ether viscosity and its measuring methods have not been described

in physics literature up to date. The kinematic viscosity values, calculated and measured, give a basis to consider that the ether stream is similar to real known gases in its interaction with solids, in passing around obstacles and moving through pipes. Solids interacting with the ether flow should encounter major ether-dynamic resistance. The interferometer test shows that a dielectric tube can channel the ether as well as the metal tube. The inability of ether flow to pass through obstacles explains the unsuccessful prior attempts to detect the ether drift with enclosed interferometers.

Pioneer 10, 11 Anomalies, 1972 - 2004 update

Description:

The Pioneer anomaly/effect is the measured deviation from trajectory models of various unmanned spacecraft visiting the outer solar system, notably Pioneer 10 and 11. Doppler tracking data from the Pioneer 10/11 spacecraft from between 20-70 AU, yields an unambiguous and independently confirmed anomalous blueshift drift of $2.92 \pm 0.44 \times 10^{-18}$ s/s^2. It can be interpreted as being due to a constant acceleration of $a_P = (8.74 \pm 1.33) \times 10^{-8}$ cm/s^2 directed towards the sun. No systematic effect has been able to explain the anomaly as of 2005.

The Pioneer 10 data spans 11 years; Pioneer 11 spans 4 years. At 20 AU, the spacecraft was sufficiently far from the sun for the pressure of solar radiation to have dropped to a level where the 252 kilogram probe could no longer be accelerated by the pressure. A systematic error then became apparent, an unexplained acceleration directed towards the sun that has been present ever since in all four spacecraft – the two Pioneers, Galileo and Ulysses. Although the data from the Galileo and Ulysses spacecraft indicate a similar effect, their design, spin-stabilization and proximity to the sun do not favor easy detection. Should the anomaly not be a force but rather a cause that affects all frequency standards, accelerometers will be ineffective in discovering the nature of the observed anomaly. There are no current space missions that are expected to provide useful data.
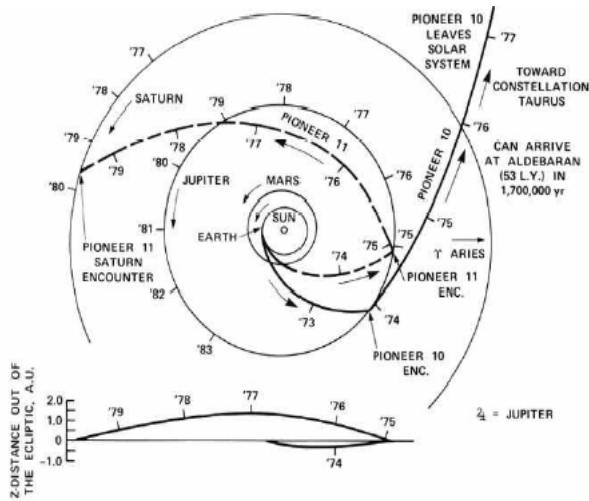
Summary of the Pioneer orbits in the interior of the solar system.[336]

Details of the effect:

1. The Voyager data was too coarse for testing.
2. Large, bound astronomical bodies show no signs of the anomaly, although the acceleration is too large to have escaped detection in planetary orbits, particularly for Earth and Mars.
3. The fundamental problem is measured as a Doppler shift; the delta in acceleration is inferred by holding c constant.
4. The range of the anomaly is unknown; it is basically constant between 20 and 70 AU. (NB: an AU (Astronomical Unit) is the Earth-sun distance, about 92 million miles)
5. It was masked by the larger solar wind acceleration until reaching 20 AU.
6. The direction of the acceleration is assumed to be towards the sun, but the resolution does not permit this assertion. It is possible that the acceleration is: (a) toward the Earth; (b) along the direction of motion, or (c) along the spin axis.
7. The actual direction indicates a physical origin that could be: (a) new dynamical physics originating from the sun; (b) a time signal anomaly; (c) a drag or inertial effect; (d) a property of the ether flow in the outer solar system; (e) an on-board systematic defect.

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[336] http://arxiv.org/PS_cache/gr-qc/pdf/0507/0507 052.pdf Fig. 1.

8. When all systematic factors common to all four craft are taken into account, the anomaly still remains.
9. A Voyager-type space-craft is not appropriate; its frequent attitude-control maneuvers overwhelm any small external acceleration.
10. Ulysses data analysis discloses an unmodeled acceleration towards the Sun of $(12 \pm 3) \times 10^{-8}$ cm/s^2, about 50% higher than the Pioneer anomaly.
11. Viking ranging data accuracy limits any unmodeled radial acceleration acting on Earth and Mars to no more than 0.1×10^{-8} cm/s^2.
12. Ranging data are independent of the Doppler shift; they are found from signal time delay calculations of the motion are made on the basis of the range time-delay and/or the Doppler shift in the signals.
13. Despite large solar radiation effects, the nominal value obtained for the Galileo spacecraft by measurement was $\sim 8 \times 10^{-8}$ cm/s^2, comparable to the Pioneer values.
14. The a_P stays approximately constant for a long period (Pioneer 10 is now past 70 AU).
15. The Pioneer anomalous acceleration contradicts the accurately known motion of the inner planets.

Suggestions/interpretations:

- A gravitational frequency shift of Pioneer signals proportional to distance and the density of the interplanetary dust cannot be responsible for the anomaly; known properties of the dust are not large enough to produce the observed acceleration.
- The effects of dark matter or modified gravity fail because observable effects that should be seen on the orbits and distances of the planets are not seen.
- Possible problems with atomic clocks have been eliminated as a cause.
- The predominant opinion of a thrust from gas leakage does not explain why the leakage from four independent craft of three different designs has the same effect.
- Proposed missions to provide useful data include using two craft near Saturn at wide angles to pinpoint the effect direction by signal interferometry.
- internal systematic properties, undiscovered because of identical design.

- a viscous drag force proportional to the velocity of the Pioneers.
- Unknown mass distribution in the outer solar system.

The possibility of a new paradigm, or the reinstatement of an old one, may be in the offing.

C Anisotropy

The basic experimental observable is a Doppler frequency shift. If f_o refers to the observed frequency, f_m refers to the frequency predicted from theoretical models and f_r is the reference frequency, then:

$$f_o - f_m = -f_r (2at/c) = -f_r (2v/c)$$

The frequency has been measured as decreasing at 6×10^{-9} hertz per second or 1.5 Hz over a period of 8 years. Since t and c are known, the non-Newtonian acceleration a has been the suspect. But the possibility of c changing with the ether density or flow has not been addressed. The behavior of the space probes provides dynamic information on the dependency of light speed on the ether of interplanetary space. The Pioneers are, in effect, mapping the solar system ether flow.

Measurements actually indicate that the observed Doppler frequency, f_o, is dropping with time. Let's solve for f_o from the above equation,

$$f_o = f_m - f_r (2at/c) = f_m - f_r (2v/c)$$

Since f_m remains unchanged, a decrease in observed frequency will occur with an increase in $f_r (2v/c)$ or a decrease in c. So a change in a or in c will cause the Pioneer effect.
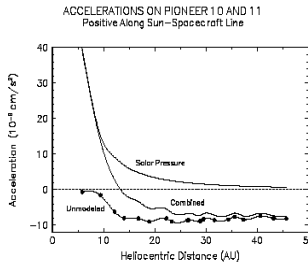
Pioneer accelerations vs. distance from the sun.[337] The accelerations are: a) the calculated solar radiation acceleration (top line), b) the

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[337] http://arxiv.org/PS_cache/gr-qc/pdf/0104/0104064.pdf Fig. 3.

unmodeled acceleration (bottom line), and c) the measured combined acceleration (middle line)

Subtraction of the measured acceleration from the solar wind/radiation pressure gives the unknown anomalous acceleration. The solar radiation pressure decreases as the inverse square, $1/r^2$.
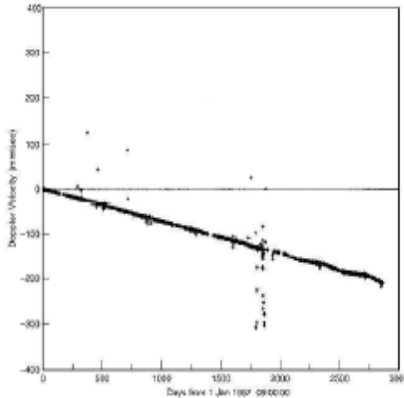
Observed Doppler velocity minus model
Doppler velocity for Pioneer 10 vs. time.[338]

The slope of the long term plot of velocity versus time above visually demonstrates that the acceleration is negative and constant. The drift is clear, definite, and cannot be removed without either adding acceleration, a_P, or the inclusion of a frequency drift or clock acceleration, at.

Periodic variations:
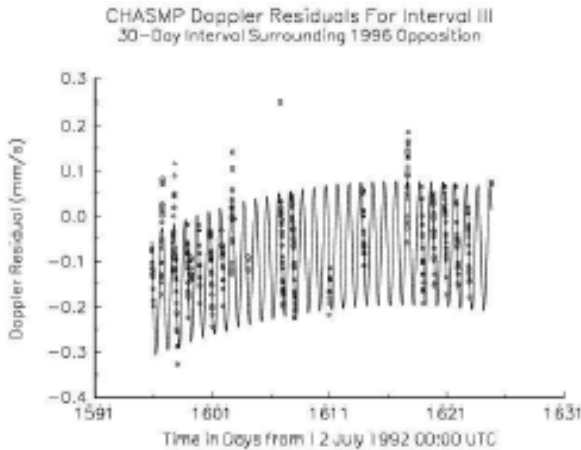
Periodic Doppler shifts over 30 day interval[339]

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[338] http://arxiv.org/PS_cache/gr-qc/pdf/0104/0104064.pdf Fig. 6.

A pattern now becoming familiar: a short-term diurnal sine wave within an oscillating long term envelope. The data lacks the details to separate out either diurnal (solar day) from sidereal day, or to determine the direction of the source. The odds are on the Virgo-Leo cluster for the sidereal direction and the ecliptic normal for the annual variation.

An anomalous oscillatory annual term, smaller in size than the anomalous acceleration a_P, has been found by using a 1-day average over all 11.5 years, yielding:

$$a_A = (7.77 \pm 0.16) \times 10^{-8} \text{ cm/s}^2$$

for the added annual oscillation. The presence of the small annual term on top of the complete solution is apparent in the graphic above. If approximated by a simple sine wave, the amplitude of the annual sinusoid is about 1.6×10^{-8} cm/s^2. Two different programs were independently able to produce similar post-fit residuals, giving confidence in the solutions.

A least-squares fit to an annual sine wave produced:

Amplitude v	0.1053 ± 0.0107 mm/s
Phase	5.3 ± 7.2
Angular velocity ω	0.0177 ± 0.0001 rad/day
Bias/offset	0.0720 ± 0.0082 mm/s

The amplitude v and angular velocity ω of the annual term results in a small acceleration amplitude of $a = v\omega = (0.215 \pm 0.022) \times 10^{-8}$ cm/s^2. As seen above, there is a significant diurnal term in the Doppler residuals, with period approximately equal to the Earth's sidereal rotation period. The diurnal amplitude is comparable to that in the annual oscillation, but the angular velocity is 366 times larger. So the magnitude of the apparent angular acceleration, $(100.1 \pm 7.9) \times 10^{-8}$ cm/s^2, is large compared to a_P. The best estimate of the amplitude of the Pioneer 10 sine wave is $(0.525 \pm 0.155) \times 10^{-8}$ cm/s^2 and that of the Pioneer 11 wave is $(0.498 \pm 0.176) \times 10^{-8}$ cm/s^2. The difference in phase between the Pioneer 10 and Pioneer 11 waves is 173.2, similar to the angular separation of the two spacecraft in ecliptic longitude. The amplitudes are in the same proportion as the cosines of the ecliptic latitudes for the two spacecraft. Are the annual and diurnal terms caused by a misalignment of the Pioneer orbits on the ecliptic?

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[339] http://arxiv.org/PS_cache/gr-qc/pdf/0104/0104064
.pdf Fig. 18.

Still, the characteristic signature of a_P is a linear drift in the Doppler frequency, not the annual/diurnal features.
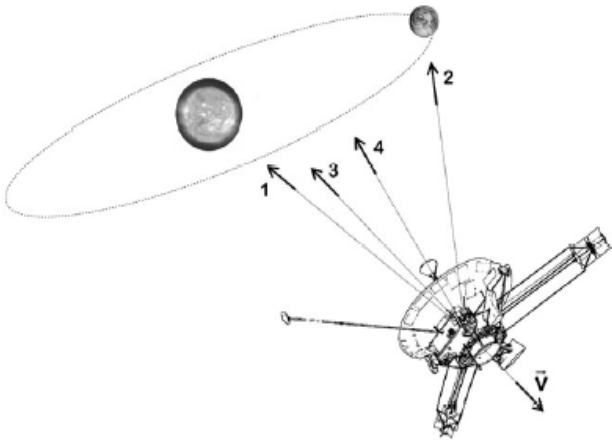
Direction of average acceleration[340]

Four possible directions for the Pioneer anomaly:

(1) towards the Sun,
(2) towards the Earth,
(3) along the direction of motion,
(4) along the spin axis.
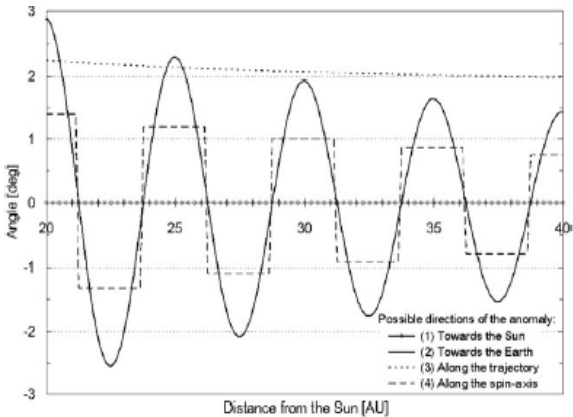
Characteristics of four possible directions of the anomalous acceleration. The signatures are distinctively different.[341]

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[340] http://xxx.lanl.gov/PS_cache/gr-qc/pdf/0308/0308 017.pdf Fig 3.

At 20 AU, the angle between sun and Earth is only three degrees, which is the maximum angle subtended by the sun and the Earth. The average angle is < one degree. With the radiation pattern of the Pioneer antenna and the lack of precise 3D navigation, the determination of the exact direction of the anomaly is difficult. Without an improved antennae and navigation the following directions are indistinguishable:

(1) towards the sun
(2) towards the Earth
(3) along the direction of motion of the craft
(4) along the spin axis

This suggests, for each respective direction, the corresponding inference:

(1) new dynamical physics originating from Sun
(2) a time signal anomaly
(3) a drag or inertial effect, or
(4) an on-board systematic

- The angle from the sun (1) to the trajectory line is fixed.
- The angle towards the Earth (2) is a cosine curve formed by its orbit that is modified by a $1/r$ envelope as the craft moves further out. If the anomaly is directed towards the Earth (2), the current accuracy of the Earth's ephemeris and a sinusoid signal will be essential to determine this.
- An almost-linear angular change approaching the direction of the Sun would indicate a path-related source for the anomaly (3)
- The direction along the spin axis (4) is a series of decreasing step functions, created by the orientation maneuvers.

These four possible anomaly directions all have different characteristics. A future space mission dedicated to resolving the direction of the anomaly should be able to resolve the direction uncertainty.

Claims and Responses

Claim #1: The angle towards the Earth is a cosine curve formed by its orbit. If this cosine variation is observed, the conclusion is that the anomaly is pointed at the Earth, not the sun.

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[341] http://xxx.lanl.gov/PS_cache/gr-qc/pdf/0308/0308 017.pdf Fig. 4.

Response: No. There is a metaphysical assumption here that the Earth moves around the Sun. The reality is that the Earth is fixed, so no variation in direction should be seen. It is the sun that should display a sinusoid curve, in its motion around the Earth. This is a good example of how false cosmic premises compound conceptual errors. The erroneous interpretation of the results will be taken as more proof of a fixed sun and an Earth in orbit around it.

Claim #2: The Pioneer mystery was attributed to a possible "anomalous" acceleration (new physics!), directed toward the sun for both spacecraft.

Response: But if the Pioneer signal travels faster in the ether of space, due to either a change in its density or speed, the frequency shift/acceleration would be a consequence of the change in c.

Claim #3: The position of a spacecraft is found by examining the diurnal variation imparted to the Doppler shift by the Earth's rotation.

Response: Or the effect of the ether rotational flow on the spacecraft!

Claim #4: As the ground station rotates underneath a spacecraft, the Doppler shift is modulated by a sinusoid.

Response: Or the ether rotates between the two!

Claim #5: If the Pioneers are simulating the rotating Earth as in Foucault's experiment, a coordinate transformation to the Cosmic Microwave Background rest frame would entirely remove the Pioneer effect.

Response: No. The effect is absolute, due to the ether, and would be seen in any frame.

Claim #6: The annual and diurnal terms are likely different manifestations of the same modeling problem whose sources are both Earth-related.

Response: The terms are manifestations of an ether that flows through space. The Earth is related to these terms via the ether.

Summary of Data and Experiments

S = supported, D = disproof,
N = neutral or does not apply

Notes: "S" for an experiment does not indicate a proof or confirmation. All empirical evidence is inductive, increasing the probability of the theory's validity, but never excluding future improvement or even abandonment. "D" in any column for a theory requires responses to remove it, otherwise there is no rational reason to maintain a paradigm that cannot explain one or more experimental results within its scope. Only experimental evidence and common experience are investigated below. Theory is discussed as it pertains to the experiment. The first row is the consensus proposed by scientific opinion, which is often far from unanimous – especially in the interpretation of results by relativists. This also holds for the summary columns. The second row of each experiment is the geocentric view.

Dayton Miller, 1921

Proposal: A laborious and precise repetition of the Michelson-Morley experiment, with observations taken over a decade, at high altitude with large insulated and non-magnetic interferometers. Claim of ether detection disproved by Shankland.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = N

Geocentric Response: Proposed a modified ether model of partial drag/entrainment. Obtained positive results for a net ether drift of about 10 km/s towards the galactic North pole. This daily or seasonal effect destroys the foundation of the theory of Relativity.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = D

Illingworth, 1972; Joos, 1932

Proposal: A Michelson interferometer employing helium as the medium, hoping to reduce thermal variations due to *n*. Originally reported no ether drift, accurate to about 1 km/s. (Joos) intended to be a large vacuum interferometer, leaky equipment seals caused conversion to helium,

chosen for its low refractive index, less than air. Small fringe shift showed a speed of only 1.5 km/s.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: Both Illingworth and Joos found similar results with helium. The change in *n* from air to helium confirmed the refractive index dependence, agreeing with the Michelson-Morley experiment and Miller about an absolute cosmic motion around 400 km/s.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = D

Pound-Rebka, 1959

Proposal: Demonstrated that a beam of very high energy gamma rays was slightly red shifted as it fought gravity and rose up a 22 meter elevator shaft at Harvard. The redshift predicted by General Relativity theory of two parts in a thousand trillion (2×10^{-15}) was detected to within one percent (1%) of the computed value. In the reverse direction the gamma waves were blue-shifted to a higher frequency so that the Mössbauer resonant absorption was reduced. The amount of shift in the wavelength corresponded directly to that predicted by General Relativity theory. Both modes show the validity of the Equivalence Principle.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = S

Geocentric Response: The Hatch scale predicts a change in *c* that also predicts the measured frequency shift and agrees with the Equivalence Principle to first order. The Pound-Rebka result thus supports both General Relativity theory and Geocentrism (and many others).

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = N, General Relativity = N

Jaseja, 1963

Proposal: Two He-Ne masers mounted with axes perpendicular on a rotating table produced a consistent interference pattern. Cited as yet another "null" result for absolute motion testing.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: A fringe pattern dip occurs at a sidereal time agreeing with the Miller cosmic direction. Unfortunately, without knowing the ratio of He to N, the exact value of *n* cannot be used to predict the actual ether speed. This test failed in two ways: (1) omitted the refraction correction, (2) no comparison was made with Miller's long-term data (5 years earlier) in sidereal time.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = D

Spinning Mössbauer disc; Chapeny, 1963; Turner-Hill, 1964

Proposal: One Way Tests of Light Speed with Mössbauer effect. Uses a rotating gamma ray source and fixed detector at the center of rotation to place an upper limit on any one-way anisotropy of 3 m/s. Reverses the light path direction by using a rotating source and fixed gamma ray detector at the center to place an upper limit on any one-way anisotropy of 10 m/s. Both spinning Mössbauer experiments use a one-way light path to confirm isotropy of light speed. They are strong evidence in support of Special Relativity by validating the claim of isotropic light speed in every inertial frame by showing that there is no detectable ether drift in the laboratory.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: Only in 2002 was the Michelson-Morley principle of operation understood; its proper analysis leads to rejection of Special Relativity theory in support of Geocentrism. Vacuum interferometers are worthless for detecting ether drift. Only gas Michelson interferometers can detect absolute motion. The drift speeds measured are similar to the Miller and corrected Michelson-Morley experiment. Should have been repeated in vacuum, to verify a true null result.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = D

Shamir-Fox, 1969

Proposal: Repeat of the Michelson-Morley experiment with He-Ne laser and plexiglass ($n = 1.49$) wave guides 0.26 long. Interpreted in terms of the Fresnel drag and Lorentz contraction effects. Light within the plexiglass was modeled as dragged along with it, adding a speed of ($1-1/n^2$)V_{ether} to the speed in the solid, c/n. No shifts were seen on rotation, though sensitivity was .00003, setting an upper limit on ether drift to 6.64 km/s. Conclusion: negative result "enhances the experimental basis of Special Relativity."

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: The use of solid media to detect absolute motion is hopeless, as Miller's data showed that solids absorb ether. Objectively, as a test of ether motion, this experiment was meaningless.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Shapiro Venus Radar, 1969

Proposal: Direct test of Einstein's second postulate and with General Relativity claims that *c* depended on the strength of the gravitational force along its path, in the 1961 interplanetary radar contact with Venus. The expected time delay, due to the passage close to the Sun, would be about 200 milliseconds. The test was successful.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = S

Geocentric Response: Bryan Wallace discovered in 1961 that radar distance measurements of the surface of the planet Venus did not confirm the constancy of the speed of light. There were systematic variations in the radar data containing diurnal, lunar and synodic components. Wallace's analysis strongly challenged the Shapiro reading of results. His analysis of sparsely published 1961 data on the interplanetary radar contact with Venus concludes the data showed a *c* + *v* Galilean component.

Summary: Geocentric = S, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Brillet-Hall, 1979

Proposal: Employed a Fabry-Perot etalon setup with highly accurate lasers and a constant reference length to put an upper limit of 30 m/s for c one-way trips, but reduced this to only 0.000001 m/s for two-way light travel in static or partially entrained ether. This corresponds roughly to the Michelson-Morley experiment (no variations of the round-trip speed of light in different directions, with a time-scale of minutes). Temperature was stabilized inside a vacuum tube. Claimed to impose the most accurate limits on round-trip c anisotropy, since Brillet-Hall found the beat-frequency between a single-mode static laser and its rotating twin limited c anisotropy to 3 parts in 10^{15}.

Summary: Geocentric = D, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: No need to know anything more after the "vacuum" path is mentioned. Without a gas in the path ether interaction is virtually immeasurable – the Cahill criterion. When long term data collected by Brillet-Hall is analyzed it reveals a daily and annual low velocity periodic variation, anticipating confirmation by future tests of higher precision.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = N

Torr-Kolen, 1981

Proposal: Two atomic clocks separated by 500 meters look for sidereal phase variations between them. Guided wave one-way speed-of-light experiment based on the cut-off frequency of a wave guide. Claimed a clear null result for the anisotropy of cosmic radiation that defines a preferred frame of reference.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: The data clearly indicate a signal of about 0.5 µV representing eastward motion. This one-way phase shift disappeared from

the complete round-trip measurement, showing that two-way light speed tests can mask changes in *c*. Showed the ability to sense the speed of a test device using optical speed-of-light sensing in an enclosed room, a very definite disproof of Special Relativity!

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = D

Throbbing Earth, 1983

Proposal: Gravity-wave detectors in Geneva and Frascati, Italy operating for over a year have recorded ground pulsations, most likely expansions and contractions of the entire Earth. Pulse amplitudes are about 100 times larger than gravity wave expectations, but the key feature is the pulsing period – regularly every 12 sidereal hours, which indicates stellar origin.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = N, General Relativity = N

Geocentric Response: First, note that this has been known for over two decades, with no experimental follow-up or even proposed theory. Why is this astounding fact a scientific pariah? What sort of cosmic force could make Earth throb with energy with such precise celestial–based timing? Sidereal waves are anathema to the scientific modernist.

Summary: Geocentric = S, Heliocentric = N, Ether = N, Special Relativity = D, General Relativity = D

Silvertooth, 1986

Proposal: A first-order test of a one-way laser beam interfering with a standing wave initiated by the same laser. The standing wave nodes shifted position when the equipment direction was changed. One wave was phase modulated with respect to the other, creating phase differences that were measured with a photomultiplier tube of special design. Silvertooth's results demonstrate that the wavelength of light varies with the direction of its propagation. The experiment was repeated in 1992, with the same results.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: Silvertooth claimed his interferometer detected the absolute motion of the Earth with respect to the ether. Silvertooth's velocity vector points in a different direction, with twice the speed of Miller's ether velocity, but agrees with Holger Müller's ether velocity. He always found a preferred direction in the direction of the constellation Leo, traveling at a velocity of 378 km/sec. If relativity is correct, then this result should be total nonsense. If the result is correct, however, then it's relativity that is rubbish.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = D

DeWitte, 1991

Proposal: Over a six-month period of testing a 1.5km underground coaxial cable, DeWitte found a cyclic component in the phase drift between high-precision cesium-beam clocks. A 5MHz radio frequency signal generated from each cesium time-base produced two independent but identical signals to within the limits of cesium clock drift. The period proves to be the sidereal day, so DeWitte inferred the cause responsible for the phase shift was galactic, not man-made, in origin.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: No feedback from Relativists yet; it may be that the results are too new, or they are being ignored, or Relativity has no response. Confirms the Miller results with a non-interferometer experiment. Using the Fresnel drag correction predicts an ethereal speed of 900 km/s, far beyond the results of other experiments. This is just another contra-indication of the ether-drag concept, whether partial or total. To repeat this as a two way light-speed experiment, with round-trip measurement to see if a null-result would be obtained due to round-trip averaging, would be enlightening.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = D

CMB Dipole, 1996

Proposal: NASA's COBE satellite sky-mapping project revealed a dipole temperature anisotropy in the cosmic background radiation (CBR),

indicating that the solar system is moving through this unique inertial frame at approximately 390 ± 60 km/s in the direction of Leo. In the CMB rest frame this is one part in 800 (0.13%) of c and more than 10 times the Earth's orbital speed.

Summary: Geocentric = N, Heliocentric = N, Ether = N, Special Relativity = S, General Relativity = S

Geocentric Response: If the CMB fills the universe, then its rest frame must be the absolute frame forbidden by Relativity. Why isn't the Big Bang recession of galaxies at much greater speed than the dipole speed detected in the CMB?   What makes the cosmic expansion speeds invisible? The dipole shows that the galaxies are not receding but are basically at rest in a radial direction and the Earth is at rest, with the Regulus group approaching us. There is a preferred orientation in space, as seen from Earth. The universe has an absolute reference system, debunking Relativity theories; the cosmological principle is disproved. The CMB dipole was totally unexpected and still unexplained by theorists.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = D

Nodland-Ralston, 1997

Proposal: A statistical computer analysis of astrophysical data shows a systematic rotation of the polarization plane of radio waves depends on the waves' direction and travel distance. The effect is extracted independently from Faraday rotation, and found to be correlated with the angular positions and distances to the sources. Monte Carlo analysis yields probability 10^{-3} for the axis to be a random fluctuation. Dependence on redshift rules out a local effect. Barring a hidden systematic bias in the data, the correlation indicates a new cosmological effect.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: "Indication of anisotropy in electromagnetic propagation over cosmological distances" is a well-done article reporting a systematic angle difference between the polarization of radio waves from distant galaxies and the long axis of the elliptical optical images from those galaxies. The polarization axis passes through the Earth from

Serpens to Aquila, supporting the Earth's central position in the universe. The observed axis is due to the ether flow.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = D

CMB Quadrupole-Octopole, 2002

Proposal: WMAP reveals anomalies at the largest angular scales (> 60°): (1) the vanishing of the angular two-point correlation function; (2) under-sized quadrupole and octopole moments, both very planar and aligned; (3) all minima and maxima fall on a great circle on the sky; (4) the low multipoles are inconsistent with a Gaussian normal distribution; (5) they have strong correlation with the solar system ecliptic and the CMB; (6) all patterns have a high level of statistical significance (>99%); (7) becoming more likely that the large scale microwave sky has a local cause.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: So, the latest CMB analysis shows unexpected correlations of low multipoles with the ecliptic and galactic plane! The measurement does not agree with the generic prediction of a random, statistically isotropic sky from Big Bang inflation theory. Instead, there is a totally unexpected symmetry for what should be a map of the cosmos, not of the local structures. This finding is non-trivial, casting doubt on the standard cosmic interpretation of the lowest-*l* multipole correlations from the sky map temperatures. Uncertainty also surrounds the Big Bang claim that the first stars formed very early in the history of the universe.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = D

Galaev, 2002

Proposal: Light speed experiment to first order in v/c, based on viscous gas movement in tubes.

Summary: Geocentric = N, Heliocentric = N, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: Ether verification and measurement of velocity and viscosity with millimeter radio waves, by the gas phase method. Demonstrates ether exists, is dynamic, has viscosity, a cosmic source, and depends on latitude and altitude. Earth exhibits NO orbital motion. Simply put, virtually all these results conflict with Special Relativity and General Relativity theory. No response by Relativists to this recent disproof has been published yet.

Summary: Geocentric = S, Heliocentric = D, Ether = S, Special Relativity = D, General Relativity = D

Pioneer 10-11 Anomaly, 1972-2204

Proposal: The speed of light in deep space may not be *c*, based on the Pioneer probes. Their radio signals contain an "anomalous" Doppler shift, attributed to a small constant acceleration sunward. The drift is a blue shift, uniformly changing with a rate of ~ $(5.99 \pm 0.01) \times 10^{-9}$ Hz/s, or 8.0 x 10^{-8} cm/sec^2.direction: a line-of-sight constant acceleration toward the sun. distance: from ~20 to 70 AU from the sun.

Summary: Geocentric = D, Heliocentric = S, Ether = D, Special Relativity = S, General Relativity = N

Geocentric Response: The annual effect is particularly large in the excursion of Pioneer 11 out of the ecliptic plane! This is a rare opportunity to measure the ether flow outside the ecliptic. The increase in the Pioneer acceleration supports ether flow theory. The effect is due to the varying ether as the transition is made from Newtonian gravity near Earth to the intense firmament of deep space. If the anomalous radial acceleration acting on spinning spacecraft is gravitational in origin, it is not universal. It must affect bodies in the 1000 kg range more than bodies of planetary size by a factor of 100 or more, a violation of the Principle of Equivalence.

Summary: Geocentric = N, Heliocentric = N, Ether = S, Special Relativity = D, General Relativity = D

Conclusion

Since the speed of light proves not to be a universal constant, being subject to variation by daily, seasonal and other periodic effects, the credibility of Relativity should collapse like a house of cards. But there are

too many with interests and egos vested in Relativity – so it is propped up with *ad hoc*, just so, and contradictory supports. But a house built on sand cannot stand the storm of contrary evidence. Nothing strikes fear into the heart of ardent relativists more than experiments that detect "sidereal" variations in terrestrial measurements. The logic is terrifying: How can the stars produce periodic waves every 24 hrs – 4 min if not moving themselves at that rate? If it is the sun's gravitational force lines that we rotate through each day, it should repeat exactly every 24 hours, not 23 hours and 56 minutes. What an important 240 sec! Present popular theories regarding the rotation of the Milky Way Galaxy cannot be correct! Their reasoning requires our sun to be traveling in a relatively circular orbit, which means that we would have to be traveling toward a direction that is very close to 90° away from where the core of the Galaxy really is: [R.A. 17h. 45m. Decl. -29°]. That is not the case! The sun is actually traveling in a direction toward Hercules [R.A.18h Decl. +29°] at 20 km/sec (Wilson, 1911). This is about 32° away from an orbital path in the Milky Way! The crucial tests are the disproofs, the tests that rated an X in explaining the results in the foregoing charts. Using unbiased logic and no ideological prejudices (in the sense that a stationary Earth is not excluded metaphysically as an option for explanation) the tests show that the predictions/claims of:

- Heliocentrism are challenged 23 times,
- Special Relativity 40 times, and
- General Relativity 35 times.
- Geocentrism is never eliminated, in any test.

Despite this scientific analysis, the rejection of geocentrism will continue until reason returns. There are scientists today who have boldly rejected the speculation of Relativity and found, as this chapter has, that experiments consistently disprove its principles, even when wrapped in mathematical legerdemain. But they will not, they cannot, shake off the mistakes of the past until they return to the belief of the ancients in a *terra* that is truly *firma*.

"We wouldn't know truth if it jumped up and bit us in the ass. We're probably fairly good at recognizing what's false, and that's what science does on a day-to-day basis, but we can't claim to identify truth."

Steven M. Holland[342]

"…the tail is just as capable of wagging the dog in science as anywhere else."

Robert Laughlin[343]

The common idea that scientists reject a theory as soon as it leads to a contradiction is just not so. When they get something that works at all they plunge ahead with it and ignore its weak spots…scientists are just as bad as the rest of the public in following fads and being influenced by mass enthusiasm."

Vannevar Bush[344]

"It is not uncommon for engineers to accept the reality of phenomena that are not yet understood, as it is very common for physicists to disbelieve the reality of phenomena that seem to contradict contemporary beliefs in physics."

Henry H. Bauer[345]

"Hypothesis…establishes itself by a cumulative process…if you make the same guess often enough it ceases to be a guess and becomes a scientific fact."

C. S. Lewis[346]

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[342] Professor of Geology at University of Georgia to colleague Bruce Railsback. Quote personally verified by phone from Dr. Holland on Aug 8, 2007.
[343] Robert Laughlin, *A Different Universe,* 2005, p. 100.
[344] Vannevar Bush, MIT Dean of Engineering (d. 1974), attributed, not verified.
[345] Henry H. Bauer, professor at Virginia Polytechnic, "The So-Called Scientific Method," in *Scientific Literacy and the Myth of the Scientific Method*, 1992.
[346] C. S. Lewis, *The Pilgrim's Regress*, 1958, p. 37.

The ALFA Model

Absolute Lab Frame & Flexible Aether

Dr. Robert Bennett
e-mail: robert.bennett@rcn.com

This paper challenges dissidents to escape the mainstream cage of theories imposed by fiat and adopt a science epistemology based on consistent logic and the scientific method of empirical proof by falsifiability. The Fizeau and Sagnac results will be revisited and analyzed afresh to reach two conclusions that shake the foundations of belief in cosmic architecture and composition. The Absolute Lab frame and Flexible Aether model will be shown to be consistent and supported by all experiments examined to date. This support includes tests that extend Sagnac to linear motion and mechanics, the key results of Michelson & Morley/Gale, and classic aether tests. Establishment claims that support the Earth's rotation, revolution and translation will be subjected to logic and the scientific method. Consequences of the ALFA paradigm will be outlined.

1. Introduction

1.1. The Dissident Paradox

Even though the inconsistency of SR is evident immediately from its two premises, yet the discussion of contradictions is allowed to continue further, in violation of Popper's scientific logic rules.

For example: photon speed is constant in any frame x ,

SR axiom 2: $$V_{\mathrm{ph},x} = c \qquad (1)$$

(c is light speed in vacuum).

All objects are stationary in their own frames, with respect to themselves, in their own proper frame.

Null axiom $$V_{x,x} = 0 \qquad (2)$$

But if x is the photon frame, then $V_{ph,ph} = 0$ for the null axiom and $V_{ph,ph} = c$ from axiom 2.

1.2. Handling Inconsistency

The consequence of ignoring this contradiction is that testing is useless, since anything can be proven true or false in an inconsistent system. To illustrate, just foolishly add the axiom:

$$1 = 2$$

to the valid and consistent rules of arithmetic and behold what mayhem is generated by the inconsistency. When this system proves that

$$x = y$$

for any x, y, the reason is that the inconsistent axiom was allowed. By adding

$$1 = 2$$
$$+2 = 1$$
$$3 = 3$$

the possibility of using two false statements to prove a truth is demonstrated. This example corresponds to dissidents who ignore the SR axiomatic conflict and allow establishment arguments over SR logical conflicts and implementation details and interpretation of SR rules to persist. Just as the inconsistent arithmetic system can prove that $1 = 1$, $2 = 2$ and $1 = 2$, mainstream science can prove any empirical test of SR is valid, because its basic rules conflict.

Relativity claims of experimental support are meaningless; the logical inconsistencies of SR and GR allow any test to prove them true…. or false.

Our epistemology follows the <u>scientific method</u> and <u>logic</u>:

When a contradiction is found, **STOP** !!

    a. abandon the theory, or
    b. eliminate the contradiction

Why? Accepting contradictions allows anything to be proven true

    ⇨ nothing can be proven true

Modern science (MS) claims that relativity predicts the correct results for all experiments. This is true. Relativities also predict different results for all tests!

1.3. Clues to SR Rejection

Those who question the relativity principle have no concept of the signs that mark its invalidity – of how to recognize a preferred/absolute frame. If relativity is true:

Start with a relative displacement between 2 objects, a and b:

$$D_{a,b}(t) = -D_{b,a}(t) \tag{3}$$

The rate of change of each side gives the condition for relative motion/velocities

$$V_{a,b}(t) = -V_{b,a}(t) \tag{4}$$

Repeated derivatives generate higher order motions, like

$$A_{a,b}(t) = -A_{b,a}(t) \tag{5}$$

(Note that accelerations are relative, not absolute, as some relativists claim – just another inconsistency).

Now, if the relativity principle is false, there must be at least one case where

$$V_{a,b} \neq -V_{b,a} \tag{6}$$

that marks the existence of a preferred frame. E.g., if a is the photon frame 'ph' and b is any inertial frame 'in', then

$$V_{\text{ph,in}} = c \ . \tag{7}$$

But $V_{\text{ph,in}} = ?$ It's undefined. Measurements can't be made from the photon frame, a violation of the scientific method's falsifiability criterion. (except for Einstein, whose gedanken experiments replace real testing.)

In addition, if an absolute frame abs exists, then $V_{a,b}$ must use $V_{a,\text{abs}}$ to correspond with experimental tests. We then can detect an absolute reference system by looking for.

$$V_{a,b} \neq -V_{b,a} \tag{8}$$

$$V_{a,b} = V_{a,\text{abs}} \tag{9}$$

1.4.Another Relativity Show Stopper

A dropped ball with mass m hits the ground at speed $V_{m,e}$ and energy $\frac{1}{2}mV_{m,e}^2$ measured in the Earth's frame. In the m frame the Earth hits the mass with energy $\frac{1}{2}M_eV_{e,m}^2$.

Conservation of energy requires that

$$\frac{1}{2}mV_{m,e}^2 = \frac{1}{2}mV_{e,m}^2 \qquad (10)$$

But relativity requires that $V_{m,e} = -V_{e,m}$, so m must equal M_e, which is 10^{25} times bigger!!

Only the speed in the earth frame is logically consistent with physical laws (energy) and real; the speed in the ball frame is phenomenal… an appearance. Relativity contradicts conservation of energy… the earth frame does not.

Another characteristic of relativity violation is found in dynamic laws that have a velocity dependence, terms that are functions of v, or $F(v)$.

Objects at rest in a dynamically preferred frame will have $v = 0$, and the equations of motion will have their simplest form. E.g., in mechanics the centripetal force

$$F_c = \frac{mv^2}{r} \qquad (12)$$

will be zero when the mass is at rest in the preferred frame.

In EM the Lorentz force will only have an **E** field contribution, When the charge q is at rest in the preferred frame,

$$\mathbf{F}_L = q\left(\mathbf{E} + \mathbf{v} \times \mathbf{B}\right) = q\mathbf{E} \qquad (13)$$

Dissidents clamor for originality, for thinking outside the box, but does this box contain logic and testing? Many adopt the rejection of the scientific method, as does mainstream physics. All with similar thoughts should stop reading here, for this paper adopts the traditional scientific method of investigation, based on**:**

- **Testability:** capable of being falsified by a test here and now
- **Consistency**: no contradictions in premises, test or meaning. If you have a problem with these two criteria, then don't bother reading further. Subjective dislike of a theory is not a scientific argument.

1.5. The Aether Model

During the 1800's most physicists believed that a fundamental substrate pervaded all space, an elastic medium allowing the propagation of light, namely the EM aether. Its nature was modeled after the properties of sound in fluids like water and air.

We will adopt a general model so as not to eliminate initially any empirically testable model. **Aether phases** may be of three types:

1. solid like ice, a grid or rigid lattice (Lorentz, M&M)
2. flexible passive, dragged by material motion, like water entrained by paddle or propeller
3. flexible active, having a natural flow, like a river, the Jet or Gulf streams

For the last two types, the interaction coupling between aether and matter/particles can be partial or full. The last option of a natural aether flow is most often overlooked by modern analysts, who resort to aethereal euphemisms like quantum foam, vacuum, dark matter or zero point energy.

1.6. Aether Motion Testing
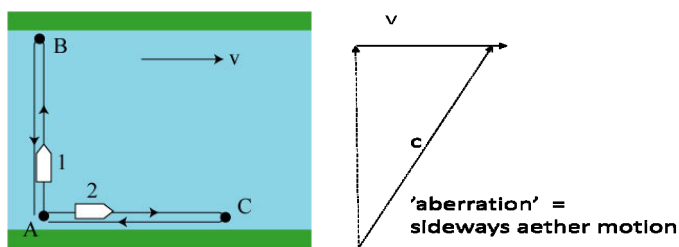
Fig. 1. OWLS /TWLS - One Way Light Speed vs. Two Way Light Speed

We will use the aether model of 150 years ago. A boat (photon) moving in a river(type 3 aether) can simulate interaction of photons and an aether flow moving at speed v.

A boat (Fig. 1 left,#2) can move at speed c in still water, so it moves downstream at $c+v$ and upstream at $c-v$. Measurement of the roundtrip speed along A-C-A (TWLS) will not detect the aether speed v, since

$$\frac{c+v}{2} + \frac{c-v}{2} = c \ .$$

Only an OWLS test will detect aether speed v parallel to the light beam.

Conclusion: All TWLS tests of light speed in parallel aether flows are worthless and claims of isotropy of c with high precision lasers (or vacuum interferometers) are bogus.

Fig. 1 as drawn is incorrect, since boat #1 would be deflected to the right (downstream) while crossing. The right diagram does show what aberration to expect from the moving medium's (water/aether) effect on the boat/photon, an aberration angle of $\sin^{-1}(v/c)$.

The speed of photons perpendicular to the aether current is

$$\left(c^2 - v^2\right)^{1/2} = c\left(1 - \frac{v^2}{c^2}\right)^{1/2} \approx c\left(1 - \frac{2v^2}{c^2}\right).$$

It's this change in c of order v^2/c^2, due to the aether cross-current, that Michelson and Morley sought to measure.

2. Early Aether Tests

Some aether detection tests were designed to be so; others were serendipitous.

2.1. Arago Prism Telescope (1810) [1]

Arago attempted to measure starlight refraction with a glass prism in a telescope (Fig. 2). According to Snell's law angles of refraction would depend on c and the different velocities of the stars and the motion of the earth at different times of the day and year. The angle of refraction will be different for light moving at different speeds. Contrary to this expectation he found there was no difference in refraction between stars, at differing times of day or between seasons. Light from every star is refracted the same.
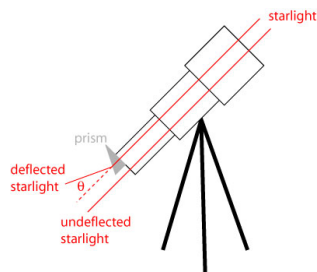
Fig. 2. Arago prism telescope

Conclusion: Light speed c is independent of stellar (source) and earthbound (observer) motions.

2.2. Faraday Rotor Generator (1831) [2]

Faraday found there is an induced current if a conductor and a magnet are joined together and rotated, having no relative motion, but both spinning in the lab frame. This is contrary to Faraday's and Maxwell's laws.
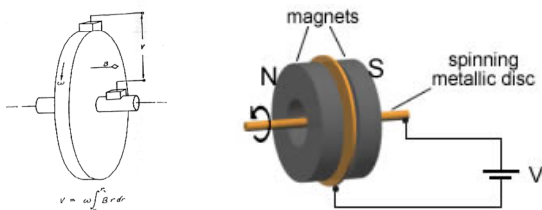
Fig. 3. Faraday Rotor Generator - schematic (left) and physical set-up

Conclusion: The Hertzian EM equations predict this result, if the convective velocity is the speed of aether in the lab $V_{ae,lab}$.

2.3. Fizeau Water Pipes (1861) [3]
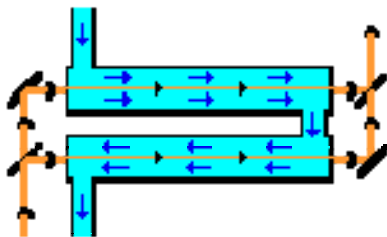
Fig. 4. Fizeau water pipe

Fresnel proposed in 1818 that matter moving at v would partially drag aether along, reduced by the drag factor $1 - 1/n^2$. The Speed of Light v_{SoL} for this case is Fresnel's Law:

$$v_{SoL} = \frac{c}{n} + v\left(1 - \frac{1}{n^2}\right) \tag{14}$$

Fizeau tested and confirmed the Fresnel conjecture by splitting a beam and sending the half beams through water moving in opposite directions with speeds $+v$ and $-v$ (Fig. 4). The half beams were recombined and compared in an interferometer. Fresnel's law showed aether is dragged with water/ matter at a greatly reduced speed.

Note that if a vacuum is used, where $n=1.0000$, no dragging will occur; v_{SoL} will be c. It is hopeless to test for c anisotropy with a vacuum, as there is no mass for the aether to interact with. Yet such vacuum experiments are cited by MS scientists as proof of SR's second axiom, and the non-existence of aether.

Also, note that the aether motion is measured within the dragging medium, not outside it, as in the Sagnac test, which shows no reduction in v_{SoL}. Another important note, for future reference in the Sagnac test, is the understood reference frame for Fizeau's experiment the lab frame!

Conclusion: v_{SoL} is composed of two terms, one which depends only on the refractive index *n*, and the other is dependent on both *n* and *v*.

2.4.Airy Water Telescope (1871) [4]

Airy put water in the telescope and saw no change in aberration angle. This was termed a 'failure', since Bradley's theory of receiver motion predicted a change with n.
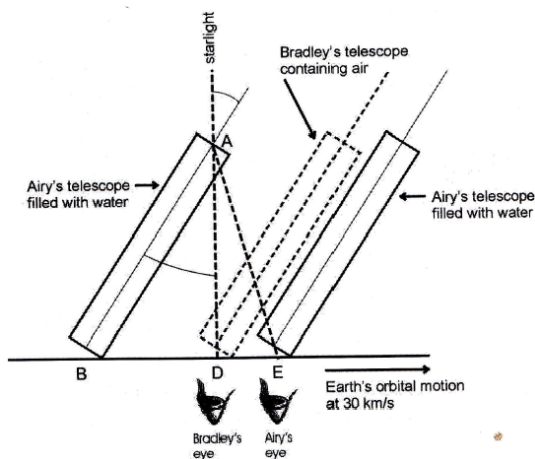
Fig. 5. Airy water telescope

<u>Bradley</u> – For all dashed lines in Fig.5: The middle telescope must be tilted to see the starlight's aberration. When light moves through the telescope from A to D the Earth – and telescope - move from B to D. This determines the aberration angle of tilt,

$$\tan^{-1}\frac{\mathrm{BD}}{\mathrm{AD}}.$$

<u>Airy</u> – solid lines: With water added (left telescope), the light travels the distance AD through the telescope slower, at ¾ of *c*.

So the telescope travels further at the Earth's orbital speed, a distance BE, and the aberration is greater, $\sin^{-1}(\mathrm{AD/BE})$. Nice theory, but fails to predict the actual result, shown in the right telescope – there's NO CHANGE in the tilt! The Earth's motion as cause of aberration is simply refuted by Airy's test – the 'failure' to increase aberration with water.

Airy's 'failure' is in reality a 'success' for the ALFA model, where the flexible aether's sidereal rotation explains that the deflection occurs in transit. The light path is bent in space, before entering the telescope, while the Earth is at rest.

ALFA analysis: There are no D and E distances, since the Earth is motionless. The light beam in water travels slower, at 3/4 of *c*, from A to B, but there's no sideways motion. So no additional tilting is needed. Airy's test is an ALFA success!

Conclusion: The Earth's motion as cause of aberration is simply refuted by Airy's test – the 'failure' to increase aberration with water. The deflection of starlight known as stellar aberration must occur BEFORE the light enters the scope.

2.5. M&MX (1886) [5]
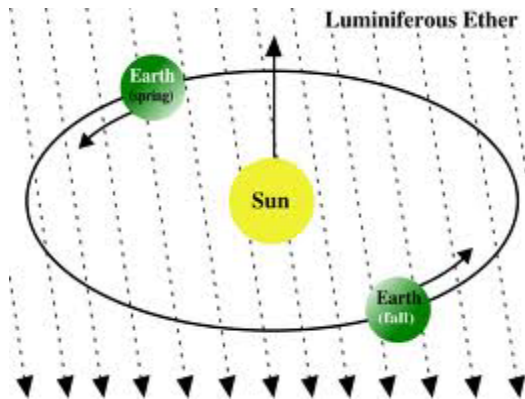
Fig. 6. Earth's annual motion through aether

For a fixed aether, both a daily and annual periodic change in aether direction is forecast, based on the heliocentric model in Fig.6. The annual change is due to the orbital speed of the Earth and is 30 times greater than the equatorial spin.

Number of fringe shift n

$$n = \frac{Lv^2}{\lambda c^2}$$
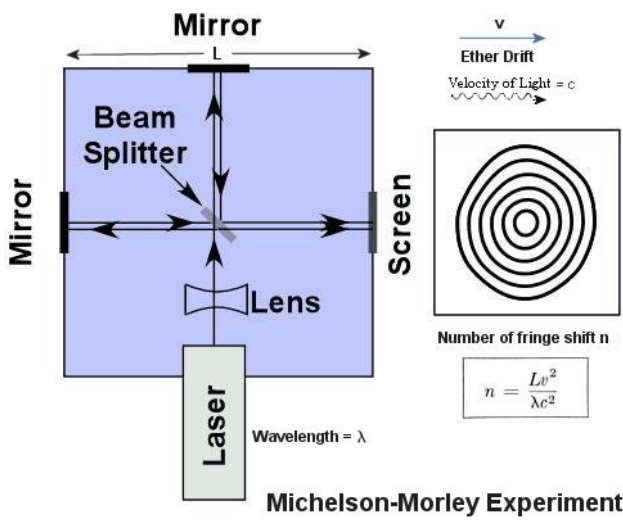
Fig. 7. M&MX - apparatus schematic (left) and screen pattern

The aberration boat model can be conceptually transferred to the motion of a photon up/down an aether stream with motion cross-stream. In the diagram above a beam split into 2 half beams at a right angle is then compared for a phase difference when combined on the interferometer screen.

The result was equivalent to a speed of ~ 5 kms, about 15% of the expected orbital speed of 30 km/s. The disappointment was reflected in the summarizing term – a 'null' result.

The experimental error analysis of 5 runs in Fig.8 shows that the M&M SoL average was always greater than c , and only one set of error ranges overlapped the value of c . Although this result is consistent with an Earth and an aether approximately at rest, this option was not listed among the four options for interpretation given in Michelson's conclusion.
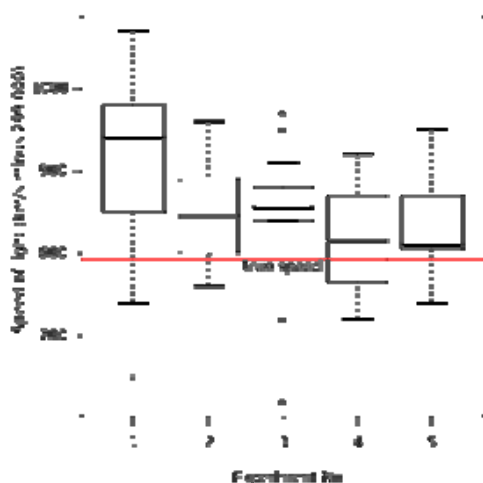
Fig. 8. Box plots from the Michelson–Morley experiment

The search for the aether effectively ended with Einstein's paper on SR in 1905. Albert E said no aether was needed, while Albert M ignored the Earth and aether at rest! Note: this experiment is small-scale and low precision; the use of transverse flow means the accuracy is of second order $\sim (v/c)^2$.

Conclusion: There is no aether, or the Earth and aether are co-moving.

3. Review of Sagnac-type Tests

3.1.Sagnac (1913) [6]

In the Sagnac test an interferometer that detects the overlapping pattern of two counter-rotating light beams resulted in a measured Speed of Light v_{SoL} that was the usual light speed c plus or minus the rim speed of the spinning platform v.
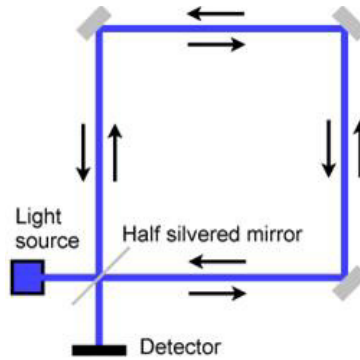
Fig. 9. SagnacX schematic

The light beam in Fig. 9 was split into CW and CCW paths that combined again at the interferometer detector for fringe measurement; the entire apparatus was mounted on a turntable. Sagnac found that $v_{SoL} = c$ when the speed of the rotor in the lab frame was zero. But when the rotor's edge speed was v, $v_{SoL} = c \pm v$.
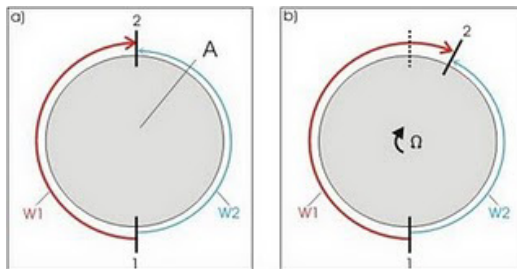
Fig. 10. Optical bench at rest and then rotating CW

When the platform is at rest (Fig.10 left) the CW w_1 and CCW w_2 half-beams travel the same distance in the same time. But when the platform spins CW (Fig.10 right) the co-rotating w_1 beam travels a greater distance than the counter-rotating w_2 beam, in the same time. Were the photons replaced with human runners, the result would be the same - the CCW runner would win the race.

In SR v_{SoL} for either beam must be c in either the lab or rotor frame, whether the rotor spins or not. In the rotor frame, the light beam should see no rotation, because the whole optical bench rotates: source, mirrors and film are on the turntable. Measurements are made in the rest frame of the apparatus which is only rotating in the lab frame. Relativity says v_{SoL} should be c, but Sagnac measures

$$v_{SoL} = c \pm v \qquad (15)$$

v_{SoL} is anisotropic - it is not c in the rotating frame!

Sagnac considered that the turntable rotation dragged or entrained the aether in the space around it, at the same speed (full dragging) as the rotor v. The v_{SoL} change was due to the motion of the aether in the path of the light beam, either boosting it $+v$ for co-rotation or $-v$ for counter-rotation. He then concluded that v_{SoL} was independent of the source speed, and that an entrained aether was detected, explaining the unexpected results, that is, to relativists. Incredible as it may sound, although the results had found that counter-rotating light beams travel at $c \pm v$, relativists actually delude themselves that the Sagnac change in v_{SoL} is consistent with SR! Their idol, Einstein himself, chose to ignore the results that contradicted his 1905 paper – even 40 years later he had no adequate response. Einstein was quite aware of Sagnac's work, but chose to ignore the refutation and hope the Sagnac result would be forgotten. But for its use in optical navigation and GPS, it no doubt would be.

3.2. Sagnac Analysis of Light Speed

Note: SagnacX is first order in v/c. The complete Sagnac result in transparent dielectric having index of refraction n is

$$v_{SoL} = \frac{c}{n} \pm \frac{v}{n^2} \tag{16}$$

We simplify the analysis by considering only the fast co-rotating beam, the plus sign, and suppress the factors involving n. (The full expression can be restored at the end.) So v_{SoL} is simplified to

$$v_{SoL} = c + v \tag{17}$$

In both the lab and rotor frame (for the co-rotating beam).

Sagnac found the result was independent of both source and detector speed and the aether was being dragged along at the speed of the rotor.

Note: the lab frame measurement of $c + v$ was not recorded by Sagnac but reported by Dufour & Prunier in 1938. They also found that:

- The same result was found by mixing of optical parts between lab and rotor.
- The effect extended at least 10 cm from the rotor.
- The optical path must include the rotation center, else $v_{SoL} = c$

4. The ALFA Model

4.1.Absolute Lab/Dynamic Aether

The metaphysical premises are:
1. Light speed in aether is always c (c/n in dielectric)

$$V_{\text{ph,ae}} \equiv c \tag{19}$$

where 'ph' represents a photon, 'ae' is aether.
2. Galilean velocity addition is valid: (based on Fizeau's exp.) The Speed of Light in any frame x is

$$v_{SoL} = V_{\text{photon,aether}} + V_{\text{aether,reference system}}$$
$$= V_{\text{ph,ae}} + V_{\text{ae},x} = c + V_{\text{ae},x} \tag{20}$$

Various theories are now applied to the Sagnac result and their predictions are compared to the Sagnac result. For all models, the measured rim speed of the rotor is v, so

$$V_{\text{rot,lab}} = v \tag{21}$$

Special Relativity is based on no aether and two axioms:

SR1: $$V_{x,y} = -V_{y,x} \tag{22}$$

SR2: $$V_{\text{ph},x} = c \tag{23}$$

Applying SR1 to v_{SoL} gives $V_{\text{ph},x} = -V_{x,\text{ph}}$. But $V_{x,\text{ph}}$ is untestable using the scientific method.

SR2 predicts lab and rotor frames will both measure c, but the Sagnac result is $c + v$ for both. Both axioms are invalid! *There must be some preferred frame in which* $V_{x,y} \neq -V_{y,x}$! Ritz ballistic claims v_{SoL} depends on the emitter's speed. Invalid! Sagnac found v_{SoL} is independent of source speed.

Aether theories are separated into static and flexible. For **Static Aether** type 1:

$$V_{\text{ae,lab}} = 0 \; ; \qquad V_{\text{ae,rot}} = 0 \tag{24}$$

By Eq. (20) $$v_{\text{SoL}} = V_{\text{ph,ae}} + V_{\text{ae,lab}} = c + 0 = c \tag{25}$$

And $$v_{\text{SoL,rot}} = V_{\text{ph,ae}} + V_{\text{ae,rot}} = c + 0 = c \tag{26}$$

Both rigid aether predictions conflict with Eq. (18). For **Dynamic Aether** type 2 with full dragging:

by measurement $$V_{\text{rot,lab}} = v \tag{27}$$

by assumption $V_{\text{ae,lab}} = v$ and $V_{\text{ae,rot}} = 0$ $\tag{28}$

The rotor frame sees a co-rotating aether. v_{SoL} in the lab in Eq. (20) $= V_{\text{ph,ae}} + V_{\text{ae,lab}} = c + v$ agrees with Eq. (18). The rotor $v_{\text{SoL,rot}} = V_{\text{ph,ae}} + V_{\text{ae,rot}} = c + v$ from Eq. (18) implies $V_{\text{ae,rot}}$ must equal v, in conflict with the assumption of full dragging,

$$V_{\text{ae,rot}} = 0 \tag{29}$$

Can $V_{\text{ae,rot}} \neq 0$ so that aether speed $= v$ in both frames?

Before rejection this as a dead end, recall that SR was refuted, so a preferred frame must exist. If $V_{\text{ae,rot}}$ is v, not 0, then the lab frame must be preferred for detecting aether motion! $V_{\text{ae,lab}}$ and $V_{\text{ae,rot}}$ both equal v!
From the results Eq. (18) and velocity analysis,

$$V_{\text{ae,rot}} = V_{\text{ae,lab}} + V_{\text{lab,rot}}$$

implies by substitution that

$$v = v + V_{\text{lab,rot}} \tag{30}$$

which further implies that

$$V_{\text{lab,rot}} = 0 \neq V_{\text{rot,lab}} = v \tag{31}$$

In the rotating frame the lab is at rest! If relativity were true $V_{\text{lab,rot}}$ would equal $-v$, not 0. As the rotor can have any speed the result is general.

4.2. Absolute Rest Theorem

$$Vlab, x = 0 \tag{32}$$

where x is any rotating frame on Earth. The lab is always at rest with respect to any rotating system. The Earth is the frame of absolute rotation sought by Newton and rejected by Einstein. With $V_{\text{ae,rot}} = v$, Flexible Aether predictions agree with Eq. (18).

Conclusion: Only the Absolute Lab (ECEF) frame with Flexible Aether model $V_{\text{ae,rot}} = v$ agrees with Eq. (18).

$$v_{SoL} = c + v \tag{33}$$

in both frames (and with similar tests: M&MX, R. Wang, Dufour & Prunier, etc.)

The SoL is $c+v$ for the co-rotating beam, in both the lab and rotor frames, independent of source and detector motion, *but dependent on aether motion*.

4.3. Summary of Sagnac Results

$$v_{SoL,x} = V_{\text{photon,aether}} + V_{\text{aether},x} = c + V_{\text{ae,lab}} \tag{34}$$

from Eq. (32). So whatever reference frame x is used, light speed only depends on the aether speed in the lab frame.

$$V_{\text{photon,aether}} + V_{\text{aether,lab}} = c + V_{\text{ae,lab}} \tag{35}$$

4.4. Absolute Time

Newton had an abstract concept of absolute space and time, though neither could be defined concretely for measurement. Does the absolute frame of ALFA have a corresponding well-defined absolute time…capable of being tested?

The conditions for having an absolute time-keeper are:

- Stable
- Global synchronization
- Autonomous operation
- Universal accessibility across the world
- Immunity from environmental changes

There is really only one clock that fills all these slots – the most ancient of time-keepers, the heavenly procession of the stars – astronomical star time! Stellar rotation provides a universal master clock in the time domain.

Clones of the master clock – or slave clocks – can be used just as now, as long as they are monotonic and can be scaled up to the master clock in the heavens. This resolves time dilation issues. Cosmic time is free of local influences and is truly universal, the sky being accessible anywhere on Earth.

The ALFA model axioms are:

1. Light speed in aether is always c =>

$$V_{\text{photon,aether}} = V_{\text{ph,ae}} = c \tag{36}$$

2. Absolute velocity addition: (lab = ECEF frame)

$$v_{\text{SoL},x} = V_{\text{photon,aether}} + V_{\text{aether,lab}} = c + V_{\text{ae,lab}} \tag{37}$$

3. Absolute Rest theorem:

$$V_{\text{lab},x} = 0 \tag{38}$$

The lab/Earth is universally at rest.

4. Absolute Frame theorem:

$$v_{\text{SoL},x} = c + V_{\text{ae,lab}} \tag{39}$$

Whatever reference frame x is used, light speed only depends on aether speed in the lab frame.

5. Absolute time:

$$T_{\text{lab}} = T_x \tag{40}$$

measured with the aethereal motion of the stars, or 'cosmic time'.

5. More Empirical Support

5.1. M&M Redux
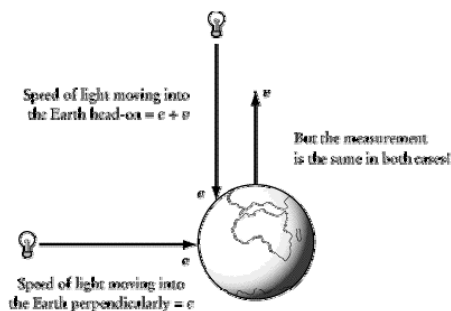
Fig. 11. Predicted light speed for motion parallel and orthogonal to Earth's motion

Let's all concentrate. Is there any value of Earth's speed v for which c does equal $+v$? All the establishment super-stars for over a century couldn't get this right!

From Eq. (2):
$$v_{SoL,lab} = c + V_{ae,lab} \tag{41}$$

from 'null' result:
$$v_{SoL,lab} = c + \Box\, 0 \tag{42}$$

implies
$$V_{ae,lab} = 0 \tag{43}$$

The aether speed is approximately zero at the Earth's surface, so both the Earth and the surface aether speed are zero (within the M&MX precision limits - MMX is second order in $(v/c)^2$; Sagnac is first order in v/c. ALFA explains the null result as a motionless Earth and aether.

5.2. Michelson-Gale (1925) [7]

Counter-rotating half beams traversed a 1.2 mile perimeter in an Illinois field (Fig. 12, right). There should be a phase difference arising from the difference in rotation speed between the north and south leg, where $v_1 > v_2$. The result indicated a difference corresponding to a daily eastward rotation, which Mic-Gale misinterpreted as the Earth's rotation, since Sagnac's result showed

the Earth doesn't rotate. Besides ignoring the possible aether rotation westward around a static Earth, detection of Earth's rotation by the light beam requires an aether medium.
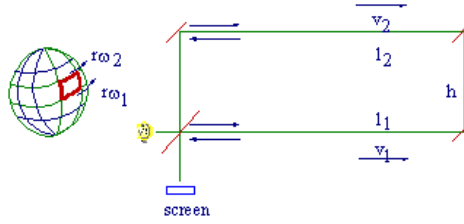
Fig. 12. Michelson-GaleX – location and schematic

Test result:

$$v_{SoL} = c + r\omega = c + v$$

where r is the distance to polar axis, and ω is the sideral angular velocity

From Eq. (2) $\quad v_{SoL\text{-}lab}$ $\quad v_{SoL\text{-}lab} = c + V_{ae,lab}$ (44)

from the test result $\quad v_{SoL\text{-}lab} = c + v$ (45)

implies $\qquad V_{ae,lab} = v$ (46)

$v =$ aether flow near the ground

Conclusion: The Earth has an autonomous aetherosphere that rotates westward at every latitude in one sidereal day. The aether here is flowing naturally, not passively being dragged, a proof of existence of type 3 active aether currents, the analog of rivers or the Jet and Gulf streams. Other cases of type 3 flow are the GPS "Sagnac" effect and the E-W radio signal delay.

5.3. Dufour & Prunier (1937) [8]

… extended the Sagnac study with much the same equipment. They found the same results as Sagnac did, but with important additions.

Conclusion: v_{SoL} in the lab frame is the same as in the rotor frame.

$$v_{SoL} = c \pm V_{ae,lab}$$ (47)

$V_{ae,lab} = 0$ if the light path doesn't include the rotor's center, and is unchanged up to 10 cm above the rotor surface. (Unfortunately this was not extended to find the range of aether drag by the rotor.)

Aether is dragged around the rotor at the same speed. The aether speed in any frame is the same as the lab frame.

5.4. Ruyong Wang FOC (2005) [9]
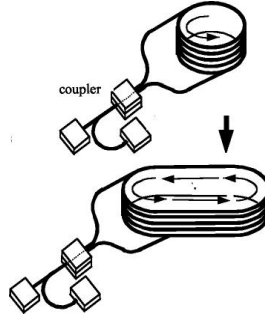
Fig. 13. Converting a FOG into a FOC

Strictly interpreted, the SagnacX only applied to rotational dragging of aether. But Wang showed the same result is found when aether is dragged in a straight line.

The Sagnac setup is improved by using fiber optics instead of mirrors to form the optical path and amplify the timing difference by using multiple coils – the Fiber Optic Gyro - FOG (Fig.13 top). Then the loops are distorted into a racetrack oval to create linear sections (Fig.13, bottom).
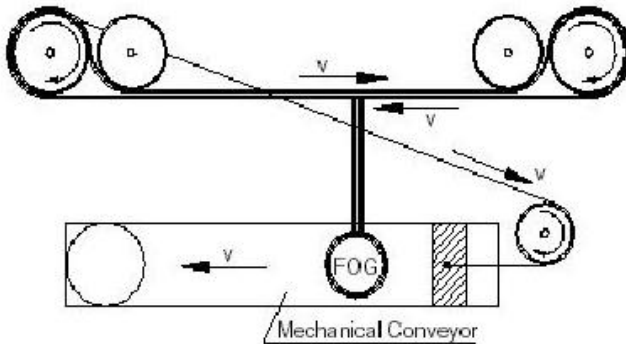
Fig. 14. Fiber Optic Conveyor - FOC

The bold line is the optical path/fiber which corresponds to the Sagnac rotor frame. The light diagonal line is the conveyor cord. The FOG apparatus is mounted on a FOC and records the change in

SoL as the system moves linearly with speed v, dragging aether with it (Fig.14).
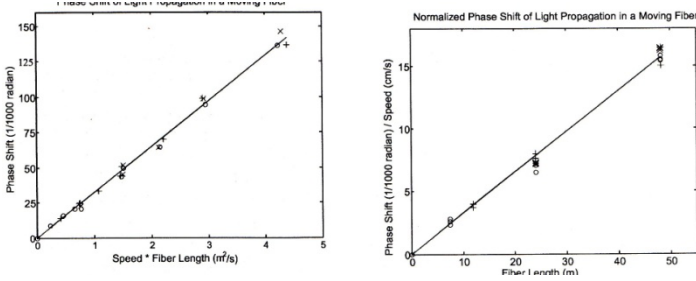
Fig. 15. The phase shift (y) is proportional

to optical path length and conveyor speed (x).

$$\text{Phase shift} \sim v_L \qquad (48)$$

This is consistent with the Sagnac cocept of matter dragging aether, which causes the observed change in v_{SoL}. Going unnoticed by Wang is the outstanding evidence in this experiment of the motionless Earth. The graph clearly displays the zero speed in the lab frame, when MS mavens have the Earth rushing in various directions, around the Milky Way center, toward the Virgo cluster, etc.

Conclusion: The ALFA model is not restricted to photons in rotating aether, but also holds for aether in linear motion - that is, to all aether motions.

5.5. The Universal ALFA

The Sagnac effect has also been applied to matter-waves – Ca atoms, neutrons and electrons [10]. The ALFA formula for light speed,

$$v_{\text{SoL}} = c \pm V_{\text{ae,lab}} \qquad (49)$$

is replaced by

$$v_{\text{SoM}} = V_{m,\text{ae}} + V_{\text{ae, lab}} = V_{\text{max}} + v \qquad (50)$$

where $v_{\text{SoM}} =$ Speed of Matter, $V_{m,\text{ae}} =$ speed of mass in aether, and $v =$ speed of aether in the lab frame. In complete generality, the

ALFA model can apply to the motion of photons or particles for aether motion in the lab frame.

Conclusion: The same effect of aether speed, whether photons or particles, whether rotational or linear, is verified. The Sagnac result is not photo-specific, but a general relationship between moving aether and objects in the lab frame.

5.6.Aberration

The aberration of light in a moving medium was demonstrated by Jones in 1971 [11]. The transverse 'Fresnel ether drag' experienced when light passes through a refracting medium moving at right angles to the original direction of the light, and confirmed indirectly by Airy's water-filled telescope experiment, has now been observed directly. A change in rotation speed from 600 to 1800 rpm of a glass disc produced a transverse displacement of $1.5*10^{-6}$ mm in a light beam passing twice through the disc. This agrees with the Fresnel formula to within the 10% accuracy of the experiment.

Note: had Jones used a light path outside the glass, instead of inside, the displacement would have been about twice as great.
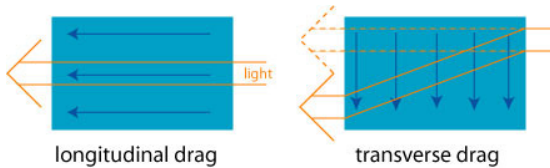
Fig. 16. Light beam direction vs. aether motion

Longitudinal drag (Fig.16 left) occurs when light passes parallel $c+v$ or antiparallel $c-v$. Transverse drag (Fig.16 right) entrains the photons sideways at an angle $\sin^{-1}(v/c)$.
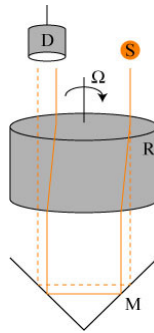
Fig. 17. The dashed line is the light path through the glass at rest into detector D. The solid line is the path with rotation Ω.
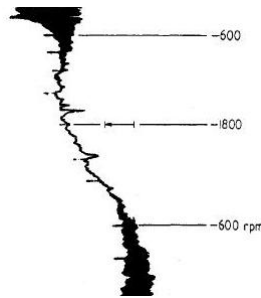
Fig. 18. Eyepiece view of beam position after passage
through a rotating glass disk

Fig. 18 is the angular shift Jones saw when the glass disk's speed was increased by 1200 rpm.

Conclusion: Stellar aberration can be caused by the dragging of light by the transverse motion of aether rotation around the Earth.

5.7. Newton's Spinning Bucket

…remains a perennial puzzle for cosmology, unsolved over four centuries. Newton's belief was in evidence of an absolute space (whose origin was not specified), while Mach and Bishop Berkeley held that the bucket test showed relative rotation, the influence of distant matter on local rotation. It represents the classic clash of absolute frame and relative motion perspectives, whose arguments pro and con are still being debated.

Considered a gedanken exp. by the MS establishment, it is usually summarized by its basic features [12]. But it can easily be implemented in reality [13] – the best (and only) kind of theoretical testing. After all, why would we test theory with a theoretical experiment? By improving the protocol, using a motor-driven rotation and media other than water, hidden wave motion and nodes may be revealed, as in this link [14]. Further analysis of this experiment should reveal more key properties of the aether.

Newton believed that this experiment proved the existence of absolute acceleration and logically from this...the existence of absolute space. The significance of Newton's experiment and the logical arguments constituting his "Existence Theorem for Absolute Space" are not generally understood or accepted by mainstream physicists. Newton's concept of absolute space was not a mere assumption or premise, but rather an experimentally demonstrable property of nature.

The details of Newton's water pail experiment are summarized in the table below. Accelerations are responsible for the concave surface of the water in the pail; rotations are measured with respect to the lab.

1) start with a fully wound rope, no water or pail rotation, and a flat water surface.
2) the rope is released , the pail spins, and there is a delay before the water starts to rotate and form a vortex
3) pail and water are co-rotating , with a vortex visible
4) the rope fully winds up with opposite twists and pail stops... vortex still present

State	Pail Spin	Water Spin	Relative Spin	Water Vortex
1	No	No	No	No
2	Yes	No	Yes	No
3	Yes	Yes	No	Yes
4	No	Yes	Yes	Yes

Table of Bucket/Water states

The concave water surface can occur whether there is relative motion (4) or no relative motion (3).

The vortex appears whenever the water rotates (States 3 and 4) but not when the water does not rotate (1 and 2), regardless of relative rotation.

A vortex is only caused by the true or real absolute rotation of the water.....in the lab frame. Therefore real or absolute accelerations exist.

If acceleration is always measured to be absolute, then repeated integrations show that velocities and distances (space) must all be absolute. From the Galilean transformation it follows that if space is absolute time must also be absolute. So Newton's rotating pail test was able to show the existence of absolute space and time.

This proof agrees with the Sagnac result - that a spinning object drags aether around it at the same speed. The effect of the small pail on the water is due to the local aether set into motion; it is more significant than any gravitational effects of the Earth, Moon, and Sun.

What of the claim that there would be imperceptible tidal effects on the water surface due to the remote Moon and Sun motions? The effects of the Earth would be much greater, because it is bigger and much closer. Thus what Newton showed was that there must be relative acceleration with respect to the most significant nearby massive body, the Earth.

This is the dominant gravitational field theory. Since the Earth spins on its axis and orbits the sun which orbits the center of the Milky Way, these accelerations with respect to absolute space should have been observed… and they were not.

This misrepresents - or misunderstands - the ALFA model of a dynamic aether and an absolute fixed lab frame. The Earth is at rest in absolute space, so it is at absolute rest, the reference for all motion. Since the Earth neither spins nor orbits anything, no accelerations should be observed from the Earth..... and they were not.

5.8.Spinning Bucket Description (Simplified)

Fig. 19. Initial and final state of bucket

After twisting the supporting ropes in Fig.19, then release the bucket with a calm flat surface. Uncoiling causes the aether around the bucket – not just within the solid bucket - to rotate at the bucket's angular velocity (Sagnac measured this aether drag external to the rotor).

The aether motion is partially coupled by the Fresnel drag factor to the water, causing the water to be slowly dragged into the same rotation. Eventually the entrained water rotates at the bucket's speed and forms a vertical vortex.

Note details that support a model of entrained aether and water: There is a delay between the rotation of the bucket and the water, the inertia of the water. All of the water begins to rotate at about the same time, not spreading from the edges to the center. The bucket's spin affects all of the water, but slowly. (Fizeau found that aether is dragged by the Fresnel factor of $1-1/n^2$, or about 0.55 of the bucket speed for water.)

The solid bucket doesn't transfer mechanical energy to increase the water's rotation, because the elastic collision of the water molecules with the bucket walls causes a normal reaction force. The normal force is radial and cannot change the water's rotation.

It is in this system state that we will analyze the angular speeds in both lab and bucket frame, just as was done with Sagnac, which has been successfully analyzed above. The bucket corresponds to the rotor; water motion detects aether entrainment, as did the light beam for Sagnac.

<u>Lab frame</u>: centered any place on the bucket axis

$$
\begin{aligned}
V = V_{b,l} &= \text{speed of bucket in lab frame} \\
&= V_{w,l} = \text{speed of water} \\
&= V_{a,l} = \text{speed of aether}
\end{aligned} \tag{51}
$$

Bucket frame: centered any place on the bucket axis

$$V_{w,b} = 0 = \text{measured} \tag{52}$$

$$V_{a,b} = 0 = \text{aether} \tag{53}$$

Since the aether spins with the bucket and the water is dragged by the aether

$$V_{l,b} = -V \tag{54}$$

and the lab rotates in the opposite sense to the bucket.

But....the vortex seen in the bucket frame means the water and bucket are really rotating, although the water speed $V_{w,b}$ seems to indicate that it is not moving! The lab frame is preferred for rotation measurements; the bucket frame is fictitious and invalid for applying physical laws.

To obey the laws of physics any speeds observed in the bucket frame must be replaced by the absolute lab frame data. So

$$V_{x,b} = V_{x,\text{lab}} \tag{55}$$

Measurement of the lab frame in any other frame must be zero, so the measured value of $V_{l,x}$ must be replaced with

$$V_{l,x} = 0 \tag{56}$$

The speed of an object in frame x is computed from the Galilean law.

$$V_{x,l} = V_{x,a} + V_{a,l} \tag{57}$$

These three mechanical results in red are equal to the Sagnac analysis and consistent with an ALFA model based on EM.

Conclusion:

1. A flexible aether is consistent with the bucket result.
2. Aether can drag matter, as well as the reverse, as was seen in SagnacX and FizeauX.
3. Newton was right… almost. His vague concept of absolute space is actually the lab frame or ECEF - the absolute frame for measuring rotation of aether.

Energy considerations also show the inconsistency of relativity. In the lab frame the total energy E is the rotational kinetic energy of the bucket and water; in the bucket frame E is the rotational energy

of the water, the lab, the Earth and the universe, together rotating around the bucket.

Since kinetic energy is truly zero only in the lab frame, the lab frame is reality; the bucket frame is just phenomenal.

6. Consequences of the ALFA Paradigm

- Relativity refuted.
- Big Bang fizzles.
- Cosmological Principle is found to be unprincipled!
- Aether causes QED enigmas: entanglement, Bell's theorem.
- Newton's 3 laws now include aether effects.
- Kinetic energy is anchored, with an absolute meaning of rest.
- All physical laws that involve speed must use the lab frame: Centripetal, Coriolis, Lorentz forces.
- Lorentz transforms and inertial frames and Riemannian geometry are of no physical importance.
- Mach's principle disproven – rotation is not relative.

7. Conclusion

SR is inconsistent and invalid. Aether exists, is flexible both actively and passively, and is not the absolute reference frame. For both EM and mechanical motion the laboratory or Earth Centered Earth Fixed (ECEF) is the preferred reference frame. It uses astronomical time as the absolute time base.

Responses are solicited that refute this Sagnac analysis, which concludes with the existence of a flexible/dynamic aether and the identification of a preferred frame for measuring motion – the lab/ECEF system. Please stick to objective evidence using the scientific method and logic. Subjective opposition is not scientific. In the follow-up paper, ALFA–part 2, specific details will cover the topics here and introduce more supporting experiments and explore the consequences of the ALFA paradigm.

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Chapter 11: The ALFA Model

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Chapter 12

Hildegardian Geocentrism: Aristotelian Cosmology Meets Modern Science

A Brief History of St. Hildegard's Life

A the beginning of the second millennium stood a woman gifted with insight into cosmology that, as we look in hindsight, seems to have far exceeded the theories of Copernicus, Galileo, Kepler, Newton, and Einstein. The woman was Hildegard von Bingen, the eleventh century German mystic and Benedictine Abbess whom some call "The most gifted woman of the epoch."[347] She was born in 1098 and died at the age of 81, in 1179. She was canonized a saint by Pope Benedict XVI on May 10, 2012 and was made a Doctor of the Church on October 7, 2012.[348] Her complete story is truly amazing, but, of course, we are only interested in her cosmological revelations.

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[347] Michael Seidlmayer, *Currents of Mediaeval Thought: With Special Reference to Germany*, 1960, p. 92.

[348] As reported by the Washington Post: "At the start of the Mass, Benedict named two new "doctors" of the church, conferring one of the Catholic Church's highest honors on the 16th-century Spanish preacher, St. John of Avila, and the 12th-

Hildegard received a series of mystical visions concerning the cosmos beginning in childhood, which became more intense in her forties. She writes:

> Up to my fifteenth year I saw much, and related some of the things I had seen to others, who would inquire with astonishment whence such things might come.

Her main visions are divided into three eras: *Scivias* (1152-1158); *The Book of Life's Merits* (1158-1163); and finally *The Book of Divine Works* (1163-1173), the last being the one we will investigate. The book was written in Hildegard's native medieval German, and its contents have been reproduced and analyzed by Dr. Helmut Posch in the book titled *Das wahre Weltbild nach Hildegard von Bingen* ("The World According to Hildegard von Bingen").[349] We are indebted to him for translating Hildegard's words and interpreting them in modern scientific terms. We will add our own interpretation to Posch's as is appropriate in accord with the scientific information we have produced in this book.

In Hildegard's visions we find one of the most remarkable treatises on cosmology ever told. It is elaborate and quite detailed. It answers many of the questions with which modern science has struggled but failed to obtain satisfying solutions. For example, Hildegard helps in explaining the nature of gravity, something that has escaped the understanding of modern science to this very day, although many theories, from Descartes' vortexes to Quantum Loop theory, have been proposed. She explains the nature of light and inertia, two other phenomena modern science has long sought to understand but without much success. She explains the nature of space and its makeup, a solution, we will see, that is diametrically opposed to the "*in vacuo*" concept used in Relativity theory, but in agreement with the pre-Einsteinian particulate model of space we have been discussing in this book. She explains the mechanics of solar and planetary movement from a Tychonic perspective (*i.e.*, the planets revolve around the sun, but the sun revolves around the Earth), over four hundred years before Tycho Brahe devised it in opposition to Galileo's solar system, and she did so in the midst of the reigning Ptolemaic system.

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century German mystic, St. Hildegard of Bingen. They join the ranks of only 33 other church doctors who have been singled out over the course of Christianity for their contributions to and influence on Catholic doctrine." (See also *Catholic News Agency*: http://www.catholicnewsagency.com/news/pope-benedict-creates-two-new-doctors-of-the-church/).

[349] Helmut Posch, *Das wahre Weltbild nach Hildegard von Bingen*, Deutsche Bibliothek – CIP – Einheitsaufnahme, Aufl. – A-4880 St. Georgen, 1998.

In the wake of Newton's and Einstein's inability to explain such mundane phenomena as why a body in motion remains in motion (inertia) or why bodies fall radially toward the center of mass, or even modern science's inability to explain the true nature of light (wave or particle), the Aristotelian postulates (*e.g.* that the Earth is the absolute standard of rest, or that no object has momentum or acceleration unless a force acts upon it, *etc.*) these remain an open and viable explanation of celestial mechanics. Stephen Hawking, for all his prejudices against geocentrism, put it well when he said:

> The big difference between the ideas of Aristotle and those of Galileo and Newton is that Aristotle believed in a preferred state of rest, which any body would take up if it was not driven by some force or impulse. In particular, he thought that the Earth was at rest. But it follows from Newton's laws that there is no unique standard of rest….Is Newton right or is Aristotle, and how do you tell?….Does it really matter whether Aristotle or Newton is correct? Is this merely a difference in outlook or philosophy, or is it an issue important to science? Actually, the lack of an absolute standard of rest has deep implications for physics: it means that we cannot determine whether two events that took place at different times occurred in the same position in space….Newton was very worried by this lack of absolute position, or absolute space, as it was called, because it did not accord with his idea of an absolute God. In fact, he refused to accept the lack of absolute space, even though his laws implied it.[350]

We can see from Hawking's assessment how important is the question of whether or not the Earth is at rest. It is no exaggeration to say that all of physics and cosmology divide right at this point. If either Aristotle, on the one hand, or Galileo, Newton and Einstein, on the other hand, took the wrong path, then all subsequent physics and cosmology produced by the party at fault must be erroneous. The stakes couldn't be higher.

Whereas Galileo, Newton and Einstein gave us only mathematical equations, Hildegard, following Aristotle, gives us the physical mechanisms behind the math. In fact, as she explains the mechanics of the universe in basic Aristotelian thought forms, she is aided by visions that

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[350] Stephen Hawking and Leonard Mlodinow, *A Briefer History of Time*, 2005, pp. 22-24.

provide comprehensive answers that not even Aristotle's imagination could have created. Her understanding of the cosmos advances well beyond both her ancient and modern counterparts.

All this, of course, raises the question of how this simple woman could have known the nature of the cosmos so intimately. To our knowledge, she was never made privy to the Aristotelian library discovered in the Middle East two centuries earlier. But not only is Hildegard's use of Aristotle a phenomenon in itself, her visions often modify and correct the places in which Aristotelian physics and cosmology needed help. So elaborate and advanced is Hildegard's model of the universe that we are more or less compelled to accept that it came either partially or totally from divine sources. (If not, then we could be as quick to conclude that her visions, as the adage is commonly stated, may not be worth the paper they are written on). Her visions have explanations that any modern-day scientist would understand, even if he didn't agree with them. As such, one cannot lightly dismiss her cosmology by countering that she might have been deranged or hallucinating, for Hildegard was a well-respected intellect in her day as she engaged in all kinds of aesthetic and mind-demanding activities, from musical composition to theological writing, but she had little science knowledge that could provide the elaborate and technical explanations of the universe we find in her writings. She studied neither atoms nor gravity, yet she seems to know about both, and many other related issues, in ways at which even a modern scientist would marvel.

Some skeptic might resort to accusing her of being demonically possessed, a state of mind that somehow gave her the ability to produce all kinds of extraordinary insights. But this accusation is quickly neutralized. First, devils do not produce such technically accurate designs. Second, if one decides to open up the possibility of the preternatural to Hildegard, one consequently opens up the supernatural as well. Thus the objection loses its impact, not to mention the fact that no one in Hildegard's day, including layfolk and church hierarchy, saw any evidence in her life that would merit such a derogatory accusation. Rather, Hildegard was exhorted and authorized to publish her writings by Pope Eugenius III (1145-1153) after he had commissioned Albero of Chiny, the bishop of Verdun, to investigate her writings. Hildegard's immediate clerical authority in Mainz, Bishop Heinrich, pronounced her visions as having divine origin. As her fame spread far and wide, many prominent clerics and layman sought her wisdom, including St. Bernard of Clairvaux, St. Elizabeth of Schoenau, the emperor Frederick Barbarossa, King Conrad III, and dozens of archbishops and bishops throughout Europe. The Roman Catholic Church has "beatified" Hildegard, which is the last step toward sainthood.

Earth: The Center of Six Cosmic Layers

To no surprise, Hildegard's visions of cosmology agree precisely with the geocentric foundation laid down in Scripture; which foundation was promoted, without exception, by a consensus of the Church Fathers; continued faithfully by Thomas Aquinas and the medievals; and confirmed by papal and conciliar decrees – not something the devil would want to accommodate if he were trying to marginalize Hildegard against the patriarchs and saints of the Church.

As Hildegard would agree, if one takes Genesis 1:1-2 at face value, one must hold that the Earth was created before the sun and stars; that it is the center point of the whole cosmos, is surrounded by the firmament that reaches to the limits of the universe, and a firmament upon which waters are presently resting. Thus was the cosmology of Hildegard's visions, but with much more detail. Accordingly, as we have outlined the scientific support for a geocentric universe in the foregoing chapters, we will now consult Hildegard's visions to substantiate those facts and queries.

To begin, Hildegard's visions revealed that the Earth was in the very center of the universe, serving as the center for the compass that points north, east, south and west stretching to the edge of the universe, a universe that is finite and spherical. She revealed that the whole universe rotates around the Earth and that the Earth itself has no movement. Surrounding the Earth are six spherical layers, composed either of fire, water or air.[351] The two outer layers are composed of fire (energy). A layer underneath the fire layers is composed of "ether." The two layers nearest to Earth are composed of air, the Earth's atmosphere being closest and described as "very clean," followed by an "illuminated and humid" air

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[351] Hildegard writes: "In its outer vault appeared a circle of bright Fire around the spherical wheel and immediately under it, without gap, another circle of black Fire. The thickness of the bright Fire was double of the black Fire. The two circles were linked as if they consisted of only one. Under the circle of black Fire, appeared another circle as consisting of pure ether, with the same thickness as the two other ones together. Under this ether circle there is a circle of humid Air, with the thickness of the circle of bright Fire. Under the circle of humid Air appeared another one consisting of very clear Air, which in its consistency was similar to a nerve of the human body. It was wide like the circle of black Fire. These two circles were also linked as if they consisted of only one. Under this very white Air there is also a thin layer of Air similar to some fluffy down, with dark accumulated clouds, which are divided in the whole spherical area. All these six areas were bound without an interstice. The outer circle inundated all the other spheres with its Fire, but the water area humidified all the other ones with its humidity" (*Welt and Mensch*, 35, *Das wahre Weltbild*, p. 82).

layer. Above the two air layers is a water layer, which corresponds to the "waters above the firmament" recorded in Genesis 1:6-9. Hildegard writes that these waters "are material unlike the lower waters, that is, much finer and invisible to our eyes."[352] The words "finer" and "invisible" could mean that the water is extremely rarified and thus invisible, or that it is rarified and very far away from Earth and therefore not seen with the unaided eye. The corollary point seems to be that the water Hildegard has in view is not solid or liquid, but gaseous.
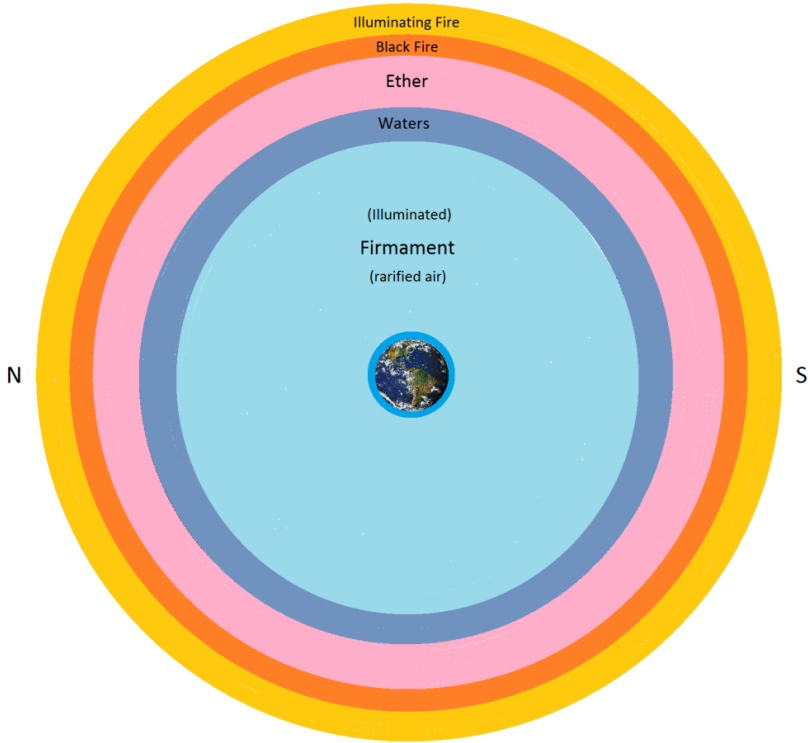
Scripture verifies that water, and the corresponding layers in Hildegard's vision, exist in these remote regions of the celestial orbs. In Psalm 104:1-6 [LXX 103:1-6], David writes:

> [1] O Lord my God, you are exceedingly great. You have put on praise and beauty:
> [2] And are clothed with **light** as with a garment. Who stretches out the heaven like a pavilion:

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[352] Hildegard, *Die göttlichen Werke*, 56; Posch, *Das wahre Weltbild*, p. 84.

[3] Who covers the higher rooms thereof with **water**. Who makes the **clouds** your chariot: who walks upon the wings of the **winds**.
[4] Who makes your angels spirits: and your ministers a burning **fire**.
[5] Who has founded the **earth** upon its own bases: it shall not be moved for ever and ever.
[6] The **deep** like a garment is its clothing: above the mountains shall the **waters** stand.
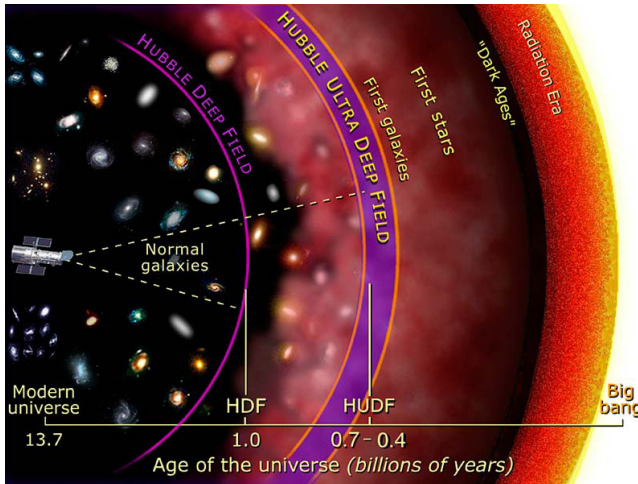
Time-based representation of the universe by NASA
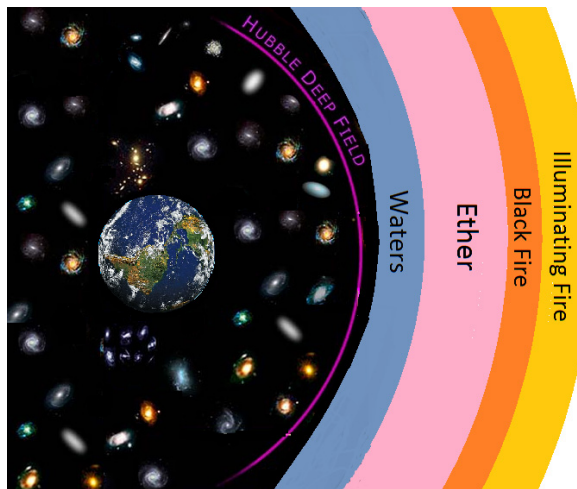
Space-based representation of the universe by Hildegard

The foregoing diagrams represent: (1) the Big-Bang universe of modern cosmology, which is based on the idea of a primordial explosion of indeterminate origin that expands out over 13.7 billion years and deposits matter and energy isotropically and homogeneously, and (2) the biblical view espoused by Hildegard which is based on the idea that the universe, with all its matter and energy, was instantaneously created over a six-day span and deposited systematically around Earth as the center of the distribution.

Water in the Remote Recesses of Outer Space

Prior to our present era, water in outer space was undetectable. Modern science, however, has discovered vast amounts of water in the recesses of space. As West Marrin writes:

> Water is certainly not limited by the confines of this planet and is, in fact, one [of] the most common molecules in the universe. The more that science looks for water in the cosmos, the more places they seem to find it.[353]

Scientists have known for quite a while that massive water clouds exist in outer space. As soon as telescopes were sensitive enough to detect it, the reports came in quite frequently. One of the first was from the University of California that reported in *Science*:

> Radio spectral line radiation of water molecules at a wavelength of 1.35 centimeters has been measured from eight sources in the galaxy. The sources are less then 7 arcminutes in diameter, have extremely high brightness, temperatures, and show many spectral features...Seven of the eight H_2O line emission sources which have been observed agree in position with known

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[353] West Marrin, *Universal Water: The Ancient Wisdom and Scientific Theory of Water*, Hawaii, Interocean Publishing, 2002, p. 67. Water has also been found on the surface of the sun. It survives the high temperatures of the sun's photosphere since the water is confined to the dark, cool regions of sunspots whose temperature is less than 3,500 Kelvin. Marrin adds: "The water discovered in the Sun and in various stars is understandably known as hot water, but it is unmistakably water, based on the wavelengths of infrared radiation that are absorbed…water is believed to filter out certain frequencies of EM radiation that are given off by stars….When these stars die, they appear to go out in a flood of water as This Element plays out its less glamorous role of mediating the destruction or recycling of the universe's stuff" (*ibid*., pp. 78-79).

hydroxide emission sources within the accuracy of measurement.[354]

The article goes on to say that the sizes of the water clouds range in length to about 80 billion miles, a distance which is 27 times the distance between the sun and Pluto. A more recent newspaper report concurred with this evidence:

Astronomers have detected water at the most distant point from Earth so far, a discovery that adds to the growing belief this essential ingredient of life may be present throughout the universe. The water was found 200 million light years away by radio telescope in Markarian 1…said James A. Braatz, an astronomer at the University of Maryland.[355]

Often water is found in the strangest places:

Recently, two of the brightest supergiants in the galaxy, Betelgeuse (in the Orion constellation) and Antares (in the Scorpio constellation), were discovered to actually have water in their photospheres, as well as in the circumstellar material surrounding their photospheres….The structure of photospheres in cool stars is due primarily to the opacity of water, which is one of the most abundant molecules in such stars. The presence of photospheric water in these red supergiants confirms that it is located within the star itself and is not just a component of the dust and gas clouds surrounding stars. Aging supergiants have

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[354] S. H. Knowles, *et al*., "Spectra, Variability, Size, and Polarization of H2O Microwave Emission Sources in the Galaxy," *Science*, March 7, 1969, pp. 1055, 1057. Basil writes: "Let us understand that by water, water is meant; for the dividing of the waters by the firmament let us accept the reason which has been given us" (*Hom.*, 3, 9).

[355] "Water found on distant galaxy," *Associated Press*, Minneapolis, 1994. Braatz continues to find water in space. As of 2005, Braatz's most recent abstract reveals a "Search for Extragalactic Water Maser Emission with the GBT: Independent Measurement of the Hubble Constant: Consequently, we propose to conduct a search for extragalactic water maser emission in edge-on Seyfert 2 and LINER systems. Considering the detection rates of our recent GBT surveys among edge-on active systems, we expect to detect ~20 new sources, thereby increasing the number of known water maser sources by nearly 50%" (Conducted by the National Radio Astronomy Observatory).

been observed to release massive amounts of water as they die.[356]

Regarding the water in and surrounding the constellation Orion, Marrin adds:

Recent data indicate that this cloud complex contains an extremely high concentration of water vapor, which has been estimated on the order of 1 part in 2,000 or about 500 parts per million. This is about twenty times greater than the water concentration in other interstellar gas clouds and represents enough water to fill the Earth's oceans ten million times![357]

In addition to water's ubiquity, modern science is continually amazed at the makeup and function of the water molecule. The simple combination of two hydrogen atoms and one oxygen atom has, as it turns out, a dizzying array of combinations and actions that is highly unique among nature's compounds. As Marrin tells it:

Water is not simply H_2O, but rather is a complex network of interconnected water molecules, especially in its solid and liquid states. Moreover, this network is constantly shifting its connections (known as hydrogen bonds) among neighbors so that the resulting geometries are exchanged as many as a trillion times per second….Many of water's most puzzling properties, as well as its ability to solvate or "include" an amazing variety of substances within its network, are a direct result of these molecular gymnastics…[358]

And later:

Based on the percentage of water versus carbon-containing compounds in biological organisms, there is little doubt that the biosphere is water-based rather than carbon-based. Not only does water constitute most of our mass, it is required in essentially every biological structure and process. It was formerly understood that water simply acted as the solvent or matrix within which the carbon-containing compounds (*e.g.*, DNA,

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[356] *Universal Water*, pp. 76-77.
[357] *Universal Water*, p. 78.
[358] *Universal Water*, p. 93.

proteins) orchestrated the drama that creates and sustains biological life. It now appears as though water participates in directing the processes to an extent that was previously unimagined.[359]

The purpose of detailing the above facts is to point out that, as modern science has confirmed the presence of water in outer space, it is certainly no stretch of the imagination to accept that there is "water above the firmament," as both Genesis 1:6-9 and Psalm 148:4 indicate. Considering the complexity and versatility of the water molecule, it no doubt plays a vital role both on Earth and in the cosmos, the latter being a dimension of water's existence that science is just now beginning to discover and confirm. We will see more of the precise function of this cosmic water later in Hildegard's writing.

Scriptural Accounts of Primordial Water and Plasma

As we noted above, according to Hildegard the water above the firmament is just one of six layers surrounding the Earth. If this is, indeed, the correct understanding of the structure of the universe, we can then reconstruct the process of its development and its constitution by employing other information from Scripture. The relationship between the layers is expressed in various passages. For example, 2 Peter 3:5 confirms Genesis 1:2's stipulation that the Earth was originally created inside a spherical mass of water:

> …that by the word of God the heavens existed long ago, and an Earth formed out of water and by means of water, through which the world that then existed was deluged with water and perished. But by the same word the heavens and Earth that now exist have been stored up for fire, being kept until the day of judgment and destruction of ungodly men. (RSV).

The clause "Earth formed out of and by means of water" is the Greek γῆ ἐξ ὕδατος καὶ δι ὕδατος, wherein ἐξ means the Earth came from water, while the Greek δι, in this case, does not mean "through" but is closer to "between," and thus tells us that the Earth was surrounded by water (*i.e.*, water covered the entire spherical circumference), and held there, as Peter says, by the word of God. The original mass of water surrounding the Earth was huge, measuring multi-thousands of miles in

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[359] *Universal Water*, p. 125.

diameter, since later it would be used to cover the vast circumference assigned to it in the distant cosmos. Hildegard tells us that the original **water surrounding the Earth was solid ice**, until the Spirit moved upon it and light was created.[360] Consequently, the Earth of the First day of creation was like a seed in the middle of a vast frozen ocean. We can assume that once the light was created its heat melted the ice. Moreover, since science shows that a great residue of water remains in the cosmos, we can surmise that as the firmament expanded on the Second day and took the greater portion of the primordial waters with it to form the "waters above the firmament," a substantial residue of that water was left in the cosmos and it is this amount that science is now detecting in outer space, and whose importance we will discover momentarily.
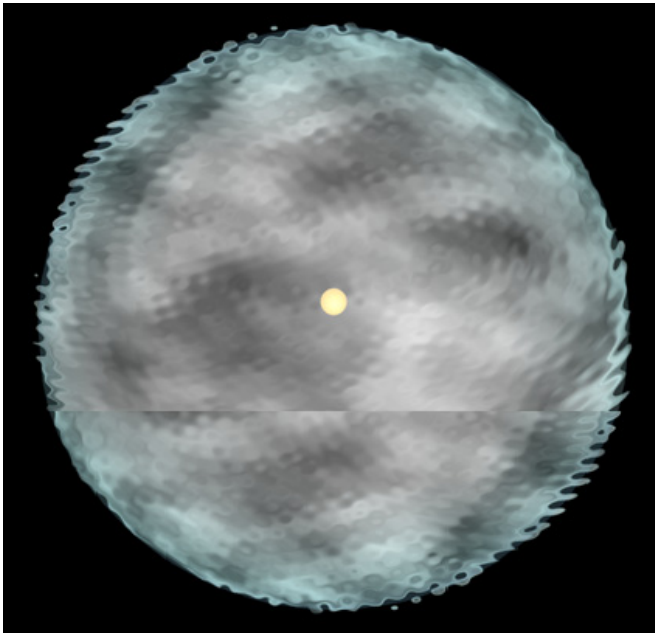
In addition, 2Peter 3:6 indicates that the original water surrounding the Earth was later employed in the Great Flood (Genesis 7-9). This does not necessarily mean that the "waters above the firmament" were called down, for they are permanently fixed in their respective cosmic layer;

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[360] "During the Creation, the Water was then cold and didn't flow, while the Earth was still empty. But the Spirit of God moved up the waters and heated them, so that they should contain the Fire and flow as liquid" (*Ursachen u. Behandlung der Krankheiten*, 68; *Das wahre Weltbild*, p. 89). In Gn 1:2, 6, 7, the Hebrew dual form for water, הִמַּיִם, implies two water forms or sources.

rather, the water left behind in the cosmos after the expansion of the firmament could have been accumulated and dispersed on the Earth at the proper time, and its source is thus appropriately called the "windows of the heavens" (Genesis 7:11; 8:2). Since, as noted above, astronomers have discovered huge water clouds in space that stretch in length by as much as 27 times the distance from the sun to Pluto and could thus fill our oceans a billion times over, it is certainly reasonable to surmise that such massive deposits of water in space could have been used in the Great Flood. The water presently found in our local system may be the remnants of that event.

Interestingly enough, St. Peter says in the same context:

> But by the same word the heavens and Earth that now exist have been stored up for fire, being kept until the day of judgment...the heavens will pass away with a loud noise, and the elements will be dissolved with fire, and the Earth and the works that are upon it will be burned up" (2Pt 3:7,10).

The source of this destructive energy may be Hildegard's two outer layers of "fire." We can surmise that at the appropriate time they will be brought down from their remote recesses in space and squeezed toward the center of the universe until the world is destroyed. As opposed to the *Big Bang*, we might call this scenario *The Big Implosion*. In the beginning of creation, however, what most likely occurred is that these two layers of energy originated from the "light" created on the First day. This primordial light (which was distinct from the sun and stars that would not be created until the Fourth day), initiated the day/night sequence on Earth for the first three days of the creation week. The daylight was produced by a confinement of the light to less than a hemisphere (Genesis 1:3 says "and God separated the light from the darkness"), which light moved around the Earth every twenty-four hours, perhaps in tandem with the Spirit that "moved over the face of the waters," to keep it liquefied.

One way in which the luminosity would be possible is if the light of the First day were in the form of a fire or plasma, since in that form it can be contained and moved.[361] For the purposes of comparison, the sun

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[361] We note here that Aristotle held a view of light close to the modern view, that is, that light is ἐνέργεια (energy) and travels through or vibrates in a διάφανες (diaphanes) or medium filling all of space. This is close to the Pythagorean view that understood light as a stream of particles that hit the eye, and opposed to the view of Plato that the eye emits a "divine fire" that is directed to the object. The Arabs of the Middle Ages adopted Pythagorus' view. It wasn't until 1690 that a wave theory of light was proposed by Huygens, and Newton understood it as

(which modern science has confirmed is a giant ball of fire), is also called a "light" in Gn 1:14-17, and it is also assigned the same function, that is, "to separate the light from the darkness" (Gn 1:18). Presently, as the sun revolves around the Earth, it creates the day/night sequence. In the same way, the rotational movement given to the primordial light of the First day was the means by which God "separated the light from the darkness" on the first three days. Hildegard speaks in a similar way:

> Almighty God, who is life without beginning and without end, and who constantly knows everything, made the material for all heavenly things and all mundane things together, that is, heaven as lucent matter, and earth, which was opaque matter. This luminous matter, however, from the glory of eternity flashed like a dense light that lit up over the opaque matter in such a way as to join itself to it. And the two substances were created at the same time *and appeared as if in a circular orbit*….The six days are six acts; for the beginning and the completion of each act is called a day. Neither was there an interval after the creation of primary matter, but instantly, as it were, the Spirit of God hovered over the waters, and afterwards, too, there was no delay, but God said immediately: "Let there be light" and light was made.[362]

Scripture later maintains this distinction as it speaks of four separate celestial sources. For example, in Ec 12:2 the preacher writes: "Before the <u>sun</u>, and the <u>light</u>, and the <u>moon</u>, and the <u>stars</u> be darkened."[363] Notice that the sun and stars are distinguished from the "light." The same four sources are noted again in Psalm 148:3: "Praise ye him, O <u>sun</u> and <u>moon</u>: praise him, all ye <u>stars</u> and <u>light</u>." Thus we know that this detailed description is not merely an idiosyncrasy of only one biblical writer.

"vibrations in the ether," thus developing the view of Aristotle. Today the theory of what constitutes light is still not settled. It is best described as waves that carry particles or waves composed of particles, since light has properties both of a wave and of a particle. As Oliver Lodge once quipped: "the two concepts are like a shark and a tiger, each supreme in its own element and helpless in that of the other."

[362] Briefwechsel, *Das Wahre Weltbild*, p. 22. Regarding the creation of the angels, Hildegard states that it occurred during the creation of light. She writes: "For at the first fiat, 'let there be,' the angels came forth…" (*ibid.*).

[363] The Hebrew contains four separate nouns with an article for each of the four, in addition to each being separated by the *waw* conjunction, denoting in the clearest of terms that the four sources are separate and distinct. Reading from right to left: עד אשר לא־תחשך השמש והאור והירח והכוכבים

Since at the beginning of creation the Earth was surrounded by a huge mass of water, the light created subsequent to the initial 12 hours of evening on the First day would have radiated through the water on its way to the Earth's surface.[364] Water, then, was the first medium in which light traveled. Being on the outer circumference of this multi-million-mile layer of water, these primordial fires would, indeed, have been immense, much larger than our present sun, and even much larger than thousands of suns. But since the massive water beneath it would have proportionately diffused its light and heat, the Earth would have received the proper amount of radiation. As Hildegard says, the four elements of fire, earth, water, and air are kept in perfect balance, during and after the creation.

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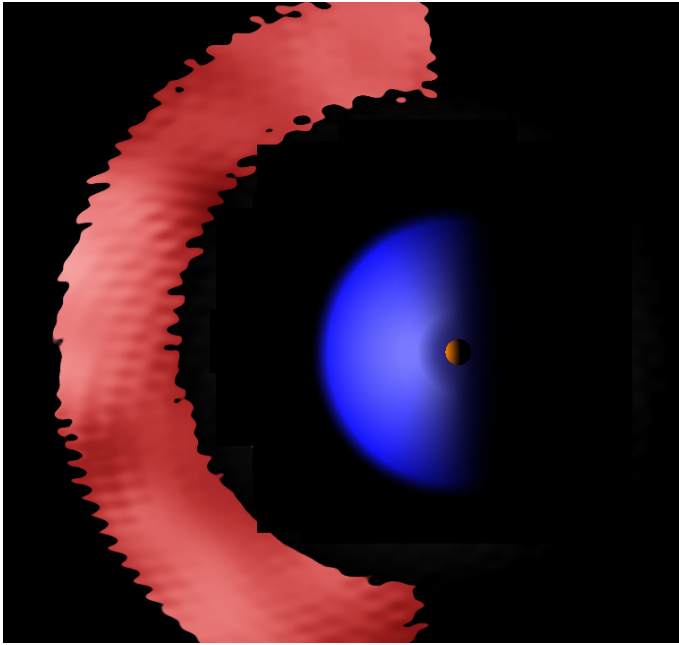
[364] If we assume that the primordial light was created immediately after the Earth and the water surrounding the Earth were created, yet "darkness" or "evening" would have transpired for 12 full hours before the light appeared on the surface of the Earth, this would allow 12 hours for the light to travel through the water to reach Earth. In other words, while the light is traveling through the water, the surface of the Earth is still in its 12 hours of "darkness" or "evening." Considering that light travels two-thirds of its normal air speed in water, it would have traveled 123,000 miles per second through the primordial water. Traveling 12 hours at 123,000 mps means that the radius of the surrounding water could have been as long as 10,627,200,000 miles, which equals 1.54×10^{28} cubic miles of volume. This is more than three times the spherical volume of our solar system.

The Sequence from the First Day to the Fourth Day

One might ask why there were two separate light sources: one source for Days 1-3 and another source for Days 4-6. The reason is that the major portion of both the primordial light and the primordial water created on the First day are to be transported away from the Earth, a migration which happened on the Second day, when God created the firmament. After the water is sent away, it is the firmament's turn to serve as light's medium. As the firmament was being "stretched out"[365] it created the fabric of space (which, as we stipulated earlier, is a rigid yet flexible particulate, not a vacuum), and at the same time, took with it the fire and water to their new recesses in the outer universe, and which subsequently formed the layers of fire and water existing there in Hildegard's cosmology. Our present sun would have been too small to provide the light for the day/night sequence required by the text of Genesis 1:5: "and there was evening and there was morning, one day." As we noted, the size of the sphere of water that covered the Earth on the First day was thousands of times bigger than the sun itself and therefore the sun's light could never have penetrated to the Earth in order to provide enough light to dispel the darkness.

Although the expanding firmament carried the greater portion of the light and water to outer layers of the universe, a small portion of the water remained on Earth and a portion of the fire was left above the Earth. This residual water was then used to fill the ocean and river basins on the Third day, while the residual light was confined to a hemispherical region above the Earth and rotated with the same twenty-four cycle as did the larger hemisphere of fire on the First day. On the Second and Third days, of course, much less light would be needed to illuminate the Earth since after the First day there is no longer any water surrounding the Earth to diffuse the light. As these residual fires surrounding the Earth burned out just after the second 12-hour period on the Third day, this would necessitate the creation of additional "fires" on the dawn of the Fourth day, namely the sun, in order to provide the Earth with an uninterrupted sequence of day and night. (NB: Genesis 1 keeps track of time by "evening to morning," not morning to evening).

It is more likely, however, that the residual fire (or energy plasma) circling the Earth on the Second and Third days was not exhausted (the same is true for the sun for the foreseeable future) and was thus used to form the sun on the Fourth day, a position held by a number of Church

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[365] *Cf.* Jb 9:8; Ps 104:2; Is 42:5; 44:24; 45:12; 51:13; Jr 51:15; Zc 12:1. We also note that, although Scripture says many times that the sun, stars and moon are "in the heavens," the Earth is never said to be "in the heavens."

Fathers and medieval scholars.[366] This sequence of events fits the text of Genesis 1, since the size and intensity of the residual fires on the Second and Third days would have to be the same as our present sun, otherwise the Earth would not have been hospitable to the vegetation created on the Third day. The firmament, having already been created for the purpose of being a depository for the heavenly bodies, will have the sun placed in it on the Fourth day. As the firmament rotates on a twenty-four hour cycle, it will carry the sun with it, and thus the day/night sequence will be uninterrupted for the remainder of time.

The Outer Layer of Energy Confirmed by Modern Science
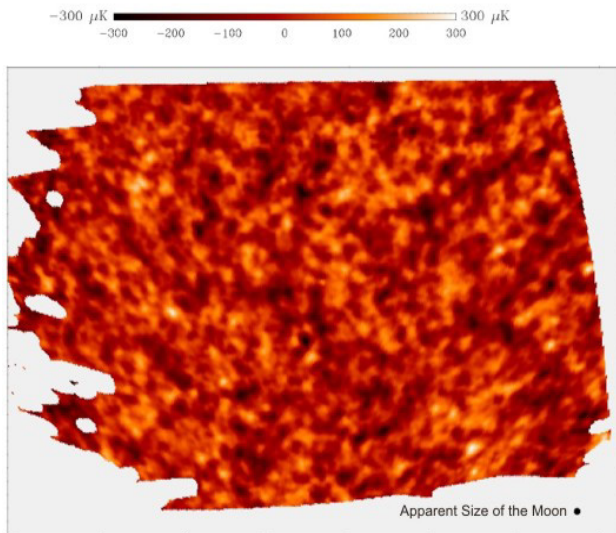
The original mass of fire, however, is still at the outer recesses of the universe. Its heat is very intense, and thus we can understand why it will

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[366] Gregory of Nyssa (*Hexameron*, PG 44, 66-118); Ephrem the Syrian (*Genesim et in Exodum commentarii*, in CSCO, v. 152, p. 9); Chrysostom (*Homilies on Genesis* (PG 53, 57-58). Thomas Aquains also held this view (*Summa Theologica*, 1, Qs. 67, Art. 4, Re. 2), as did a few other medievals: Honorius of Autun (*Hexameron* PL 172, 257); Peter Lombard (*Lombardi opera omnia*, PL 192, 651); Colonna, aka Aegidius Romanus (*Opus Hexaemeron*); Nicholas of Lyra (*Postillae perpetuae*); Cajetan (*Commentarii de Genesis 1*), and followed by Moses Mendelssohn (*Commentary on Genesis*) Zwingli (*Werke*); Luther (*Commentary on Genesis*); Calvin (*Commentary on Genesis*); Petavius (*Dogmata theologica*) *et al*.

someday be used to destroy the inner universe. Interestingly enough, modern science may have received a glimpse of this layer, or something close to it. In December 1998 a team of international cosmologists sent up the BOOMERANG (Balloon Observation of Millimetric Extragalactic Radiation and Geophysics) telescope over Antarctica for ten days.[367] It took pictures of the cosmic microwave background radiation as it would appear at the edge of the universe. The picture shows what looks like a **mass of fire or plasma**, evenly dispersed throughout the universe. As one caption described it: "In this picture, we see the distant universe as it makes its transition from a glowing 2700ºC plasma to a perfectly transparent gas….BOOMERANG is the first telescope with the resolution and sensitivity required to image these…" Not surprisingly, most scientists who interpreted the picture believe in the Big Bang theory, thus they add that the plasma is from "approximately 14 billion years ago, a mere 300,000 years after the Big Bang." Of course, since the Big Bang never occurred, this leaves the primordial plasma as a created artifact of the First day of Creation, when God said: "Let there be light."

This conclusion is supported by the fact that the BOOMERANG's depiction of the primordial plasma does not support the Big Bang theory. Although the world's scientists were initially enthused by the pictures, that enthusiasm soon turned to dismay when it was discovered that the plasma contained too many unexpected anomalies. As *Scientific American* reported it:

> Usually cosmology goes something like this: new observations come in, scientists are baffled, models are upended. After the dust settles, however, patches are affixed and the prevailing theory emerges largely intact. But when the measurements by the Boomerang and Maxima telescopes came in, the sequence was reversed. Scientists were elated. "The Boomerang results fit the new cosmology like a glove," Michael S. Turner…told a press conference in April. And then the dust settled, revealing that two pillars of Big Bang theory were squarely in conflict…[368]

> …follow up studies soon showed that the lingering discrepancy, taken at face value, indicates that the universe is in fact spherical….The second …suggests that the primordial plasma contained surprisingly many sub-atomic particles….But accounting for those extra particles is no easy matter. According

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[367] *Nature*, April 27, 2000, pp. 907-1021.
[368] "Boomerang Effect," *Scientific American*, July 2000, p. 14.

to Max Tegmark…the Boomerang results imply that subatomic particles account for 50 percent more mass than standard Big Bang theory predicts – a difference 23 times larger than the error bars of the theory. "There are no known ways to reconcile these measurements and predictions," says David R. Tytler of the University of California at San Diego.[369]

A similar finding was found by the Goddard Space Flight Center headed by Alexander Kashlinsky. Discovering the same "strange background glow" from having "peered all the way to the most remote objects in the universe," *Discover* writes:

> Kashlinsky and his team at Goddard examined a deep-exposure image of a patch of sky taken by NASA's orbiting Spitzer Space Telescope and then subtracted the light from all the evident stars and galaxies. What was left was a dim background glow never seen before…." We see a signal that cannot be explained by stellar populations that we know," Kashlinsky says.[370]

So here we see that the scientific evidence does not support the Big Bang theory; rather it supports Hildegard's spherical universe with the hot plasma she says resides at its outer layers. According to Hildegard, the ether and water layers beneath it cool the high temperatures created by the plasma. The ether layer would serve as the initial thermal cushion to diffuse the heat, while the water layer would complete the process. As Hildegard puts it: "The outer sphere throws its fire equally on the other spheres. On the opposite side, the water sphere humidifies equally with its humidity all the other spheres," yet she also tells us that these cosmic waters "are in their own state, different than the lower waters [on Earth]."[371] As we will see later, the cosmic water may be in a super-

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[369] *Ibid.*, p. 15.
[370] Susan Kruglinski, "Hunting of the First Stars," *Discover*, February 2006, p. 17. George F. R. Ellis recognized this same trait in inhomogeneous [Earth-centered] models of the universe, stating: "Just as in the standard universe models, the region beyond would be occupied by a hot cosmic plasma; and this could be the source of the blackbody radiation" (G. F. R. Ellis, R. Maartens and S. D. Nel, "The Expansion of the Universe," *Mon. Not. Royal Astronomical Society*, 184, 1978, p. 444).
[371] *Die göttlichen Werke*, 56; *Das wahre Weltbild*, p. 84. Posch adds: "The volume of these elementary quantas of fine matter is smaller by many orders of magnitude than the atomic corpuscles, and which are invisible to our eyes. The upper waters

gaseous state, yet it humidifies the whole universe, and, as Hildegard adds: "The humidity and fire produce the appropriate heat to strengthen the firmament."[372] This exchange of the four elements, among other processes (such as the cosmic winds upon which we will elaborate later), would leave the ambient temperature of the universe as cool as the present 2.73° Kelvin, while the water nearest the fires could be as hot as 3500° Kelvin and still allow the water to survive in the form of molecules.

The Purpose of the 2.73° CMB

The maintenance of 2.73° Kelvin[373] brings up a very significant dimension of Hildegard's cosmology. Modern science has struggled to understand the origin and homogeneity of the 2.73° temperature, the most popular theory being that it is the remnant of the radiation from the so-called Big Bang explosion that various scientists believe occurred 13.5-15.5 billion years ago. Others hold that it is the resulting energy from the vibration of dense particles in space; while still others believe it is the residual temperature of all the stars and galaxies in the universe.

According to Hildegard's visions, the 2.73° Kelvin is a well-designed and precise residual temperature that is employed to keep the universe stable. It is the result of a cyclical thermic process occurring in the whole universe precisely so that it won't overheat. The very high density of the firmament (which we will detail momentarily) allows it to act as an ideal gas, and according to the well known formula: $P \times V/T = R$,[374] the 2.73°

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are also invisible, as is the cosmic air and fire. The upper water is not comparable to H_2O, as the cosmic air is not comparable to our atmospheric air" (*ibid*).

[372] *Die göttlichen Werke*, 56; *Das wahre Weltbild*, p. 84.

[373] The Kelvin scale begins with absolute zero, below which temperatures do not exist. Absolute zero, or 0°K, corresponds to a temperature of -273.15° Celsius. Thus, a temperature of 2.73° Kelvin is very cold and very near absolute zero. The Kelvin degree is the same size as the Celsius degree. For example, the freezing point of water is 0° Celsius; the boiling point of water is 100° Celsius, which correspond to 273.15° Kelvin and 373.15° Kelvin, respectively. The Kelvin scale is named after the British mathematician and physicist William Thomson Kelvin, who invented it in 1848.

[374] The behavior of an ideal gas is described by the relationship $PV = kT$ (pressure × volume = k × temperature). The proportionality constant, k, is usually expressed as the product of the number of moles, n, of the gas and a constant R, known as the universal gas constant, which has a value of 8.3149×10^3 joules/kilogram-mole-degree. The ideal gas law is simplified by replacing the ordinary volume V by the specific volume v, which is equal to V/n, which then yields the formula $Pv = RT$.

Kelvin is the precise temperature needed to coordinate with the volume and pressure within a finite and closed universe. If these values were not maintained, then, as Hildegard says, the universe would "melt." We have already seen in our discussion of helium-4 in Volume I that at the right Kelvin temperature (between 0.25° and 3.0° for helium-4) what we know as a gas at room temperature becomes a frictionless "supersolid" at the low end of the Kelvin scale. As we will see, Hildegard tells us the same principle is true with the firmament.

The Four Elements of the Universe

Hildegard's visions show that she understood matter to be composed of four basic elements, the same ones that Aristotle recognized: fire, air, water and earth, which Aristotle obtained from Empedocles. Tempted as we might be to dismiss these as primitive concepts or think of them as referring merely to specific physical substances (*e.g.*, dirt, flames, oceans/rivers, wind/breath), in reality the four terms represent the general makeup of all matter. On one level of understanding, "earth" refers to solids; "water" refers to liquids; and "air" refers to gases – the three states of matter that any modern scientist would recognize. The "fire" represents energy, or what some identify as the fourth state of matter – plasma. In fact, plasma physicists consider fire to be plasma, as they do the sun, the stars, intergalactic nebulae, quasars, radiogalaxies, galaxies, auroras, lightning, the flow of electrical current in conductors and semiconductors, fluorescent lights and neon signs. Thus we have matter and energy, the two entities constituting anything physical that the universe has to offer. Even modern scientists recognize the fire-air-water-earth terminology. For example, biogeochemist Egon Degens writes:

> The element air is described by molecular kinetics and statistical physics. The "simple" substance fire is thermodynamically defined as heat or energy. Quantum mechanics, solid-state physics and chemistry refer to matter rather than to Earth. The problem child, however, is water, because so far no equation can thermodynamically describe its reaction and properties at the molecular level.[375]

As we relate Hildegard's description of these four elements to even deeper facts from modern science, we find that the four also correspond to

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[375] *Universal Water: The Ancient Wisdom and Scientific Theory of Water*, Hawaii, Interocean Pub., 2002, p. 93.

the fundamental building blocks of nature that we moderns have assigned such names as protons, neutrons and electrons. The "fire" is the energy of the atom, otherwise known as the electron, whereas the protons and neutrons, known as a nucleon, are the "earth" (proton) and "water" (neutron). As we will see later, the atom is also comprised of "air," which occupies the space between the "fire" of the electron and the "earth" and "water" of the nucleon. In a very similar way, Hildegard's visions show the universe is constructed with the energy zones in the outer layers; the air/water layers in the middle zones; and the earth material in the center.

Accordingly, Hildegard adds: "More or less than these four elements there is nothing."[376] Scientifically speaking, we understand this to mean that the 103+ elements of the **Periodic Chart** do not represent substances that have differing fundamental components. Lead, for example, is not made of lead protons and lead electrons; rather, lead has 82 protons and 82 electrons. If we take away two protons and two electrons to leave an 80-80 balance, we will have the element mercury. Take away one more proton and electron and we now have gold. The fundamental building blocks are the same; only their number and ratio change from element to element.

The cosmic spheres of fire, air, water and earth are in constant communication and exchange in order to produce the proper balance required for the universe's stability. This, we might say, is the *Ultimate Unified Field Theory*. As Hildegard puts it:

God has built the world by means of the four elements, so that no one of them may be separated from the others, for then the world

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[376] *Ursachen u. Behandlung der Krankheiten*, 71, *Das wahre Weltbild*, p. 85.

would go back to nothingness if an element could exist separately from the others.[377]

For example, to varying degrees, fire (energy) permeates the other three elements: water, air and earth. The very formula we moderns use, $E = mc^2$, is, in Hildegardian terms, little more than the permeation of the element fire (energy) into earth (matter). As we noted above, on a macro scale astronomers have seen evidence of "fire" in the form of plasma all throughout the universe, the study of which is commonly known as plasma cosmology.[378] In addition, it is fire (energy) that turns solids into liquids, and liquids into gases. Each state must maintain a certain energy envelope in order to remain a solid, liquid or gas. As Hildegard puts it in her scientific terms: "The water contains in itself fire…the water could not flow if it didn't contain some fire."[379]

In Hildegard's terminology, "fire" represents many things, and we moderns have to accommodate her language to what we know scientifically. Although we speak of energy coming in the form of the entire electromagnetic spectrum – from gamma rays, to visible light, to microwaves – in Hildegard's vision "fire" represents all of these various energy forms. As Dr. Posch has suggested, we would venture to say that

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[377] *Ursachen u. Behandlung der Krankheiten*, 68, *Das wahre Weltbild*, p. 89.

[378] Nobel laureate, Hannes O. G. Alfvén, "Cosmology in the Plasma Universe: An Introductory Exposition," IEEE Trans. *Plasma Science*, Feb, 1990; "Plasma Physics from Laboratory to Cosmos – The Life and Achievements of Hannes Alfvén," by Carl-Gunne Fälthammar, IEEE Trans. *Plasma Science*, June 1997; *World-Antiworlds: Antimatter in Cosmology*, 1966; Eric Lerner, *The Big Bang Never Happened*, 1992; US Dept. of Energy advisor and Associate Director of Los Alamos National Laboratory, Anthony Peratt (A. Peratt and D. Nielsen, "Evolution of Colliding Plasmas," *Physical Review Letters*, 44, pp. 1767-1770, 1980); Oscar Buneman in "A Tribute to Oscar Buneman – Pioneer of Plasma Simulation," IEEE Trans. *Plasma Science*, Feb, 1994; Nobel nominee, Kristian Birkeland, in "The Worlds in the Universe," wrote: "This theory differs from all earlier theories in that it assumes the existence of a universal directing force of electro-magnetic origin in addition to the force of gravitation, in order to explain the formation around the sun of planets (which have almost circular orbits and are almost in the same plane) of moons and rings about the planets and of spiral and annular nebulae" (*Sky and Telescope*, "Birkeland and the Electromagnetic Cosmology," May 1985). The first to recognize the plasma state was Sir William Crookes, who discovered it in 1879, and which was later given the name "plasma" by Nobel laureate Irving Langmuir in 1929. Interestingly enough, Hildegard's visions portray something very close to plasma cosmology for the origin of the sun's energy and its relationship to the planets.

[379] *Ursachen u. Behandlung der Krankheiten*, 68, *Das wahre Weltbild*, p. 89.

Hildegard's "fire" comes in three states, just as matter comes in solid, liquid and gaseous form. The fire we see as flames is analogous to the solid state; electrical current or light waves are analogous to the liquid state, while radiation and high-energy plasma are the gaseous state. Similar to solids, flames are confined to a certain locale. But as liquids flow, so light energy flows from one place to another. For example, a lightning bolt that descends and hits the ground will suddenly burst into flames, and in such cases one could say that the liquid form of energy was turned into a solid form. We also know that light can penetrate its medium only so far, for opaque substances will deter it, whereas radiation, like a fine gas, can penetrate through various surroundings. Radiation also produces heat, and thus makes it similar to a flame. In fact, there is so much "fire" in the element radium that it literally overflows with radiation. In the words of Marie Curie, the discoverer of radium:

> A glass vessel containing radium spontaneously charges itself with electricity…Radium possesses the remarkable property of liberating heat spontaneously and continuously. A solid salt of radium develops a quantity of heat such that for each gram of radium contained in the salt there is an emission of one hundred calories per hour. Expressed differently, radium can melt in an hour its weight in ice. When we reflect that radium acts in this manner continuously, we are amazed at the amount of heat produced, for it can be explained by no known chemical reaction. The radium remains apparently unchanged.…As a result of its emission of heat, radium always possesses a higher temperature than its surroundings.…When a solution of a radium salt is placed in a closed vessel, the radioactivity in part leaves the solution and distributes itself through the vessel, the walls of which become radioactive and luminous… We may assume, with Mr. Rutherford, that radium emits a radioactive gas and that this spreads through the surrounding air and over the surface of neighboring objects. This gas has received the name emanation. It differs from ordinary gas in the fact that it gradually disappears.[380]

Another important relationship among the four elements is the affinity, on the one hand, of fire and earth, and, on the other hand, air and water. As we noted earlier, one example of the former relationship is that

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[380] "Radium and Radioactivity," Mme. Sklodowska Curie, *Century Magazine*, January 1904, pp. 461-466. The "gas" is now known as radon.

as "fire" represents the electron, the "earth" represents the proton. These two substances each carry a charge and thus relate to each other electrically or electromagnetically. All communication flows from positive to negative and back again. In another way, light is invisible unless it reacts with matter. We cannot see a light beam until some solid object impedes it, and this is one reason why the night sky is so dark. It is different for air and water. The communication between their domains consists largely of mechanical waves, incorporating pressure and temperature and other motions.

Upon these four elements and their communicative principles is based the workings of the whole universe. It is really quite simple. Modern science assigns various values and proportions to these entities and their relationships, such as Planck's constant, Boltzmann's constant, Avogadro's constant, the Gravitational constant, the electron charge value, etc., but they are all essentially describing the four basic elements of Aristotelian science and how they interact with one another.

The Rotation of the Firmament

As we have indicated the point earlier in this volume, the form and substance of the biblical "firmament" is particulate. Although its discovery has eluded both biblical scholars and scientists, some, like St. Augustine, never doubted its existence. As he once said in his famous book *The Literal Meaning of Genesis*: "…we must not doubt that it does exist in that place. The authority of Scripture in this matter is greater than all human ingenuity."[381] This is the consistent testimony of the patristic era, and it is a haunting voice against modern scholars who have given up the hope of finding the firmament, thus forcing them to declare that "Augustine's search for the firmament should seem baffling."[382] Unlike many modern scholars who have accepted Copernican cosmology with its attendant Big Bang origins, the Fathers were faithful to the biblical text, no matter how difficult it was to understand from their limited science. The medievals who followed them adhered with the same tenacity to the literal words of Scripture. As such, the Creator did not leave us in the dark regarding the correct understanding of Holy Writ.

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[381] *The Literal Meaning of Genesis*, Book 2, Chapter 5, Number 9. Aquinas adds: "Whether, then, we understand by the firmament the starry heaven, or the cloudy region of the air, it is true to say that it divides the waters from the waters..." *Summa Theologica*, Book 1, Question 68, Art. 3.
[382] Stanley Jaki, *Bible and Science*, p. 95.

As we noted earlier, geometrically speaking, there is no relative difference between a rotating universe around a fixed Earth and a rotating Earth in a fixed universe. They are, indeed, mirror images of one another. Nevertheless, there is only one true reality. As such, only one cosmology can be correct. In Hildegard's visions, it is the firmament that rotates, not the Earth, and this fundamental fact is mentioned many times in her description of the universe. As Helmut Posch notes it:

> This true world-view is no invention of mine. It is the result of Hildegard's statements. So that every reader may see this for himself, in what follows let me quote those statements which are of decisive import for the world view….All this detailed physical knowledge far exceeds our present-day knowledge. Only someone who knows how the universe is really designed can speak like this. Since Hildegard was not a genius but a simple woman, all this knowledge can only arise from instructions of the Omniscient One."[383]

Accordingly, Hildegard writes:

> And further I saw the world vault, through powerful drifts of the east and the south winds with their crosswinds, allowing it to circulate over the Earth from east to west, and there the west wind and the north wind caught it together with its crosswinds and tossed it underneath the Earth back from west to east.[384]

Posch gives us the meaning of her words:

> According to this, the entire universe is put in motion by the cosmic winds. They supply the unimaginable propulsion energies for the rotation of the firmament. Observed from the north, the firmament rotates equatorially and clockwise from east to west. Not a single heavenly body moves by its own power. All of the kinetic propulsion energy flows entirely from the stationary-positioned winds. Without these winds the entire universe would be completely without gravity, weightless like thoughts…. Even the largest stars would not weigh a gram because mass without the wind energy flowing through it would contain no gravity-forming power ….Mass and energy only

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[383] *Das wahre Weltbild*, pp. 119, 121.

[384] *Das wahre Weltbild*, p. 113.

appear to be equivalent. At close observation, energy is an interaction between matter and the winds.[385]
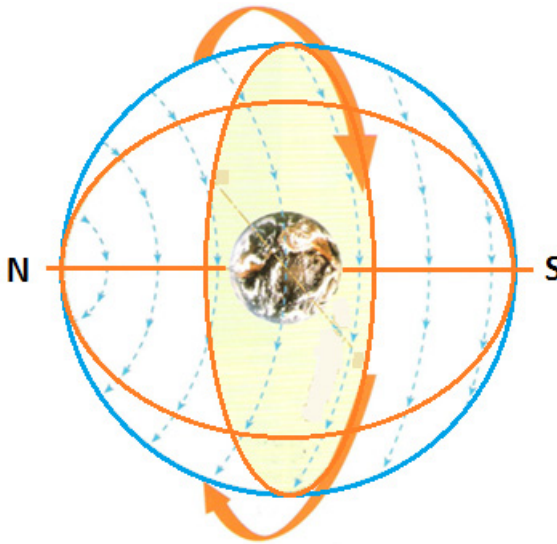
Thus, the entire universe rotates 360º per day, moving clockwise, or east to west, from the position of one standing at the North Pole. To reinforce the picture Posch adds: "Therefore, geostationary satellites travel against the rotation of space in order to appear stationary [to us]." We also see that the phenomenon of inertia in the cosmos is not due to some mysterious property of matter (that modern science has yet to explain), but is merely the result of cosmic winds pushing the firmament and its heavenly bodies in the designated direction. In this system, as Posch notes: "Thus it has been clarified physically why the sun, with its enormous mass, can move around the little spot of Earth. According to the current law of gravity, there would be no explanation for this."[386] Hildegard's vision thus adds a deeper understanding to the mundane meaning often assigned to the winds of Ecclesiastes 1:4-6:

> A generation goes, and a generation comes, but the Earth remains forever. The sun rises and the sun goes down, and

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[385] *Das wahre Weltbild*, pp. 113-114.
[386] *Das wahre Weltbild*, p. 120. Note: Posch is referring strictly to the Newtonian explanation for gravity, an explanation that does not take into account the Machian view that the whole universe is involved in the forces experienced by our solar system.

hastens to the place where it rises. The wind blows to the south, and goes round to the north; round and round goes the wind, and on its circuits the wind returns.

Moreover, because "the Earth remains forever," Hildegard's visions see a real "up" and "down" to the universe, which is due to the immobility and permanence of the Earth from which all other movements in the universe are measured. She writes:

For the sun, God has determined that it should shine above the Earth and hide under the Earth. That's why during the day it shines on the Earth, just as a man lives watchfully with open eyes during the day; at night, however, it moves beneath the Earth, just as a man sleeps with his eyes closed at night.[387]

The Local Cosmic Counter-Current

In addition to the rotation of the firmament by the force of the cosmic winds, Hildegard sees a local counter-current in her vision. She writes:

Also I saw: in the upper fire of splendor there appeared a circle that girded the entire firmament from east to west. From there a wind forced the planets to go from west to east against the rotating direction of the firmament. However, it did not send out its blows toward the Earth, like the other winds, but only moderated the course of the planets, as we said before already….The firmament rotates speedily, and the sun, together with the other planets, slowly moves towards it in the opposite direction and hampers its velocity.

For if the sun did not impede the firmament by its resistance to it, or if it ran counter to the firmament even with the other planets and with the same velocity with which is revolves, everything would be mixed up and the entire firmament would burst asunder. For if the firmament were immovable so that it would not revolve, then the sun would be above the Earth almost throughout the entire summer, without it becoming night, and almost during the entire winter under the Earth, without it being day.

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[387] *Welt und Mensch*, p. 164; *Das wahre Weltbild*, p. 120.

Now, however, the firmament revolves in such a manner that it moves counter to the sun, and the sun counter to it, for which reason the firmament compresses itself through the heat of the sun and is made more resistant all the more quickly, that is to say: when the sun traverses the firmament and wholly penetrates it and pours through it with its fire.[388]

Firmament-Rotation

Firmament rotates around the Earth clockwise in 23 hrs and 56 minutes

Earth

Mercury

Venus

Mars

Jupiter

Saturn

Sun and Planets run counter to firmament by about 1 degree per day
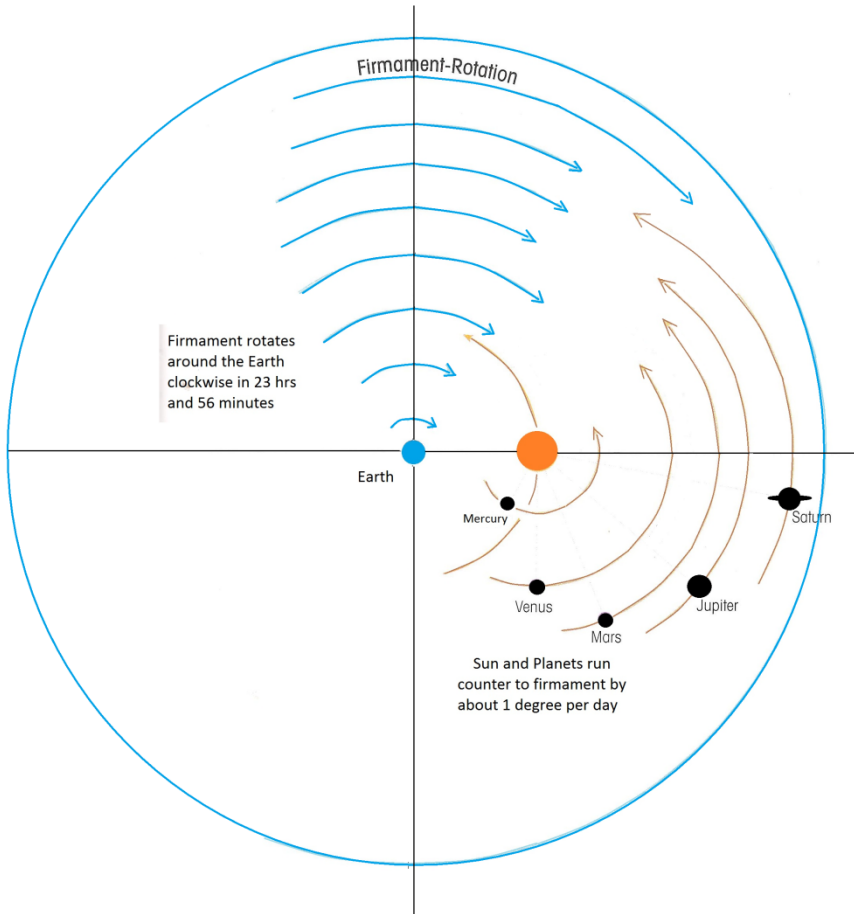
So we have a counter-clockwise current that is moving the entire solar progeny from west to east against the clockwise movement of the firmament from east to west. As Posch sees it: "This relative movement is the actual centerpiece of Hildegard's celestial mechanics." The sun, which

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[388] *Das wahre Weltbild*, p. 116; *Ursachen u. Behandlung der Krankheiten*, 24 in *Das wahre Weltbild*, pp. 120-121.

carries the planets, is moving ever so slowly against the rotating firmament due to the presence of a local cosmic wind. We can readily see the physical results of these motions and counter-motions. For example, the local motion of the sun against the firmament causes the sun to retard in its movement with respect to the Earth and the stars by about 1º of arc per day. This will cause a difference in the amount of time the stars, which are stationary inside the firmament, revolve with the firmament around the Earth, as opposed to the time the sun and the planets revolve around the Earth. The difference between the two is commonly known as the "sidereal day" as opposed to the "solar day." The sidereal day is 23 hours and 56 minutes. The solar day is 24 hours. Thus, the sun needs 4 minutes more to complete its revolution around the Earth, which is due to the fact that it is being slightly retarded by the cosmic winds in the firmament.[389] The 4 minute lag will make the sun appear to travel through the 12 stations of the Zodiac each year.

Hildegard gives the details of the how and why:

> For if the sun did not impede the firmament by its resistance to it, or if it ran counter to the firmament even with the other planets and with the same velocity with which it revolves, everything would be mixed up and the entire firmament would burst asunder. For if the firmament were immovable so that it would not revolve, then the sun would be above the earth almost throughout the entire summer, without it becoming night, and almost during the entire winter under the earth, without it being day. Now, however, the firmament revolves in such manner that it moves counter to the sun, and it the sun counter to the firmament, for which reason the firmament condenses itself through the heat of the sun and is made more robust all the more quickly, that is to say: when the sun traverses the firmament and wholly penetrates it and pours through it with its fire.

> Before the fall of Adam the firmament was immovable and did not rotate. After his fall, however, it started to move and to revolve. From the Last Day on, however, it will again stand still,

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[389] In the heliocentric explanation, the extra four minutes is said to be due to the Earth revolving around the sun, wherein the Earth must rotate 361º per day rather than 360º in order for the sun and stars to line up with the same point on the Earth each day. We might add that Hildegard's cosmic wind may find its evidence in the modern science's claim that the solar system is moving in the direction of various constellations (*e.g.*, Draco, Hercules, et al). By Mach's principle, it may just as well be that the solar system is fixed and the ether wind is moving against it.

as it was on the first day of creation before Adam's fall. Now, however, it rotates so that it will receive its strength from the sun, the moon, and the stars, because if it stood still it would become liquified and weaken, melting in a short time. For the same reason, because it revolves according to a specific rule, it also purifies the elements. The purification at times manifests itself in the form of water-bearing black clouds, as we see them. This is like water that, being put on the stove in a pot, boils and is purified under the influence of the boiling heat.[390]

The Force that Moves the Planets

There is something even more significant about the solar wind. It is strongest nearest the sun and weakest at the planet Pluto. It can be thought of as a cyclone-like whirlwind or solar eddy within the larger circular current that pushes the firmament. As in a natural eddy, the angular velocity is fastest near the center. Hence, those planets nearest to the sun will revolve faster than those farther away. Not having any suitable mechanical reason for the various speeds of revolving planets, modern science is limited to explaining this phenomenon mathematically by the formula $F = ma$, or $a = v^2/r$, wherein a planet that is revolving around the sun is said to be accelerating, while the force of its movement is the rate of acceleration multiplied by the mass of the planet. At the same time, the planet is said to be pulled into the sun and the strength of the attraction is represented by the formula $F = Gm_1m_2/r^2$, wherein the mass of the sun and planet are multiplied with a gravitational constant G (determined in the laboratory by measuring the force of attraction between two small objects), divided by the distance squared between the sun and the planet. This is commonly known as the Inverse Square Law. The balance between $F = ma$ and $F = Gm_1m_2/r^2$ is said to keep the planet on its circular path so that it neither falls into the sun nor flies off into outer space. The problem with these formulas, however, is that they do not explain what, precisely, is the physical nature of the attracting force between the sun and the planet, nor do they explain why a planet has continual acceleration. It is similar to watching the dial on a scale calibrate the weight of an object without being able to see the object that is placed on the scale. The object could be an animal, mineral or vegetable, but we could never know by merely observing the scale's dial. Analogously, modern science has no physical explanation for gravity or inertia. They merely 'watch the dial,' as it were, and compute the result with mathematical formulas.

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[390] *Ursachen u. Behandlung der Krankheiten*, p. 24, *Das wahre Weltbild*, p. 121.

One scientist, Josef Tsau, has broken away from the constraints of Newtonian physics and believes that the universe is bathed in a primary ether particle, the neutrino, which seems to answer to Hildegard's solar wind. Tsau has a lot on his side, since the existence of neutrinos has been verified many times. Although they have mass, neutrinos are extremely small entities. They can apparently travel through the empty space of the atom and do so at the speed of light. Having no charge, they can only affect other masses by their high kinetic energy. Fifty trillion of them are said to pass through our human body every second. Seventy billion neutrinos hit each square centimeter on the surface of the Earth. Tsau has developed a whole science of physics based on how the neutrino wind interacts with atomic particles, explaining everything from gravity to how light travels to how planets revolve around the sun.[391]

As we noted earlier in remarks about Newton, the much-ballyhooed 'inverse square law' is not really as stupendous as it is claimed to be, for it is simply a natural geometric phenomenon. The inverse square law applies not only to the decrease in the force of gravity with increase in distance, but of practically any substance that can travel away from its source at a constant angle of dispersion. For example, one could obtain the inverse square law from an action as simple as measuring the amount of paint dispersed from the nozzle of a can of spray paint. The density of the paint sprayed will be inversely proportional to the square of the distance at which the paint ends up from the nozzle. In other words, the inverse square law is based on a simple law of geometry, and has nothing to do with the nature of gravity, *per se*. Anything that radiates away from the source at a constant angle (*e.g.*, gravity, electricity, sound, force, light, gas density, charge) will follow the inverse square law, for at greater distances from the source, that which is dispersed must cover an increasing area and volume, and if it is distributed evenly in that larger volume, its density will

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[391] Josef Tsau, *Discovery of Aether and its Science*, 2005. It is Tsau's belief that a neutrino wind generated by the sun pushes the planets in their orbital paths, thereby answering the mysterious phenomenon of inertia. He writes: "The high energy neutrino particles produced by the dense-matter object of the Sun affected by its rapid rotation and the strong force fields created by the rotation may form a constant spiral neutrino-particle wind that provides a directional pushing effect only, which may cause the outer layer of the Sun to rotate and is utilized by all planets to stay in orbit. If a planet is orbiting in the right direction, such a spiral wind at equilibrium would constantly give it a push in both its orbiting and anti-gravity directions to keep it in orbit" (p. 22).

decrease proportionately, by a rate that is the inverse to the square of the distance.[392]

As we can see, the Hildegardian model exceeds the Newtonian system. Hildegard gives us a physical reason for gravity, inertia and the combined movements of the constituents of the universe. Pluto moves slower than Mercury because Pluto is farther away from the vortex of the solar wind that pushes the planets. Near the sun the speed of the vortex is at its fastest, and this increased velocity, as Posch interprets Hildegard, "is necessary in order to carry the enormous heat away from the sun, otherwise the sun would become too hot and scorch everything on Earth."[393] In other words, the circulating current acts as a giant fan to radiate the proper amount of heat from the sun to the planets.

From Hildegard's vision, Posch explains the nature of the current:

> The counter-rotating wind current is narrow, like a belt. We should imagine the current as a disk-shaped rotating field in which the planets and the sun are carried. The planets, in fact, revolve on a plane, namely the ecliptic plane. This plane is unstable. It gyrates, and does so within a constant angle of 23.5º, forming a complete precessional movement around its fixed point, Earth, in one year. The Earth is the center of rotation for both the rotation of space and the point of intersection for the precessing counter-rotation of the ecliptic plane.[394]

The Cause of the Four Seasons

Here we have the explanation for the four seasons. The seasons are not caused by an Earth that is tilted 23.5º toward the North Star, but by the swaying movement of the ecliptic (that is, the path of the sun through the zodiac) as it changes the plane of its orbit by 23.5º every six months. The plane of the sun's path will precess up and down by 23.5º just as a spinning gyroscope wobbles up and down. The total amount that the sun's

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[392] This rule does not apply to plasma and magnetism, however, due to the internal workings of their specific properties.

[393] *Das wahre Weltbild*, p. 117. Since the period of the planet will be proportional to its distance from the center of the vortex, the vortex nearest to the sun is traveling very fast. Posch holds that within 1.5 kilometers the vortex is moving at the speed of light. At 3 million kilometers it is moving at 210.66 km/sec, and at Mercury, which is 57.9 million kilometers, it is moving at 47.94 km/sec, which is equal to the orbital speed of Mercury around the sun. These values are reached by dividing the constant 364.87 by the square root of the distance (*ibid*., p. 130-131).

[394] *Das wahre Weltbild*, p. 117.

plane moves against the Earth's equator is 47.0º per year, or 0.2568º per day. (See enclosed CD animation for a demonstration). As Hildegard puts it: "The other planet moves counter to it and drags the sun upwards to the constellation of Aries…. These propel [accelerate] the sun forward with great force, like a bull….the two planets accompany the sun for a while so that it won't move downwards too fast." And beginning at the constellation of Virgo, "the sun moves more slowly [decelerates] on its path…"[395]
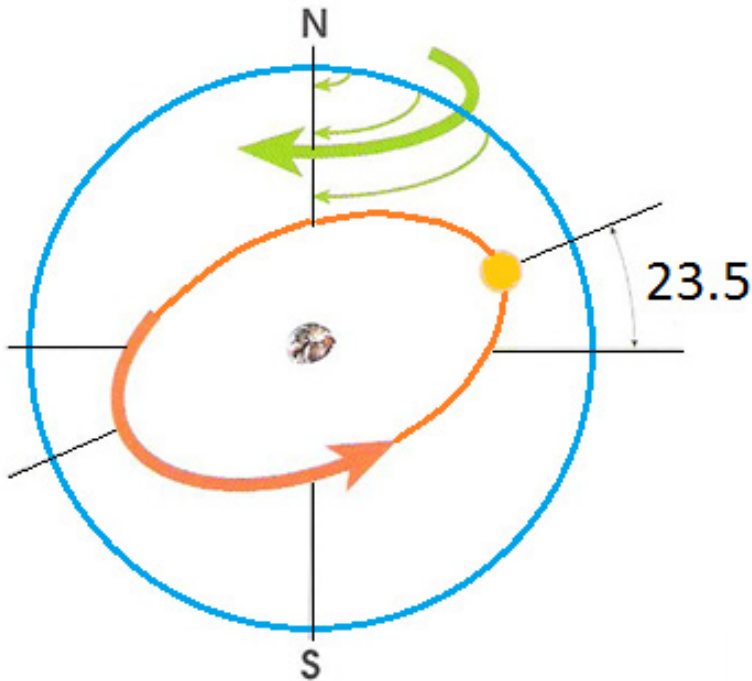
If this is true, then what force is making the sun's plane of orbit change? This force, Hildegard's vision reveals, comes from the same counter-current described above. She writes:

> The sun emerges as the largest planet; it heats up the firmament and its fire and strengthens it, and with its radiance it illuminates the Earth…By means of the strength of the revolution of the firmament the sun is driven in a slanted orbit from east to west

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[395] *Das wahre Weltbild*, p. 143.

through the south, even though in its journey it makes an effort to move counter to the motion of the firmament.[396]
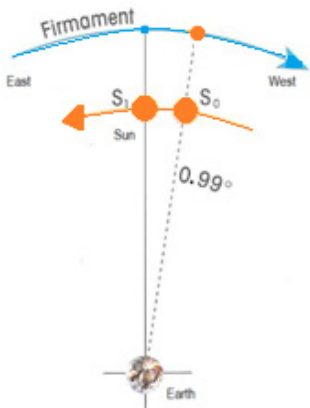
Firmament rotates 0.99 degrees each day towards the west
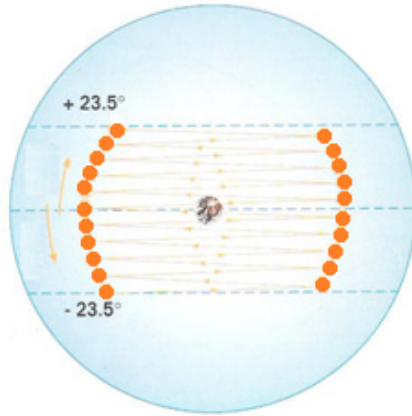
The sun moves 23.5 degrees about every 91 days. It tightens its orbit as it moves

Hence, as the countercurrent moves against the firmament's current, it creates an eddy of force around the sun. This force pushes the sun up and down within the margin of 47.0º each year. As Posch describes the force of the solar eddy:

A further consequence of this eddy current is the swinging-out-at-the-side of the entire plain vis-à-vis the equatorial rotation of space. The effect resembles kite-flying. If you walk against the wind with the kite, it goes up in a slanted manner. Current and counter-current result in a sideways movement. That is why the sun does not move counter to the rotation of space in an equatorial plain but rises by about 0.2568 degrees with respect to the celestial equator. This ascension remains constant throughout the whole year. Thus the sun virtually spirals upwards counter to the rotating direction of the firmament day after day by approximately 0.25 degrees. After half a year (183 days) it has risen from -23.5 degree to +23.5 degrees, that is, by as much as 47 degrees. (47:183 = 0.2568). Hildegard writes that the contra-

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[396] *Die göttlichen Werke* 96, 100; *Das Weltbild*, p. 119.

rotating wind current is narrow like a belt. We need to image the cyclone current as a disk-shaped field of rotation in which the planets and the sun are carried. The planets in fact revolve on a plane, namely the ecliptic plane. This plane, however, is unstable and forms in a constant angle of 23.5 degrees a complete precession movement around the fixed-point earth within one year. The earth is the center of rotation for the rotation of space and at the same time the point of intersection for the precessioning counter-rotation of the ecliptic plane. Thus the sun is raised from -23.5 degrees to +23.5 degrees in the first period of six months and returns to its point of origin after the summer solstice. This is how the four seasons are formed.[397]

Still another function of the counter eddy current is heat distribution to the planets. As Posch puts it:

The planets, too, move counter to the rotating direction of the firmament, because they are caught up in this counter-current. The farther away from the sun a planet is, the slower it becomes, because the angular velocity of the eddy current decreases as the distance increases. Near the sun the eddy current twirls the fastest. Close to above the sun's surface it circulates in light-speed, as calculations will yet show. Hildegard mentions, among other things, that this is necessary in order to carry the enormous heat away from the sun. Otherwise the sun would become too hot and scorch everything on earth.[398]

The Universe Flips Over

As the firmament rotates, Hildegard's visions show another dimension of its action:

Further I saw the south wind with its side winds, starting the day of the winter solstice, gradually lift the primordial vault from south towards north, supporting both, as it were, until the summer solstice....From the same day onward, when the days start to become shorter, the north wind with its side winds, eschewing the sunlight, pushes this vault from north to south,

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[397] *Das wahre Weltbild*, p. 117-118.
[398] *Ibid*., pp. 116-117.

until, the days getting longer, the time has once again come for the south wind to push it back up.[399]

December 23   March   June 21

June 23   September   December 23
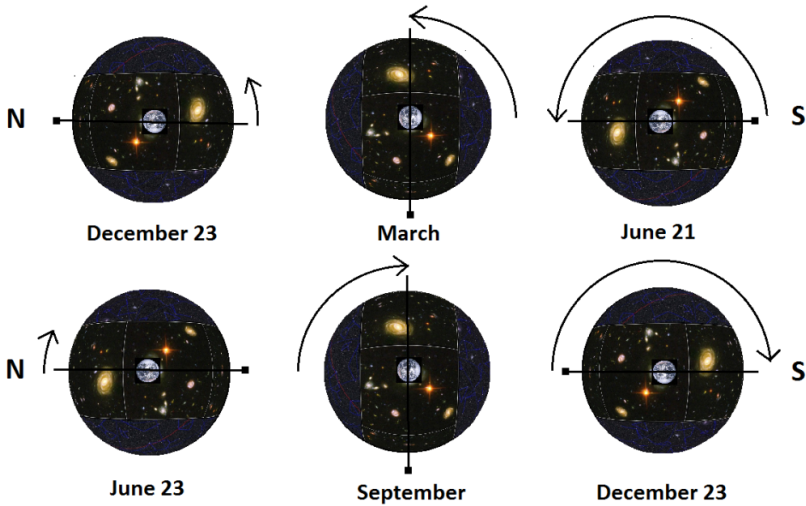
This is most amazing. Hildegard is telling us that the whole universe is flipped over every six months. The flipping occurs between the north and south poles of the universe. The side of the universe that was nearest the north region is, six months later, nearest to the south region, and vice-versa six months later. The slow flip is caused by the universal winds. The universal south wind pushes the south universal pole toward the north; while the universal north wind pushes the north universal pole toward the south. Later we will see precisely how these cosmic winds are able to push the universe.

The reason the universe must swing back and forth is to keep it balanced and as one spherical whole. As Posch puts it:

> Hildegard says man will never fully understand the structure of the universe. If we consider the numerous theses and hypotheses about the formation of the world, we must agree with Hildegard's statement. Without Hildegard's concrete information we would probably never find out, aside from the already-discussed movements, the cosmos also carries out a kind of swinging motion, which we men do not even notice. What's it about? What are these mysterious processes of which we are allegedly unaware? Due to the unbalanced rotation of the

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[399] *Das wahre Weltbild*, p. 119.

firmament from east to west, over a long period of time the spherical shape of the universe could not be maintained without some countermeasure. Let us think of bread dough that is always rotated in the same direction only. The spherical shape gradually turns into an elongated strudel, which eventually disintegrates into two pieces. In the cosmos, the unbalanced rotation would have similar variations of shape as a consequence. In order to prevent a deforming and melting of the cosmos, the north and south winds alternately exert pressure so that the entire universe is permanently remoulded.
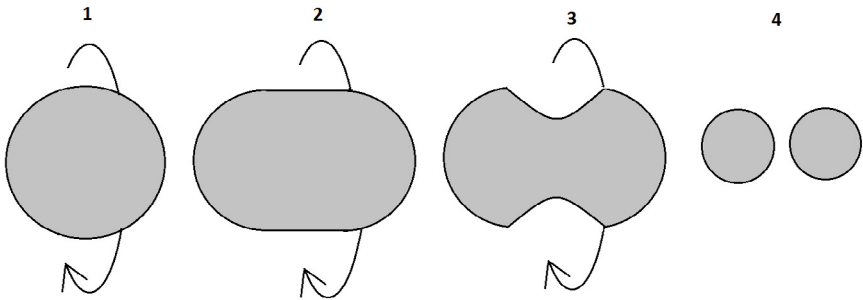
Here is yet another interesting facet to Hildegard's cosmology. In her vision, the north and south poles of the Earth do not lie in a vertical direction but horizontal. Thus, the universe rotates daily around the north-south pole like chicken on a rotisserie or a wheel rotating on an axle, and which axle slowly changes its polar orientation on a semi-annual schedule. The horizontal position of the north-south axle will allow the four compass points to form a horizontal plane, which then explains why Scripture sometimes refers to the "four corners of the Earth." A square with a corner positioned at each of the compass points is horizontally circumscribed in a sphere.[400] Another means of compensating for Scripture's language is that the "corners" are the tips of the four hemispherical cones that converge at the center of the Earth.

Modern cosmologists seem to have found recent evidence for the twisting or flipping of the universe. In 1997 physicists Borge Nodland and John Ralston discovered that radio waves traveling through space rotated the plane of their polarization.[401] C. Wolf believes this phenomenon to be

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[400] Is 11:12; Ap 7:1; 20:8.

[401] "Indication of Anisotropy in Electromagnetic Propagation Over Cosmological Distances," *Physical Review Letters* 78, 16:3043-3046, April 21, 1997. For a selected data set, the axis they found had a declination and right ascension of (d,

of such importance that it may force "modifications to particle theory and cosmology" and "possible alterations of fundamental physical theory…in the future."[402] Even though Nodland and Ralston's rotation was small (one period of polarization rotation completed in about ten billion years), they could be measuring merely the slight differences in Hildegard's semi-annual universe rotation. In other words, the universe's polar rotation is so precise that the finest instruments detect only a one in 10^{10} variation. Whatever the correct application, the news of rotating electromagnetic waves was not well received from the science community, since it would automatically deny Einstein's cherished theory of General Relativity that claims there is no center or distinction in the universe.

The reason the universe must make this annual 180º change is that its constant daily rotation in one direction (east to west) causes an increasing momentum, which, if there were no compensating factor, would begin to deform the universe's spherical shape. The universe would become elongated and eventually break into two or more pieces. Hildegard puts it:

> For if the sun did not impede the firmament by its resistance to it, or if it ran counter to the firmament even with the other planets and with the same velocity with which it rotates, everything would be mixed up and the entire firmament would burst asunder. For if the firmament were immovable so that it would not rotate, then the sun would be above the Earth almost throughout the entire summer, without it becoming night, and almost during the entire winter under the Earth, without it being day.

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a) = (0° ± 20°, 21^h ± 2 ^{h}), within 45° of the "opposite" pole. The statistical probability that the two axes are only accidentally within 45° of each other is not negligible. Ralston and Nodland added that the twisting of the waves increased the more it receded further into the universe, suggesting that the rotation was a truly universal phenomenon. They also pointed out that the rotation was specific to the direction one looked. It twisted right if one looked in one direction, but left if one looked in the opposite direction. In 1982, Paul Birch was the first to report the basis for such a phenomenon when he observed a correlation of the polarization angle with the source location angle relative to a preferred axis in the universe (*Nature*, London, 298, 451, 1982). Kendall and Young confirmed Birch's results two years later (D. Kendall and G. A. Young, *Monthly Notices of the Royal Astronomical Society*, 207, 637, 1984), as did M. Beintenholz and P. Kronbert (M. Beintenholz and P. Kronberg, *Astrophysics* J, LI, 287, 1984).

[402] C. Wolf in "Polarization Rotation Over Cosmological Distances as a Probe to New Physics," *Aperion*, Vol. 8, No. 3, July 2001, p. 95. Nature also has other such "flipping" motions. The magnetic fields of the sea floor switch their poles. The magnetic field of the sun switches its poles once every 22 years.

Now, however, the firmament rotates in such a manner that it moves counter to the sun…for which reason the firmament compresses itself through the heat of the sun and is made more resistant all the more quickly, that is to say: when the sun traverses the firmament and wholly penetrates it and pours through it with its fire.[403]

The Behavior of Man and the Reaction of the Cosmos

In Hildegard's next series of statements, she reveals one part of the interconnection between the events in the cosmos and the behavior of mankind. After the fall of man in Eden, nature was altered or damaged in various ways. Death entered the world, animals became fearful of men, the ground produced thorns and thistles, and the whole universe was made subject to gradual deterioration.[404] Hildegard tells us that the same is true with the firmament:

Before the fall of Adam the firmament was immovable and did not rotate. After his fall, however, it started to move and to revolve. From the Last Day onward, however, it will again stand still as it was on the first day of creation and before Adam's fall.[405]

This means that the light of the first three days of creation, and, after that, the sun and stars of the Fourth day up until the sin of Adam, were revolving around the Earth without being carried by the firmament. Apparently, the firmament was in a pristine condition prior to the Fall and this condition changed drastically afterwards. As it stands now, unless the firmament rotates it will become unstable and disintegrate. As Hildegard puts it:

Now, however, it rotates so that it will receive its power from the sun, the moon and the stars, because, if it stood still, it would become liquefied and weakened, melting in a short time.[406]

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[403] *Ursachen u. Behandlung der Krankheiten*, 24, *Das wahre Weltbild*, p. 121.
[404] *Cf.* Gn 3:17-19; Jr 12:4; Rm 8: 19-22; Ac 3:21.
[405] *Ursachen u. Behandlung der Krankheiten*, 24, *Das wahre Weltbild*, p. 121.
[406] *Ursachen u. Behandlung der Krankheiten*, 24, *Das wahre Weltbild*, p. 121. The condition of the firmament may have also affected the speed of light. In the more ideal condition prior to the Fall, the speed of light through the firmament would have been much faster, which would help account for the fact that starlight would have appeared on Earth on the fourth day of creation, otherwise, in contradiction

The firmament is subservient and compliant with the shiners [stars] for the benefit of the Earth, and serves the Earth, as the fire stabilizes it [the firmament], the air restrains it, and the water dashes it; the firmament performs as one who serves and the Earth stands as someone who is seated and ruling.[407]

According to Posch's interpretation of Hildegard:

Through its [the firmament's] rotation, the elements are purified; otherwise we would have suffocated in the world's stench long ago. The elements interact with the cosmic elements, as we know by now, and are constantly "filtered" and "distilled" thereby.[408]

The Constitution of the Firmament

Our present knowledge of science may also confirm what Hildegard's vision reveals about the firmament. Very special factors are necessary to have such a versatile and undetectable medium permeate the entire universe. Notably, this subject is approached, albeit indirectly, by one of the world's most respected physicists, John A. Wheeler, professor emeritus of Princeton University and co-author of the most comprehensive book written on gravitation to date. In an article he wrote with C. M. Patton titled: "Is Physics Legislated by Cosmology?" Wheeler, interestingly enough, begins with an offhand comment about the first two days of Genesis. He writes:

No one sees any longer how to defend the view that 'geometry was created on Day One of creation, and quantized on Day Two. More reasonable today would appear the contrary view, that 'the advent of the quantum principle marked Day One, and out of the quantum principle geometry and particles were both somehow built on Day Two.[409]

In a simplified way we can summarize Wheeler's concern by noting that his remarks show that physics has wrestled with the proverbial

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to Genesis 1:14-19, they could not have been used as timekeepers (*e.g.*, sidereal time) by the patriarchs. Since light travels faster or slower depending on the medium, there is no scientific anomaly in the above scenario.

[407] *Berliner Fragmente*, 38, *Das wahre Weltbild*, p. 131.

[408] *Das wahre Weltbild*, p. 132.

[409] J. A. Wheeler and C. M. Patton, "Is Physics Legislated by Cosmology," in *The Encyclopedia of Ignorance*, 1977, p. 22.

problem of the chicken and the egg. Which came first, the chicken (geometry) or the egg (the composition of the universe that allows geometry and, even more basic, the concept of extension)? Technically speaking, an *ex nihilo* understanding of Day One and Day Two would have no such concern, since things are merely called into being by divine fiat and made to work with whatever material is present on the respective Days of creation. Nevertheless, Wheeler's point about the "quantum principle" does not go unappreciated by an *ex nihiloist*, for the point of his remark is that the "geometry" of the cosmos has a substratum which is defined by the principles of quantum mechanics, and which thus allows for the phenomena of extension and collapse. As Wheeler puts it:

> The black hole, as "experimental model" for gravitational collapse, brings us back full-circle to the paradox that continually confronts us, and all science, the paradox of big bang and gravitational collapse of the Universe itself. The existence of these two levels of collapse reminds us, however, that theory gives us also what is in effect a third level of collapse, small-scale quantum fluctuations in the geometry of space taking place and being undone, all the time and everywhere.[410]

We, of course, are only interested in Wheeler's "third level of collapse," since it relates directly to the constitution of the firmament of Day Two, or what Wheeler sees as the means by which the "…quantum principles of geometry and particles were…built." In this regard, Wheeler states:

> Among all the great developments in physics since World War II, there has been no more impressive advance in theory than the analysis of the fluctuations that take place all the time and everywhere in the electromagnetic field. There has been no more brilliant triumph of experimental physics than the precision measurement of the effect of these fluctuations on the energy levels of the hydrogen atom….These developments tell us immediately that the electron in its travels in a hydrogenic atom is subject not only to the field Ze/r^2 of the nucleus, but also to a fluctuation field that has nothing directly to do with the atom, being a property of all space.[411]

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[410] J. A. Wheeler and C. M. Patton, "Is Physics Legislated by Cosmology," p. 24.
[411] *Ibid*., p. 24.

In other words, the electron not only has to interact with the nucleus, but with the field of space between the nucleus and the electron, yet a field that "has nothing to do with the atom" itself, but is a property of the independent existence of something other than the atom. So, according to Wheeler, we have protons, neutrons, electrons and an undefined but experimentally proven "field" which constitutes the fabric "of all space." We will see shortly that Wheeler's explanation is precisely what Hildegard's visions tell us of the constitution of the universe and the physical cause for gravity, nearly one thousand years before "the great developments in physics since World War II"! The only difference is that, whereas Wheeler sees "changes in connectivity with 'handles' and 'wormholes' in the geometry all the time and everywhere forming and disappearing, forming and disappearing ('foam-like structure of space'),"[412] Hildegard's visions tell us that the "foam-like structure of space" is permanent and non-fluctuating. It doesn't "disappear" into "other universes" and come back a split second later. It is here to stay because it was made, *ex nihilo*, on Day Two, and which we call the Firmament.

Wheeler goes on to explain the dimensions and magnitude of this "field…of all space…is the Planck length,"[413] which is what we have been arguing as one of the basic constituents and dimensions of the firmament's granularity.

He continues:

One who had never heard of electricity, looking for evidence of this multiple connectivity of space, would *predict* electricity as [a] consequence of it. Thereupon *finding* electricity in nature, he would take this discovery as evidence that space really is

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[412] *Ibid*., p. 25.

[413] "In a region of observation of dimension L the calculated fluctuation field is of the order, $\Delta\varepsilon \sim (hc)^{1/2}/L^2$… The consideration of principle that give one in electrodynamics the fluctuation formula $[\Delta\varepsilon \sim (hc)^{1/2}/L^2]$ tell one that in geometrodynamics, in a probe region of extension L, the quantum fluctuations in the normal metric coefficients $-1, 1, 1, 1$ are of the order, $\Delta g \sim L^*/L$. Here $L^* = (hG/c^3)^{1/2} = 1.6 \times 10^{-33}$ cm is the Planck length. These fluctuations are negligible at the scale of length, L, of atoms, nuclei, and elementary particles, as the wave-induced fluctuations in the level of the ocean appear negligible to an aviator flying 10 km above it. As he comes closer, or as L diminishes, the fluctuations become more impressive. Finally, when the region of analysis is of the order of the Planck length itself, the predicted fluctuations are of the order $\delta g \sim 1$."

multiply connected in the small. Nothing prevents our rising above the accidents of history to take the same position.[414]
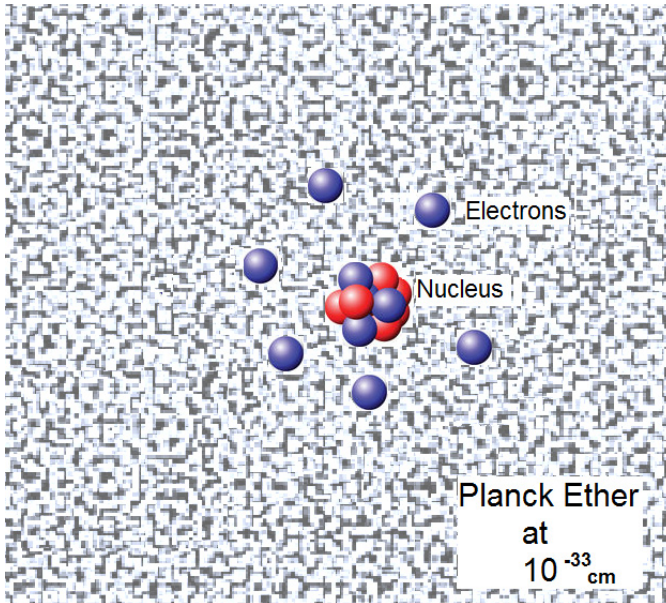
These fluctuation charges are not a property of elementary particles. The relevant scale of distances is twenty orders of magnitude less than nuclear dimensions. The charges are not quantized in magnitude. The charges occur everywhere, not only where there is a particle.[415]

The view that large fluctuations go on at small distances puts physics in a new perspective. The density of mass-energy associated with a particle…is as unimportant compared to the calculated effective density of mass-energy of vacuum fluctuations down to the Planck scale of lengths…10^{94} g/cm^3…as the density of a cloud, $\sim 10^{-6}$ g/cm3, is unimportant compared to the density of the sky, $\sim 10^{-3}$ g/cm^3…the proper starting point in dealing with physics…is the sky, not the cloud…no theory of

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[414] Concluding with: "Accordingly we are led to think of space as having a kind of fluctuating foam-like structure, with everywhere positive and negative charges of order $q \sim (hc)^{1/2} \sim 10e$ continually being created and annihilated."

[415] "Is Physics Legislated by Cosmology?" p. 26.

particles that deals only with particles will ever explain particles.[416]

Not only do we have Wheeler admitting that science gives us no answer for the origin of electricity (something Hildegard has answered by saying it is a form of plasma), we have him describing the basic constituents of Hildegard's firmament. Our quest now is to show how Hildegard's vision of the firmament "melting" if it did not rotate is true in scientific terms. Gerardus Bouw has done the most productive work in this area. Using Wheeler's equation,[417] Bouw writes:

> The *Planck density*, as this density is called, is today regarded as due to fluctuations in a vacuum caused by the uncertainty principle. Because of this, some have looked to this density as an explanation of the origin of the big-bang, assuming that the latter started at that density. But if the universe started at the Planck density, then it would also have to start at the Planck length and then the total mass of the universe would only be of the order of 10^{-5} grams. Furthermore, there is nothing vacuous about the firmament and so it is more logical to assume this to be a pervasive density which on sub-nuclear scales the universe can only suspect; but of whose existence it can never be certain. This, then is the density of the firmament.[418]

Obviously, if the firmament has such a tremendous density (10^{94} g/cm^3) one wonders how anything could move through it. A mere teaspoon full would weigh hundreds of millions of tons. As we noted earlier, however, science itself has found the answer since the discovery in 1923 of deBroglie waves. Material objects, from things as small as the electron to as large as stars, move in wave motion through the firmament.

Since the firmament is rotating, this will create a centrifugal force. Hence, to remain stable, the firmament will require an equal and opposite force to keep it from disrupting. Or, perhaps a better way to phrase it is by Hildegard's description: "if it stood still, it would become liquefied and

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[416] *Ibid*., p. 27. In his arrival at the density of the substratum of 10^{94} g/cm^3, Wheeler uses the equation $\rho \sim [(hc/L^*)/c^2]/L^{*3} \sim M^*/L^{*3} \equiv 2.2 \times 10^{-5}$ g/$(1.6 \times 10^{-33}$ cm$)^3 \sim 10^{94}$ g/cm^3.

[417] $\rho \sim [(hc/L^*)/c^2]/L^{*3} \sim M^*/L^{*3} \equiv 2.2 \times 10^{-5}$ g/$(1.6 \times 10^{-33}$ cm$)^3 \sim 10^{94}$ g/cm^3.

[418] *Bulletin of the Tychonian Society*, No 43, 1987, p. 17. In a related series of equations, Bouw finds that the energy flux of the firmament is 3×10^{125} ergs/cm^2/sec.

weakened, melting in a short time."[419] This opposite force will come from the universal winds that blow inward and create a ubiquitous pressure (the force which we understand as gravity) to keep the firmament from radiating outward, as well as the internal cohesion of the firmament itself that holds it together. If one of the fundamental substrates of the firmament is in the Planck dimensions, then a certain rotation period will be required to compensate for the inward pressure (gravity). The amount of centrifugal force created by the rotation will not equal the inward pressure; otherwise there would be no gravity. Rather, the rotation will be just enough to allow a residual inward pressure in order to give us the strength of gravity we see today. The rate of rotation required of the firmament to reach this equilibrium is approximately 24 hours, which means it will turn 4.166×10^{-3} degrees per second, or 7.27×10^{-5} radians per second. Since the centrifugal and centripetal forces are balanced in favor of gravity in the rotating firmament, then the firmament's angular momentum should be proportional to the gravitational constant (G), the density (ρ) and the mass (M).

A similar discovery in physics may help us understand how the rotation of the universe helps keep it stable. In the book, *The Ether of Space*, after speaking about the tremendous elasticity and density of the ether as an "incompressible," "perfectly frictionless inviscid fluid," and "a perfect continuum, an absolute plenum,"[420] Sir Oliver Lodge states the following:

> But we must go on to ask, To what is this rigidity due? If the ether does not consist of parts, and if it is fluid, how can it possess the rigidity appropriate to a solid, so as to transmit transverse waves? To answer this we must fall back upon Lord Kelvin's kinetic theory of elasticity: that it must be due to rotational motion – intimate fine-grained motion throughout the whole ethereal region – motion not of the nature of locomotion, but circulation in closed curves, returning upon itself – vortex motion of a kind far more finely grained than any waves of light or any atomic or even electronic structure.[421]

Lodge, of course, did not believe that the universe rotated around the Earth. He made the same mistake that all other scientists made when interpreting the Michelson-Morley experiment. Several times in his book

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[419] *Ursachen u. Behandlung der Krankheiten*, 24, *Das wahre Weltbild*, p. 121.
[420] Sir Oliver Lodge, *The Ether of Space*, 1909, pp. 47, 90, 95.
[421] *Ibid*., pp. 102-103.

Lodge refers to the Earth moving "nineteen miles a second" around the sun as his basis for interpreting the famous interferometer experiment.[422] Thus, the "rotation" to which Lodge refers here is to the vortex motion of the ether itself, but according to Kelvin's kinetic theory, the required rotation could just as well be satisfied by a rotating universe.

Lodge makes further comments regarding ether, matter and rotation:

> The Essential distinction between matter and ether is that matter moves, in the sense that it has the property of locomotion and can effect impact and bombardment; while ether is strained, and has the property of exerting stress and recoil. All potential energy exists in the ether. It may vibrate, and it may rotate, but as regards locomotion it is stationary – the most stationary body we know: absolutely stationary, so to speak; our standard of rest.[423]

Here, of course, we see that, identical to Lorentz and other physicists of this day, the ether was understood to be stationary while the Earth moved "nineteen miles per second" through it, which is why they were all so disconcerted when the Michelson-Morley experiment did not detect any such movement. Instead of having the Earth as their "standard of rest," they chose a stationary ether. Still, they possessed the scientific intuition that space contained a medium, and their quest was to understand the nature of that medium. They reasoned that it remained stable because of its rotation, which rotation allowed this "frictionless fluid" to also act as a solid. Lodge elaborates as follows:

> But now comes the question, How is it possible for matter to be composed of ether? How is it possible for a solid to be made out of fluid? A solid possesses the properties of rigidity, impenetrability, elasticity, and such like; how can these be imitated by a perfect fluid such as the ether must be?

> The answer is, They can be imitated by a fluid in motion; a statement which we make with confidence as the result of a great part of Lord Kelvin's work. It may be illustrated by a few experiments. A wheel of spokes, transparent or permeable when stationary, becomes opaque when revolving, so that a ball thrown against it does not go through, but rebounds. The motion

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[422] *Ibid*., pp. 55, 58, 61, 63, 66, 68.
[423] *Ibid*., p. 118.

only affects permeability to matter; transparency to light is unaffected. A silk cord hanging from a pulley becomes rigid and viscous when put into rapid motion….A flexible chain, set spinning, can stand up on end while the motion continues. A jet of water at sufficient speed can be struck with a hammer, and resists being cut with a sword. A spinning disk of paper becomes elastic like flexible metal, and can act like a circular saw.[424]

Of course, the remaining question for Lodge and the scientists of his day was how the ether could spin. As they understood it:

If the ether can be set spinning, therefore, we may have some hope of making it imitate the properties of matter, or even of constructing matter by its aid, But *how* are we to spin the ether? Matter alone seems to have no grip on it. As already described, I have spun steel disks, a yard in diameter, 4000 times a minute, have sent light round and round between them, and tested carefully for the slightest effect on the ether. Not the slightest effect was perceptible. We cannot spin ether mechanically.[425]

We have already seen, however, that Lodge's experiments were sullied by his assumption that the Earth was moving at "nineteen miles per second" and thus his, and other experiments, would not be able to detect any significant effect on the ether. The point here is that Lodge and his colleagues recognized that the plenum of ether could perform as a rigid, solid mass if it were spun. Again, this mechanism is precisely what the Hildegardian system supplies to the universe of ether – a daily spin to keep it rigid and, as Hildegard puts it, "to keep it from melting" (that is, turning into a fluid).

In addition to the above, rotation is also involved in the relationship between electricity and magnetism, which will allow us to draw out further answers to the versatility of the geocentric universe. As Lodge explains the relationship:

Rotation is supposed to exist whenever we put a charge into the neighborhood of a magnetic pole. Round the line joining the two, the ether is spinning like a top. I do not say it is spinning fast: that is a question of its density; it is, in fact, spinning with excessive slowness, but it is spinning with a definite moment of

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[424] *The Ether of Space*, pp. 118-119.
[425] *Ibid*., p. 120.

momentum. J. J. Thomson's theory makes its moment of momentum exactly equal to *em*, the product of charge and pole; the charge being measured electrostatically and the pole magnetically.

How can this be shown experimentally? Suppose we had a spinning top enclosed in a case, so that the spin was unrecognizable by ordinary means – it could be detected by its gyrostatic behavior to force. If allowed to "precess" it will respond by moving perpendicularly to a deflecting force. So it is with the charge and the magnetic pole. Try to move the charge suddenly, and it immediately sets off at right angles. A moving charge is a current, and the pole and the current try to revolve round one another – a fact which may be regarded as exhibiting a true gyrostatic action due to the otherwise unrecognizable etherial spin. The Fact of such magnetic rotation was discovered by Faraday.[426]

This principle may explain why the Earth has a magnetic force pivoting off its poles and surrounding its entire circumference. Simply put, the rotation of the universe with its accompanying ether, which carries an electric field with its own impedance,[427] will create a magnetic force on the poles of a stationary Earth.

Hildegard and the Cause of Gravity

As we have noted earlier, Isaac Newton did not discover the nature of gravity. He merely gave us a mathematical formula to calculate its effects. Although Newton and his devotees usually describe gravity as an attractive force, the most that can be said for this view is that it satisfies the appearances. The main problem with viewing gravity as a local force due to some innate property of matter is that it would not begin to explain how gravity can operate over vast distances, otherwise known as the "action-at-a-distance" problem, something Newton hardly addressed, let alone solved.

Recall in our earlier discussion concerning the makeup of the atom that there exists a huge volume between the nucleon and the electron. In 1911 Ernest Rutherford, after bombarding very thin sheets of gold with

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[426] *The Ether of Space*, pp. 121-122.
[427] According to "Space Must Be Quantizied," *21st Century*, May-June, 1988, p. 26ff, the impedance of space is 376 ohms.

alpha particles, discovered that even though the alpha particles were 8,000 times larger than the electron, and the metal foil was 400 atoms-thick, nevertheless, most of the particles penetrated the foil with little problem. Only a few, perhaps 1 in 1,000, were scattered, some deflected 90 degrees, others 180 degrees. An obvious interpretation of this phenomenon is that most of the alpha particles move through the atom as if it were almost completely empty. The few alpha particles that were deflected had done so because they hit the nucleus of the atom, which means that most of the mass of the atom is concentrated at the central point. As it turns out, only a quadrillionth of the atom is occupied by mass, that is, only 0.000,000,000,000,1%. What constitutes the other 99.999,999,999,999,9%? Hildegard's vision tells us that it is the fourth element, "air," or what we would understand as a subatomic ether that pervades the whole universe, yet it does not penetrate the nucleus or the electron but only the space between the two. In a simple analogy, we could say that the "fire" of the electron is bathed in a sea of cosmic "air" in order that it can continue to "burn." As Hildegard describes it: "In each of the elements there indwells an air that corresponds to its nature."[428] Every cubic centimeter of space, and even matter itself, contains trillions upon trillions of these little entities, forming an invisible medium throughout the universe. As Oliver Lodge wrote, quoting J. J. Thomson:

> "In fact, all mass is mass of the ether; all momentum, momentum of the ether. This view, it should be said, requires the density of the ether to be immensely greater than that of any known substance."

> Yes, far denser – so dense that matter by comparison is like gossamer, or a filmy imperceptible mist, or a milky way. Not unreal or unimportant – a cobweb is not unreal, nor to certain creatures is it unimportant, but it cannot be said to be massive or dense; and matter, even platinum, is not dense when compared with the ether.[429]

This subatomic ether performs a number of important tasks, but probably the most important is that it helps create gravity. As it occupies the space in the atom, as in Rutherford's experiment, most of it passes through, but some of it hits the nucleus, yet it cannot penetrate the nucleus

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[428] "Einem jeden der höheren Elemente wohnt eine Luft inne, die seiner Beschaffenheit entspricht" (*Die göttlichen Werke*, 122, cited in *Das wahre Weltbild*, p. 103).

[429] *The Ether of Space*, p. 116.

because of the latter's density. This fits the science we already know concerning protons. They are virtually indestructible and do not decay. Experiments with the proton reveal that its average lifetime must exceed 10^{32} years.[430] Although the nucleus is about 10^{-14} cm in length, its density is far more compact. No one really knows how dense it is. In any case, the atom moves in whatever direction the ether moves the nucleus. There is no longer any need to wonder why atoms were designed with mostly "empty space." They were designed as such to allow them to be penetrated by even smaller unseen entities to create the phenomenon of gravity.[431]

As we noted above, modern science has found substantial evidence that open space is not a vacuum; rather, it is filled with infinitesimal particles. It was for this very reason that the interferometer experiments in the course of 50 years all demonstrated positive results for an ether circling the Earth, but results that were not even close to coinciding with an Earth revolving around the sun at 66,000 mph. We also noted earlier that Carl Anderson discovered the positron in 1932. From this discovery various scientists have understood that space is packed with electron-positron pairs (or what we have coined as "electropons"), such that the sudden appearance of an electropon pair when a 1.02 MeV charge is administered in open space is that the charge is jarring the particles loose from the all-pervading electropon lattice. One scientist, Menahem Simhony, estimates that the number of electropon pairs in one cubic millimeter of space is 6×10^{30}, with a binding energy of 27 quadrillion kilowatt hours, yet this energy is a million times smaller than the binding energy of the atomic nucleus.[432] Hence, the nucleus would remain impenetrable to the electropons, and thus the electropon sea could move the nucleus. Thus we

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[430] James S. Trefil, *The Moment of Creation: Big Bang Physics from Before the First Millisecond to the Present Universe*, 1983, pp. 141-142. Although protons have been theorized to consist of other particles (*e.g.*, leptons, quarks), nevertheless, in the cosmic realm the proton remains indestructible. Whereas 100 MeV is needed to remove an electron from an atom, and 10^6 MeV to remove protons from neutrons, it would take 10^{11} MeV to break down a proton. By comparison, the best modern accelerators can presently produce 10^{12} MeV.

[431] For an example of how this principle can be demonstrated, Posch cites that the Earth consists of only 10^{-14} % mass, based on the current atomic model in use today. This, of course, leaves 9.9×10^{15} % as empty space. If, in turn, the ether penetrates the Earth with a pressure of 10^{14} p, only 10^{-14} of this pressure is absorbed by the Earth's mass. The difference between the unhindered permeation and the resisted amount is as small as 10^{14} % [corrected]. As such, 10^{-14} % of 10^{14} $p = 1$ p. This equation corresponds exactly to the Earth's measured gravity, which is 1 p or 1 gram per square centimeter (*Das wahre Weltbild*, p. 104).

[432] Menahem Simhony, *Invitation to the Natural Physics of Matter, Space and Radiation*, 1994.

have a viable mechanism for gravity. Later we will discover what might move the electropon sea against the nucleus.

Simhony's value of 10^{30} electropons per cubic millimeter of space is precisely the same value found by another researcher in the field, Allen Rothwarf (although the two scientists worked independently).[433] Moreover, setting their sights on specifically addressing the gravity question, Frederick Rothwarf and Sisir Roy combine the electropon pairs into a second ether composed of particles on the Planck scale, so that there are "two ethers." Offering a solution to gravity, they write:

> These particles, called partons or gravitons, are assumed to have a mass equal to the Planck mass[434] and to constitute an ether A_G, that transmits gravitational forces at a speed c_G, which exceeds the speed of light c_0. Along similar lines, Van Flandern and Vigier have analyzed planetary and cosmological data to obtain a lower limit of c_G, 2×10^{10} c_0 = 6×10^{18} m/s" [*i.e.*, 20 billion times the speed of light].[435]

Einstein, of course, had limited the speed of gravity to luminal parameters, but many physicists admit that this limitation simply will not survive in a universe of Planck dimensions, and it is one of the reasons why Relativity and Quantum Mechanics have never had a successful union.

That gravity is based on an ether-pressure is related to the various corpuscular theories of gravity originating in the work of Nicholas Fatio de Duillier (b. 1664) and Georges-Louis Le Sage (b. 1724), and continuing in modern times to the more advanced theories. For example, astrophysicist Toivo Jaakkola writes:

> A few words about the gravitational ether, and the ether concept in general may be in place here. The ether hypothesis was thought to be buried by the Michelson-Morley experiment, but today it is more alive than ever, in the form of the CBR [Cosmic Background Radiation]: experiments capable of finding the ether

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[433] Allen Rothwarf, "Cosmological Implications of the Electron-Positron Ether," *Physics Essays*, 11, 1998. John Kierein finds a similar density to the electron-positron model, and by it shows that redshift is due to the Compton effect (John Kierein, "Implications of the Compton Effect Interpretation of the Redshift," *IEEE Trans. Plasma Science* 18, 61 (1990).

[434] $m_p = (hG/c)^{\frac{1}{2}}$

[435] "The Time Dependence of Fundamental Constants and Planck Scale Physics," in the paper dated November 14, 2003, p. 8.

were not possible in the 1880s, but were possible in the 1960s. In a sense, the electromagnetic ether has always been observed – as the heat of the Sun (since as pointed out, CBR is reprocessed photons).

The gravitational ether must be structured much like its electromagnetic counterpart. Local fields would cause the ordinary gravitational processes. Corresponding to CBR, there must be a cosmic background gravitation, CBG, probably with its specific gravitational spectrum. How to observe CBG? It has been already observed, as the cosmological redshift effect, z.

Gravitation works *via* gravitational quanta, gravitons…. Quantized gravitation is also required by the redshift and other equilibrium effects. Gravitons are gravitational equivalent to electromagnetic quanta, photons, both those of the cosmic background radiation CBR and incident photons from galaxies. Gravitons and baryonic matter interact and are in equilibrium on the cosmological scale. The graviton-baryonic interaction is the redshift effect, and the CBR is re-emission of energy gained by the cosmological gravitons in the redshift effect.

Gravitation on a body is a pressure effect of gravitons flowing from the background space. As a rule, due to the equilibrium principle, the flow is proportional to the mass of the body. As for all concentric flows (*e.g.*, radiation) the surface density of the graviton inflow follows the familiar inverse square distance law….The energy of the gravitons is proportional to the parameter which we call "strength of gravitation," G. Therefore, we obtain for the surface gravity on a spherical body with mass M and radius R the familiar Newtonian $a = GM/R^2$.

All the main cosmological, astrophysical and physical facts: the gravity and Olbers paradoxes, redshift effects and CBR, gravitation and radiation, and the existence of particles can be conceived in the framework of this ether concept.[436]

In summary, Jaskkola holds that:

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[436] "Action-at-a-Distance and Local Action in Gravitation," in *Pushing Gravity*, pp. 157-159.

- The CMB [CBR] radiation shows that ether exists all over the universe.
- The redshift shows that a Cosmic Background Gravitation in the form of gravitons also exists.
- Gravitons interact with baryonic matter (the atomic nucleus).
- Gravitation on a body is a pressure effect of gravitons flowing from the background space.
- The strength of the gravitons is equal to the gravitational constant *G*, and the force is measured by the inverse square law.

Halton Arp adds that gravitons are:

> …very low mass particles with a huge de Broglie wavelength compared to photons [and thus] have much less interaction with the intergalactic medium….The photon is transmitted through the average cosmic false vacuum, material vacuum or zero point energy field – to use just a few names given to the old fashion concept of 'ether.' But the graviton interacts with much less of this molasses and hence moves much faster.[437]

Reginald T. Cahill adds that interferometer experiments dating back to Miller in 1925 and the coaxial cable experiments up through DeWitte in 1991 show the presence of gravitational waves. These waves are said to be the proper interpretation of the periodic and non-random fluctuations in the same forces measured by the "Stanford University-NASA Gravity Probe B" satellite experiment that measured a geodetic precession and the Lense-Thirring 'frame-dragging.' Cahill concludes that the data shows "gravity may be…well represented in terms of a 'flow' system involving a velocity vector field…and this formalism is physically indistinguishable from the Newtonian formalism…"[438]

The Physical Cause of Gravity

How might this ether "flow" system work, mechanically speaking, to cause the effect of gravity? As we noted previously, the mechanism may

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[437] "The Observational Impetus for Le Sage Gravity," in *Pushing Gravity*, p. 4.
[438] Reginald T. Cahill, "Novel Gravity Probe B Gravitational Wave Detection," Flinders University, Adelaide, Australia, August 21, 2004, p. 3. Various universities around the world have established Gravitational Wave Physics. The lab headed by Lee Samuel Finn and Benjamin Owen at Penn State University is one example.

actually be very simple. The ether has a granularity and concentration that is far finer and far denser, respectively, than ordinary matter. As such, ether will serve as the interstitial substance that fills the so-called "empty" space within the atom, as well as the space outside the atom. Since, however, the ether does not penetrate the atom's individual particles (protons, neutrons, etc), these atomic particles thus account for a percentage of the mass of the atom. But since the atomic particles are less dense than the ether, yet they occupy space in the atom, this means that the total density within the atom will be slightly less than the density of ether outside the atom. This imbalance will cause what can best be described as a partial vacuum in the ether, and the ether will seek to correct the vacuum by attempting to come to equilibrium. Here is the key: *The effort to correct the vacuum pressure is the cause of gravity*. The less-dense ether within the atom will seek to draw inward the denser ether that is outside the atom, and this force will continue until a balance is reached, but, in fact, a balance is never reached, and thus the force of gravity persists indefinitely.

In Newton's case, for example, the apple falls to the Earth because the larger the mass, the stronger the vacuum pressure. The Earth, which is the larger mass, will create a stronger ether vacuum pressure than a smaller mass, and thus the smaller mass (the apple) will be drawn toward the larger mass by the force of the Earth's greater ether vacuum pressure. The reason the Earth creates a greater ether vacuum pressure than the apple is that the more atomic mass an object has, the less interstitial ether it will possess in its given volume, and thus the greater the imbalance it will have with the ether outside its mass. The Earth, having more mass than the apple, has less interstitial ether within its particular volume and thus a greater ether vacuum.

By the same principle, Jupiter will have more gravitational force than the Earth because Jupiter, having more atomic mass than Earth, will have less interstitial ether for its given volume, and thus create a greater ether vacuum, which then attempts to pull more forcefully the ether from outside the planet in order to reach equilibrium.

The Universal Winds from Points of the Zodiac

Hildegard explains a complex system of moving space throughout the universe. There are four main movements corresponding to the four compass points, but Hildegard usually refers to the Zodiac points to be even more specific (e.g., leopard, lion, wolf bear). The four main sectors each create four movements so that there are twelve in all. She writes:

Towards these four sides there appeared four heads: of a leopard, of a wolf, of a lion, and of a bear. Above the top of the figure, in the sphere of the pure ether, I saw the leopard's head expel, as it were, a blow from its mouth. The blow of its throat bent back somewhat at the right side, became elongated, and ran into the figure of a crab head with two claws, forming two feet, as it were. At the left side of its mouth its blowing, likewise bending backwards a little, ended in a deer's head.
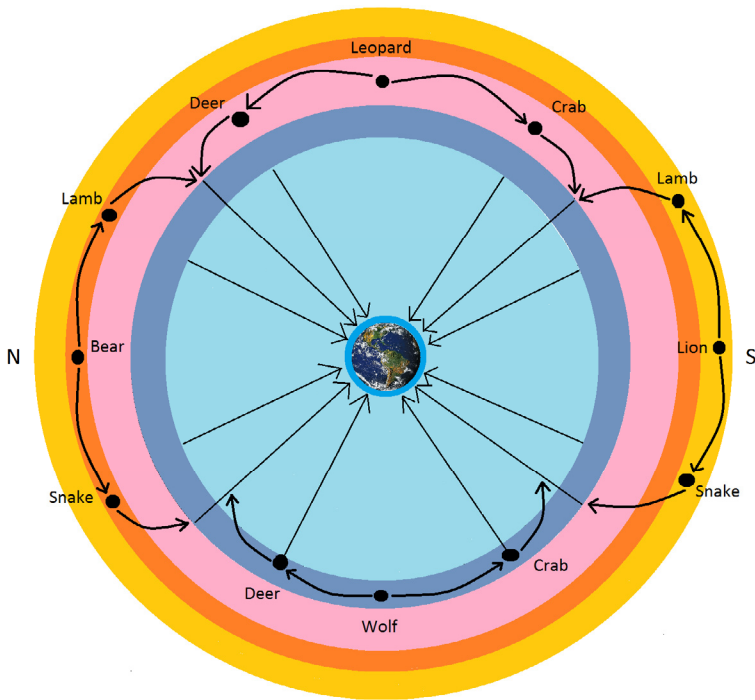
Out of the crab's mouth, in turn, there came a breath, which advanced to the middle of the space which was located between the leopard and the lion's head. Out of the mouth of the deer's head there swelled a blow to the middle of the space between leopard and bear's head. All these blows were of equal length. The blow that extended from the right side of the leopard's head to the head of the crab, the blow that, on the left side of the same mouth, went to the head of the deer, just like the blow from the deer's head, which extended all the way to the middle of the

space between the heads of the leopard and the lion. Finally, too, the blow came out of the mouth of the deer's head to the middle of the space between the heads of the leopard and the bear. All these heads breathed into the described wheel and towards the figure of the man.

Beneath the feet of the image of the man there came out, in the sphere of the watery air, a blow out of the mouth of the crab head with two claws. Out of this mouth, too, there came a blow as another wind to the wolf-lion-boundary. It, too, blew to the right to the middle of the space which was between the heads of the wolf and the bear. It ended in the figure of a deer's head, from where another wind moved to the wolf-bear-boundary. Corresponding to the gap between the heads, the winds also expanded, as this was already described with the leopard.

To the right, in the sign of the illuminated fire I saw a lion's throat blow from left to right. On the right, the wind turned into a snake, on the left in a lamb. The snake's head appeared in the center of the space which was located between the lion's head and the wolf's head, and expelled a breath. That breath expanded to the other half and merged with the blow which came from the crab's head, which was located between the head of the wolf and the lion. The lamb's head appeared in the center of the space between the lion's head and the leopard's head. Its breath expanded to the other half and ran towards the breath which came from the crab's head, which was located between the leopard's head and the lion's head. Corresponding to the spaces between the heads, the distances between the winds were also equal among each other. And their blowing was directed to the spherical wheel as well as the **human image** mentioned earlier.

To the left there appeared in the sign of the black fire a bear's head, out of whose mouth a wind blew to the right and to the left. To the right it ended in a lamb's head, to the left it took on the figure of a snake head. From the lamb's head a wind blew to the bear-leopard-boundary, from the snake head blew one to the bear-wolf-boundary. All winds were of equal length and were pointed to the human image across the universal sphere.[439]

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[439] *Welt und Mensch*, p. 36; *Das wahre Weltbild*, pp. 98-100.

"Thereupon there appeared a wheel, wonderful to behold, on the breast of the aforementioned figure. In the middle of this wheel the figure of a man [human being] appeared. Towards the four directions there appeared four heads, in fact, so to speak, that of a leopard, of a wolf, of a lion, and of a bear. For above the figure's vertex I saw, in the circle of the clear aether, the head of a leopard, which emitted a breath of air from its mouth. This breath curved itself at the right side of the mouth and formed into the head of a crab. However, at the left side of the mouth the breath terminated in the head of a deer. All these heads breathed onto the specified wheel and the human figure."[440]
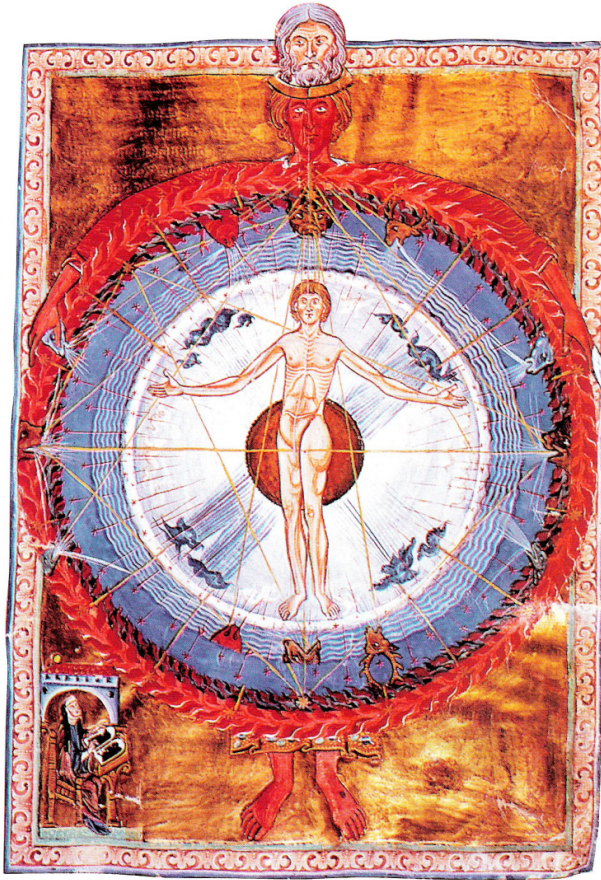
Hildegard's vision of "The Human Figure" in the center of the cosmos

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[440] *Die göttlichen Werke*, 441, *Das wahre Weltbild*, p. 111

The **twelve cosmic winds** and their points of origin are symmetrically and evenly divided around the perimeter of the universe. Essentially, the winds are arranged in such a way that they create a continual flow of pressure towards the center. We can imagine these as concentric spheres of cosmic ether waves moving toward the center at a constant speed, a sort of pressure wave. We can assume that it is in the form of millions of longitudinal waves hitting the Earth at every spherical square inch on its surface, thus keeping it from moving either translationally and rotationally.

The movement of the winds is somewhat complex. One set of winds begins outside the outer fire layer of the south side of the universe and blows laterally around the circumference and, after bouncing off the edge of the universe, curls inward toward the center of the universe where the Earth is located. Another set of winds begins at the north side of the universe in the inner fire layer and performs the same action as the south side winds. Another set of winds begins at the east side of the universe in the ether layer and performs the same action as the north and south winds. Finally, a fourth set of winds begins at the west side of the universe in the water layer and follows the same pattern as the other three winds.
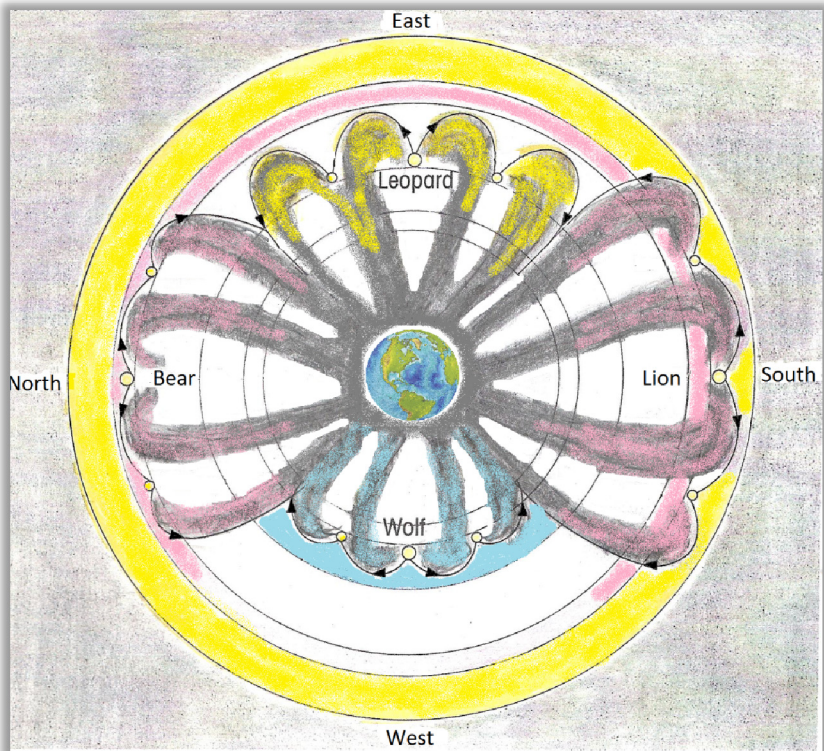
Hildegard employed the names of animals both to distinguish each originating point (*i.e.*, south, north, east, or west) and to distinguish the separate winds within each origin point. Altogether, in Hildegard's vision, there are four main winds (which originate from the four compass points) and eight adjacent winds.[441] These twelve winds, symmetrically situated in space as if they were each at the hour position of a giant clock, produce cosmic waves distributed to the whole universe and which are directed, like spokes of a wheel, toward the center, where Earth is located. The pressure created by the twelve winds is distributed evenly at all points and consequently, as they reach the center, they are in mechanical equilibrium and thus hold the Earth in the exact center. These same winds, as they travel from the outer edge of the universe toward the Earth, create the phenomenon of gravity and inertia for every other celestial body in the universe. Consequently, any celestial body outside the Earth's immediate area will experience disproportional cosmic wind currents and thus move with respect to those currents.

Hildegard intimates that the winds originate both by the energy latent within each celestial layer (based on the principle that "fire" is included in each of the other three elements: air, water, and earth), yet the largest and primary cosmic wind begins in the layer of pure energy that is in the outer layer of the universe where also the universe's most massive stars are located.[442] In a fashion easily explainable in terms of modern science, the energy from the outer layer of the universe creates the inward gravitational pressure as it moves the particulate substance in space in symmetric wave motion towards the center of the universe. In this way, every object of the universe will experience gravity and inertia. Hildegard insists that there is neither movement nor force without these cosmic winds. Thus gravity is not a "curvature of space" and inertia is not an inherent property of motion, but both are the result of a well-designed universal machine working on the principle of mechanical cause and effect. Hildegard's vision of universal winds thus replaces the need for Dark Matter, for we can easily see that gravity is not dependent on the presence of matter; rather, it is a pressure force caused by the transfer of some type of

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[441] *Welt und Mensch*, 36; *Das wahre Weltbild*, p. 100.

[442] In one instance, Hildegard attributes the origin to God himself, as she quotes what the man in the center of the universe said to her: "I am hidden in them as a fiery power. They blaze upwards out of me!" (*Die göttlichen Werke*, 42, *Das wahre Weltbild*, p. 101). This revelation thus makes an intimate connection between God and the universe, as suggested by Colossians 1:16-17: "for in him all things were created, in heaven and on Earth, visible and invisible, whether thrones or dominions or principalities or authorities – all things were created through him and for him. He is before all things, and in him all things hold together."

electrical or plasma energy into a kinetic energy so that the cosmic winds can carry the waves of gravity and interact with the matter in a closed universe. It is possible that the high energy gamma-ray bursts or X-ray bursts found over the entire perimeter of the cosmos may be the peep holes by which we can verify the existence of this universal energy.

The Sixteen Controlling Stars

In conjunction with the cosmic winds, Hildegard's vision reveals **sixteen** of the most massive and powerful stars placed symmetrically at the perimeter of the outer fire layer of the universe. Four stars are positioned between a pair of compass points. Since they are evenly spaced from one another around the universe's circumference, their center of mass is the Earth itself and their energy is directed towards it like the spokes of a wheel.
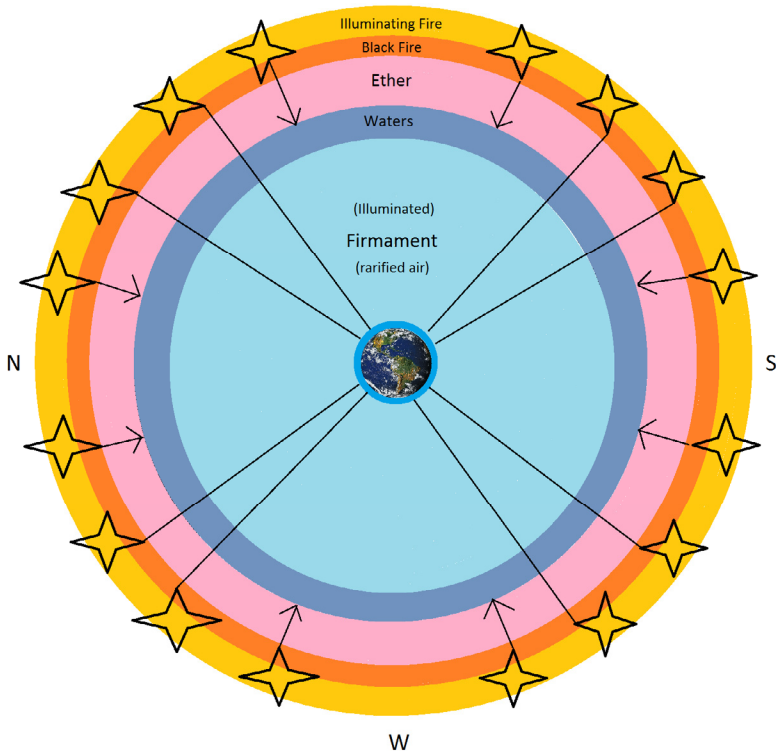
Hildegard writes:

In the zone of splendid fire you see the 16 main stars, because the biggest stars are situated at the outermost region of the celestial vault. Four between the leopard's and the lion's heads, four between the lion's and the wolf's heads, four between the wolf's and the bear's heads, and four between the bear's and the leopard's heads. That is: four stars between the east and south winds, four between the south and west winds, four between the south and north winds, four between the north and east winds dominate these sections and impact these winds. If they were more stars, they would overload] the celestial vault. Fewer would damageably weaken the vault. Since God preserves all created things from excessive abundance and unworthy shortage, it is always four each between two winds, because thus many are useful and necessary and not in their place unnecessarily. They are equally effective and stick to the firmament like nails on a wall. They never leave their place but rotate with the primordial vault, which they help to establish.

From these the two in the middle between two heads each send our their rays to a point opposite of the weather zone, just as bony pockets go from a man's head down to his feet. As bony pockets strengthen a man's entire body, in like manner these stars strut the entire primordial vault and offer resistance to the adjacent winds so the winds do not move the firmament too much. They provide the cosmic air with the proper balance and are good neighbors to each other, because one helps the other carry the celestial vault. The other eight of both sides of the head direct their rays only to the zone of the black fire, because there they support their adjacent winds and offer resistance to the shadow fire so that it not send out excessive blazes of fire. These stars are all affixed to the firmament in equal distance from each other so that they preserve the primordial vault evenly and forcefully.

You see that the circle of the pure ether and the circle of the bright clear air are full of stars, which send their twinkling to the clouds on the opposite side. They are not too many. With their fire they warm up the firmament and strengthen it. With their rays they penetrate the clear air all the way to the clouds under

the strong, white, luminous air and stop the clouds, so that they stay within their God-given boundaries.[443]

Recapping, Hildegard says: "If there were more stars they would overload the celestial vault. Fewer would weaken and damage the vault….They are equally effective and adhere to the firmament like nails in a wall. They never leave their place but rotate with the primordial vault, which they help sustain."[444] The two outer stars from each compass quadrant radiate their tremendous energy towards the center (Earth), while the two inner stars in the quadrant (eight in all) radiate as far as the inner fire layer. All in all, Hildegard says:

> …these stars strut the entire primordial vault and offer resistance to the adjacent winds so that the winds do not move the firmament too much. They provide the cosmic air with the proper balance and are compatible with each other, because one helps the other carry the celestial vault.[445]

The purpose for the two inner stars radiating only to the inner fire layer is "that they support the adjacent winds and offer resistance to the fire so that it need not send out excessive blazes."

As for the billions of other stars in the cosmos, Hildegard states that they are evenly spaced throughout that "ether" layer and the "illuminated air" layer, and "warm up the firmament and strengthen it" (*viz*., the 2.73º Kelvin temperature). This would mean, then, that there are stars above and beneath the "water" layer, or what we commonly call "the waters above the firmament."

Modern science has confirmed the existence of massive stars in the universe. Already in the time of Albert Michelson in the 1920s, their existence was known and measured. Using the 100-inch Mount Wilson telescope, Michelson and Francis Pease were able to calibrate stars with linear diameters of 20 million miles (Arcturus); 30 million miles (Aldebaran); and 400 million miles (Antares). These figures haven't changed much from recent calibrations.[446] They also found that Betelgeuse, a variable, pulsating star, measures between 360 and 500 million miles in diameter. To get a grasp of how big these stars are, at its widest diameter, Betelguese would be twice as big as all of the spherical

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[443] *Die göttlichen Werke*, p. 111, *Das wahre Weltbild*, p. 102-103.

[444] *Die göttlichen Werke*, 111, *Das Weltbild*, p. 102.

[445] *Die göttlichen Werke*, 111, *Das Weltbild*, p. 102.

[446] Arcturus: 30 million; Aldebaran: 35 million; Antares: 410 million. Bernard Jaffe, *Michelson and the Speed of Light*, p. 159.

volume between the sun and the orbit of Mars. It is these types of stars, sixteen of them, that Hildegard says rule the universe's distribution of energy.

Of the Earth's inner structure, Hildegard says: "Half of the earth, that is, its upper layer, is delicate, soft, and able to be drilled through. The other half, however, that is, its core is tough, hard, and impenetrable. Its hardness and strength exceeds that of iron."[447] From this description we understand that the Earth has a dense core that is 4,000 miles in diameter, which is about five times that estimated by modern science.

The Effects of the Cosmos upon Earth

In Hildegard's cosmology all the heavenly bodies communicate with one another through the four elements of fire, air, water, or earth. Nothing is wasted or idle. For instance, Hildegard's visions show that the stars have a direct effect on the clouds in the Earth's atmosphere. She writes:

> With their rays they penetrate the clear air all the way to the clouds under the strong, white, luminous air and hold them so that they stay within their God-given boundaries.[448]

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[447] *Die göttlichen Werke*, 203, *Das Weltbild*, p. 109.
[448] *Die göttlichen Werke*, 111, *Das Weltbild*, pp. 102, 105.

Current science literature remarks on a similar cosmic-to-cloud exchange. In the 1990s, H. Svensmark of the Danish National Space Center found a connection between cosmic-ray intensity and cloudiness on Earth. Svensmark found that the influx of cosmic-ray muons created large numbers of sulphuric acid droplets, which then served as condensation nuclei for cloud formation. Writing about the phenomenon in *New Scientist*, Nigel Calder remarks:

> He [Svensmark] found that when the sun's activity was at its lowest, during which time about 25% more cosmic rays reach Earth, the planet was 3 per cent cloudier than during solar maxima.[449]

Hildegard continues:

> And this same air – the illuminated air over the atmospheric layer – also seems to carry the clouds a little higher, which are soon flying high and full of light, soon descending and dark. This spews out the watery air and gathers it back together, just as a smith's bellows brings forth a blow and draws it back in. Therefore certain stars, while put into the element of fire, then ascend in their circulation, drag the cloud upwards, whereby they too become illuminated. But when they descend in their circulation, they release the clouds again and thus they are dark and trigger downpours.[450]

This revelation explains a heretofore mysterious phenomenon (*i.e.*, how water, which is much heavier than air, can stay above air), but it is a solution that neither modern meteorology nor astrophysics has ever considered. According to Posch, Hildegard is describing a process whereby the electromagnetic impulses of the stars (which can act on the Earth's entire atmosphere instantaneously since they form a giant sphere of constant and inexhaustible power) act like an anode and cathode. The starlight ionizes the air, which, in turn, creates differentiated layers of gas. The gas layers, reacting to the flow of gravity, create changes in air pressure while also seeking to stabilize the total energy of the system. Hence, the cosmic pressure from gravity coupled with the reverse pressure created by the ionization of the atmosphere describes Hildegard's

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[449] Nigel Calder, "Cosmic Rays Before Seven, Clouds by Eleven," *New Scientist*, Oct. 10, 2006, p. 13

[450] *Die göttlichen Werke*, 66, *Das wahre Weltbild*, p. 105.

"bellowing" effect, which we experience as high- and low-pressure pockets throughout the Earth. The whole process results in a continual regeneration of the atmosphere. One of the effects of such atmospheric purification is the production of soft rainwater through a type of distillation process, a distillation that is initiated by the immense energy of starlight from billions of stars.

Moreover, a similar process of gas exchange occurs throughout the universe and is one of the reasons that the temperature can remain at precisely 2.73º Kelvin. Such a process would require the existence of massive amounts of water in space similar to the way water exists in the Earth's atmosphere. Indeed, our earlier citations of the scientific evidence show that such amounts of water exist not only in space but also in the stars themselves.

Regarding electrical processes playing some part in the attraction and repulsion of cosmic entities, as early as 1830, Ottavio F. Mossotti, a French physics teacher at the University of Buenos Aires, postulated that attractive force was caused due to the very slight excess of attractive forces between electrical particles as opposed to the particles' force of repulsion. Since matter is understood to contain positive and negative electricity, obviously, if the attractive forces between particles of opposite electrical charge exceed the repulsive forces of the like particles, an attraction would result.[451] Since electrical forces are so much stronger than what we experience as gravitational force, it would only require a slight residue of attractive electrical force to produce the forces we experience in the cosmos. This would require that Coulomb's law, which holds that two repulsions and two attractions cancel each other, could be slightly weighted to one side or the other. Of note, AmpΠre had shown that another motion is produced between electrical charges that are not described by Coulomb's law. Wilhelm Weber added that attraction also depends on the velocities and accelerations of the bodies in view, whereas Coulomb's law applies to bodies at rest.[452] In any case, Weber seriously considered Mossotti's hypothesis, publishing a paper on the relationship between electricity and gravitation which relates the difficulty in testing whether there is, indeed, a slight difference between attractive and repulsive forces.[453]

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[451] O. F. Mossotti, "On the Forces which Regulate the Internal Constitution of Bodies," 1830.

[452] Wilhelm Weber, "Elektrodynamische Maasbestim-mungen: Über ein allgemeines Grundgesetz der elektrischen Wirkung," Werke, Berlin: Julius Springer, 1893, pp. 25-215. Cited in *21st Century Science* by Laurence Hecht, Spring 2001.

[453] *Ibid*., pp. 479-525.

Following Weber, Walter Ritz also questioned the electrodynamics of Maxwell and Lorentz, and attempted to revive the abandoned approach of Gauss and Weber. He postulated that the result of the electrical forces between two bodies would be attractive. His reasoning was not based on Mossotti's theory, however. Ritz based his on the internal motions of the electrical particles in the atoms. Having died prematurely, Ritz had no opportunity to develop his idea. Current Plasma cosmology is just now delving into these areas of research and much has been written on what has come to be known as the "electric universe."[454]

Energy Supplied to the Sun

Interestingly enough, plasma cosmology holds that the energy from the sun and stars that creates heat and light does not originate from a process of nuclear fusion within the cores; rather, it originates from the energy given to the star from external electrical forces in the cosmos which are then distributed on the surface of the star. Hildegard's visions portray something very similar, at least for our sun. Her visions reveal that in order for the sun to remain aglow, it must always be supplied with the cosmic air current. As we have already noted, the air current originates in the outer layers of the universe, yet Hildegard adds that the planets themselves help radiate the air current toward the sun. Mars, Jupiter and Saturn work as a three-blade fan circulating the rarified cosmic air. As Hildegard says:

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[454] As plasma physicist Eric Lerner suggests in his book *The Big Bang Never Happened*, Vintage Books, 1992; also Erwin Saxl, "An Electrically Charged Torque Pendulum," *Nature*, v. 203, pp. 136-138 (1964). C. F. Brush discovered anomalies between mass and gravity in certain materials, and concluded: "the ratio of mass to weight is not the same for all kinds of matter, as has been supposed, and the mass-weight ratio is not constant even in the same kind of matter" (*Physical Review*, vol 31, p 1113(A); Vol 32, p 633 abstract. Proc. Amer. Philosophical Soc. Vol IX No. 2, 1921; Vol LXVII No. 2, 1928; Vol LXVIII No. 1, 1929. *Journal of the Franklin Institute*, Vol. 206, No. 1, 1928). The *Biefield-Brown Effect*, as found by Thomas Townsend Brown in the late 1920's, produced a slight weight change in a specially constructed capacitor when it was subjected to an extremely high DC voltage. Others have verified the effect and several patents have been granted over the years, but no one has been able to explain what the effect is or its source. Roger Brown, in *The Biefield-Brown Effect Revisited* (1996), offers an explanation to the origin of the force. Many others have written on this topic, but theories postulating that electrical forces cause gravity contradict the tenets of General Relativity, and therefore such papers are usually shunned by the major physics periodicals.

And there are only three, for if they were more, they would ignite the fire too much and disturb it through their orbits. Or if they were fewer, the fire would become cold in its blaze."[455]

The planets enable the sun. Without them, the sun could not exist. They add warmth to it….The planets move from west to east counter to the firmament. Thereby they restrain the fire of the sun with their fire and, on the other hand, renew it for the great kindling. If they did not run counter to the firmament and hurry towards the sun from behind, the sun would not be renewed but freeze into solidity….That's why the planets have effectively been put in the firmament by the Creator of the world in this manner.[456]

The first planet (Saturn) uses its radiance to lighten the radiance of the sun.

The second one (Jupiter) uses its blaze to serve the blaze of the sun.

But the third one (Mars) with its orbit attempts to keep the orbit of the sun on its straight course.

The sun is surrounded, guided, and held tight by these three. In this respect it is to give to the firmament and the whole world the right mixture of its warmth and radiance.[457]

The sun would scorch the earth if the moon did not offer resistance, because the moon tempers the sun's blaze by means of its cold moisture. That's why the sun and moon, by divine ordinance, serve man in this manner, bringing him health or infirmity, according to the mixture of air and air flow. That's how it was revealed.[458]

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[455] *Die göttlichen Werke*, 92. *Das wahre Weltbild*, p. 133.

[456] *Die göttlichen Werke*, 101. *Das wahre Weltbild*, p. 134. Posch notes: "Accordingly, it is manifestly known that the periodic activity of the sun is linked to the orbits of the planets. The fluctuating number of sun spots was discovered by Samuel Schwabe the previous century. They can become so big that sometimes at sunrise one can see them with the naked eye. Emerging in a period of about 11 years, the sun spots indicate a cooling of the sun's surface" (*ibid*).

[457] *Die göttlichen Werke*, 93; *Das wahre Weltbild*, p. 132.

[458] *Berliner Fragmente*, 30; *Das wahre Weltbild*, p. 136.

Mathematical Constants in the Geosystem

As we have noted, although we commonly accept that the sun rises in the east and sets in the west, in actuality the firmament is rotating east to west (or clockwise for someone standing at the North Pole) and it is carrying the sun. At the same time, the sun is making a very slow counter-clockwise movement, from west to east, against the firmament. Analogously, we might say the sun is moving slowly upstream like a salmon. As it moves against the current, the sun takes 27.2753 days to make a complete counter-revolution within the firmament, based on sidereal time and position.

While the sun is orbiting the Earth, so is the moon, and in almost the same way and in the same time. As the firmament moves clockwise (from east to west) it carries the moon, and thus the moon appears to rise in the east and set in the west, just like the sun. Its time between rising and setting is almost identical to the sun's, except that it needs an extra 0.0447 days to make its revolution around the Earth, based again, on sidereal time and position. In all, the moon takes 27.32 days to complete one revolution around the Earth. (Keep in mind, however, that compared to the background of the stars, both the sun and the moon are slowly moving west to east on a daily basis).

That the sun and the moon have an almost identical time of revolution around the Earth is no mere coincidence. Since each revolves in about 27 days, there is a one-to-one ratio. This ratio is needed to establish the balance in the universe's movements. Any faster or slower and the movement would be out of kilter, namely, the balance between what Newtonian physics understands as the centrifugal and centripetal forces, but also other important forces, such as the gravitational constant, the angular momentum of subatomic particles, and most if not all of the other fundamental constants we have noted previously.

According to Posch, the precise number 27.32 becomes very important in cosmological mechanics. Basing the rotation of the firmament on a 366-day-per-year cycle, there are certain fixed ratios that naturally develop. That is, 1 year divided by 366 days equals 0.002732 years; and 1 year divided by 27.32 days equals .03660 years. For the first value, we can say that 1 day equals 0.002732 years, or that the firmament rotates 360º every 0.002732 years. Other uses appear in, for example, the acceleration of the moon as it orbits the Earth at 0.273 cm/sec^2, and the moon's radius being 0.272 of Earth's radius, which shows that there exists an intimate mechanical connection between the Earth and the moon. Perhaps

Hildegard's statement that the moon's orbit around the Earth is the basis "by which everything else is reckoned" can now be better understood.[459]

No Ellipses for the Solar Movements

Another interesting facet of Hildegard's universe is that the path the sun traces out as it orbits the Earth is not an ellipse. In keeping with the Aristotelian model, the sun moves in a circle. As Hildegard describes it:

> The other planet moves counter to it and drags the sun upwards to the constellation of Aries….These propel the sun forward with great force [acceleration]….The two planets accompany the sun for a while so that it won't move downwards too fast. [At Virgo] the sun moves more slowly on its path [deceleration].[460]

Actually, in the relationship of the sun to the Earth, a non-elliptical path is not critically significant. Although in heliocentric illustrations the ellipsis of the Earth's path around the sun is often exaggerated for effect, in actuality it is very close to a perfect circle, with only a 3% variance. Still, there is a slight difference which would accumulate over time and thus a precise understanding of these movements is necessary to know.

We noted earlier in comparing Kepler's solar system against Copernicus' that, whereas Copernicus sought to keep the perfect circles of Aristotle and Ptolemy, this system did not work properly, forcing Copernicus to include 48 epicycles to his planetary movements. Seeing these flaws, Kepler found that the data of planetary movement (which he obtained from Tycho Brahe) fit much better when the orbits of the planets around the sun were elliptical, some of the planets having a sharper ellipse than others. In that comparison, we also noted that an elliptical path is equivalent to a circular path if the speeds of the orbits are adjusted. Hence, as long as Hildegard's geocentric model can account for these differences, her system is equivalent to the Keplerian elliptical system. This is not to say that the Keplerian system is the standard by which all other systems are judged (for we have seen that even the Keplerian solar system has its difficulties), but only to say that Hildegard's model explains the motions of the sun and planets in circular orbits just as well as the best heliocentric model explains elliptical orbits.

What makes the planets travel faster in one part of their orbit and slower in another? As Posch puts it:

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[459] *Das wahre Weltbild*, p. 123.
[460] *Das wahre Weltbild*, p. 143.

The reason is that the center of mass (or center of gravity) of the cyclical counter-rotation lies nar the sun's mass, whereas its point of rotation is the Earth. For the spatial rotation, the north-south axis of the Earth forms the central point of rotation, whereas the counter-current intersects the north-south axis in the center of the Earth at an angle of 23.5º (the ecliptic). Thereby emerges a rectified current between the Earth and the sun, which results in an acceleration, of course, whereas the direction of rotation over and above that is counter-rotation. This also explains why the distance Earth-sun (1AU) is so significant mathematically. The sun obeys the laws of the gyroscope. Its torque causes the precessional movement.[461]

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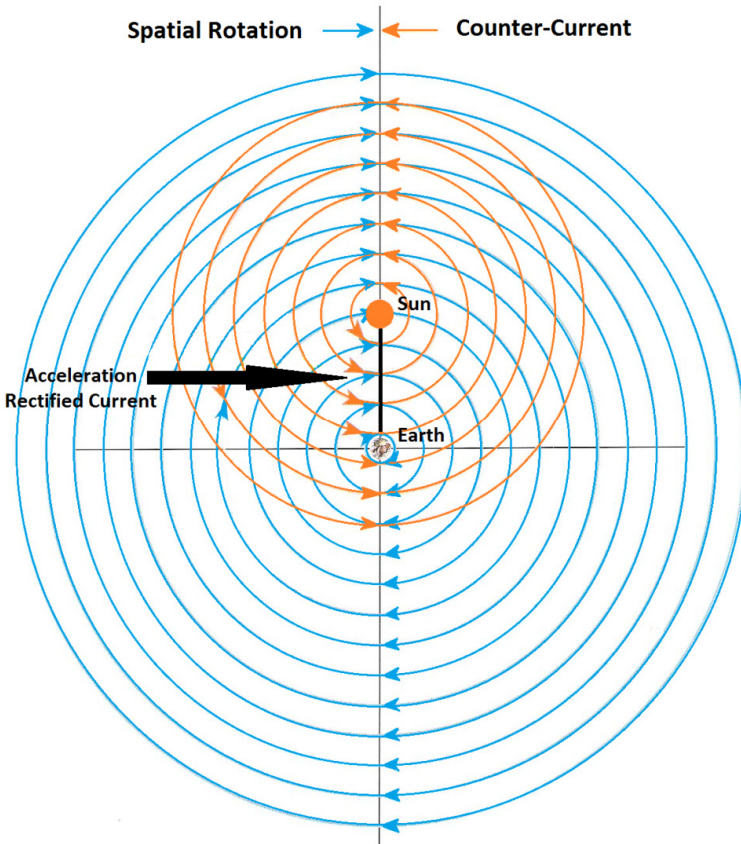
[461] *Das wahre Weltbild*, p. 151.

The Significance of the Analemma

As the sun moves in its orbit over the course of a year it forms an **Analemma**. By photographing the sun at the same time each day for an entire year and assembling the photos so that they show the progressive movement of the sun, a figure-8 pattern is revealed. In addition, the lower loop of the figure-8 is longer and covers more area than the upper loop. The first composite photograph of this phenomenon was produced by Dennis Di Cicco and published in *Sky and Telescope* in 1979. In the heliocentric system the Analemma's asymmetry is explained by the Earth's tilt of 23.45º in addition to the ellipses it forms as it travels around the sun. In the Hildegardian geocentric system it is explained by the precessional movement of the sun in addition to its acceleration and deceleration at specific points in its orbit.
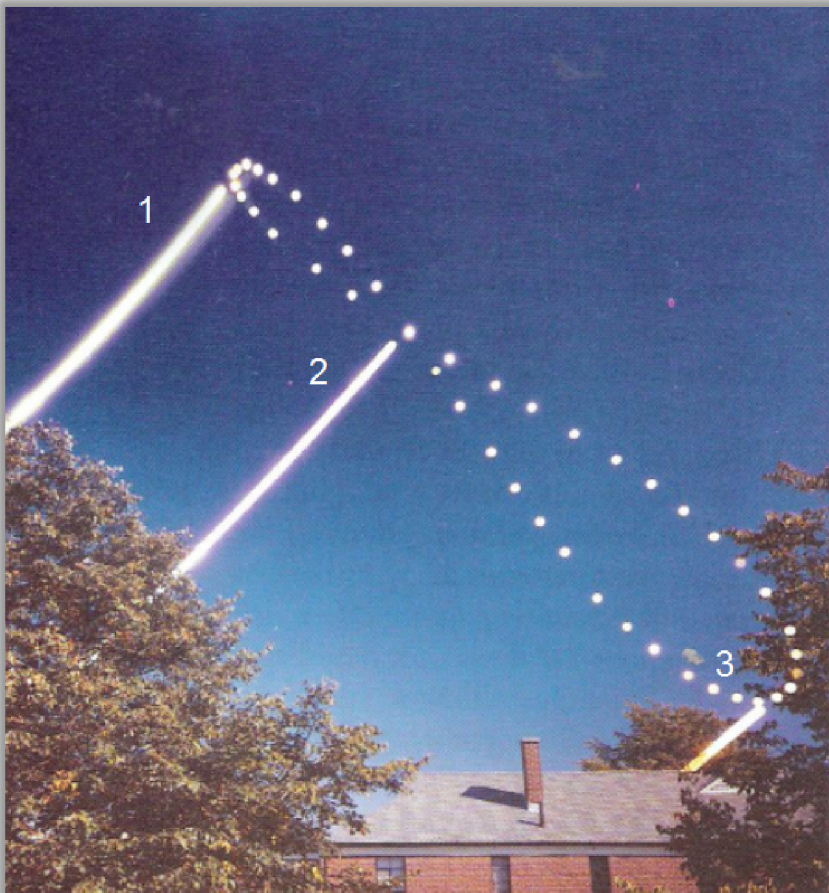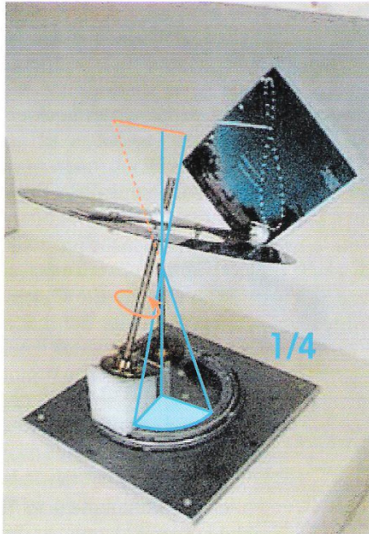
Winter — 1/4
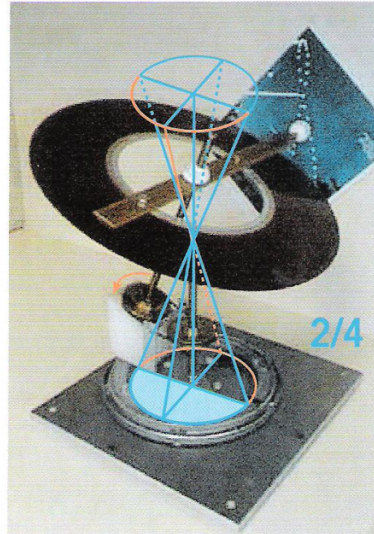
Spring — 2/4
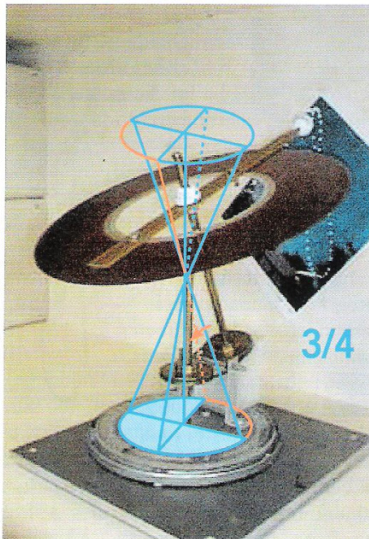
Summer — 3/4
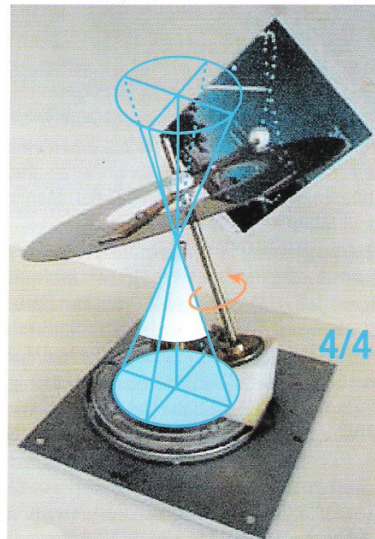
Autumn — 4/4

As Posch discovered, these two independent movements of the sun follow the principle of the Cardanic function. As one text stated:

A mechanism that is particularly useful, surprisingly, is the cardanic joint, which is well-known in other applications. Its

precision is based on a caprice of nature. Moreover, it is certainly an interesting coincidence that certain basic relations of celestial mechanics describe the same functional relations as the movement of the universal joint or cardan joint. The effect of the cardan is understood in the following relation: Tangent B = Cosine N × Tangent A, where A = angle at the drive; B = angle at the output; and N = slope between A and B. The exact same function describes the relation between the eccentric and the true anomaly….Further, the relation between the center of the ellipse and the eccentric anomaly is, in turn, the Cardanic function.[462]

The "caprice of nature" to which the author refers is that, although the drive of a universal joint is uniform, the output is asymmetrical. This causes the mechanism to wobble or create a precession. This is why all rotating shafts that use a universal joint will vibrate, and it is the same reason why a gyroscope will wobble around its center of mass when it is hit by an external force. In essence, an elliptical orbit in which the sun or a planet accelerates or decelerates in keeping with Kepler's law of areas is equivalent to the same principle that governs Cardanic movement. The question is: which system is correct? If the sun and planets travel in circular orbits although at asymmetric velocities, and by doing so match Kepler's elliptical orbits, then there is nothing in the mathematics that can deny it as a viable order of celestial movement. In fact, Kepler knew that the sun moved faster through the stars at various times of the year. As Einstein notes of Kepler:

> To begin with it followed from observations of the sun that the apparent path of the sun against the background of the fixed stars differed in speed at different times of the year…[463]

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[462] Quoted from *Der Himmel auf Erden*, Meier, cited in *Das wahre Weltbild*, p. 145. In orbital motion, an elliptical orbit is understood as the product of three elements: (1) the semi-major axis, which gives the size of the orbit; (2) the eccentricity, which gives the shape of the orbit (between 0 for a circle and 1 for an infinite parabola); and (3) the mean anomaly, which is an angle growing at a steady rate up to 360º for each orbit. The actual position, however, is given by the *true anomaly*, which is given in polar coordinates.

[463] On the occasion of the three hundredth anniversary of Kepler's death. Published in the Frankfurter Zeitung, Germany, November 9, 1930, Albert Einstein, *Ideas and Opinions*, New York, Crown Publishers, 1954, Wing Books, 1984, p. 263.

This is quite significant, since if Kepler understands the stars as fixed in space, then the sun's acceleration and deceleration against such a fixed background means that the sun is producing an absolute movement. In any case, whereas Kepler's model is quite complicated, Hildegard's model can be represented by a simple **sine curve** in which the acceleration and deceleration of the sun represents the positive and negative curves on the *x*-axis of the graph.
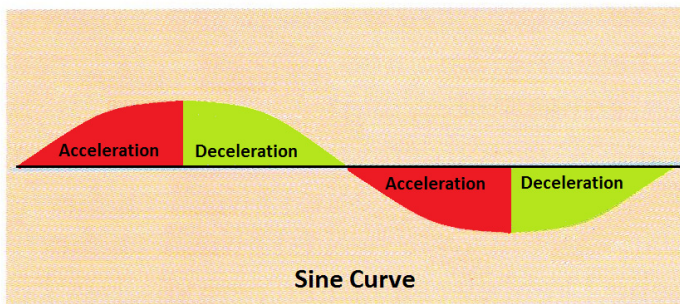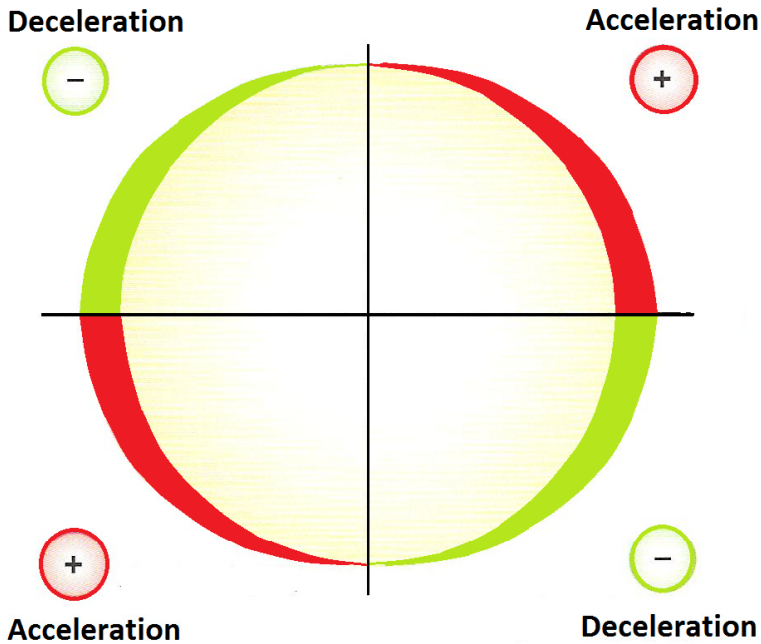
Yet there is another ingredient to this phenomenon. As we noted above, the Analemma shows that the sun travels farther in the lower loop of the figure-eight than it does at the top loop. There are two reasons why this is so. The first is that the sun is traveling on the ecliptic plane that is oscillating side-to-side over a span of 47 degrees in the course of one year. But it is not only oscillating with a side-to-side motion but with a circular motion, just like the plane of a spinning gyroscope that starts out with a 23.5° tilt (provided we keep the gyroscope spinning). To get a good mental picture of how this occurs, one can view the planet Saturn over the course of its orbit around the sun. Saturn's rings will represent the plane of the ecliptic while Saturn itself represents the Earth. Over the course of its 29.5-year orbit, Saturn's equatorial plane will oscillate side-to-side 54 degrees, or 27 degrees above and beneath its center of mass. As it does so the plane will also precess, which will appear in telescope photographs showing the rings moving front-to-back as well as side-to-side, just as in gyroscopic motion. If one were to attach a long pencil to the rings and have it draw on a background behind Saturn, one would see the characteristic Analemma.
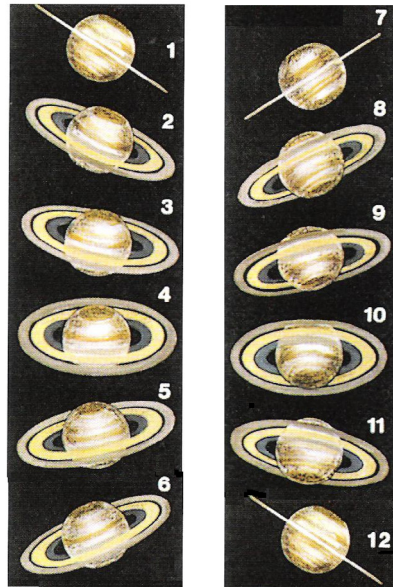
The Analemmas, however, are made without the ellipses of the Keplerian system. The reason is that the sun will orbit the Earth in an asynchronous manner, accelerating and decelerating at periodic points in the orbit. In all, there are two accelerations and two decelerations, evenly

divided over the orbit. Using the face of a clock to create the image, from 12-3 the sun is accelerating; from 3-6 it is decelerating; from 6-9 it is accelerating; and from 9-12 it is decelerating, following the typical sine curve. As the sun makes these varying movements in gyroscopic fashion, the Cardanic function will produce the characteristic elongated lower loop of the Analemma.

In addition to the sun's annual precession, there is another precession that it creates, although this one is over the course of 26,000 years. As we noted earlier, the sun is revolving daily with the rest of the universe in a clockwise direction around the Earth each day. But the sun is also moving in a counter-clockwise motion against the clockwise motion of the universe. Because of the sun's asymmetrical gyration in its orbit, it will cause the orbit to advance 50 arc seconds beyond the starting point of the annual revolution, and this will cause the sun's orbit to precess ever so slightly against the uniformly rotating universe. Over the course of 26,000 years, the sun will come back to the beginning of its precession cycle. Whereas the heliocentric system attributes the 26,000-year cycle to the precessional movement of the Earth's axis, which is said to be generated by the bulge in the Earth's equatorial plane (even though satellite photographs of the Earth do not show an equatorial bulge), geocentric cosmology attributes this precession to a miniscule time difference in the movement of the sun against the firmament. Consequently, this 26,000-year precession will cause the **Analemma to shift** to the east each year by 50 arc seconds against the background of the stars.
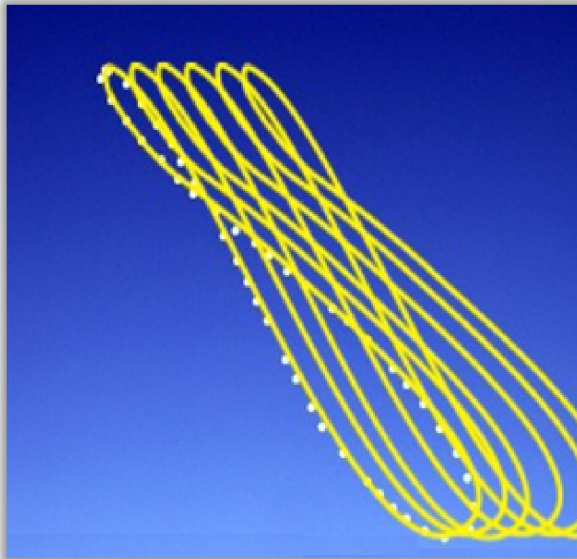
The next issue to be investigated concerns the force that is causing the sun and the planets to accelerate and decelerate at precise periodic points in their orbits. Before we answer this question, we should note that the same question should be asked of those who advocate the Keplerian model of ellipses, that is, according to Kepler's second law, what, precisely, causes the planets to trace out equal areas in the same time period? A Keplerian would answer this challenge by appealing to the "force of gravity" and the "force of momentum," showing us by mathematical equations how these two principles work in tandem. But in reality these mathematical equations neither tell us what moves the planet in its designated orbit, nor the cause of gravity or momentum. The equations merely measure the respective forces. Moreover, in not knowing the cause of the forces, the Keplerian cannot even be sure that the orbits of the planets are ellipses. The ellipse is merely his most convenient mathematical model, but it is certainly not the only possible model. Hildegard's system is very unique because she tells us the physical cause of every movement in the system, and it is then our job to apply the mathematics to what we know is the reality, rather than, as Kepler did, create a mathematics for something he did not know was the reality.

We noted previously that in Hildegard's system the planets are propelled around the sun through a system of cosmic eddy currents, which have varying strengths depending on the planet in view. Now we will add a second dimension to the movement of these currents. The currents will periodically accelerate or decelerate because, as Posch says, "the center of gravity of the cyclonic counter-rotation lies in the solar mass, whereas its point of rotation is the Earth."[464] He further explains that the rotation of the universe is centered on the north-south axis of the Earth, but that the counter-rotation of the sun intersects the north-south axis at an angle of 23.5 degrees. This creates a "rectified current" between the sun and the Earth, which results in an acceleration of the sun, and likewise for the inner planets as opposed to the outer planets. Since there are two opposing currents: (a) the current causing the universe to rotate around the Earth, and (b) the current causing the sun to move against the rotation of the universe; and since these currents pivot off a fixed Earth, there will arise differences in current pressure that will cause periodic acceleration of anything outside the Earth. Calculating the rate of acceleration is rather

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[464] *Das wahre Weltbild*, p. 149. His German reads: "Der Grund liegt darin, weil der Schwerpunkt der zyklonförmigen Gegendrehung in der Sonnenmasse liegt, während ihr Drehpunkt die Erde ist."

simple. Using the sine curve we can determine the measure by which any planet will deviate from uniform speed.[465]

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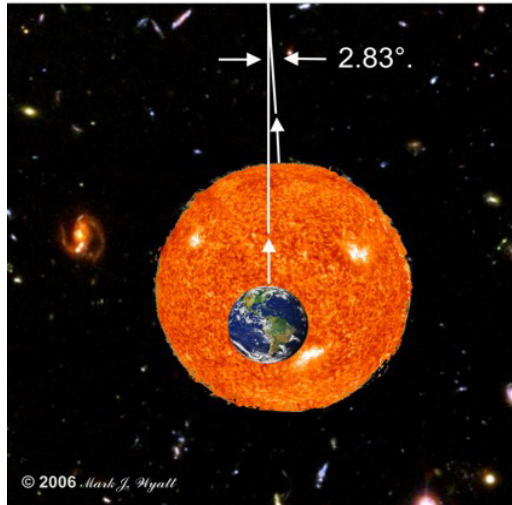
Another factor in these movements is the tilt of the sun. According to Posch's calculations, the sun is at a constant **axial tilt of 2.83° eastern** longitude vis-à-vis the vertical of the ecliptic plane. (In the Copernican theory the sun is tilted at 7.25° but this value does not make any appreciable difference in the movement of the planets). On January 5, as it would be viewed from Earth, the sun's axis is perpendicular to its equator and it has the lowest speed in its orbit. Normally we would think that these changes would begin to occur at the winter solstice on December 21-22, but because of the sun's axial tilt, it is the case that the gyroscopic effect, which in turn produces its angular momentum, gives the sun about an extra two weeks before it reaches its lowest ebb. Once it reaches the lowest speed on January 5, it will immediately begin to accelerate. This acceleration will last until about March 6, and then it will begin to decelerate until about July 7. At this point the sun's axis is once again perpendicular to its equator (as it was on January 5), but this time the axis is tilted 2.83° toward Earth instead of away from it. On July 7 the sun will

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[465] Posch adds that in changing from an elliptical to a sinusoidal acceleration, one must include the necessary conversion factors. Putting the data in dBASE4, he gives the parameters as: k = 360/365.2422 = constant angular speed of the sun; n = 1 = trip meter (in loop per day + 1); exz = eccentricity (starting with a zero value on January 5th); x1 = D to R (n × k) = average daily increase in radian measure where D to R is degrees to radiant. The resulting equation is: y = D to R (exz) × sin (x1) × 180/π.

again accelerate until September 8 and then decelerate until January 5. Incidentally, these fluctuations in speed of the sun in Hildegard's system would equate to the eccentricity of the Earth's orbit in the Copernican system. Quoting Posch's calculations in detail, we read:

> The acceleration of the sun starts, in each case, after the winter solstice around January 5th and after the summer solstice around July 7 and lasts a quarter of a year each time. The angular momentum, accordingly, amounts to 2/4. Canceled down, this corresponds to the well-known value ½, *i.e.*, 0.5. If we calculate using an angular momentum of ½, we get a yearly period. But if we are more correct and make it 2/4, as it corresponds to reality, then we get the desired semi-annual period. To make it easier, we simply cut the circle (360º) and the circular number (π) in half, whereby we receive the appropriate value of the periodic acceleration (in the Copernican system = eccentricity); Exz = eccentricity • 180/ (π / 2).[466]

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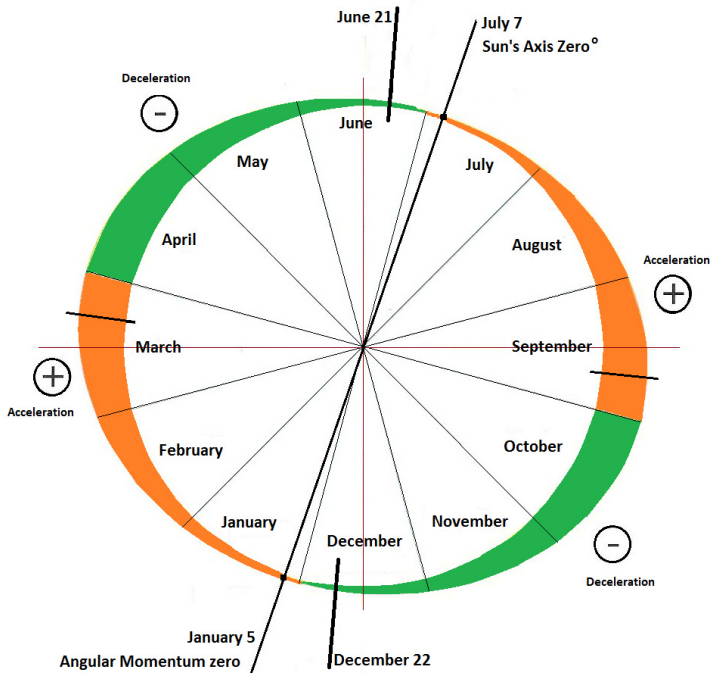
[466] *Das Wahre Weltbild*, p. 153.

Because the new method yields the acceleration factor (xl) from the daily increase (days × 0.98º), there follows from it the conversion of the elliptical eccentricity (exz) from the residual of the central equation (c) in a daily fraction. To obtain exact values for our starting position (earth/sun), we need to consider the residual speed of the 'run-down phase' as residual acceleration.

Only in this manner are the digits after the decimal point of the beginning value sufficiently exact. Thus, the formula for our docking maneuver must be:

$$\text{Daily increase } x1 = n \times 0.985647$$
$$\text{Acceleration } y = exz \times \sin(x1)$$
$$\text{Daily fraction } n = (c/exz) / 0.985467$$

The n-value contains the daily fraction. Thus we are able to continue calculating seamlessly on a Hildegardian basis with +1 for each following day. The result is astonishingly precise. Of course the ecliptical coordinates still need to be converted to the hourly circle, and the nutation and aberration still need to be factored in. The numbers agree almost exactly to the second with the official astronomical specifications of the celestial yearbook.[467]

The basis of calculation is a precessional computation that progresses purely mechanically, without including the nutation or aberration.

I took the *true length* of the sun on December 25th as the starting position. The daily value is sufficient for a first approximation. For an exact calculation, it would also be necessary here to determine [ascertain] the daily fraction at the time of the passage of the meridian (if equation of time = 0.000…). All the rest is obtained by the trigonometric functions of the x and y axes, as the formula in the box shows.

Thereby I have proven once more that celestial mechanics is indeed derivable from two counter-rotating circular movements! This process further supplies us with an important indication for the accuracy of the Hildegardian worldview. Why? Because the

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[467] *Das Wahre Weltbild*, p. 154.

periodic acceleration phases of the sun begin at exactly the point in time after which its axis passes the zero point. They begin several days after the winter solstice, around January 5th each time, and several days after the summer solstice, around July 7. On these two days, the additional

- angular momentum = zero
- position of the axis = zero

The phase shift of the angular momentum at the winter and summer solstice results from the constant inclination of the sun's axis of about 2.83 degrees.

In this manner the Creator solved the overcoming of the dead point at the turning point in an elegant way. He slightly displaced the sun's axis from the vertical position, whereby the axis lags behind. This leads to its angular momentum not yet having reached the zero value when arriving at its turning point. Thereby the sun overcomes the turning point with its remaining speed without much effort.

If the sun's axis stood exactly perpendicular to the ecliptic, its angular momentum at the turning point would be zero, and to overcome the dead point additional energy would be necessary. This energy would be supplied at the expense of the sun's orbital speed, which is not, however, according to the mind of the Creator.

A logical corollary of the sun's circular movement is its constant distance to the Earth, of course. If the theoretical solar diameter is produced in celestial yearbooks because people are calculating using Kepler's laws, then one can confidently discard these numbers. The sun always has the same diameter because its distance to the Earth is constant throughout the entire year.

1) dm = DtoR (2.83) true inclination of the sun's axis (in radian measure).
2) b = DtoR (n × k-beg) number of days × 0.98 degrees: true length Dec. 25.
3) es = obliquity of the ecliptic.
4) soX = ATAN (cos(b) × tan(es)) × 180/π is the ecliptical precessional motion.

5) soY = ATAN (cos(b) × tan(dm)) × 180/π is the rotational axis of the sun.

6) soZ = round (soX + soY,1) are the X + Y = position angle of the sun.[468]

Posch then cites a source showing corroboration with his findings.

One year after my mathematical studies I read in Raum & Zeit Spezial 7 [Space & Time Special 7] a discourse about calculating planetary orbits. Therein the mathematician J. Huber proves that the revolutions of the planets can also be interpreted as a vortex. The entire study appeared in *Mathematische Physikalische Korrespondenz* (no. 144, Institut Dr. Unger, CH-4149 Dornach). We confine ourselves only to the conclusions of the mathematical results, which lead to the following statements:

It is obvious that Einstein's field theory of planetary orbits leads to the same results as Newton's mass theory…that is, the acceleration of gravity is equated with a centripetal acceleration of an orbit. The planetary system, in its action, is comparable to a huge vortex, whose center is located in the central body. Presupposing stable relations, imagine this vortex as divided into individual concentric stream tubes.

If we now keep in mind that the speed of light c, according to $gM = c^2r$, increases as the radius decreases, we can imagine, according to the Bernoulli equation:

$$c^{2/2} + p/p = \text{constant}$$

that, in the same sense, the inner pressure in the stream tubes decreases vis-à-vis the center. This pressure gradient, which points from the inside to the outside, effects a centripetal force on a planet, which corresponds to gravitational force.

It may be interesting in addition to envision the relations of a solid-state vortex, *e.g.*, a rotating disc. Also imagine this vortex to be divided into individual circular discs and take into account that here the speed c with an increasing radius remains a pressure

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[468] *Das Wahre Weltbild*, p. 156.

gradient to the outside. As is generally known, this [speed] results in centrifugal forces, which affect every voxel of the disc.

Wherever the centripetal speed gradient of the planetary vortex is locally disturbed through a con-glomeration of matter, *e.g.*, in the form of the planet, a centrifugal force joins the centripetal one, and the stationary orbit of the planet is marked by the fact that the effect of both forces keep the equilibrium for each revolution. This result suggests that gravity should be looked at as an effect of the quantum of the spin of matter. Apparently the direction of the spin is irrelevant for gravity.

It may be of interest to review the condition c^2r = constant numerically for the solar system some time. This is to happen by means of the specifications in *Meyers Handbuch über das Weltall* [Meyer's Handbook on the Universe] (pp. 179/183).[469]

Remarkably, there is the strongest agreement between the product of the square of the average [mid-] orbital speed and the large half-axis of the planetary orbits, and the product of the gravitational constant and solar mass.

Planet	$a \times 10^6$ km	$v^2 \times a$ km/s	$= c^2r$
Mercury	57.9	47.9	1.3284
Venus	108.2	35.0	1.3254
Earth	149.6	29.8	1.3285
Mars	227.9	24.1	1.3236
Jupiter	778.0	13.1	1.3351
Saturn	1427	9.6	1.3151
Uranus	2870	6.8	1.3270
Neptune	4496	5.4	1.3110
Pluto	5946	4.7	1.3134

Mean value [average]   = 1.3231

$$gM_{So} = 1.3234 \times 10^{26} \text{ cm}^3/\text{sec}^2$$

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[469] *Das Wahre Weltbild*, p. 157.

$$(c^2 \times 1 \text{ AE} = 1.3444)$$

In accordance with the present figures, it is possible, consequently, to calculate the planets' orbits without making use of the notion of gravity. This is apparently to be ascribed to the interpretation of the planetary system as a vortex. The question is now whether gravitation in general can be explained as a vortex effect.

Posch makes this note before the author continues:

Thus, based on the present insights, we shall attempt to describe a possible solution to this puzzle. Note: What follows is a mathematical derivation of tangential speeds on a circle. After that it says further:

Applied to the problem at hand, this means that every point of mass which, as hinted at in the mentioned essay, can be understood as the sum of space structure vortexes, exists a potential vortex field, whose axis can occupy any spatial direction. Accordingly, the centripetal force of this vortex field is spherically-symmetrical with the intensity $^1/r^2$, in accordance with the equation of Bernoulli, that is, it is identical with the gravitational force. In other words: The gravitational field can be interpreted generally dynamically as an effect of a space-structure movement, similar to the electrostatic field.[470]

Keplerian Anomalies

Concluding this section, Posch adds:

And that's exactly what Hildegard says! The result of this mathematical study is entirely in agreement with Hildegard's postulate, according to which the planets move around the sun on the basis of an eddy current. Gravity is a force of the winds. From them flows the potential energy that gives weight to matter and forms and builds gravitational fields. The cyclone impels the planets.

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[470] *Das Wahre Weltbild*, p. 158.

Since in the classical world of Newtonian legalities there is no circular motion that continues on its own, a circular orbit must have a force as its cause. These forces are formulated in Newton's theory of mass, whereas the ingenious gentleman left open where these forces come from.

If, then, the orbiting planets use energy (as our vehicles use fuel), then there arises the question: where do the planets get their impulsion energy? According to the first law of Kepler, the planetary orbit is dependent on the relationship of the potential energy of the planet to its kinetic energy. In other words: the spin is taken from the difference between circle and ellipse, for the sum of potential and kinetic energy is always constant. According to the law of the conservation of angular momentum and energy, the demand for energy is passed back and forth between kinetic and potential energy each time.[471] In the perihel, E_{kin} has a maximum, E_{pot} a minimum, whereas in the aphel, E_{pot} reaches a peak and E_{kin} a minimum. Strictly speaking, this is not physics but magic, for there is never any mention of energy consumption!

The First and Second Laws of Kepler apparently make our planetary system into a perpetual motion machine, though even this supposition is already prohibited by science. Nevertheless, for thousands of years the planets have been moving around the sun without any weariness and without wearing themselves out. But there is no magic in the skies. Without this cyclone, no planet would revolve around the sun. The energy comes from *it* – and not from the mass – as we have been able to prove mathematically.

Just as a wind turbine only supplies energy if the wind blows constantly, so the energy demand of the universe must be met by a constant supply of energy, *i.e.*, through a continuous blowing of the cosmic winds. Hildegard confirms the constant supply of energy in the universe: "…for the side winds, incessantly, even if mildly, do not stop blowing air" (*Die göttlichen Werke*, 84).

This permanent blowing of the cosmic winds not only makes possible the revolution of the firmament, it also supplies the

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[471] *Das Wahre Weltbild*, p. 158.

kinetic energy for the planetary movements, which do not, after all, travel around the sun free of charge. They do not receive their angular momentum reciprocally from the mass, as has been explained hitherto, but through the cyclone. The wind current that flows to it replenishes the constant consumption of energy and keeps the centrifugal and centripetal forces balanced.

Gravitational force must be redefined as vortex force, just as the superrotating disc galaxies show, which cannot be understood either with Newton's or with Einstein's theories of gravity. For the outer regions of the disc galaxies move around their galactic center a lot faster than they could be stabilized with the Newtonian gravitational effect of the inner visible star masses. This behavior can only be explained with vortex systems and their nebula vortex systems. Spiral nebulas in particular, which are very similar to our weather charts, indicate very clearly that there are eddy currents in the universe.[472]

Objection: "At the rotation of the firmament, the fixed stars close to us would already exceed the speed of light many times over.

Response: Here the reasoning is incorrect already. The stars do not move; all of space does. Since the stars do not move, they cannot exceed any speed, either.

Objection: "In the physical world, mass also implies the force of gravity. Now, the sun's mass is so great that it contains 322,800 earth masses, and surely many of the billions of stars have even greater masses. Should it be conceivable that the earth, which is infinitesimally small by comparison, really possesses the necessary gravitational force? It will be impossible to answer this question in the earth's favor."

Response: This argument sounds really silly from Hildegard's point of view. Since space moves and all the stars with it, their orbits do not depend on the earth's gravity. The idea of a gravitational force must be abandoned.[473]

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[472] *Das Wahre Weltbild*, p. 159.
[473] *Das Wahre Weltbild*, p. 162.

The Rotation of the Earth: A Catastrophe!

Have physicists ever thought about what physical consequences a rotating earth would bring about? At the equator the earth's circumference is around 40,000 km.

$$40,000 : 24 \text{ (hr)} = 1,666 \text{ km/h}$$

If the earth rotated, a point at the equator would have to move at 1,666 km/h! That's faster than sound! Sound waves only travel at a speed of 1,200 km/h. How should two people be able to talk to each other if sound waves were slower than the earth's rotation?

He who has experienced how much window panes vibrate when an airplane breaks the sound barrier, can imagine how much energy would have to be used to have a conversation! Due to the law of inertia, the atmosphere [mantle of air], too, would move more slowly than the earth, which would result in hurricane-like storms around the globe. Similarly, the oceans would roar around the globe like the water film on a grinding stone! Like a raging river they would go around the globe and highly flood the continents in a continuous storm surge. Neither the air nor the oceans would be calm for even one moment. A rotating earth would make life on earth impossible, because for us men there would be no chance to survive with permanent flooding [high tide] and a continuous hurricane.[474]

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[474] *Das Wahre Weltbild*, p. 164.

Chapter 13

Modern Science and its Persistent Problems

Critical Remarks from its Own Ranks

Today, science lives in the aura of being a monolithic consensus of truth and impartiality. Unfortunately, this is at best an exaggeration, and often it is simply untrue. Science, like any other endeavor of man, is subject to the weal or woe of human participation and its common foibles. As science walks in the precarious halls of trial and error, it is, contrary to popular opinion, particularly prone to mistaken notions. As scientist Lewis Thomas (d. 1993) recently confided:

> Science is founded on uncertainty…. We are always, as it turns out, fundamentally wrong.…The only solid piece of scientific truth about which I feel totally confident is that we are profoundly ignorant about nature....It is this sudden confrontation with the depth and scope of ignorance that represents the most significant contribution of twentieth-century science to the human intellect.[475]

> The principle discoveries in this [20th] century, taking all in all, are the glimpses of the depth of our ignorance about nature. Things that used to seem clear and rational, matters of absolute certainty – Newtonian mechanics for example – have slipped through our fingers, and we are left with a new set of gigantic puzzles, cosmic uncertainties, ambiguities. Some of the laws of physics require footnotes every few years, some are cancelled

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[475] Lewis Thomas, "On Science and Certainty," *Discover Magazine*, 1980, p. 58. Lewis also quips: "On any Tuesday morning, if asked, a good working scientist will tell you with some self-satisfaction that the affairs of his field are nicely in order, that things are finally looking clear and making sense, and all is well. But come back again on another Tuesday, and the roof may have just fallen in on his life's work"; "In real life, every field of science is incomplete, and most of them – whatever the record of accomplishment during the last 200 years – are still in their very earliest stages."

outright, some undergo revised versions of legislative intent like acts of Congress.[476]

Karl Popper, one of the more respected secular philosophers, issued major critiques throughout his life on the industry of science. He writes:

> For us therefore, science has nothing to do with the quest for certainty or probability or reliability. We are not interested in establishing scientific theories as secure or certain, or probable….It can even be shown that all theories, including the best, have the same probability, namely zero….the realization that our attempts to see and to find the truth are not final, but open to improvement; that our knowledge, our doctrine, is conjectural; that it consists of guesses, of hypotheses rather than of final and certain truths. [477]

Since most people are not familiar with the intricacies of research and discovery, the doctrines concerning the mechanical workings of the universe are inevitably left to what modern society has come to know as "the scientist." Today, those with credentials in theology, or even philosophy, are invariably ignored when the crucial decisions are made regarding what will be taught in the universities. The sad truth is, however, that an inordinate number of scientists are employed for their own selfish interests, and never consider, let alone seek, an authority above themselves. Statistics reveal just how bad it has become. *Scientific American* carried an article a few years ago on the work of James H. Leuba, a statistician who both in 1914 and 1933 surveyed the religious beliefs of American biological and physical scientists of their views on two fundamental beliefs in Christianity: (1) the worship of God and (2) the existence of an afterlife. This study was important to Leuba since, as he said, "scientists enjoy great influence in the modern world, even in matters religious."[478] At first glance, Leuba's results seem somewhat reassuring. Among a general cross section of scientists, he found that 40% believed in God. But then he concentrated on the more elite scientists, those whose

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[476] Lewis Thomas, "Making Science Work," *Discover*, March 1981, p. 88.

[477] Karl Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge*, 1963, 1965, pp. 229, 192, 151. Popper opens with: "The title of this lecture is likely, I fear, to offend some critical ears. For although 'Sources of Knowledge' is in order, and 'Sources of Error' would have been in order too…" (*ibid*., p. 3).

[478] "Scientists and Religion in America," Edward J. Larson and Larry Witham, *Scientific American*, Sept. 1999, p. 89.

names are in the newspapers, who write the major books and articles, and who have the most influence on what the public believes. He found that an astonishing "80 percent of top natural scientists rejected both cardinal beliefs of traditional Christianity." *Scientific American* then did its own study and found even worse results. Using the 1,800 members of the 1998 *National Academy of Sciences* as its measure of who comprised the "elite scientists" of the day, the editors found that:

> Disbelief among NAS members responding to our survey exceeded 90 percent….NAS biologists are the most skeptical, with 95 percent of our respondents evincing atheism and agnosticism. Mathematicians in the NAS are more accepting: one in every six of them [17%] expressed belief in a personal God.[479]

Commenting further, the article shows that atheism is encouraged in academic circles, and those who have any Christian beliefs are quietly suppressed:

> University of Washington sociologist Rodney Stark…points out, "There's been 200 years of marketing that if you want to be a scientific person you've got to keep your mind free of the fetters of religion."….higher education on the whole winnows out the idea of God or people who hold it. In research universities, "the religious people keep their mouths shut," Stark says. "And the irreligious people discriminate. There's a reward system to being irreligious in the upper echelons."[480]

The reasons for this rampant atheism are then discovered:

> Legendary evolutionary biologist Ernst Mayr, an NAS member since 1954, made a study of disbelief among his Harvard University colleagues in the academy. "It turned out we were all atheists," he recalls. "I found that there were two sources." One Mayr typified as, "Oh, I became an atheist very early. I just couldn't believe all that supernatural stuff." But others told him, "I just couldn't believe that there could be a God with all this

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[479] *Ibid.*, p. 90.
[480] *Ibid.*, p. 91.

evil in the world." Mayr adds, "Most atheists combine the two. This combination makes it impossible to believe in God."[481]

How ironic is it that atheistic men are using religious and moral principles to judge whether God exists. With the audacity of a woman of the night, they dare blame God for the evil in the world.[482] Scripture has quite a different scenario, of course. It solemnly testifies that God blames man for the evil in the world. As Genesis 6:5-6 laments before the Great Flood:

> The Lord saw that the wickedness of man was great in the earth, and that every imagination of the thoughts of his heart was only evil continually. And the Lord was sorry that he had made man on the earth, and it grieved him to his heart.

Thus, we would ask, rhetorically: who is right about the cause of the world's evil? Is it the scientist or is it God who cannot lie and declares in Romans 3:10-18:

> There is none righteous, no, not one; no one understands, no one seeks for God. All have turned aside, together they have gone wrong; no one does good, not even one. Their throat is an open grave, they use their tongues to deceive. The venom of asps is under their lips. Their mouth is full of curses and bitterness. Their feet are swift to shed blood, in their paths are ruin and misery, and the way of peace they do not know. There is no fear of God before their eyes.

Although there are many examples of atheist-driven scientific agendas in the halls of modern science today, one person who particularly fills that description in the field of cosmology is the late Carl Sagan. One of the first exposures a novice has to the godless world of Sagan is this sad statement ascribed to one of his characters in his novel, *Contact*:

> "If God is omnipotent and omniscient, why didn't he start the universe out in the first place so it would come out the way he wants? Why's he constantly repairing and complaining? No, there's one thing the Bible makes clear: The biblical God is a

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[481] *Ibid*., p. 91.
[482] Proverbs 30:20: "Such is the way of an adulterous woman: she eats, wipes her mouth, and says, 'I have done no wrong.'"

sloppy manufacturer. He's not good at design, he's not good at execution. He'd be out of business if there was any competition"[483]

Autonomy was Sagan's gospel. As he himself stated: "First: there are no sacred truths…arguments from authority are worthless,"[484] and in the context Sagan is referring to religious authority. In other places he creates fear and resentment against religious authority, portraying it as vicious ogre who is not interested in truth or even discussion. He writes:

> It took the Church until 1832 to remove Galileo's work from its list of books which Catholics were forbidden to read….The high water mark in recent history is the 1864 *Syllabus of Errors* of Pius IX, the pope who also convened the Vatican Council at which the doctrine of papal infallibility was, at his insistence, first proclaimed….But surely the Inquisition ushering in the elderly and infirm Galileo in to inspect the instruments of torture in the dungeons of the Church not only admits but requires just such an interpretation. This was not mere scientific caution and restraint, a reluctance to shift a paradigm until compelling evidence, such as the annual parallax, was available. This was fear of discussion and debate. Censoring alternative views and threatening to torture their proponents betray a lack of faith in the very doctrine and parishioners that are ostensibly being protected.[485]

In place of traditional religion, science has become a religion in its own right. In essence, it has been turned from science to *Scientism*. Its advocates preach its subjective beliefs just as strongly as any modern gospel evangelist. Whereas in the past the Church was the supreme authority, *Scientism* has no peer today. As it seeks converts it presents as its foundation stone the Copernican revolution. In the words of Gunther Stent, a biologist at Berkeley:

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[483] Spoken by the character Sol Hadden in Carl Sagan's *Contact*, 1985, 1997, p. 285. The prior sentences state: "All this speaks of incompetence. If God didn't want Lot's wife to look back, why didn't he make her obedient, so she'd do what her husband told her? Of if he [God] hadn't made Lot such a s---head [expletive deleted], maybe she would've listened to him more."

[484] Carl Sagan, *Cosmos*, 1980, p. 333, and *Broca's Brain*, 1979, p. 62.

[485] *Pale Blue Dot*, pp. 40-41.

In the wake of the publication of Darwin's *On the Origin of Species*, the idea of progress was raised to the level of a scientific religion….This optimistic view came to be so widely embraced in the industrialized nations…that the claim that progress could presently come to an end is now widely regarded as outlandish a notion as was in earlier times the claim that the Earth moves around the sun.[486]

The public, who is pacified by such things as cell phones, antibiotics, jet planes, and computers, will rarely challenge the claims of modern science or attempt to upset the *status quo*, since whatever problems science may have, still, it makes our lives more comfortable than those who lived in the medieval era. But the sad fact is, except for a few basic ideas, today's science is very confused and it is at a loss to explain most of what it observes in nature, especially in the areas of cosmology and cosmogony. In most cases it is completely on the wrong track. As John Horgan notes:

…sometimes the clearest science writing is the most dishonest…Much of modern cosmology, particularly those aspects inspired by unified theories of particle physics and other esoteric ideas, *is* preposterous. Or, rather, it is ironic science, science that is not experimentally testable or resolvable even in principle and therefore is not science in the strict sense at all. Its primary function is to keep us awestruck before the mystery of the cosmos.[487]

The universe is so complex and so bewildering that honest scientists are only too willing to admit that the more data that scientific instruments attain, the more difficult becomes the task to make sense of it all. As astronomer Fred Hoyle summed it up: "The whole history of science shows that each generation finds the universe to be stranger than the preceding generation ever conceived it to be."[488] Biologist J. B. S. Haldane quipped: "The universe is not only queerer than we supposed, but queerer than we can suppose."[489] In brief, knowledge is abundant; but proper interpretation of the knowledge is severely lacking. Astronomer Halton

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[486] G. Stent, *The Paradoxes of Progress*, 1978, p. 27.

[487] John Horgan, *The End of Science: Facing the Limits of Knowledge in the Twilight of the Scientific Age*, 1997, pp. 93-94.

[488] Fred Hoyle, *Astronomy and Cosmology*, San Francisco, 1975, p. 48. Interestingly enough, Hoyle makes the comment in a context concerning whether the heliocentric or geocentric system is the correct model.

[489] Attributed, not verified.

Arp reminds us: "Really all we have for data in astronomy is photons as a function of x and y and frequency. The challenging puzzle is then to try to reason out how nature works,"[490] and that, indeed, is a very difficult task without the proper guidance.

The Guardians at the Gate of Knowledge

Unfortunately, as scientists placate the populace with creature comforts they, in turn, have enjoyed the god-like status they have attained in the eyes of the adoring public. But the real truth is that today's gods of science fight amongst themselves just like the mythical gods of ancient Greece or Rome because, when all is said and done, they are certain of very little of what is going on in the universe. They have lots of information but in the main they are at a loss to make sense of it all. Everyone has an assortment of facts. But correct interpretation is the key to truth, and most scientists fail at this point. The universe is simply too complex for their tiny theories.

Nevertheless, since almost everyone has been convinced that the Earth revolves around the sun, anyone who even attempts to espouse the opposite view is immediately classified in the fringe category; someone, perhaps, who still believes in a flat Earth and spends his day donning an aluminum foil hat waiting for messages from outer space. Whatever their reasons, most scientists and laymen will simply not consider the possibility of a motionless Earth in the center of the universe, no matter what the scientific evidence shows them. If one should dare to persist and challenge them, they will not hesitate to become abusive. Thomas Kuhn observes:

> During the century and a half following Galileo's death in 1642, a belief in the Earth–centered universe was gradually transformed from an essential sign of sanity to an index, first, of inflexible conservatism, then of excessive parochialism, and finally of complete fanaticism. By the middle of the seventeenth century it is difficult to find an important astronomer who is not Copernican; by the end of the century it is impossible…[491]

Or as Lakatos notes:

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[490] Halton Arp, *Seeing Red: Redshifts, Cosmology and Academic Science*, 1998, p. 208.

[491] Kuhn, *The Copernican Revolution*, 1959, p. 227.

> The Ptolamaists did their thing and the Copernicans did theirs and at the end the Copernicans scored a propaganda victory….Therefore the acceptance of the Copernican theory becomes a matter of metaphysical belief.[492]

But it still remains true that people are set free by truth. Falsehoods keep them in darkness and force them to live in an illusion, under oppression, ultimately destroying them. Fortunately, man is blessed with an innate desire to find the truth, put there by his Creator. Often this desire is difficult to satisfy because various ideologues of the world have a vested interest in keeping the rest of the human race in ignorance in order to advance their own agnostic or atheistic agenda, while casting aspersions on those who reject their godless worldview. As we have seen, however, the evidence for a central and immobile Earth is so abundant that one might find himself asking that haunting question: who, in fact, are the real fringe cases? Are they people who have put their trust in divine revelation and the corroborating evidence from science, or are they people like Carl Sagan who espouse such celestial gods as:

> We are the local embodiment of a Cosmos grown to self-awareness. We have begun to contemplate our origins. We are star-stuff pondering the stars! Our ancestors worshipped the Sun, and they were not that foolish. It makes sense to revere the Sun and the stars, for we are their children.[493]

Indeed, the same thing happened among Sagan's "ancestors." As the Old Testament records:

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[492] Imre Lakatos and Elie Zahar, "Why Did Copernicus' Research Program Supersede Ptolemy's," *The Copernican Achievement*, ed. Robert S. Westman, 1975, p. 367.

[493] Carl Sagan, *Cosmos*, 1980, p. 243. As the rock icon Joni Mitchell sang: "I came upon a child of God / He was walking along the road / And I asked him, where are you going / And this he told me… / We are stardust, billion year old carbon. / We are golden. / And we've got to get ourselves back to the garden" (Woodstock, 1969). The Vatican's liberal-minded astronomer, Fr. George V. Coyne, S.J., said much the same in a recent interview: "There is no other way…to have the abundance of carbon necessary to make a toenail than through the thermonuclear processes in stars. We are all literally born of stardust" (*The Catholic Review*, 8-18-2005, p. A32). Suffice it to say, stellar "thermonuclear process" is an unproven science, and is now facing considerable contradictions from Plasma cosmology.

All men are vain, in whom there is not the knowledge of God: and who by these good things that are seen, could not understand Him that is, neither by attending to the works have acknowledged who was the workman: But have imagined either the fire, or the wind, or the swift air, or the circle of the stars, or the great water, or the sun and moon, to be the gods that rule the world. With whose beauty, if they, being delighted, took them to be gods: let them know how much the Lord of them is more beautiful than they: for the first author of beauty made all those things. Or if they admired their power, and their effects, let them understand by them, that He that made them, is mightier than they: For by the greatness of the beauty, and of the creature, the Creator of them may be seen, so as to be known thereby.[494]

Coming from the same atheistic background, former cabinet member of the Clinton administration, Robert Reich, knows who the real combatants are. In a recent article he stated:

The great conflict of the 21st century will not be between the West and terrorism. Terrorism is a tactic, not a belief. The true battle will be between modern civilization and anti-modernists; between those who believe in the primacy of the individual and those who believe that human beings owe their allegiance and identity to a higher authority; between those who give priority to life in this world and those who believe that human life is mere preparation for an existence beyond life; between those who believe in science, reason, and logic and those who believe that truth is revealed through Scripture and religious dogma.[495]

Reich, of course, is on the side of the modernists, the individualists, and the here-and-now autonomous logicians. In short, those who believe in God are Reich's enemies.

Why do men succumb to such alternatives when they know the path of truth and goodness? Scripture calls it "the *mystery* of iniquity," and, seeing how many terrible consequences men suffer because of their evil, to witness their continual denial of God is, indeed, a great mystery. Modern man seems to do whatever he can to make himself god-like so as to push the true God off the stage. In no better place is this evident than in modern man's cosmological theories. With a whisk of his mathematical wand, he,

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[494] Wisdom 13:1-5 (RSV).
[495] Robert Reich, "The Last Word," *The American Prospect*, July 1, 2004.

like God, can create any universe of his choosing. As physicist J. J. Thomson once noted:

> "We have Einstein's space, de Sitter's space, expanding universes, contracting universes, vibrating universes, mysterious universes. In fact the pure mathematician may create universes just by writing down an equation, and indeed if he is an individualist he can have a universe of his own."[496]

As astrophysicist Gerard de Vaucouleurs put it:

> Less than 50 years after the birth of what we are pleased to call "modern cosmology," when so few empirical facts are passably well established, when so many different over-simplified models of the universe are still competing for attention, is it, may we ask, really credible to claim, or even reasonable to hope, that we are presently close to a definitive solution of the cosmological problem?…. Unfortunately, a study of the history of cosmology reveals disturbing parallelisms between modern cosmology and medieval scholasticism; often the borderline between sophistication and sophistry, between numeration and numerology, seems very precarious indeed. Above all I am concerned by an apparent loss of contact with empirical evidence and observational facts, and, worse, by a deliberate refusal on the part of some theorists to accept such results when they appear to be in conflict with some of the present oversimplified and therefore intellectually appealing theories of the universe…doctrines that frequently seem to be more concerned with the fictitious properties of ideal (and therefore nonexistent) universes than with the actual world revealed by observations.

He adds:

> With few exceptions modern theories of cosmology have come to be variations on the homogeneous, isotropic models of general relativity. Other theories are usually referred to as 'unorthodox,' probably as a warning to students against heresy. When inhomogeneities [NB: theories that can lead to an Earth-centered

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[496] *Einstein: Life and Times*, p. 301. Misner, Thorne and Wheeler list seven distinct universes that can come from changing the mathematical variables of General Relativity (*Gravitation*, p. 747), let alone the numerous variations of other models, *e.g.*, Steady State and Plasma universes.

universe] are considered (if at all), they are treated as unimportant fluctuations amenable to first-order variational treatment….But if nature refuses to cooperate, or for a time remains silent, there is a serious danger that the constant repetition of what is in truth merely a set of *a priori* assumptions (however rational, plausible, or otherwise commendable) will in time become accepted dogma that the unwary may uncritically accept as established fact or as an unescapable logical requirement. There is also the danger inherent in all established dogmas that the surfacing of contrary opinion and evidence will be resisted in every way. [497]

Much of today's confusion is due to the spooky world of Quantum Mechanics, which hasn't fared any better than Einstein's Relativity in making sense of it all. Faced with atomic particles that seem to have a mind of their own and don't obey the laws that the experimenters demand from them, today's scientists have left us with some of the wildest and most fantastic speculations and theories ever concocted by grown men. As **Stephen Weinberg** notes, "The techniques by which we decide on the acceptance of physical theories are extremely subjective."[498] Or as Robert Matthews reviews it:

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[497] Gerard de Vaucouleurs, "The Case for a Hierarchial Cosmology," *Science*, v. 167, No. 3922, 1970, pp. 1203-1204.

[498] As quoted in an interview with John Horgan and cited in John Horgan, *The End of Science*, 1996, p.74. In the interview Horgan notes: "Weinberg retorted, in effect, that he does not see why we should be interested in a God who seems so little interested in us, however good he is at geometry" (*ibid*., p. 77). At the 2006 Salk Institute forum, Weinberg stated: "Anything that we scientists can do to weaken the hold of religion should be done and may in the end be our greatest contribution to civilization" (*New York Times*, Nov. 21, 2006).

Take quantum theory…Over the past century it has passed every single test with flying colours, with some predictions vindicated to 10 places of decimals. Not surprisingly, physicists claim quantum theory as one of their greatest triumphs. But behind their boasts lies a guilty secret: they haven't the slightest idea why the laws work, or where they come from. All their vaunted equations are just mathematical lash-ups, made out of bits and pieces from other parts of physics whose main justification is that they seem to work.[499]

The newest twist for Quantum Mechanics is the "anthropic principle" wherein the complexity and fine-tuning of the universeman is explained by the fact that, by pure chance in quantum fluctuations, we humans happen to fit into this particular universe and are therefore significant in that sense only. Other universes have other rules that they go by, but ours becomes what it is by our mere existence and observation of it. Such self-deification, to create matter *ex nihilo* like God, is the ultimate quest of modern science.[500]

Much of the confusion started when Einstein made a wrong turn interpreting the Michelson-Morley experiment, and when Quantum scientists took a dangerous detour after Paul Dirac's prediction and Carl Anderson's discovery of the positron. They concluded that matter and energy could be created and destroyed. Since this interpretation, even though it produced absurd results,[501] helped save the reigning paradigm of the Standard Model, it was all kept very quiet. The inventor of this

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[499] Robert Matthews, *New Scientist*, Jan. 30, 1999, p. 24.

[500] See this site for a brief explanation: http://physics.about.com/od/ astronomy/f/AnthropicPrinciple.htm. John D. Barrow and Frank J. Tipler, *The Anthropic Cosmological Principle*, 1986, pp. 677f. Nick Herbert, *Quantum Reality: Beyond the New Physics: An Excursion into Metaphysics and the Meaning of Reality*, 1987, pp. 16-29. John A. Wheeler, "Bohr, Einstein, and the Strange Lesson of the Quantum," *Mind and Nature*, ed., Richard Q. Elvee, 1981, pp. 18-20. George Greenstein, *The Symbiotic Universe: Life and Mind in the Cosmos*, 1988, pp. 222-224.

[501] The mathematics of the so-called "Standard Model" of the atom has the unfortunate anomaly of producing an electron with infinite rest mass. Since by other means science has determined the rest mass to be 0.511 MeV, it requires a "renormalization" of the Standard Model's mathematics, namely, the 0.511 value is added in by hand, and no one is the wiser. This procedure is justified on the basis that "positive infinity divided by negative infinity" is an indeterminate value, and thus 0.511 is just as good as any other figure to add in (see D. L. Hotson "Dirac's Equation and the Sea of Negative Energy" *Infinite Energy*, Issue 43, 2002, p. 3).

methodology was physicist **Richard Feynman**, but he was honest enough to admit that it was:

> The shell game that we play…called 'renormalization.' But no matter how clever the word, it is what I would call a dippy process! Having to resort to such hocus pocus….I suspect that renormalization is not mathematically legitimate.[502]

Asked, then, why he was awarded the Nobel Prize, Feynman replied, "We have designed a method for sweeping them under the rug."[503]

Richard Feynman (1918 – 1988)

D. L. Hotson shows just how much "hocus pocus" is involved in these schemes:

> His professors taught that conservation of mass-energy is the never-violated, rock-solid foundation of all physics. In "pair-production," a photon of at least 1.022 MeV "creates" an electron-positron pair, each with 0.511 MeV of rest energy, with

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[502] Feynman in *The Strange Theory of Light and Matter*, 1985, p. 128.

[503] James Gleick, *Genius: The Life and Science of Richard Feynman*, 1992, p. 378. Feynman's remark was not said in jest. Gleick prefaces it with: "He did make a serious remark – and repeated it all day – that reflected his inner feeling about renormalization. The problem had been to eliminate infinities in calculations, he said, and 'We have designed a method for sweeping them under the rug." Concerning physics' newest brainchild, String Theory, Feynman states: "I am an old man now, and these are new ideas, and they look crazy to me, and they look like they're on the wrong track….I do feel very strongly that this is nonsense" (P. C. W. Davies and J. Brown, *Superstrings – A Theory of Everything*, Cambridge Univ. Press, 1998, pp. 193-194).

any excess being the momentum of the "created" pair. So supposedly the conservation books balance. But the "created" electron and positron both have spin (angular momentum) energy of $\hbar/4\pi$. By any assumption as to the size of electron or positron, this is far more energy than that supplied by the photon at "creation." "Isn't angular momentum energy?" he asked a professor. "Of course it is. This half-integer spin angular momentum is the energy needed by the electron to set up a stable standing wave around the proton. Thus it is responsible for the Pauli Exclusion principle, hence for the extension and stability of all matter. You could say it is the sole cause of the periodic table of elements." "Then where does all this energy come from? How can the 'created' electron have something like sixteen times more energy than the photon that supposedly 'created' it? Isn't this a huge violation of your never-violated rock-solid foundation of physics?" "We regard spin angular momentum as an 'inherent property' of electron and positron, not as a violation of conservation." "But if it's real energy, where does it come from?" "'Inherent property' means we don't talk about it, and you won't either if you want to pass this course." Later, Mr. Hotson was taken aside and told that his "attitude" was disrupting the class, and that further, with his "attitude," there was no chance in hell of his completing a graduate program in physics, so "save your money." He ended up at the Sorbonne studying French literature and later became a professional land surveyor.[504]

Irrespective of the exploits of the Quantum world, in the macro-world Copernican cosmology is the *sine qua non* of the science establishment. It goes by one of two names in today's scientific literature: *The Copernican Principle* (for those who are bold enough to admit the basis for their agenda), or *The Cosmological Principle* (for those who believe Copernicus is the foundation for modern science but choose labels that are less obvious). Whatever the name, it is a fact that no other scientific hypothesis comes close to the effect that removing the Earth from the center of the universe has had upon the thinking and aspirations of mankind. As we noted in Volume I, Stephen Gould claimed that the common feature of all science is the removal of Earth from the center of the universe, and Stephen Hawking added that this removal has divested mankind of

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[504] D. L. Hotson, "Dirac's Equation and the Sea of Negative Energy," *Infinite Energy*, 8, 43, 2001, p. 37.

certainty, eternity, and absolutes. This is the wonderful life, a world they have created for themselves, a world in which they can be judged by nothing bigger than themselves.

Diametrically opposed to Gould's and Hawking's doctrine, of course, is the God of Scripture. The fact that man was placed in the center of the universe is apparently a very important piece of information to reveal to us, since the opening words of Genesis begin not with a detailed description about God, but about the Earth that God created before anything else, and which was furbished several days before the other celestial bodies were placed as its surrounding adornment.[505] Unfortunately, men have long since forgotten Genesis, relegating it to the dustbin of myths and legends. In fact, with the coming and going of about a dozen or so cosmological theories since the time of Galileo, we will see that each one has systematically tried to eliminate the need for the Genesis Creator. In their pursuit, however, they soon found that each cosmology proposed by their best and brightest was seriously flawed, and, by their own calculations, men were stuck with the reality that the universe had a beginning, whether they liked it or not.

Still, they try to escape the inevitable and, like Stephen Hawking, ask silly questions such as: "What place, then, for a creator?"[506] Or, they seek

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[505] "In the beginning God created the heavens and the earth. The earth was without form and void, and darkness was upon the face of the deep; and the Spirit of God was moving over the face of the waters. And God said, 'Let there be light'; and there was light."

[506] Stephen Hawking, *A Brief History of Time: From the Big Bang to Black Holes*, 1988, p. 141. In his second book Hawking expands on the idea, treating the universe as being god-like, without beginning or end: "The universe would be completely self-contained and not affected by anything outside of itself. It would neither be created nor destroyed. It would just BE. As long as we believed the universe had a beginning, the role of a creator seemed clear. But if the universe is really completely self-contained, having no boundary or edge, having neither beginning nor end, then the answer is not so obvious: what is the role of a creator?" (*A Briefer History of Time*, 2005, p. 103); later adding the naïve remarks: "Or does it need a creator, and if so, does He have any other effect on the universe? And who created Him?" (*ibid.*, p. 142). According to John Horgan: "There is no place, was his reply; a final theory would exclude God from the universe, and with him all mystery. Like Stephen Weinberg, Hawking hoped to rout mysticism, vitalism, creationism from one of their last refuges, the origin of the universe. According to one biographer, Hawking and his wife, Jane, separated in 1990 in part because she, as a devout Christian, had become increasingly offended by his atheism" (*The End of Science*, pp. 94-95). In another place Hawking wrote: "What I have done is to show that it is possible for the way the universe began to be determined by the laws of science. In that case, it would not

to convince the public with absurd tautologies like those of Carl Sagan: "A universe that is infinitely old requires no Creator."[507] In essence, infinity has become science's god – a cold, impersonal, and unfathomable entity that mankind can neither comprehend nor repay. Through these false gods man attempts to dethrone the true God of heaven and Earth. This quest is nothing new, of course. It was the very lie with which the devil tempted our first parents, saying: "God knows in the day you eat of it *you shall become as gods*, knowing good and evil."[508]

The innate desire to imitate our Creator, which God has instilled in man as a worthy goal to attain, took a terrible detour with our first parents. Failing, however, to learn from this tragic lesson, modern man, including the ecclesiastics who have bowed themselves to science's whims through the abracadabra of "biblical criticism," do everything they can to erase the relevance or even existence of Adam and Eve from our collective consciences, preferring instead to believe that monkeys are our uncles. Instead of bowing before Him in respect of St. Paul's admonition that "…ever since the creation of the world, His invisible attributes of eternal power and divinity have been able to be understood and perceived in what He has made,"[509] they make silly caricatures of God and, as St. Paul forewarns us, they "worship the creation rather than the Creator,"[510] as Carl Sagan proves for us:

> The idea that God is an oversized white male with a flowing beard who sits in the sky and tallies the fall of every sparrow is ludicrous. But if by God one means the set of physical laws that govern the universe, then clearly there is such a God. This God is

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be necessary to appeal to God to decide how the universe began. This doesn't prove that there is no God, only that God is not necessary." Sometimes Hawking seems to deify the universe, or attribute things to it that religion attributes to God alone. He writes: "Yet in another kind of time, the universe has no boundary. It is neither created nor destroyed. It just is….The inflation was a good thing in that it produced all the content of the universe quite literally out of nothing. When the universe was a single point, like the North Pole, it contained nothing" (*Black Holes and Baby Universes*, pp. 68, 97).

[507] Carl Sagan*, Cosmos*, 1980, p. 249. See also Sagan's contemptuous books against religion, *e.g.*, *Broca's Brain*, 1979, and *Dragons of Eden*, 1977.
[508] Genesis 3:5.
[509] Romans 1:20. As Immanuel Kant once noted: "Two things fill the mind with ever new and increasing wonder and awe…the starry heaven above me, and the moral law within me."
[510] Romans 1:25.

emotionally unsatisfying. It does not make much sense to pray to the law of gravity.[511]

There is probably no better example of the dilemma of modern man than Carl Sagan. God doesn't take kindly to such remarks, however. As Scripture declares, He is never mocked.[512] Anyone with a proper understanding of God, which he can quickly glean from even a cursory reading of the narratives of Scripture, will realize that He often gives man the godless world that he wants – as punishment for ignoring Him.[513] In turn, He will laugh from heaven when their calamities strike.[514] Dr. Gould, Dr. Sagan, and Dr. Einstein, all of them now deceased, should have known these Scriptures very well, since at least those coming from the Old Testament were part of their formative years.[515]

The bare truth is: if one acts like an animal (which is the case when men pretend God doesn't exist), then God will allow one to believe one is descended from an animal. Stephen Gould reflects this very fact when he

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[511] Sagan, as quoted in *U.S. News and World Report*, December 23, 1991, p. 61. Similar quotes from Sagan include: "A naïve Western view of God is an outsize, light-skinned male with a long white beard, who sits on a very large throne in the sky and tallies the fall of every sparrow" (*The Varieties of Scientific Experience*, p. 149); "If we long to believe that the stars rise and set for us, that we are the reason there is a Universe, does science do us a disservice in deflating our conceits?....For me, it is far better to grasp the Universe as it really is than to persist in delusion, however satisfying and reassuring" (Carl Sagan, *The Demon-Haunted World: Science As a Candle in the Dark*, 1996, p. 12). "In many cultures it is customary to answer that God created the universe out of nothing. But this is mere temporizing. If we wish courageously to pursue the question, we must, of course ask next where God comes from? And if we decide this to be unanswerable, why not save a step and decide that the origin of the universe is an unanswerable question? Or, if we say that God has always existed, why not save a step and conclude that the universe has always existed?" (Carl Sagan, *Cosmos*, p. 257).

[512] Galatians 6:7 ("Make no mistake: God is not mocked, for a person will reap only what he sows").

[513] *Cf.* 2 Thess. 2:11; Rom. 1:24-31; Num. 11:18-20.

[514] Psalm 37:13; Psalm 59:9; Proverbs 1:26; Habakkuk 1:10; Wisdom 4:18.

[515] Sagan writes: "…as is plainly stated at every Rosh Hashonhan and every Jewish wedding ceremony, the Universe is less than 6,000 years old" (Carl Sagan, *The Demon-Haunted World: Science as a Candle in the Dark*, p. 325). Sagan would also be familiar with the following teaching in Deuteronomy 4:19: "And *beware* not to lift up your eyes to heaven and see the sun and the moon and the stars, all the host of heaven, and be drawn away and worship them and serve them, those which the Lord your God has allotted to all the peoples under the whole heaven."

states that we have become "large reasoning animals" and we owe this to "our lucky stars."[516] Ironically, like pigs wallowing in the mud or dogs eating their own vomit, modern man seems all too comfortable with such demotion and degradation. He'll accept any harebrain idea as long as it allows him to escape bowing down to an Almighty Being. Alan Rauch shows us why, and, not surprisingly, it all goes back to the disdain for an Earth-centered cosmos:

> Darwin's theory neatly summed up a view of the natural world that did not privilege any living thing over another. Instead, all organisms (including, by implication, humans) were subject to the physical forces of nature and, of course, to each other. Combined with new perspectives on space, time, and matter, *this view removed man from centrality in the universe*. The age-old idea that man was a creature revered by nature and favored by God could no longer be professed without serious misgivings.[517]

Although some scientists pay lip service to "searching for God," in reality the quest of modern man has been a continual effort to remove God from the stage of human history. Ever since the time of Galileo, man has tried to become a god by relying on his own knowledge and effort. Unfortunately, the more he does so, the more detached he becomes and the further away he remains from becoming like God. This is the secret of life. Those who discover it are blessed, indeed. Those who refuse it will be forever mired in futility and frustration. Even DNA discoverer James D. Watson admitted:

> One could not be a successful scientist without realizing that, in contrast to the popular conception supported by newspapers and mothers of scientists, a goodly number of scientists are not only narrow-minded and dull, but also just stupid.[518]

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[516] Stephen Gould, *Wonderful Life*, 1989, p. 318.

[517] Alan Rauch, *Useful Knowledge: The Victorians, Morality And The March of Intellect*, 2001, p. 12, emphasis added.

[518] Unfortunately, Watson was a religious skeptic. At the age of 74 he stated that religious explanations are "myths from the past....Every time you understand something, religion becomes less likely. Only with the discovery of the double helix and the ensuing genetic revolution have we had grounds for thinking that the powers held traditionally to be the exclusive property of the gods might one day be ours." Crick and Watson boasted that their chief goal was to "discredit the existence of God." Francis Crick (d. 2004), recently stated: "The God hypothesis is rather discredited....Archbishop Ussher claimed the world was created in 4004

In spite of this, science has become the weapon of choice for modern man in order to make himself the god of this world, answerable to no one but himself. But he only deceives himself. Although he fights to suppress it, inside each man God has instilled the knowledge that he will one day face judgment for his beliefs and actions. As Sirach assures us:

> Much labor was created for every man, and a heavy yoke is upon the sons of Adam, from the day they come forth from their mother's womb till the day they return to the mother of all. Their perplexities and fear of heart – their anxious thought is the day of death, from the man who sits on a splendid throne to the one who is humbled in dust and ashes, from the man who wears purple and a crown to the one who is clothed in burlap; there is anger and envy and trouble and unrest, and fear of death, and fury and strife. And when one rests upon his bed, his sleep at night confuses his mind. He gets little or no rest, and afterward in his sleep, as though he were on watch, he is troubled by the visions of his mind like one who has escaped from the battlefront; at the moment of his rescue he wakes up, and wonders that his fear came to nothing.[519]

There have been three major attempts in the last five hundred years to make man's dream of removing God from the stage come true. The first was Copernicus' heliocentrism, the second was Darwin's evolution, and the third was Einstein's relativity. Modern scientists instinctively know that all three are immediately falsified if the Earth is motionless in the center of the universe. But if they are successful in dismissing that proposition as "unthinkable," these three theories will continue to rule the hearts of men like no other before them, each propped up by a pseudo-science that purports to know the real truth when in fact it knows very little. Each in its own right is a direct assault on what men previous to them believed to be true based upon a face value reading of the Old and

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BC. Now we *know* it is 4.5 billion old. It's astonishing to me that people continue to accept religious claims. People like myself get along perfectly well with no religious views" (*London Daily Telegraph*, cited in *The Washington Times*, 3-24-2003). But in his more somber moments Crick admitted: "The origin of life appears almost a miracle, so many are the conditions which would have had to be satisfied to get it going….Every time I write a paper on the origin of life, I swear I will never write another one, because there is too much speculation running after too few facts."

[519] Sirach (Ecclesiasticus) 40:1-7.

New Testaments. As the modern scientific icon Paul Davies confirms for us:

> Could this have happened without any supernatural input? Quantum physics seems to provide a loophole to the age-old assumption that "you can't get something for nothing." Physicists are now talking about "the self-creating universe": a cosmos that erupts into existence spontaneously... The question of whether the details of this theory are right or wrong are not so very important. It is now possible to conceive of a scientific explanation for all creation…Has modern physics abolished God altogether?[520]

The implication of Davies' statement is that modern physics has, indeed, abolished the need for God. But Davies is not alone. As we saw with Stephen Hawking's "what place, then, for a creator?" this convenient '*sine Deo et ex nihilo*' universe is a common belief among today's cosmologists.[521] Being a little more honest about modern cosmology's naked emperor, astrophysicist Andrei Linde revealed why many have been forced to the absurd "something from nothing" position:

> The first, and main, problem is the very existence of the Big Bang. One may wonder, What came before? If space-time did not exist then, how could everything appear from nothing? What arose first: the universe or the laws determining its evolution? Explaining this initial singularity – where and when it all began

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[520] Paul Davies, *God and the New Physics*, 1983, p. viii. In two letters sent to me, dated August 8-9, 2004, Davies confirmed my assessment of his views, stating: "In a nutshell, I have always argued against invoking any sort of God to create the universe in the big bang. I think physics can explain the big bang without supernatural input. The correct place to locate God-questions is in the laws of physics, not the initial conditions….I have long argued against the notion of any sort of God who resides within time, and who preceded the universe…The classical Christian doctrine of creation "ex nihilo" does NOT mean that God created the world at some moment in time as a temporal act. This is a mis-reading of classical theology" (Letters on file). Ralph Estling states that he also contacted Davies about this question. Estling writes: "I've had correspondence with Paul Davies on cosmological theory…I asked him what he meant by 'Nothing.' He wrote back that he had asked Alexander Vilenkin…and Vilenkin had replied, 'By Nothing I mean Nothing'" (*Skeptical Inquirer*, January/February, 1995, pp. 69-70).

[521] Meaning: "Without God and out of nothing."

– still remains the most intractable problem of modern cosmology.[522]

A few physicists tried to answer the question. In 1973 Edward P. Tryon fired the first shot: "I proposed that our Universe had been created spontaneously from nothing, as a result of the established principles of physics."[523] Alan Guth of M.I.T. and Paul Steinhardt of Princeton followed in 1984 with an article stating:

> The inflationary model of the universe provides a possible mechanism by which the observed universe could have evolved from an infinitesimal region. It is then tempting to go one step further and speculate that the entire universe evolved from literally nothing.[524]

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[522] Andrei Linde, "The Self-Producing Inflationary Universe," *Scientific American*, Magnificent Cosmos, 1998, p. 99. Linde then reveals five other problems with the traditional Big Bang theory. To overcome these, Linde posits that "energy in the scalar field" and "quantum fluctuations" produce all the proper ingredients in a super expansion. He writes: "Our universe appears smooth and uniform because all inhomogeneities were stretched $10^{10^{12}}$ – that is, a 1 followed by a trillion zeros….This tremendous spurt immediately solves most of the problems of the old cosmological theory" (*ibid*. p. 101). But, he realizes this "may seem too good to be true. Indeed, if all inhomogeneities were stretched away, how did galaxies form? The answer is that while removing previously existing inhomogeneities, inflation at the same time made new ones….The evolution of inflationary theory has given rise to a completely new cosmological paradigm, which differs considerably from the old Big Bang theory and even from the first versions of the inflationary scenario. In it the universe appears to be both chaotic and homogeneous, expanding and stationary. Our cosmic home grows, fluctuates and eternally reproduces itself in all possible forms, as if adjusting itself for all possible types of life" (*ibid*., p. 102).

[523] Edward P. Tryon, "What Made the World?" *New Scientist*, March 1984, p. 15. In another work he stated: "Our universe is simply one of those things which happen from time to time" ("Is the Universe a Vacuum Fluctuation?" *Nature*, 246, December 1973, pp. 396-397).

[524] Alan Guth and Paul Steinhardt, "The Inflationary Universe," *Scientific American*, May 1984, p. 128. To Guth, David Berlinski replied: "Thus, Alan Guth writes in pleased astonishment that the universe really did arise from 'essentially nothing at all'…It would appear, then, that 'essentially nothing' has both spatial extension and mass. While these facts may strike Guth as inconspicuous, others may suspect that nothingness, like death, is not a matter that admits of degrees" (Was There a Big Bang?" *Commentary*, February 1998, p. 37). Berlinski is a member of the Discovery Institute and a Ph.D. in philosophy from Princeton.

More Big Bang theorists jumped on the bandwagon. Physicist John Gribbin followed two years later with these words: "the new models are based on the concept that particles can be created out of nothing at all…matter might suddenly appear in large quantities."[525] Victor Stenger adds: "What caused it? Not everything requires a cause. It could have just happened spontaneously…"[526] which led scientific satirist Terry Pratchett to conclude: "The current state of knowledge can be summarized thus: In the beginning, there was nothing, which exploded."[527] Or as Lynda Williams, professional entertainer and physics teacher at San Francisco State University, sang in her latest "Cosmic Cabaret": "In the beginning, there was nothing" she whispers, and then "BIG BANG!" she screams.[528] The *New York Times* concluded: "The only thing that all the experts agree on is that no idea works – yet."[529]

Finally, Linde answered his own question by positing that the universe "grows, fluctuates and eternally reproduces itself in all possible forms, as if adjusting itself for all possible types of life."[530] Assertions such as these prove to us once again how cosmologists can create any universe they wish just by the stroke of a pen. Linde's universe apparently has a mind of its own, in addition to being eternal. In his logic, one deals with the problem of the origin of the Big Bang by simply claiming that the

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[525] John Gribbin, "Cosmologists Move Beyond the Big Bang," *New Scientist*, 110, No. 1511, 1986, p. 30.

[526] Victor Stenger, "Was the Universe Created," *Free Inquiry* 7, 3, Summer, 1987, p. 26. Stenger was a physicist at the University of Hawaii. In a later publication, Stenger added: "The Universe revealed by science shows humanity as an infinitesimal speck in space and time with random chance as an important factor affecting events" (*Free Inquiry* 23, September 2003, p. 40).

[527] Terry Prachett, *Lords and Ladies*, 1996, p. 7.

[528] Philip and Phylis Morrison, "The Big Bang: Wit or Wisdom?" *Scientific American*, February 2001, p. 93. After giving a short history of the repertoire of cosmological theories that have all been overturned, the Morrison's add: "We simply do not know our cosmic origins; intriguing alternatives abound, but none yet compel. We do not know the details of inflation, nor what came before, nor the nature of the dark, unseen material, nor the nature of the repulsive forces that dilute gravity. The book of the cosmos is still open. Note carefully: we no longer see a Big Bang as a direct solution. Inflation erases evidence of past space, time and matter. The beginning – if any – is still unread. It is deceptive to maintain so long the very term that stood for a beginning out of nothing. The chanteuse will compose a clever new song once the case is clear" (*ibid.*, p. 95).

[529] "Before the Big Bang There Was…What?" *The New York Times*, May 22, 2001.

[530] Andrei Linde, "The Self-Producing Inflationary Universe," *Scientific American*, Magnificent Cosmos edition, 1998, p. 102.

Big Bang itself is eternal; that one Big Bang produces another Big Bang, *ad infinitum*. In short, the Big Bang becomes man's god. That grown men would actually come to the point in which they speak of something coming from nothing, or matter having its own eternity, all in an effort to eliminate the biblical God as the miraculous *ex nihilo* Creator of the universe, is one of the surest signs of modern man's insanity. But this is the religion of *Scientism*, and its believers hold to it just as tenaciously as a Christian holds to Christianity.

For over a thousand years, beginning from the time of Constantine in the early fourth century to the birth of Copernicus in the late fifteenth century, all men of godly heritage believed that the sun and stars revolved around the Earth; that all we see was created directly by God, and that the universe was limited and ordered. Ironically, modern man often calls this period of time (circa 400-1400 AD) the "Dark Ages" because of what they deem as "superstitious" beliefs, but, in reality, a more ominous Dark Ages began about 1400 AD with the advent of Copernicus, since man, spiritually speaking, has been on a steady decline ever since. True, man has invented many material things during this latter period that give the illusion of progress, but Scripture foresaw all of it and wasn't impressed. As God predicted to Daniel concerning our age:

> Many shall run to and fro, and knowledge shall increase…. when the shattering of the power of the holy people comes to an end all these things would be accomplished…. the wicked shall do wickedly; and none of the wicked shall understand; but those who are wise shall understand.[531]

As the context reveals, however, this increased knowledge has only led man to accelerate and to magnify the evil residing in him, an evil that he has never conquered, but merely camouflaged or ignored. There are still barbarians today, only they use pens and computers rather than clubs and swords. When all is said and done, modern technology has only prompted man to do evil more quickly and efficiently, while he ignores God more boldly and pridefully than he ever did before, and *Scientism* has been his blind guide.

Solomon, the wisest of all men, put the attainment of knowledge into proper perspective:

> He has put eternity into man's mind, yet so that he cannot find out what God has done from the beginning to the end….And I

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[531] Daniel 12:4, 7, 10 (RSV).

saw every work of God, I concluded that man cannot discover the work which has been done under the sun. Even though man should seek laboriously, he will not discover it; and though the wise man should say, "I know," he cannot discover it.[532]

Fortunately, however, science is a two-edged sword. True science will never oppose God or His revelation to us, but today's scientists desperately want us to believe otherwise. Separating science from God is the ultimate quest of modern man.

Is Modern Science Corrupt?

Does modern man possess true science? The answer, in most cases, is no, especially in the field of cosmology. As the Russian Nobel Prize-winning physicist Lev Landau put it: "Cosmologists are often wrong, but never in doubt."[533] Or as Halton Arp noted:

> …the problem is pervasive throughout astronomy and, contrary to its projected image, endemic throughout most of current science. Scientists, particularly at the most prestigious institutions, regularly suppress and ridicule findings which contradict their current theories and assumptions.[534]

And a bit later:

> After a ridiculously long time it has finally dawned on me that establishment scientists actually proceed on the belief that theories tell you what is true and what is not true.[535]

Modern man has only made it appear as if he possesses the truth, since he has learned quite handily that only by giving such impressions can he rule the hearts of men. And that's what it is all about – power over the people.

Most people are under the illusion that science is a monolithic consensus of truth and certainty. The reality is that science is subject to the same forces of fame, fortune, pride, position, politics, ignorance and bias

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[532] Ecclesiastes 3:11; 8:17.
[533] As quoted from Dennis Overbye's article in the *New York Times*, "In the Beginning," July 23, 2002.
[534] *Seeing Red: Redshifts, Cosmology and Academic Science*, 1998, p. 12.
[535] *Ibid*., p. 239.

as is any other venture of life. These human frailties often dictate the direction science will take, whether the course turns out to be right or wrong. M.I.T. professor Thomas Kuhn has shaken up quite a few of his scientific colleagues by pointing out these unpleasant realities. In his book *The Structure of Scientific Revolutions*[536] he notes that personalities and politics play a large role in science and its theories. He concludes that scientists can never truly understand the real world, and they understand each other even less. Kuhn, the first to coin the word *paradigm* to describe scientific myopia, reveals that scientists are molded in their thinking by the reigning models of the day, solving problems only within the accepted constraints, and rarely, if ever, challenging those constraints. He shows that the reigning paradigm at first appears to reconcile all experimental results. With time, anomalies begin to appear, which then give way to a new paradigm, but not without a long and arduous fight. As Fred Hoyle notes:

> Science today is locked into paradigms. Every avenue is blocked by beliefs that are wrong, and if you try to get anything published in a journal today, you will run up against a paradigm, and the editors will turn you down.[537]

Kuhn adds that anomalies in scientific experiments are often ignored, at least until so many of them accumulate that scientists are forced to find a new paradigm. Changes occur when someone young and not fully indoctrinated makes a successful bid to overcome past failures. Still, many adopt a new paradigm simply because it is supported by other scientists with strong reputations.

Physicist Chet Raymo of Stonehill College says much the same in his critique:

> Science has evolved an elaborate system of social organization, communication, and peer review to ensure a high degree of conformity with existing orthodoxy.…In a recent article titled "When Do Anomalies Begin?" (*Science*, February 7th, 1992),

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[536] Thomas Kuhn, *The Structure of Scientific Revolutions*, 3rd ed., 1962, 1996. Since 1962, Kuhn's book has sold over a million copies in 16 languages.

[537] *Scientific American*, "Profile: Fred Hoyle: The Return of the Maverick," by John Horgan, March 1995, p. 47. In the same article, Horgan notes that, even though Hoyle had some "bizarre ideas," *Nature* dubbed him "one of this century's leading scientists." Horgan begins his article with "…a special fear may creep into the hearts of scientists: What if Fred Hoyle is right? Then astronomy is a sham, biology a house of cards and modern medicine an illusion" (*ibid.*, p. 46).

Alan Lightman of MIT and Owen Gingerich of the Harvard-Smithsonian Center for Astrophysics describe the conservation of science. They acknowledge that scientists may be reluctant to face change for the purely psychological reason that the familiar is more comfortable than the unfamiliar.…Usually, say Lightman and Gingerich, such anomalies are recognized only in retrospect. Only when a new theory gives a compelling explanation of previously unexplained facts does it become "safe" to recognize anomalies for what they are. In the meantime scientist often simply ignore what doesn't fit.…For some people outside mainstream science, the path toward truth seems frustratingly strewn with obstacles. Like everyone else, scientist can be arrogant and closed-minded.[538]

In a *Newsweek* article, Brian Martin reveals what a cut-throat business science is today:

Textbooks present science as a noble search for truth, in which progress depends on questioning established ideas. But for many scientists, this is a cruel myth. They know from bitter experience that disagreeing with the dominant view is dangerous – especially when that view is backed by powerful interest groups. Call it suppression of intellectual dissent. The usual pattern is that someone does research or speaks out in a way that threatens a powerful interest group, typically a government, Industry or professional body. As a result, representatives of that group attack the critic's ideas or the critic personally-by censoring

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[538] Chet Raymo, *Sky and Telescope*, 84 (4), 364 (1992). Lightman and Gingerich wrote: "An anomaly in science is an observed fact that is difficult to explain in terms of the existing conceptual framework. Anomalies often point to the inadequacy of the current theory and herald a new one. It is argued here that certain scientific anomalies are recognized as anomalies only after they are given compelling explanations within a new conceptual framework. Before this recognition, the peculiar facts are taken as given or are ignored in the old framework. Such a 'retrorecognition' phenomenon reveals not only a significant feature of the process of scientific discovery but also an important aspect of human psychology….Science is a conservative activity, and scientist are reluctant to change their explanatory frameworks. As discussed by sociologist Bernard Barber, there are a variety of social and cultural factors that lead to conservatism in science, including commitment to particular physical concepts, commitment to particular methodological conceptions, professional standing, and investment in particular scientific organizations" ("When Do Anomalies Begin?" *Science*, 255, 690-695, (1992).

writing, blocking publications, denying appointments or promotions, withdrawing research grants, taking legal actions, harassing, blacklisting, spreading rumors.[539]

In the new book on the myth of the objectivity of the modern scientist, Derek Hodson reveals the astonishing results from several studies:

> It is commonly asserted that particular personal characteristics and attitudes are essential for the successful pursuit of science, and that scientists themselves all possess a particular cluster of attitudes and attributes, including superior intelligence, objectivity, rationality, open-mindedness, willingness to suspend judgment, intellectual integrity and communiality…. More than 30 years ago, Roe (1961) suggested that scientists themselves do not possess these so-called 'scientific attitudes,' although they think that they do. They, too, subscribe to the myths about the emotionally-detached, disinterested impartiality of the scientist. Or they continue to promote a false image because they perceive it to be in their interests….Roe concludes: "The creative scientist, whatever his field, is very deeply involved emotionally and personally in his work." More recent work by Mahoney (1979) examined the extent to which scientists possess each of the characteristics so frequently ascribed to them. His conclusions are as follows.
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> - Superior intelligence is neither a prerequisite nor a correlate of high scientific achievement.
> - Scientists are often illogical in their work, particularly when defending a preferred view or attacking a rival one.
> - In experimental research, scientists are often selective, expedient and not immune to distorting the data.
> - Scientists are probably the most passionate of professionals. Their theoretical and personal biases often colour their alleged openness to the data.
> - Scientists are often dogmatically tenacious in their opinions, even when contradictory evidence is overwhelming.

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[539] "Stamping Out Dissent," *Newsweek*, April 26, 1993, pp. 49-50.

- Scientists are not paragons of humility or disinterest. Rather, they are often selfish, ambitious and petulant defenders of personal recognition and territoriality.
- Scientists often behave in ways which are diametrically opposite to communal sharing of knowledge. They are frequently secretive and occasionally suppress data for personal reasons.
- Far from being a 'suspender of judgment,' the scientist is often an impetuous truth-spinner who rushes to hypotheses and theories long before the data would warrant.

Mitroff and Mason (1974) distinguish two kinds of scientist: the extreme speculative scientists, who "wouldn't hesitate to build a whole theory of the solar system based on no data at all," and the databound scientists, who "wouldn't be able to save their own hide if a fire was burning next to them because they'd never have enough data to prove the fire was really there." What this and several other studies show is that, contrary to the textbook stereotype, the greater the scientist, the more likely she or he is to belie the myth of the disinterested, uncommitted individual, the "depersonalized and idealized seeker after truth, painstakingly pushing back the curtains which obscure objective reality" (Cawthron and Rowell, 1978).[540]

John E. Chappell, Jr., with whom I had many phone conversations before his recent death, related how in the 1920's when Einstein's theory of General Relativity won the day with what many scientists have come to realize were bogus photographs of starlight bending near the sun (See Vol. 1, Appendix 3), outright censorship began to reign supreme in the halls of many universities. He writes:

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[540] Derek Hodson, "Science fiction: the continuing misrepresentation of science in the school curriculum," 1998, in *Pedagogy, Culture and Society*, 6:2, pp. 205-206, Routledge, 2006. Hodson's references include: A. Roe, (1961) "The Psychology of the Scientist," *Science*, 134, pp. 456-459; P. J. Gaskell, (1992) "Authentic Science and School Science," *International Journal of Science Education*, 14, pp. 265-272; M. J. Mahoney, (1979) "Psychology of the Scientist," *Social Studies of Science*, 9, pp. 349-375; I. Mitroff and R. Mason, "On evaluating the scientific contribution of the Apollo missions via information theory: a study of the scientist-scientist relationship," *Management Science: Applications*, 20, pp. 1501-1513; E. Cawthron and J. Rowell, (1978) Epistemology and science education," *Studies in Science Education*, 5, pp. 31-59.

One of the most recent comes from a new NPA member who, when doing graduate work in physics around 1960, heard the following story from his advisor: While working for his Ph.D. in physics at the University of California in Berkeley in the late 1920s, this advisor had learned that all physics departments in the U.C. system were being purged of all critics of Einsteinian relativity. Those who refused to change their minds were ordered to resign, and those who would not were fired, on slanderous charges of anti-Semitism. The main cited motivation for this unspeakably unethical procedure was to present a united front before grant-giving agencies, the better to obtain maximal funds. This story does not surprise me. There has been a particularly vicious attitude towards critics of Einsteinian relativity at U.C. Berkeley ever since. I ran into it in 1985, when I read a paper arguing for absolute simultaneity at that year's International Congress on the History of Science. After I finished, the Danish chairman made some courteous remarks about dissidents he had learned about in Scandinavia, and then turned to the audience for questions. The first speaker was one of a group of about 4 young physics students in the back. He launched immediately into a horrible tirade of verbal abuse, accusing me of being entirely wrong in my analysis, a simplification of the Melbourne Evans analysis – "Evans is wrong; you are wrong," he shouted. He accused me of being way out of line to present my "faulty" arguments on his prestigious campus. When I started to ask him, "Then how would you explain...," he loudly interrupted me with "I don't have to explain anything." The rest of the audience felt so disturbed by all this, that the question session was essentially destroyed.[541]

Others have experienced what, for lack of a better term, amounts to a cult of Einstein that has been engineered by very high-placed sympathizers of Einstein's world view. Ruggero M. Santilli writes of his own experience:

This book is, in essence, a report on the rather extreme hostility I have encountered in U.S. academic circles in the conduction, organization and promotion of quantitative, theoretical, mathematical, and experimental studies on the apparent insufficiencies of Einstein's ideas in face of an ever-growing

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[541] John E. Chappell, Jr., "What Ideas Does The NPA Stand For?" February, 2000.

scientific knowledge. In 1977, I was visiting the Department of Physics at Harvard University for the purpose of studying precisely non- Galilean systems. My task was to attempt the generalization of the analytic, algebraic and geometric methods of the Galilean systems into forms suitable for the non-Galilean ones. The studies began under the best possible auspices. In fact, I had a (signed) contract with one of the world's leading editorial houses in physics, Springer-Verlag of Heidelberg West Germany, to write a series of monographs in the field that were later published in refs. [R. M. Santilli, *Foundations on Theoretical Mechanics*, I: The Inverse Problem in Newtonian Mechanics, Springer-Verlag, NY, 1978] and [R. M. Santilli, *Foundations of Theoretical Mechanics*, II: Birkhoffian Generalization of Hamiltonian Mechanics, Springer-Verlag, NY, 1982]. Furthermore, I was the recipient of a research contract with the U.S. Department of Energy, contract number ER-78-S-02- 4720.A000, for the conduction of these studies. Sidney Coleman, Shelly Glashow, Steven Weinberg, and other senior physicists at Harvard opposed my studies to such a point of preventing my drawing a salary from my own grant for almost one academic year. This prohibition to draw my salary from my grant was perpetrated with full awareness of the fact that it would have created hardship on my children and on my family. In fact, I had communicated to them (in writing) that I had no other income, and that I had two children in tender age and my wife (then a graduate student in social work) to feed and shelter. After almost one academic year of delaying my salary authorization, when the case was just about to explode in law suits, I finally received authorization to draw my salary from my own grant as a member of the Department of Mathematics of Harvard University. But, Sidney Coleman, Shelly Glashow and Steven Weinberg and possibly others had declared to the Department of Mathematics that my studies "had no physical value." This created predictable problems in the mathematics department which lead to the subsequent, apparently intended, impossibility of continuing my research at Harvard. Even after my leaving Harvard, their claim of "no physical value" of my studies persisted, affected a number of other scientists, and finally rendered unavoidable the writing of IL GRANDE GRIDO.[542]

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[542] R. M. Santilli, *Il Grande Grido: Ethical Probe on Einstein's Followers in the*

Reflecting on the views of Michael Polanyi, Catholic historian Philip Sherrard writes:

> Other philosophers of science like Michael Polanyi have spoken of how impossible it is for the scientist not to be influenced by purely subjective factors such as what he expects to see, what other people have persuaded him that he should see, and so on – factors which mean that measurements of temporal and spatial intervals are not just given to the mind but are given to a particular mind deeply and inextricably involved with its own subjective personal prejudices and requirements.
> In short, it could be argued that scientists themselves now admit that the best of their theories are but hypotheses, and that these, far from being reached inductively on the basis of objective data, as the old-fashioned empiricist would have it, are for the most part simply postulated as the most probable explanation or interpretation of certain data in accordance with a specific model which the scientist in question happens to have accepted.[543]

Going deeper into our subject, Sherrard compares modern science to Eastern mysticism:

> Indeed, some scientists…claim that what they call the new physics has entirely emancipated itself from the mechanistic worldview of Cartesian and Newtonian physics and has in fact moved close to the worldview of Eastern mysticism. The two basic theories of modern physics – the quantum theory and the theory of relativity – exhibit…all the main features of the Eastern world view.[544]

> Ultimately, if the 'new physics' has performed any positive service it is that it demonstrates more clearly than ever before the total incompetence of modern science to say anything about the nature of the universe in which one can place any trust at all….their attempt to explain many phenomena by their examination of a few is a purely arbitrary process and cannot have anything to do with knowledge in the real sense of the word. Yet this on their own confession is all they are capable of

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U. S. A. : An Insider's View, 1984, p. 7.
[543] Philip Sherrard, *The Rape of Man and Nature: An Enquiry into the Origins and Consequences of Modern Science*, 1987, p. 74.
[544] *Ibid*., p. 75.

doing: That all scientific theories and models are by definition approximations, and may be totally inadequate to convey a true picture of the reality with which they purport to be dealing, is a conclusion to which all modern scientific research is condemned by the premises from which it starts.[545]

Finally, an observation that relates directly to our present cosmological debate, Sherrard states:

In its turn, this revolution may be said to have two main characteristics, which are closely interconnected. The first is that it assumed that knowledge must be based on the observation of external phenomena: it must be based on sense-data without reference to the divine or indeed to any preconceived *a priori* ideas. The second is that it concluded that in order to reduce the data obtained from the observation of external phenomena to a coherent and reliable system of knowledge they must be submitted to the discipline of mathematics….The divorce between religion and philosophy is absolute: concern for the spiritual is banished from the study of physical phenomena and all scientific knowledge must be derived from the observation of a natural world regarded as a self-subsistent entity.[546]

Astronomer Tom van Flandern, once a card-carrying member of the scientific elite, writes how amazed he became when he discovered that almost every theory he had been taught in his professional career was wrong:

I particularly noted a regular practice of not re-examining the fundamental assumptions underlying a theory once it gained "accepted" status, almost no matter how incompatible some new observations or experiment might be. And I saw powerful vested interests in a "status quo" develop around certain accepted theories. It gradually became clear that a lot of people had a lot to lose if an accepted theory or practice were challenged; the authors of the original theory, whose names had become well-known; all those who published papers which reference or depend on the theory; journal editors and referees who have made decisions or criticized other works based on a theory;

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[545] *Ibid*., p. 76.
[546] *Ibid*., p. 95.

funding agencies which have paid for research which presupposes a theory; instrument builders and experiment designers who spend career time testing ideas which spring from a theory; journalists and writings whose publications have featured or promoted a theory; teachers and interested members of the public who have learned a theory, been impressed by the wonder of it, and who have no wish to have to teach or learn a new theory; and students, who need to find a job in their field of training. It has been my sad observation that by mid-career there are very few professionals left truly working for the advancement of science, as opposed to the advancement of self. And given enough people with strong enough interests, professional peer pressure takes over from there. Peer pressure in science, as elsewhere in society, consists of alternately attacking and ignoring the people who advocate a contrary idea, and discrediting their motives and/or competence, in order to achieve conformity.

Adding to the list, Van Flandern speaks about specialization actually working against the attainment of scientific truth rather than fostering it:

As if there weren't already enough inertia to major changes of models, I see yet another phenomenon – new to our era of rapid progress in science – which mitigates against change even in the face of overwhelming need for it. Few scientists consider themselves qualified very far outside their own areas of expertise. Since each expert can account for only a small portion of the data dealing with a model, he defers to the other experts to support the model in other areas. Few, if any, scientists have the breadth of knowledge to see the full picture for a given model. So the model remains supported because many individual authorities support it, none of whom have the expertise to criticize the model overall, and all of whom have the utmost confidence in the others collectively. Authorities can continue to multiply indefinitely, with no one taking responsibility for integrating all their combined knowledge. As a result, the existing models get perpetuated regardless of merit or the extent of counter-evidence, because "so many experts can't all be

wrong." Thus each expert is persuaded to force-fit his own data into the accepted model.[547]

The truth is, not only does modern man know very little about true science, he makes a concerted effort to suppress true science when it conflicts with his pseudo-scientific presuppositions and personal agendas. When their errors can no longer be suppressed, scientists will eventually capitulate, resulting in theories that change every 50-100 years or so. As Max Planck once said: "Science proceeds funeral by funeral."[548] Rather than admitting their past failures, however, modern man hails the newest theory as evidence of his own intellectual prowess, until, of course, his new theory is eventually put on the chopping block and obliterated by the next genius.

After examining several cases of fraud in the science establishment, William Broad and Nicholas Wade made a thorough search into many of its claims. They provide us with the dismal results:

> Our conclusion, in brief, is that science bears little resemblance to its conventional portrait…In the acquisition of new knowledge, scientists are not guided by logic and objectivity alone, but also by such nonrational factors as rhetoric, propaganda, and personal prejudice. Scientists do not depend solely on rational thought, and have no monopoly on it. Science should not be considered the guardian of rationality in society, but merely one major form of its cultural expression.[549]

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[547] Tom van Flandern, *Dark Matter, Missing Planets and New Comets*, 1993, pp. xvii-xviii.

[548] Anecdotal, and possibly an interpolation from his more complete remark: "A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents die and a new generation grows up that is familiar with it." Max Planck's physics teacher once advised him: "Physics is finished, young man. It's a dead-end street," then advised Planck to become a concert pianist instead" (Nick Herbert, *Quantum Reality*, p. 31). A similar statement comes from Mark Twain: "When even the brightest mind in our world has been trained up from childhood in a superstition of any kind, it will never be possible for that mind, in its maturity, to examine sincerely, dispassionately, and conscientiously any evidence or any circumstance which shall seem to cast a doubt upon the validity of that superstition. I doubt if I could do it myself" (attributed, not verified).

[549] *Betrayers of the Truth*, William Broad and Nicholas Wade, 1982, pp. 8-9. Broad and Wade point out the problems with "peer review" (pp. 18-21, 89-102), faulty data collection (pp. 107-125), desire for advancement and continuation of government funding (pp. 88-106), non replication of experiments (pp. 60-87),

Others have revealed the same corruption. Robert Bell, author of *Impure Science: Fraud, Compromise and Political Influence in Scientific Research*,[550] is one of the better. As one reviewer states:

Bell shows time and again how the supposedly 'objective' scientific-research process is subverted by ego, infighting, and the lure of cold cash….Bell opens his well-researched account with a stunning attack on the scientific community's sacrosanct system of 'peer-review,' which he says often means 'review by one's competition' in today's highly competitive world of scientific research…all too often peer review simply becomes a process by which powerful, well-established scientists can reward their friends and frustrate their rivals….the greatest problem in today's scientific community may well be fraud…particularly in the field of medical research, has resulted in deadly drugs being left on the market and faulty heart valves being implanted in people's chests.[551]

Scientific historian Robert Jahn sees much the same:

Thus, at the dawn of the 21st century, we again find an elite, smugly contented scientific establishment, but one now endowed with far more public authority and respect than that of the prior version. A veritable priesthood of high science controls major segments of public and private policy and expenditure for research, development, construction, production, education and publication throughout the world, and enjoys a cultural trust and reverence that extends far beyond its true merit. It is an establishment that is largely consumed with refinements and deployments of mid-20th century science, rather than with creative advancement of fundamental understanding of the most profound and seminal aspects of its trade. Even more seriously, it is an establishment that persists in frenetically sweeping legitimate genres of new anomalous phenomena under its

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status-quo obstacles (pp. 126-160), protecting popular scientists and pet projects from scrutiny (pp. 161-180), personal agendas (pp. 181-211). Broad and Wade uncover many discrepancies and problems with Galileo, Newton, Einstein, Darwin, and many other scientists involved with cosmological issues.

[550] Robert Bell, *Impure Science: Fraud, Compromise and Political Influence in Scientific Research*, 1992.

[551] Simon Garfinkel, "When Fraud Taints Science," *Christian Science Monitor*, July 1992.

intellectual carpet, thereby denying its own well-documented heritage that anomalies are the most precious raw material from which future science is formed.[552]

The problems haven't lessened since Wade (1982) and Bell (1992) revealed their statistics. Horace Judson, from my alma mater, George Washington University, published *The Great Betrayal: Fraud in Science* in 2004 showing that the problems are much worse than two decades ago. As the title denotes, Judson concentrates on the problem of fraud. As the reader digests the case studies Judson presents, he often has to reposition his jaw from the constant downward reflex it is prone to assume.[553]

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[552] Robert G. Jahn, "20th and 21st Century Science: Reflections and Projections," *Journal of Scientific Exploration* 15, 1, 2001, p. 21.

[553] Horace F. Judson, *The Great Betrayal: Fraud in Science*, 2004, p. 463. A recent article titled "Most Scientific Papers are Probably Wrong" in *Science Medicine* says: "Most published scientific research papers are wrong, according to a new analysis. Assuming that the new paper is itself correct, problems with experimental and statistical methods mean that there is less than a 50% chance that the results of any randomly chosen scientific paper are true. John Ioannidis, an epidemiologist at the University of Ioannina School of Medicine in Greece, says that small sample sizes, poor study design, researcher bias, and selective reporting and other problems combine to make most research findings false. But even large, well-designed studies are not always right, meaning that scientists and the public have to be wary of reported findings. 'We should accept that most research findings will be refuted. Some will be replicated and validated. The replication process is more important than the first discovery,' Ioannidis says. In the paper, Ioannidis does not show that any particular findings are false. Instead, he shows statistically how the many obstacles to getting research findings right combine to make most published research wrong. Massaged conclusions: Traditionally a study is said to be 'statistically significant' if the odds are only 1 in 20 that the result could be pure chance. But in a complicated field where there are many potential hypotheses to sift through - such as whether a particular gene influences a particular disease - it is easy to reach false conclusions using this standard. If you test 20 false hypotheses, one of them is likely to show up as true, on average. Odds get even worse for studies that are too small, studies that find small effects (for example, a drug that works for only 10% of patients), or studies where the protocol and endpoints are poorly defined, allowing researchers to massage their conclusions after the fact. Surprisingly, Ioannidis says another predictor of false findings is if a field is "hot", with many teams feeling pressure to beat the others to statistically significant findings. But Solomon Snyder, senior editor at the Proceedings of the National Academy of Sciences, and a neuroscientist at Johns Hopkins Medical School in Baltimore, US, says most working scientists understand the limitations of published research. 'When I read the literature, I'm not reading it to find proof like a textbook. I'm reading to get

Recently, researcher Woo Suk Hwang dazzled the world with his claims of cloning human embryonic stem cells, until he was forced to admit that he fabricated all of it.[554] For years the medical establishment told its patients that low-fat diets helped reduce stroke, heart disease and other such vascular maladies, but within a few short weeks into the year 2006 the same establishment told us that those studies were all erroneous based on the evidence from even "newer studies."[555] For years men and women advanced in years were told to take calcium supplements to strengthen their bones, and once again the year 2006 brought us the sad news that science, true to form, took a wrong turn, since other "studies" found that taking calcium supplements not only doesn't strengthen the bones but increases the risk of other maladies. Where will it all end?[556]

The Changing Tide

So often we hear in the media of intellectuals in academia and the science community who ridicule those who take the Old and New Testaments at face value. With much ingratiating self-satisfaction they claim that literal interpretations of Scripture have been forever banished, since we have all come to accept that the Earth revolves around the sun. Once "biblical criticism" paved the way for scholars to ignore Scripture's testimony that the Earth had no movement, it was only a matter of time before the next biblical pillar – a six-day creation – would be attacked and suppressed, along with a global flood and the Genesis genealogies to the first man that stretched no longer than about 10,000 years.

Beginning around the mid-1900s, things began to change in the world of science. It was at this time that those who accepted Scripture both as divine revelation and at face value, began to delve more deeply into the sciences than ever before. They began to see that a proper interpretation of scientific facts did not preclude a non-evolutionary origin for the Earth or a

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ideas. So even if something is wrong with the paper, if they have the kernel of a novel idea, that's something to think about,' he says." (Journal: Public Library of Science Medicine, DOI: 10.1371/journal.pmed.0020124). See also: Richard Milton, *Forbidden Science: Exposing the Secrets of Suppressed Research*, 1994; Anthony Standen, *Science is a Sacred Cow*, 1952, 2000. Standen writes: "Physics is *not* a body of indisputable and immutable Truth; it is a body of well-supported probable opinion only, and its ideas may be exploded at any time" (p. 49).

[554] "Con Men in Lab Coats" *Scientific American*, March 2006, p. 10.

[555] "Low-Fat Diet Falls Short," *Science News*, February 11, 2006, vol. 169, p. 85.

[556] See also "Face up to fraud," Nature 481, 237-238, (19 January 2012); and "20 Things You Didn't Know about Science Fraud," Eric A. Powell, *Discover*, April 2012, p. 72.

non-uniformitarian development of its terrain, but actually supported it much better than the opposing evolutionary views. There has been so much information made available that we are beginning to see universities and secondary schools take a second look at these issues. For example, the Intelligent Design argumentation has proven itself to be one of the more formidable weapons against evolutionary theory in the ongoing wars of cosmogony. Of course, the opposition against creationism and catastrophism has mounted in proportion, since many of today's secular scientists refuse even to consider alternatives to their cherished atheistic evolutionary theories. As Oxford biologist Richard Dawkins put it: "Darwin made it possible to be an intellectually fulfilled atheist," or as Richard Lewontin admitted:

> It is not that the methods and institutions of science somehow compel us to accept a material explanation of the phenomenal world, but, on the contrary, that we are forced by our *a priori* adherence to material causes to create an apparatus of investigation and a set of concepts that produce material explanations, no matter how counterintuitive, no matter how mystifying to the uninitiated. Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door.[557]

But *Galileo Was Wrong: The Church Was Right* does not address the arguments against evolution, *per se*. Many well-qualified secular and biblical scientists have done their job quite well in refuting its precarious tenets. Our book deals solely with the issue of Earth-centered cosmology, a subject that, unfortunately, many of the aforementioned biblical scientists have been somewhat reluctant to address, let alone support, for fear of appearing like the uneducated Neanderthals and stubborn academics that their evolutionary opponents accuse them of being.

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[557] "Billions and Billions of Demons," *The New York Review of Books*, January 9, 1997, pp. 28, 31. At the Salk Institute forum, Dawkins stated: "I am utterly fed up with the respect that we – all of us, including the secular among us – are brainwashed into bestowing on religion. Children are systematically taught that there is a higher kind of knowledge which comes from faith, which comes from revelation, which comes from scripture, which comes from tradition, and that it is the equal if not the superior of knowledge that comes from real evidence" (*New York Times*, Nov. 21, 2006).

Copernicus, Galileo, Kepler, Newton, Einstein, in Retrospect

In this chapter we have detailed the fraud and deception that often occurs in the scientific community. One facet of this deception is the suppression of historical facts about the personal lives of the world's renowned scientists. Their rejection of God and revelation are not in a vacuum. As we have seen from Gould to Sagan to Crick, their materialistic conclusions concerning the origins and function of the cosmos invariably affect the kind of lives they lead, and their biographies are often a sordid tale of pride and immorality. After forcefully releasing themselves from the motherly hand of the Church, scientists subsequently made themselves into icons of intellect and stamina that were bigger than life; 'men of renown' who took on an almost god-like quality, similar to the 'giants' who lived just prior to the Great Flood, and who also became the epitome of corruption and were eventually destroyed (Genesis 6:4-5). Interestingly enough, one scientist writing about Albert Einstein inscribed the words: "THERE WERE GIANTS IN THE EARTH IN THOSE DAYS" in the opening pages of his book.[558] The reality is, although these scientists are consistently revered in textbooks as the titans of humanity, history often tells quite a different story. In addition to the problems and anomalies in current science, the moral integrity of those who vied for its advancement was often at odds with convention, even by today's standards. We will limit our survey to just the prominent names associated with current Copernican cosmology: Copernicus, Kepler, Galileo, Newton and Einstein.

Nicolaus Copernicus Too Many Pagan Influences

Copernicus' personal life is not as well known as that of others who followed him, but we do know several disturbing things about him. In 1509, Copernicus published a translation of the obscenity-filled letters of the Byzantine poet, Simoncatta. Further sexual exploits came to light when it was discovered that Copernicus kept a mistress, but he refused to dismiss her when confronted by his diocesan bishop, Dantiscus. As one Copernican historian describes it:

> Doctor Nicolaus had a mistress who regularly visited his house….Sometime between July 1531 and the summer of 1538, Copernicus started receiving a woman at his curia in

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[558] Donald W. Rogers, *Einstein's Other Theory*, New Jersey, 2005.

Frombork….The woman was named Anna Schilling…. Copernicus and Anna's father were involved together for seven years, from 1529 to 1536….Most problematic for Copernicus was the fact that she was still technically married….Anna was reported to be pretty, well educated, and deeply interested in astronomy…. Despite Dantiscus's order to clean his household, Copernicus did not comply…. Though everyone knew the actual situation between Copernicus and Anna, it appears that the astronomer told people that she was simply his housekeeper….Six weeks later the situation seemed to have been addressed when Copernicus wrote to Dantiscus…. However, Copernicus had lied. He had not ended the relationship, and word of the continued presence of Anna Schilling in Copernicus's house got back to Dantiscus later that winter….In his old age, almost at the end of his allotted time, he is still said to let his mistress in frequently in secret assignations.[559]

Having heard of his fame, a fellow heliocentrist, Georg Joachim Rheticus,[560] visited with Copernicus in 1539. After befriending Copernicus and reading his works, Rheticus worked very hard in convincing him to publish his *De revolutionibus*. Prior to Copernicus' decision, Rheticus wrote a summary version of Copernicus' work titled *Narratio prima* in

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[559] Jack Repcheck, *Copernicus's Secret*, pp. 92-99, 145.
[560] Rheticus' original name was Georg Joachim Iserin. His father, Georg Iserin, had been convicted of various crimes (either sorcery or theft, or both) and was executed. Families of the executed were required to change their last name. He chose "Rheticus" from the region of Rhaetia from where his mother originated.

1540.[561] It was Rheticus' purpose to do all that he could to disseminate the heliocentric universe. With the help of the Protestant publisher Johannes Petreius,[562] Rheticus acquired the services of Lutheran Andreas Osiander to write a preface for *De revolutionibus*. After years of labor, Rheticus was finally nearing success, but he did not get to see the final draft of *De revolutionibus* before it was published. In the meantime, Copernicus had suffered a stroke in December 1542, but his book was finally published in March 1543 by Petreius, and Copernicus had died shortly thereafter. After all the work that Rheticus had done to facilitate its publication, however, he received quite a shock when he read the opening credits of *De revolutionibus*. Koestler refers to it as a "double-cross." Repcheck describes it as follows:

> …when Rheticus opened the finished book…and finally read Copernicus's opening words [and] his acknowledgments, Rheticus must have been stunned to read that although Copernicus thanked several people, he somehow forgot to thank him. This had to have been a devastating blow to the young mathematician. Historians of science have been at pains to explain what happened…Giese wrote that "your teacher failed to mention you in his Preface to the treatise"….What happened?....It must have been something specific, because the oversight is glaring.[563]

Rheticus never really recovered from this slight, for many years afterward he refused to promote Copernicus' book. We might surmise that Copernicus was not in this cosmological pursuit solely as an altruistic venture for the truth, but for the fame that he so jealously desired to guard

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[561] Rheticus writes in the *Narratio*: "…each of the planets, by its position and order and every inequality of its motion, bears witness that the earth moves and that we who dwell upon the globe of the earth, instead of accepting its changes of position, believe that the planets wander in all sorts of motions of their own" (translated by Edward Rosen, in *Three Copernican Treatises*, 1971, p. 165).

[562] Petreius published works on Luther, Erasmus, Melanchthon, Henry VIII, Regiomontanus and Gasser. Although he also published a few works by Augustine, Calvin and Luther had commandeered some of Augustine's works on predestination for the cause of Protestantism.

[563] *Copernicus's Secret*, pp. 166-167. Repcheck goes on to speculate that "after Copernicus observed the acclaim bestowed on the *Narratio prima*, and after the young and enthusiastic Rheticus left Frombrok with his masterpiece, Copernicus might have sensed that he would not be around to enjoy the moment of victory, and Rheticus surely would. Perhaps this bothered him so much that he deliberately slighted Rheticus" (*ibid*).

from any would-be usurper. Of course, Rheticus had his own problems, and perhaps Copernicus sensed something was amiss with the indulgent befriending he received from the young lad a few years earlier. As it turns out, Rheticus was a homosexual who, on several occasions, found himself being run out of town for his peccadilloes. On one occasion he was convicted of sodomy against a young boy. As Repcheck describes it:

> In April 1551, Hans Meusel, a merchant, brought a lawsuit against Rheticus for a shocking crime – the injunction claimed that the professor had "lured my son…plied him with strong drink, until he was inebriated; and finally did with violence overcome him and practice upon him the shameful and cruel vice of sodomy…Joachim Rheticus fled Leipzig immediately, leaving nearly all of his personal belongings behind…Over the next twelve months official letters were sent from the court to Rheticus and ignored. But on April 11, 1552, Rheticus, age thirty-eight, was found guilty of raping young Meusel. He was exiled from Leipzig for 101 years.[564]

In regard to his heliocentric theory, Copernicus consistently appealed to the "harmony" of his system, but it was a harmony ennobled by a sun that he personified, and, some say, deified. Copernicus writes:

> In the middle of all sits Sun enthroned. In this most beautiful temple could we place this luminary in any better position from which he can illuminate the whole at once? He is rightly called the Lamp, the Mind, the Ruler of the Universe: Hermes Trismegistus names him the Visible God, Sophocles' Electra calls him the All-seeing. So the Sun sits as upon a royal throne ruling his children the planets which circle round him. The Earth has the Moon at her service. As Aristotle says, in his *On Animals*, the Moon has the closest relationship with the Earth. Meanwhile the Earth conceives by the Sun, and becomes pregnant with an annual rebirth.[565]

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[564] *Ibid*., p. 178. Koestler adds: "Rheticus was a sodomite" (*The Sleepwalkers*, p. 179, see also pp. 170f, 184f). Gingerich confirms with: "There were dark rumors of a drunken homosexual episode involving a student half his age. The irate father of the young man involved brought a lawsuit. In disgrace, Rheticus fled from Leipzig" (*The Book that Nobody Read*, p. 182).

[565] *De revolutionibus*, "10. Of the Order of the Heavenly Bodies," as cited in *The Copernican Revolution*, pp. 179-180 (Kuhn's translation from the Latin). Charles Glenn Wallis' translation (or his editor's), although similar, seems desirous to

Karl Popper shows the origin of these cultic ideas:

> Copernicus studied in Bologna under the Platonist Novara; and Copernicus' idea of placing the sun rather than the Earth in the center of the universe was not the result of new observations but of a *new interpretation* of old and well-known facts in the light of semi-religious Platonic and Neo-Platonic ideas. The crucial idea can be traced back to the sixth book of Plato's *Republic*, where we can read that the sun plays the same role in the realm of visible things as does the idea of the good in the realm of ideas. Now the idea of the good is the highest in the hierarchy of Platonic ideas. Accordingly the sun, which endows visible things with their visibility, vitality, growth and progress, is the highest in the hierarchy of the visible things in nature.…Now if the sun was to be given pride of place, if the sun merited a divine status…then it was hardly possible for it to revolve about the Earth. The only fitting place for so exalted a star was the center of the universe. So the Earth was bound to revolve about the sun. This Platonic idea, then, forms the historical background of the Copernican revolution. It does not start with observations, but with a religious or mythological idea.[566]

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lessen Copernicus' deification of the sun by using slightly different wording and lower case letters: "In the center of all rests the sun. For who would place this lamp of a very beautiful temple in another or better place than this wherefrom it can illuminate everything at the same time? As a matter of fact, not unhappily do some call it the lantern; others, the mind, the pilot of the world. Trismegistus calls it a 'visible god'; Sophocles' Electra, 'that which gazes upon all things.' And so the sun, as if resting on a kingly throne, governs the family of stars which wheel around. Moreover, the Earth is by no means cheated of the services of the moon; but as Aristotle says in the *De Animalibus*, the Earth has the closest kinship with the moon. The Earth moreover is fertilized by the sun and conceives offspring every year" (*On the Revolutions of Heavenly Spheres*, 1995, pp. 24-26).

[566] *Conjectures and Refutations: The Growth of Scientific Knowledge*, p. 187. Popper is referring to Dominicus Maria da Novara, a mathematician and astronomer in Italy. Indulging in a bit of anachronistic evaluation, Popper goes on to defend him, suggesting that even though Copernicus' idea came before the observation, he was nevertheless correct and "not a crank." More of Popper's *a-posteriori* thinking appears later in the book: "The Copernican system, for example, was inspired by a Neo-Platonic worship of the light of the Sun who had to occupy the 'centre' because of his nobility. This indicates how myths may develop testable components. They may, in the course of discussion, become fruitful and important for science" (*ibid.*, p. 257).

Popper, being a supporter of the heliocentric revolution, couches his critique of Copernicus in rather polite terms, but essentially he is saying that Copernicus' brainchild had all the earmarks of originating from pagan sun-worship. As Wolfgang Smith notes:

> …in the Renaissance movement championed by Marsiglio Ficino, the doctrine came alive again, but in a somewhat altered form; one might say that what Ficino instituted was indeed a religion, a kind of neo-paganism. Copernicus himself was profoundly influenced by this movement, as can be clearly seen from numerous passages in the *De revolutionibus*.[567]

Upon reading *De revolutionibus*, one is struck by the preponderance of philosophical and humanistic arguments Copernicus brings to his aid. As J. D. Bernal notes: "[Copernicus'] reasons for his revolutionary change were essentially philosophic and aesthetic," and in a later edition he is more convinced that the "reasons were mystical rather than scientific."[568] Overall, Copernicus presents about five-dozen arguments, at least half of which are solely philosophical in nature. Although the other half of his argumentation depends more on mechanics, these also have philosophical appendages to them. Very few of his arguments are based on his own personal observations, since, as we noted earlier, Copernicus merely reworked the observations of his Greek predecessors. In fact, Copernicus concludes that, because the Greeks did not detail their cosmological models more thoroughly, history (and God) have called upon him to provide the long-awaited documentation of true cosmology.[569]

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[567] Wolfgang Smith, *The Wisdom of Ancient Cosmology*, p. 174. Copernicus was also influenced heavily by the liberal humanist, Codrus, who was known for denying various Church doctrines.

[568] J. D. Bernal, *Science in History*, 1st edition, London, Watts, 1954; 2nd edition, 1965. Cited in Lakatos, *Methodology of Scientific Research Programmes*, p. 129.

[569] Thomas Heath sheds more light on this connection: "Copernicus himself admitted that the [heliocentric] theory was attributed to Aristarchus, though this does not seem to be generally known….But it is a curious fact that Copernicus did mention the theory of Aristarchus in a passage which he afterwards suppressed: 'Credibile est hisce similibusque causis Philolaum mobilitatem terrae sensisse, quod etiam nonnulli Aristarchum Samium ferunt in eadem fuisse sentential.'" Heath also shows by quotes from Plutarch and Archemides that Aristarchus was the originator of the heliocentric view (Thomas Heath, *Aristarchus of Samos: The Ancient Copernicus*, 1913, p. 301ff). J. L. E. Dreyer provides a more readable translation of Archimedes' words: "You know that according to most astronomers the world (κόσμος) is the sphere, of which the center is the center of the earth, and whose radius is a line from the center of the earth to the center of the sun. But

This brings us to another disturbing aspect of Copernicus' approach to cosmology. Since Copernicus was a Canon of the Catholic Church and one who rubbed shoulders with high-placed Cardinals and enjoyed audiences with the reigning pope, one might expect him to have been a high churchman in his own right, with regular recourse to the Church Fathers, especially since he knew that a good number of them wrote definitive works on cosmology and cosmogony.[570] Moreover, one would also expect him to have sought out their consensus on important issues, since this was the Church's most formidable weapon against erroneous ideas, even as Robert Bellarmine admonished Foscarini and Galileo.[571] But one searches in vain for any patristic references in *De revolutionibus*, or, for that matter, in any of Copernicus' works. After prefacing his remarks to Pope Leo X with a castigation of those who "…although wholly ignorant of mathematics… shamelessly distorting the sense of some passage in Holy Writ to suit their own purpose," the only time Copernicus

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Aristarchus of Samos has published in outline certain hypotheses, from which it follows that the world is many times larger than that. For he supposes (ὑποτιθέται) that the fixed stars and the sun are immovable, but that the earth is carried round the sun in a circle which is in the middle of the course…" (J. L. E. Dreyer, *History of the Planetary Systems from Thales to Kepler*, 1906, p. 136).

[570] Chief among them were **Basil the Great**, bishop of Caesarea. Advancing a dogmatic assertion of geocentrism, he writes: "There are inquirers into nature who with a great display of words give reasons for the immobility of the Earth....Do not then be surprised that the world never falls: it occupies the center of the universe, its natural place. By all necessity it is obliged to remain in its place, unless a movement contrary to nature should displace it. If there is anything in this system which might appear probable to you, keep your admiration for the source of such perfect order, on the wisdom of God" (*Hexameron*, Homily 1, 10); and **Chrysostom**: "For they who are mad imagine that nothing stands still, yet this arises not from the objects that are seen, but from the eyes that see. Because they are unsteady and giddy, they think that the Earth turns round with them, which yet turns not, but stands firm. The derangement is of their own state, not from any affection of the element." (*Homilies on Titus* 2:1).

[571] Bellarmine states: "Second, I say that, as you know, the Council [of Trent] prohibits interpreting Scripture against the common consensus of the Holy Fathers; and if Your [Reverence] wants to read not only the Holy Fathers, but also the modern commentaries on Genesis, the Psalms, Ecclesiastes, and Joshua, you will find all agreeing in the literal interpretation that the sun is in heaven and turns around the earth with great speed, and that the earth is very far from heaven and sits motionless at the center of the world. Consider now, with your sense of prudence, whether the Church can tolerate giving Scripture a meaning contrary to the Holy Fathers and to all the Greek and Latin commentators" (Bellarmine to Paolo Antonio Foscarini, April 12, 1615).

crosses the threshold into the patristic witness for Leo's sake is a derisive remark about Lactantius:

> For it is not unknown that Lactantius, otherwise a distinguished writer but hardly a mathematician, speaks in an utterly childish fashion concerning the shape of the Earth, when he laughs at those who have affirmed that the Earth has the form of a globe.[572]

Consequently, as a lot, the Fathers are made to appear as ignorant partisans against the goals of science and not worthy of comment on so important a subject. The reality is that Lactantius was the only Father of the Church (and he was not a highly esteemed patristic witness) who held to the idea of a non-spherical Earth.[573] Every other Father who wrote at length on cosmological issues stated his belief, based on Scripture and science, that the Earth was a sphere.[574] But one would never know these essential facts from the biased Copernicus. Instead, Copernicus rests his lot with the Greek philosophers and astronomers, the very individuals upon

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[572] *De revolutionibus*, Dedication to Pope Paul III, *Revolutions of Heavenly Spheres*, Charles G. Wallis, p. 7.

[573] Lactantius, *Divine Institutes*, Bk 3, Ch 23: "they thought that the world is round like a ball…But if this were so, the Earth also itself must be like a globe…And if this were so, that last consequence also followed, that there would be no part of the Earth uninhabited by men and the other animals. Thus the rotundity of the Earth leads, in addition, to the invention of those suspended antipodes."

[574] **Athanasius**: "And wells, again, and rivers will never exist without the Earth; but the Earth is not supported upon itself, but is set upon the realm of the waters, while this again is kept in its place, being bound fast at the center of the universe. And the sea, and the great ocean that flows outside round the whole Earth, is moved and borne by winds wherever the force of the winds dashes it." (*Against the Heathen*, First Book, Part 1, 27); **Gregory of Nyssa**: "As, when the sun shines above the Earth, the shadow is spread over its lower part, because its spherical shape makes it impossible for it to be clasped all round at one and the same time by the rays, and necessarily, on whatever side the sun's rays may fall on some particular point of the globe…" (*On the Soul and the Resurrection*); **Augustine**: "Think we, had he ascended to the peak of some very high and pointed mountain, and looked out thence and seen the compass of the Earth, and the circles of the round world, and therefore said, 'I have seen the end of all perfection'"? (*Homilies on First John*, x, 5); **Jerome**: "…the sphere which I have called motionless and all that it contains will be dissolved into nothing, and the sphere in which the antizone itself is contained shall be called 'good ground,' and that other sphere which in its revolution surrounds the Earth and goes by the name of heaven shall be reserved for the abode of the saints" (*Letters*, 124, *To Avitus*).

whom the Church Fathers focused their critiques in the areas of cosmology and cosmogony. *De revolutionibus* is saturated with nothing but praise for the Greek cosmologists, the ones who advocated a moving Earth:

> I found in Cicero that Hicetas [of Syracuse, fifth century B.C.] had realized that the Earth moved. Afterwards I found in Plutarch that certain others had held the like opinion. I think fit here to add Plutarch's own words, to make them accessible to all: "The rest hold the Earth to be stationary, but Philolaus the Pythagorean says that she moves around the [central] fire on an oblique circle like the Sun and Moon. Heraclides of Pontus and Ecphantus the Pythagorean also make the Earth to move, not indeed through space but by rotating round her own center as a wheel on an axle from West to East.[575]

In the text of *De revolutionibus* he continues:

> It is the vault of Heaven that contains all things, and why should not motion be attributed rather to the contained than to the container, to the located than the locater? The latter view was certainly that of Heraclides and Ecphantus the Pythagorean and Hicetas of Syracuse (according to Cicero). All of them made the Earth rotate in the midst of the Universe…That the Earth, besides rotating, wanders with several motions and is indeed a Planet, is a view attributed to Philolaus the Pythagorean, no mean mathematician, and one whom Plato is said to have sought out in Italy.[576]

We see that, despite the fact that the Greeks have quite a confusing assortment of views on the cosmos, Copernicus is still enamored with their cosmologies, and especially with their mathematics, but he holds dear only the select few who believed in heliocentrism. As we have noted earlier, the appeal to "mathematics" or "mathematical harmonies" is a common thread running through most of the new cosmology, from Copernicus to Kepler through Einstein and Quantum Mechanics. The appeal, though appearing

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[575] *De revolutionibus*, Dedication to Pope Paul III. Heraclides (d. 310 BC) a Greek astronomer who was one of the first to propose that the revolution of the stars around the Earth could also be understood as the Earth rotating on its axis in the midst of stationary stars.
[576] *De revolutionibus*, 5. *Whether Circular Motion Belongs to the Earth; and Concerning its Position*.

logical and formidable, is baseless. Mathematics proves very little, except that the right side of the equation often equals the left side.

Johannes Kepler
Suspected of Murdering the Geocentrist, Tycho Brahe

Kepler, although a Lutheran, was heavily influenced by the occult, as was his mother, Katherina Kepler, and the latter's endeavor may have led to her trial as a witch.[577] Following his particular philosophy, Kepler's main motivation for bringing the sun into the center of the planetary system, as had Copernicus before him, was that he considered it worthy of symbolic deification. In one passage he describes the sun as: "Who alone appears, by virtue of his dignity and power, suited…and worthy to become the home of God himself, not to say the first mover."[578]

Much more disturbing, however, is another facet to Kepler's life that has been hidden from the eyes of the world for the last four hundred years. Although most historians were aware of Kepler's nefarious inclinations wherein jealousy and ambition ruled his motives, few were prepared for what recent forensic evidence has revealed. Whereas most scholars had thought Kepler's employer, the renowned Tycho de Brahe, died of a urinary tract infection, an exhumation of his body leading to a chemical analysis of his hair shows lethal levels of mercury poisoning just hours before his death.[579] Kepler, already steeped in the Copernican theory that

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[577] *Kepler's Witch*, James A. Connor, 2004, pp. 275-307. *The Sleepwalkers*, pp. 389-393. The woman relative who raised Katherina was executed for practicing witchcraft (John Lear, *Kepler's Dream*, 1965, p. 31).

[578] *On the Motion of Mars*, Prague, 1609, Chapter 4, as cited in Thomas S. Kuhn, *The Copernican Revolution*, 1959, p. 214. Kuhn notes: "This symbolic identification of the sun and God is found repeatedly in Renaissance literature and art" (*ibid*., p. 130). Later adding: "This conviction [of Kepler's], together with certain intrinsic incongruities discussed above, was his reason for rejecting the Tychonic system" (*ibid*., p. 214). Kepler's reference to the "first mover" encapsulates his concept that as the sun rotated on its axis, its rays would act like a brush to move the planets.

[579] Joshua Gilder and Anne-Lee Gilder, *Heavenly Intrigue: Johannes Kepler, Tycho Brahe, and the Murder Behind one of History's Greatest Scientific Discoveries*, 2004, pp. 145, 206-234. After several of Kepler's plots to confiscate

he freely wielded in his Lutheran circles with little reproach, desperately needed Brahe's forty-years' worth of planet- and star-charting to bring his "*Mysterium Cosmographicum*" visions to fruition. As Kepler describes it:

> For among the most powerful causes of visiting Tycho was this also, that I might learn the truer proportions of the deviations [of the planets] from him, by which I might examine both my *Cosmic Mystery* and *The Harmony of the World*. For these *a priori* speculations ought not to impinge on clear experience: but with it be reconciled.[580]

How valuable were these charts and data? Without them Kepler would have been just another seventeenth-century astronomer struggling to make a living by reading astrological horoscopes, for he would have had little evidence upon which to base his theory regarding the motions of the planets. Modern telescopic observation reveals that, without ever using a telescope, Brahe's data of stars was consistently accurate to within 1 minute of arc or better. His observations of planetary positions were reliable to within 4 minutes of arc, which was more than twice the accuracy produced by the best observers of antiquity. In fact, it was Tycho's express desire to use his precise measurements to uncover the errors in Copernicus' solar system. This data was absolutely priceless, and Kepler, who revered Tycho and called him *The Phoenix of Astronomy*, would eventually pay, the evidence shows, the ultimate price to obtain them. Tycho knew of Kepler's intention to acquire the charts, but Tycho wouldn't budge since he was the staunchest anti-Copernican of his day. Tycho's very first letter to Kepler outlined his express desire that his forty-years of painstaking work be used to promote the geocentric system. In his book published in 1588, *De mundi aetherei recentioribus phaenomenis*, he stated his devotion to Scripture and to geocentrism:

Brahe's records were foiled (pp. 188-194) the ultimate plot was hatched. Kepler, having become familiar with Brahe's alchemical laboratory, knew the precise dosage of mercuric chloride solution that would initiate the onset of Brahe's demise. PIXE analysis [particle-induced X-ray emission] has confirmed the presence of the lethal levels of residual mercury and calcium, the latter originating from the milk was used to camouflage the poison – a favorite medium for poison in those times.

[580] *Heavenly Intrigue*, p. 154. The Gilders' add: "Kepler had not forgotten Brahe's advice; he understood that, without the empirical backing only Brahe's incomparable observations could provide, his idea of universal structure and harmony would never amount to anything but an elegant theory" (*ibid*).

What need is there, without any justification, to imagine the earth, a dark dense and inert mass, to be a heavenly body undergoing even more numerous revolutions than the others, that is to say, subject to triple motion, in violation not only of all physical truth but also of the authority of Holy Scripture, which ought to be paramount.[581]

Tycho had more than a suspicion that Kepler saw things very differently. In the words of one author:

Kepler knew that in Tycho's possession were the raw observations that he, as "architect," longed to assemble into a coherent picture of planetary motion. And Tycho knew that the gifted Kepler had the mathematical wherewithal to prove the validity of the Tychonic [geocentric] system of the heavens. But Kepler was a confirmed Copernican; Tycho's model had no appeal to him, and he had no intention of polishing this flawed edifice to the great man's ego.[582]

As the plot thickens, Kepler tells his diary:

Let all keep silence and hark to Tycho who has devoted thirty-five years to his observations… For Tycho alone do I wait; he shall explain to me the order and arrangement of the orbits… Then I hope I shall one day, if God keeps me alive, erect a wonderful edifice.[583]

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[581] Cited in Repcheck's *Copernicus's Secret*, p. 187.

[582] Alan W. Hirshfeld, *Parallax: The Race to Measure the Universe*, 2001, pp. 92-93. Brahe was the principal author but perhaps not the only one who discovered what we now know as the Tychonic system. Helisaeus Roeslin worked on a similar system, but his work was never published. Nicholas Reimers Bär (also known as Ursus), published a Tychonic system with a rotating Earth in the *Fundaments of Astronomy* [actual title: *Nicolai Raimari Ursi Dithmarsi Fundamentum astronomicum*, Strasburg, 1588] but was known to have stolen it from Brahe, whereupon Brahe sought litigation against him, but Ursus died before the trial [see *Heavenly Intrigue*, pp. 120-185].

[583] Letter to Michael Maestlin, February 16, 1599, *Gesammelte Werke*, vol. xiii, p. 289 *seq.* (cited in *The Sleepwalkers*, p. 280). Koestler adds: "With one eye he was reading the thoughts of God; the other squinted enviously at Tycho's shining armillary spheres. But Tycho refused to publish his observations until he had completed his own theory. He jealously guarded his treasure, volumes of figures, the result of a lifetime of work."

Brahe may discourage me from Copernicus (or even from the five perfect solids) but rather I think about striking Tycho himself with a sword…I think thus about Tycho: he abounds in riches, which like most rich people he does not rightly use. Therefore great effort has to be given that we may wrest his riches away from him. We will have to go begging, of course, so that he may sincerely spread his observations around.[584]

Scheming to come into Brahe's company, Kepler finally met him on February 4, 1600. Tycho put Kepler to work crunching numbers in the hopes of

…turning his Tychonic system from a rough schematic diagram of the heavens into an accurate model from which exact predictions of planetary motion could be made…the Tychonic system – which Kepler, as a Copernican, disdained.[585]

As Kepler describes the toil:

I would have brought my discussion about the *Harmony of the World* long ago to an end except that the Astronomy of Tycho occupied me so totally that I almost was insane.

Just eighteen months later, Brahe, the epitome of perfect health, suddenly died. All the evidence points the finger at Kepler. With his usual knack for introspective understatements, Kepler tells his diary:

I confess that when Tycho died, I quickly took advantage of the absence, or lack of circumspection, of the heirs, by taking the observations under my care, or perhaps usurping them…"[586]

The rest is history, as they say, but it is filled with enough intrigue to make even Agatha Christie envious of the story line.[587]

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[584] Letter to Michael Maestlin, February 16 1599, *Gesammelte Werke*, vol. xiii, p. 289 *seq*. Partially translated from the Latin by the Gilders, *Heavenly Intrigue*, p. 132.

[585] *Heavenly Intrigue*, p. 157.

[586] Letter to D. Fabricius, February 1604, *Gesammelte Werke,* vol. xv, p. 231 *seq*., *The Sleepwalkers*, p. 350.

[587] See the most recent article in the New York Times at http://www.nytimes.com/2010/11/30/science/30tierney.html?pagewanted=all

Kepler's Interpretation of the Bible

As would be the case with Galileo the Catholic, Kepler the Lutheran felt the need to justify his heliocentric views against the geocentrism of the Bible. Similar to Galileo, Kepler dismissed the Bible's language as merely phenomenal. He writes:

> …astronomy discloses the causes of natural phenomena and takes within its purview the investigation of optical illusions. Much loftier subjects are treated by Holy Writ, which employs popular speech in order to be understood. Within this framework and with a different purpose in view, only in passing does the Scripture touch on the appearances of natural phenomena as they are presented to sight, whence human speech originated, and proceed to do so even though it was perfectly clear to everyone that optical illusions are involved. Not even we astronomers cultivate astronomy with the intention of altering popular speech. Yet while it remains unchanged, we seek to open doors of truth. That the planets are stationary or retrogress; the sun stands still, turns back, rises, sets, goes forth from one end of heaven like a bridegroom coming out of his chamber and goes down into the other end, mounts to the midst of heaven, moves against certain valleys and mountains – these expressions are used by us along with laymen, that is, with the visual sense, even though not one of these locutions is literally true, as all astronomers agree.[588]

We will address both Kepler and Galileo's treatment of Scripture in Chapter 12. Suffice it to say, Kepler, as all heliocentric astronomers who must deal with the Bible, has misrepresented and misconstrued the teaching of Scripture.

Galileo Galilei: The Rebel Turned Repentant

Galileo followed right on the heels of Kepler. Like Kepler, he had an eccentric and irascible personality, at least up until the last years of his life. But whereas Kepler was more reserved, the unconverted Galileo was the quintessential know-it-all, always and everywhere trying to outshine everyone who crossed his path. As Koestler sees him:

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[588] Johannes Kepler, *Epitomie Astronomie Copernicanae*, Book I. It was the *Epitomie* that would eventually be put on the *Index of Forbidden Books* by Pope Alexander VII.

Galileo had a rare gift of provoking enmity; not the affection alternating with rage which Tycho aroused, but the cold, unrelenting hostility which genius plus arrogance minus humility creates among mediocrities.[589]
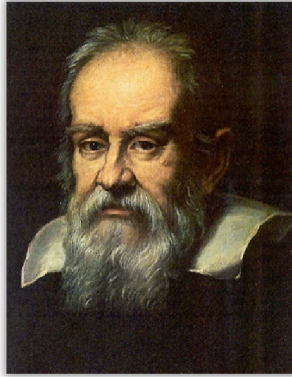
Historian A. C. Custance adds:

> Judging by Galileo's correspondence and other records of his opinion of himself he was fantastically selfish intellectually and almost unbelievably conceited. As an illustration of the former there is the now well-known fact that he refused to share with his colleagues or with acquaintances such as Kepler any of his own findings or insights; he actually claimed to be the only one who ever would make any new discovery![590]

By the same token, Galileo would ignore the overtures of his colleagues but steal secrets behind their backs. Kepler was alerted to this fact when one of his admirers wrote to him and said: "Galileo has your book and teaches your discoveries as his own…" but which Kepler, for reasons of his own, allowed him to do so without litigation.[591] In fact, Kepler sought Galileo's written correspondence on many occasions. In one instance he sent Galileo his magnum opus, *Mysterium Cosmographicum*, hoping for a review, but Galileo ignored all but two inquiries from Kepler, and those responses were separated by thirteen years. The second response was prompted by nothing less than a threat from Kepler to expose Galileo

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[589] *The Sleepwalkers*, p. 373.
[590] A. C. Custance, "The Medieval Synthesis and the Modern Fragmentation of Thought," in *Science and Faith*, p. 153.
[591] *The Sleepwalkers*, p. 365.

as a fraud unless he produced the evidence of his telescope sightings about which he had been continually bragging.

Among his other braggadocios, Galileo claimed to have invented the telescope, but Kepler and his colleagues knew it was available twenty years earlier from one of Galileo's countrymen, Giovanni Della Porta. Records also show that spectacle-maker Johann Lippershey possessed a license to make telescopes by the mid-1580s. By April 1609 one could buy a telescope from shops in Paris, the same year Galileo published that he was the first to see the moons of Jupiter, a claim which is also in doubt since there is evidence that other observations of Jupiter preceded Galileo's, and that Galileo's telescope was so small and clumsy it would have been hard to see Jupiter itself, much less its moons.[592] When Kepler pressed him to send the telescope so that his claims could be verified, Galileo gave him the typical 'the-dog-ate-it' excuse, claiming that he had "lent it to the Grand Duke for exhibition."

Still, Galileo managed to have himself become the celebrated discover of Jupiter's moons. The Jesuits of the Roman College set aside a day of ceremonies in his honor, and he was invited to a personal audience with Pope Paul V. Galileo followed this by naming the moons the "Medicean Stars" in honor of the Medici family who were the financial barons of Italy. Having previously dabbled in astrology, Galileo wrote a personal horoscope for Cosimo Medici, the Grand Duke of Tuscany, stating: "It was Jupiter, I say, who at your Highness' birth…looked down upon your most fortunate birth."[593] Cosimo promptly elevated Galileo to the position of chief mathematician and philosopher, whereupon he received a salary of 1,000 florins a year, and was thus financially secure for the rest of his life. In his usual lack of gratitude, Galileo rarely mentions Kepler's name in his books, and even those occasions are with the intent to refute him. It is no surprise that Galileo rejected Kepler's three laws of planetary motion as well as his discoveries in optics. Not surprisingly, the unconverted Galileo thought he had a better idea. To one of his other rivals Galileo stated:

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[592] Ernst Zinner, *Entstehung und Ausbreitung der Copernicanischen Lehre* (Erlangen, 1943), p. 345, cited in *The Sleepwalkers*, pp. 372-374. Various unverified stories are circulated about the unwillingness of various people to accept Galileo's sighting of Jupiter's moons, such as Cesare Cremoni and Giulio Libri, professors of philosophy at Padua and Pisa, respectively, and Christoph Clavius who is purported to have said that the moons were a trick of Galileo's telescope lenses. See Paul Feterabend's extensive treatment of this issue and the matter of Galileo's alleged invention of the telescope in *Against Method*, pp. 81-93.
[593] *The Book that Nobody Read*, pp. 200-201.

You cannot help it, Mr. Sarsi [*i.e.*, Grassi] that it was granted to me alone to discover all the new phenomena in the sky and nothing to anybody else. This is the truth which neither malice nor envy can suppress."[594]

His self-appointed monopoly on the sky is probably why Galileo also claimed to be the first to discover sunspots, but the records show that the Jesuits Johannes Farricius and Christopher Scheiner and his assistant Cysat had found the spots much earlier, both of whom had published their findings separately, many months before Galileo.

Galileo's deceit reached new heights in his confrontations with the Church's Holy Office from 1616-1633. Prior to this, Galileo had made known his views of heliocentrism privately in a 1597 letter to Kepler:

I have already for many years come to accept the Copernican opinion and with this hypothesis have been able to explain many natural phenomena, which under the current hypotheses remain unexplainable.[595]

Yet in his characteristic duplicity, in the intervening years between 1597 and up until 1613, he had been teaching against Copernicanism quite vigorously, complete with charts and graphs. A 1601 manuscript of his musings still survives today.[596] Galileo was in a constant whirlwind: saying one thing and doing another, and doing one thing and saying another. Suffice it to say, after the Church gave him every grace and favor to treat Copernicanism as a hypothesis, not fact, Galileo refused to comply, claiming he had proof when, indeed, he had none at all. The Church hierarchy simply could not put up with his roguery any longer. His former confidant, Cardinal Barberini, later became Urban VIII, and, as pope,

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[594] *The Sleepwalkers*, p. 436. Taken from Galileo's 1623 book titled *Il Saggiatore* (*The Assayer*). The book starts with a tirade against his opponents: "Others, not wanting to agree with my ideas, advance ridiculous and impossible opinions against me; and some, overwhelmed and convinced by my arguments, attempted to rob me of that glory which was mine, pretending not to have seen my writings and trying to represent themselves as the original discoverers of these impressive marvels" ("The Assayer," *Theories and Opinions of Galileo*, translated by Stillman Drake 1957, p. 274).

[595] *Le Opere di Galileo Galilei*, Vol. 10, p. 68.

[596] *Trattato della Sfera*, Florence, Opere, Ediz. Nationale, Vol. II, 1929, pp. 203ff. Galileo said the Earth did not move, since if it did, the clouds could not keep up with it. Klaus Fischer surmises that often Galileo doubted the Copernican system, since he knew he had no solid proof (*Galileo Galilei*, p. 94).

made it a point to condemn Galileo for lack of proof. Urban upheld the 1616 Sacred Congregation's verdict of "formal heresy" for Copernicanism and "vehemently suspect of heresy" for Galileo after obtaining Galileo's renunciation in 1633. He sent notice of the condemnation to all the inquisitors and papal nuncios of Europe, making it an official proclamation of the Vatican.[597]

Galileo never married but he fathered two illegitimate daughters and one son between the years of 1600 and 1606 with his long-time mistress, Marina Gamba of Venice, whom he eventually abandoned. In light of his immorality, the unconverted Galileo was hardly the example of a devout Catholic. Although Galileo took his children with him to Florence, he soon found caring for them to be very annoying and he decided to send the daughters to an impoverished convent in Arcetri because of what one historian calls his "irrepressible egotism"[598] that led him to abandon them. The older daughter was baptized as Virginia and adopted the name Maria Celeste when taking her vows as a nun. She was very close to Galileo and had much correspondence with him. At her death in 1634 (a year after Galileo's trial) Galileo became very despondent. She was chosen to read to Galileo the daily penitential Psalms imposed upon him in exile by Pope Urban VIII. The other daughter, Livia, who took the name Arcangela at the convent, maintained her animosity toward him for the rest of his life. The son, Vincenzio, was legitimized by Galileo's former student and now Grand Duke of Tuscany, Cosimo Medici.

All things considered, the unconverted Galileo was probably one of history's better examples of a sophist and propagandist. Although his image is one of an empiricist who made no claims apart from experiment, Galileo often gloried in credit where no credit was due. Arthur Koestler, helps reveal the man behind the image:

> The personality of Galileo, as it emerges from works of popular science, has even less relation to historic fact than Canon Koppernigk's…[H]e appears…in ration-alist mythography as the Maid of Orleans of Science, the St. George who slew the dragon of the Inquisition. It is, therefore, hardly surprising that the fame

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[597] As Dorothy Stimson reports, "Pope Urban had no intention of concealing Galileo's abjuration and sentence. Instead, he ordered copies of both to be sent to all inquisitors and papal nuncios that they might notify all their clergy and especially all the professors of mathematics and philosophy within their districts…" (*The Gradual Acceptance of the Copernican Theory of the Universe*, 1917, pp. 67-68).

[598] As quoted in: *This Wild Abyss: The Story of the Men Who Made Modern Astronomy*, Gail E. Christianson, 1978, p. 272.

of this outstanding genius rests mostly on discoveries he never made, and on feats he never performed. Contrary to statements in even recent outlines of science, Galileo did not invent the telescope; nor the microscope; nor the thermometer; nor the pendulum clock. He did not discover the law of inertia; nor the parallelogram of forces or motions; nor the sun spots. He made no contribution to theoretical astronomy; he did not throw down weights from the leaning tower of Pisa and did not prove the truth of the Copernican system. He was not tortured by the Inquisition, did not languish in its dungeons, did not say 'eppur si muove'; and he was not a martyr of science.[599]

The most egregious fact about the unconverted Galileo is that at the time he was vigorously defending Copernicanism before the Holy Office in 1633, he knew *even then* the system didn't work and that he had no substantial proof for it. Since he rejected Kepler's elliptical orbits,[600] and refused any compromise with the Jesuits who were going over to Brahe's geocentric model,[601] he was stuck with Copernicus' forty-eight epicycles,

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[599] *The Sleepwalkers*, p. 358. Koestler adds, however, that Galileo discovered that a pendulum swings at constant frequency, regardless of amplitude, and that he invented the pulsilogium, a timing device for taking pulses, and the thermoscope, a forerunner of the thermometer (pp. 359-360). Regarding the experiment on falling bodies, I. Bernard Cohen states that Galileo's conclusion "only shows how firmly he had made up his mind before hand, for the rough conditions of the experiment would never have yielded an exact law" (*Lives in Science*, 1957, p. 14). Some admirers even revise Galileo's words to conform to the empiricist image. Broad and Wade point out Alexandre Koyré's discovery that an author added the phrase "by experiment" to Galileo's original wording: "Nevertheless, I have discovered *by experiment* some properties of it which are worth knowing and which have not hitherto been observed or demonstrated" ("Traduttore-Traditore. A Propos de Copernic et de Galilée," *Isis*, 34, 209-210, 1943; *Metaphysics and Measurement: Essays in Scientific Revolution*, 1968). They continue: "With Galileo, the desire to make his ideas prevail apparently led him to report experiments that could not have been performed exactly as described…The Renaissance saw the flowering of Western experimental science, but in Galileo, the propensity to manipulate fact was the worm in the bud" (*Betrayers of the Truth*, p. 27).

[600] Kepler tried in many instances to establish a correspondence with Galileo, but Galileo remained quite aloof, thinking he had a better answer to cosmology. He used Kepler's material, however, whenever it was to his advantage, and claimed it as his own.

[601] Koestler writes: "Jesuit Father Horatio Grassi of the *Collegium Romanum*…quoted with approval Tycho's conclusions…a further step in the Jesuits retreat from Aristotle…and a further sign of the Order's implicit

yet he advertised the model as one that bypassed the earlier mechanical problems "with one single motion of the Earth."[602] It is obvious that either Galileo was lying or he never read Copernicus' book, which is one of the reasons Koestler refers to Copernicus' work as "The book that nobody read." Even Owen Gingerich, who disagrees with Koestler's general assessment that Copernicus' book was unread, agrees that Galileo didn't read it.[603] Calling his bluff, Robert Bellarmine stated quite clearly to Galileo that the Church would not even consider changing its position on the cosmos unless Galileo could provide proof of his claims. In one of his more audacious moves, Galileo tried to prove his case by a strange

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endorsement of the Tychonic system" (*The Sleepwalkers*, pp. 473-474). In 1619, Grassi wrote *The Astronomical and Philosophical Balance* in support of the Tychonic system, and Galileo answered with *Il Saggiatore* (The Assayer) in 1623, which, in his usual sardonic manner, calls Brahe's 40-years worth of planet-charting mere "alleged observations" and, not believing in comets himself, assigns them the title "Tycho's monkey-planets." He berates Grassi with epithets such as "piece of asininity," "buffoon," "evil poltroon," and "ungrateful villain." De Santillana adds that some of Galileo's favorites were "mental pygmies," "dumb mooncalves" and "hardly deserving to be called human beings." In all of history, only Martin Luther surpasses Galileo in the category of producing the most caustic vitriol against his opponents.

[602] As quoted from the third day of arguments in *Dialogue on the Flux and Reflux of the Tides*, also known from the title that Pope Urban preferred: *The Dialogue on the Two Great World Systems*. Koestler adds: "The third day is concerned with the astronomical arguments for and against Copernicus, and here Galileo is downright dishonest…that to 'save' the planets' apparent stations and retrogressions, Ptolemy had to introduce 'very great epicycles' which Copernicus was able to dispense 'with one single motion of the Earth.' But he breathes not a word about the fact that Copernicus, too, needs a whole workshop full of epicycles; he keeps silent about the eccentricity of the orbits, the various oscillations and librations, the fact that the sun is neither in the center of the motions, nor lies in their plane; in a word, he deliberately evades the real problems of astronomy which had started Tycho and Kepler on their quest….Moreover, he keeps silent about the fact that the Tychonic system fits the phenomena equally well.…He employs his usual tactics of refuting his opponent's thesis without proving his own; in this case not by sarcasm, but by confusing the issue" (*The Sleepwalkers*, pp. 483-485).

[603] After seeing hardly any annotations in Galileo's personal copy of Copernicus' *De Revolutionibus*, Gingerich notes: "I had long supposed that Galileo was not the sort of astronomer who would have read Copernicus' book to the very end. Even…when we had speculated how few early readers of *De Revolutionibus* there might have been, we had been reluctant to include Galileo in the list of readers. Unlike Reinhold or Maestlin or Kepler, he was not interested in the details of celestial mechanics" (*The Book that Nobody Read*, p. 200).

concoction of theory and conjecture on the nature of tidal action. Having rejected as "occultish" Kepler's explanation that the combination of the sun's and moon's gravity caused the daily tides, Galileo, even knowing that his own explanation could not be physically possible, nevertheless, to save his prestige, tried to convince the Catholic prelates that tides were caused by the tilt of the Earth's axis and the Earth's monthly changes in orbital velocity. In addition, his theory addressed only a 24-hour tidal cycle, but sailors knew, and reported to the common folk, that the tides alternated every 12 hours, creating two tides per day. Galileo then tried to explain the discrepancy by postulating that the ocean floor varied in depth. No wonder Koestler concludes his remarks with:

> There can be no doubt that Galileo's theory of the tides was based on unconscious self-deception…. Making the complexities of Copernicus appear deceptively simple, was part of a deliberate strategy, based on Galileo's contempt for the intelligence of his contemporaries. We have seen that scholars have always been prone to manias and obsessions, and inclined to cheat about details; but impostures like Galileo's are rare in the annals of science.[604]

Identical to Copernicus, Galileo was enamored with circles, and if something did not fit into that mold, it was eliminated. As Feyerabend notes:

> Galileo's circular law is not the right dynamics. It fits neither the epicycles which still occur in Copernicus, nor Kepler's ellipses. In fact, it is refuted by both. Still, Galileo regards it as an essential ingredient of the Copernican point of view and tries to remove bodies, such as comets, whose motion quite obviously is not circular, from interplanetary space. In his Assayer "Galileo talked about comets [and interpreted them as illusions, similar to rainbows] in order to protect the Copernican system from possible falsifications."[605]

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[604] *The Sleepwalkers*, p. 486. See also W. R. Shea and M. Artigas, *Galileo in Rome: The Rise and Fall of a Troublesome Genius*, 2003.

[605] *Against Method*, p. 77, n. 1, quoting Redondi's *Galileo Heretic*, pp. 145, 31. Feyerabend later adds: "An example of backward movement of this kind is Galileo's return to the kinematics of the *Commentariolus* [of Coerpnicus] and his disregard for the machinery of epicycles as developed in the *De revolutionibus*" (*ibid.*, p. 114).

As we will detail later in Volume III, however, Galileo finally came to his senses after his chastisement from Pope Urban VIII. Without any hint that he is speaking under duress or to save himself from further condemnation, Galileo writes his letter to Francesco Rinuccini denouncing Copernicanism in the most explicit terms. Of course, the malice with which Galileo started his highfalutin theories continues today, since hardly anyone in the world has ever heard of the fact that Galileo renounced Copernicus in favor of geocentrism.

Isaac Newton
Climbing the Ladder of Success: One Body at a Time

Although Isaac Newton is much deserving of scientific credit for at least providing mathematical formulas of motion that, within the margin of error, are quite accurate, his personal life was little to be admired. Kepler's jealousy of Brahe was only slightly worse than the avarice that drove Newton's to confiscate the work of his contemporaries and credit it to himself.

Case in point: astronomer John Flamsteed was the owner of voluminous notes charting lunar movements and the positions of the stars, notes that Newton desperately needed to fit the moon into his gravitational theory for the publishing of his famous *Philosophiae Naturalis Principia Mathematica*. A bitter feud resulted between the two men wherein Newton, using his influence with government officials, forced Flamsteed's hand. Not only did Newton surreptitiously wrest Flamsteed from his painstaking work, he did the same to Gottfried Leibniz, Stephen Gray and Robert Hooke. Regarding Leibniz, Westfall informs us:

> By 1713, moreover, Newton's perpetual neurosis had reached its passionate climax in the crusade to destroy the arch-villain Leibniz. Only a year earlier the Royal Society had published its Commercium epistolicum, a condemnation of Leibniz for plagiary and a vindication of Newton, which Newton himself

composed privately and thrust upon the society's committee of avowed impartial judges.[606]

In 1666,[607] 1674[608] and again in 1679 in direct correspondence with Newton, Hooke published his theory of the 'inverse square law' regarding the force of gravity. Despite admitting in his letter to Hooke that Hooke deserved credit for the discovery, Newton tried to claim it as his own, feigning that he had thought about it many years earlier but didn't decide to publish it in his own book until thirteen years after the initial ideas came to him. As historian Ellen Tan Drake notes:

> Newton, however, claimed to have arrived at his universal law of gravitation at his country home in Woolsthorpe during the plague years 1665 or 1666 (it is not clear which), during his *annas mirabilis* (this "marvelous year" when the legendary apple fell). This date, of course, would clearly predate Hooke's expression of the law except that there is clear proof that as late as 1675, Newton still thought that the planets and Sun were kept apart by "some secret principle of unsociableness in the ethers of their vortices," and that gravity was due to a circulating ether that had to be replenished in the center of the Earth by a process like fermentation or coagulation.[609]

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[606] Richard S. Westfall, "Newton and the Fudge Factor," *Science*, 179, 751, 1973.

[607] Lecture given to the Royal Society titled *Planetary Movements as a Mechanical Problem*, on May 23, 1666, as reproduced in *Early Science in Oxford* by R. T. Gunther, 1930, ref. 1, Vol. vi, p. 256.

[608] Hooke's monograph: *An Attempt to Prove the Motion of the Earth by Observation*, London, 1674, as reproduced in *Early Science in Oxford* by R. T. Gunther, 1930, ref. 1, Vol. vii, pp. 1-28.

[609] *Restless Genius: Robert Hooke and his Earthly Thoughts*, Ellen Tan Drake, 1966, pp. 32-33. Drake's source is Newton's letter to Oldenberg, Dec. 7 1675, as cited in Turnbull, 1959, vol. 1: 368; Patterson, 1950. John Aubrey in *Aubrey's Brief Lives*, 1957, p. 166, confirms that Hooke's discovery of the Inverse Square Law predated Newton's *Principia*, as does I. Bernard Cohen: "In 1717 Newton wanted to ensure his own priority in discovering the inverse-square law of gravitation, and so he invented a scenario in which he made the famous moon test not while writing the *Principia* but two decades earlier in the 1660's.… Newton never published his invented scenario of the early moon test. He included it in the manuscript draft of a letter to the French writer Pierre Des Maizeaux but then crossed it out. Newton also circulated the familiar story that a falling apple set him on a chain of reflections that led to the discovery of universal gravitation. Presumably this invention was also part of his campaign to push back the discovery of gravity, or at least the roots of the discovery, to a time 20 years

Newton won the day against Hooke by using his influence at the Royal Society, just as he did in heading off the new discoveries of Robert Boyle, all in an effort to advance his own career.[610] On at least three separate occasions Newton introduced fallacious figures into the *Principia* in order to increase its apparent power of prediction.[611] As Westfall notes:

> And having proposed exact correlation as the criterion of truth, it took care to see that exact correlation was presented, whether or not it was properly achieved. Not the least part of the *Principia's* persuasiveness was its deliberate pretense to a degree of precision quite beyond its legitimate claim. If the *Principia* established the quantitative pattern of modern science, it equally suggested a less sublime truth that no one can manipulate the fudge factor quite so effectively as the master mathematician himself.[612]

Because of Newton's vast social influence, the book was considered an "epoch-making" work long before it was thoroughly reviewed, the highly popular John Locke having accepted it based merely on the word of Newton.[613]

In addition to the ill-treatment he gave to his scientific colleagues, Newton was rumored to have had a homosexual relationship with one John Wickins, a friend with whom he had lived for twenty years. He is also said to have had a liaison with Nicholas Fatio De Duillier, a man twenty years his junior and with whom he exchanged intimate letters, many of which were later censured by Newton or a confidant. Newton was also deep into alchemy (illegal at the time) and the Jewish Kabbalah, the occult musings of medieval Talmudic authors. Although he was reputed to have Christian

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before the *Principia*" ("Newton's Discovery of Gravity," *Scientific American*, 244 (3), 166, 1981).

[610] David Clark and Stephen P. H. Clark, *Newton's Tyranny: The Suppressed Scientific Discoveries of Stephen Gray and John Flamsteed*, 2001; Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton*, 1981, 1983, pp. 471f, 601f; on Robert Boyle see *False Prophets*, Alexander Kohn, 1986, p. 39.

[611] Richard S. Westfall, "Newton and the Fudge Factor,", *Science*, 179, 751-758, 1973; *False Prophets*, Alexander Kohn, 1986, pp. 36-39.

[612] Richard S. Westfall, "Newton and the Fudge Factor," *Science*, 179, 751, 1973.

[613] Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton*, 1981, 1983, pp. 469-470; Morris Kline, *Mathematics in Western Culture*, 1953, p. 230. See also Kline's *Mathematics: The Loss of Certainty*, 1982.

moorings, Newton embraced the heresy of Arianism (*i.e.*, the denial of both the divinity of Christ and the Trinity).[614]

Unknown to most, Newton spent most of his time interpreting biblical prophecy, writing over a million words on the subject. One of his more intriguing predictions is the date of 2060 A.D. as the end of the world, but that date surfaces only because Newton decided that the Roman Catholic Church was the Antichrist. Having arbitrarily put the Church's historical peak at 800 A.D., he interpreted the 1260 days of Apocalypse 11-13 as years, adding them to 800 A.D. to come up with 2060 A.D. as the date of the end of the world.[615] As Westfall says, Newton "hated and feared

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[614] Westfall writes: "In Newton's eyes, worshiping Christ as God was idolatry, to him the fundamental sin" (Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton*, Cambridge University Press, 1981, 1983, p. 314). On Newton's intimacy with Wickens and Fatio, see *Isaac Newton: The Last Sorcerer*, Michael White, 1997, pp. 235-254. In addition, Voltaire had accused Newton of using his niece to entice politicians so that Newton could gain various positions of prestige. Voltaire writes: "I thought in my youth that Newton made his fortune by his merit. I supposed that the court and the city of London named him Master of the Mint by acclamation. No such thing. Isaac Newton had a very charming niece, Madame Conduitt, who made a conquest of the minister of Halifax. Fluxions and gravitation would have been of no use without a pretty niece" (*Dictionnaire Philosophique*, as cited in N. Martin Gywnne's *Sir Isaac Newton and Modern Astronomy*, Britons Catholic Library, n. d., p. 8). Westfall, although an admirer of Newton and predisposed to dismiss any hearsay, adds: "The wider ramifications with Halifax, and Newton's involvement in it, do not evaporate with equal ease," although "With Halifax the libertine, Victorian eulogizers could not bear to associate Newton. Nor could they bear the thought, the point of Voltaire's jibe, that Newton used the degradation of his niece to advance his own career." (*Never at Rest: A Biography of Isaac Newton*, 1981, 1983, pp. 596-597).

[615] Newton borrowed the '1260 days = 1260 year' scheme from the Puritan mystic Joseph Mede. Mede added the 1260 years to 400-455 AD and held that the end of the world would come around 1760-1815 AD. Others began at different dates (*e.g.*, Bengel at 576; Ellicott at 608; Melanchthon at 660, et al., most trying to bring the terminus to the Reformation). Newton believed that the Second Coming of Christ would follow plagues and war and would precede a 1,000-year reign of Christ and the saints on Earth, otherwise known today as "premillenniallism." He spent close to 50 years delving into biblical prophecy, writing over 4,500 pages in an effort to determine the end of the world. Many of these papers had lain undisturbed in the house of the Earl of Portsmouth for 250 years, which were eventually sold by Sothebys in the late 1930s. This collection of papers was purchased by Abraham Yahuda, and was stored in the Hebrew National Library. It was among these documents that the date 2060 was found. (See also Michael White's *The Last Sorcerer*, pp. 156-157).

popery,"[616] and as Koestler concludes, Newton was "a crank theologian like Kepler…and held that the tenth horn of the fourth beast of the Apocalypse represented the Roman Catholic Church."[617]

Albert Einstein
Everything's Relative: Including Morality

Albert Einstein's biography is one of the more lurid in the annals of science, but most of it has been hidden from the public for many years. Although *Time* magazine named him "Person of the Century,"[618] as a matter of fact, few in modern history have been so thoroughly shrouded in impenetrable media insulation as Einstein. The decease of the executors of his estate, Helen Dukas (d. 1982) and Otto Nathan (d. 1987) precipitated the release of many of Einstein's previously censured personal papers.[619]

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[616] Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton*, 1981, 1983, p. 483.

[617] Arthur Koestler, *The Sleepwalkers*, p. 536.

[618] Stephen Hawking, "Person of the Century," *Time Magazine*, December 31, 1999. *Time* lavished praise on Einstein with such phrases as: "first among the century's giants," "its greatest scientific genius," "the person who, for better or worse, personified our times and will be recorded in history as having the most lasting significance," "the world's first scientific celebrity," "the century's greatest thinker," and "the patron saint of distracted schoolkids." Such unqualified admiration for Einstein is quite sacrosanct in the scientific field. In the book *Einstein's Unfinished Symphony* by Marcia Bartusiak (New York, Berkley Books, 2000, p. 4), MIT scientist Rainer Weiss, working on the federally funded LIGO system to test for gravity waves to confirm General Relativity, is quoted as saying: "The worship of Einstein, it's the only reason we're here, if you want to know the truth." Incidentally, Bartusiak's book is titled "Unfinished Symphony" because, of all the LIGO systems built across the world, no one has ever detected General Relativity's "gravitational wave" (*ibid.*, p. 10).

[619] Helen Dukas had motivation to do so, since she met Einstein in 1928 when Einstein's second marriage [to his cousin Elsa Löwenthal] was rapidly deteriorating, of which Elsa "sought as far as possible to block the subject of infidelity from her mind" (*The Private Lives of Albert Einstein*, p. 210). Zackheim adds: "Hans Albert suspected they were lovers. His allegation was fortified by the proximity of her room in Princeton – just off Albert's study and down the hall from Elsa's. In addition, Einstein left Dukas more money in his will than any other member of his blood family, as well the net income from his royalties and copyright fees and all his books and personal effects" (*Einstein's Daughter: The Search for Lieserl*, p. 253). Highfield and Carter add: "Dukas became fiercely loyal to her employer: she was liable to attack as 'dung' any biography that dared

In them we find that, close behind the wire-haired, absent-minded and winsome Dr. Jekyll, there lurked a veritable Mr. Hyde.

Einstein's misdeeds began early in his career. He fathered a daughter out of wedlock with Mileva Marić, although the couple eventually married. They named the child Lieserl, but that is all the attention she would ever receive from Einstein. He persuaded Mileva to give the child to an orphanage so that he could avoid the social repercussions of having an illegitimate daughter. He handled it as a mere business transaction, for he never saw Lieserl face-to-face. As biographer Michele Zackheim explains it:
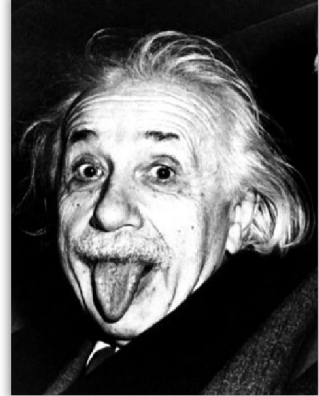
> Einstein scholars have concluded from his September 19 [1903] letter that the couple had decided to put Lieserl up for adoption, based on Albert's concern that the child's registration (or lack thereof) not be a source of trouble for her – or her parents – in the years to come….Apparently, in the end, Albert and Mileva agreed it would be best to pretend that Lieserl had never existed. And so, with a deliberate hand, the short life of Lieserl Einstein-Marić was erased.[620]

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shed light on Einstein's personal life, and she saw newsmen as her 'natural enemies'" (*The Private Lives of Albert Einstein*, p. 211).

[620] *Einstein's Daughter: The Search for Lieserl*, pp. 52-53. Zackheim also concludes from her massive evidence that Lieserl had a severe mental handicap, which helped seal the Einsteins' decision, and that she died at twenty-one months old, on September 21, 1903. Mileva's father was given the task of making sure that no official records concerning her short life remained in any governmental or church repositories (*ibid*., pp. 276-277). Highfield and Carter describe the situation: "There is no evidence that Einstein and his daughter ever set eyes on one another. For all his apparent enthusiasm after the birth, it seems that his main concern was to free himself of this burden at the earliest opportunity. Lieserl's existence was kept hidden even from his closest friends, and within months she had disappeared from his life without trace. Einstein was never to talk of her publicly, and Lieserl might have been erased from history had it not been for the discovery of his letters to Mileva by the Einstein papers project….The dangers that seemed to preoccupy him were unconnected to the child's illness: his question about registration strongly suggests that she was being surrendered for adoption, and that Einstein was eager to cover his tracks. The lack of any official record of the birth would appear to be a tribute to the thoroughness of the precautions that he referred to. Lieserl's birth posed a threat to Einstein's new start as a patent

Albert and Mileva Einstein, circa early 1900s

That such callousness wasn't merely an incidental quirk is demonstrated when Einstein later forsook his son Eduard and consigned him to a sanatorium so that he could be relieved of the financial responsibility of Eduard's care and take full advantage of the public funding available. Eduard eventually died in the sanatorium.[621]

Einstein's indifference to his children, however, was overshadowed by the animosity he showed to his wife. According to the divorce papers, Mileva was the victim of physical violence in the marriage, and Einstein's adultery was the final straw that led to the legal separation in 1914 and final divorce in 1919.[622] As the marriage to Mileva began to deteriorate,

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examiner in Berne. He had gained Swiss citizenship only a year earlier, and the stigma of an illegitimate child would have harmed his prospects…The couple's meager income may have provided another motive for giving the child away…" (*The Private Lives of Albert Einstein*, pp. 88-90).

[621] Mileva wrote to Albert: "'You have here a dear, seriously ill child. Often he asks if his father will come, and with each postponement, he becomes even more morose. He is terribly wounded.' Albert refused to come back to Zurich to see Eduard. And he refused to acknowledge the financial and psychological battles that Mileva had to wage over his care" (*Einstein's Daughter*, p. 190).

[622] Zackheim writes: "He tended to have a few romances going at once, but after Mileva, he was known to prefer simpler women" (*Einstein's Daughter*, p. 227). Highfield and Carter write: "Einstein was obliged to admit in his legal submissions that he had committed adultery. There were also references to fierce fights between him and his wife, which had made their continued marriage intolerable" (*The Private Lives of Albert Einstein*, p. 188). Zackheim gives the wording of the deposition from Einstein's own hand: "…It is true that I have committed adultery. I have been living for approximately four and one-half years with my cousin, the widow Elsa Löwenthal, and since then I have had intimate

"Einstein established himself in a bachelor apartment around the corner from Elsa," his cousin and next love interest, whom he eventually married in 1919, only four months after his divorce.[623] In one of his more audacious moves, Einstein had actually pleaded with Mileva to allow him to marry Elsa, using as his excuse that Elsa's daughter "…had to suffer from rumors that have been circulating regarding my relationship with her mother. That weighs upon me and needs to be remedied through a formal marriage."[624] If this had been the real motive for Einstein's pleading, we might be tempted to conclude that he was merely a deranged individual who had lost touch with reality. The real truth is even more sinister and shocking. The thirty-nine-year-old Einstein was actually in a debate with himself whether he should marry Elsa or her twenty-year-old daughter, Ilse, while all along he had been shacking up with Elsa (for the four years prior), and while still married to Mileva. As Zackheim explains:

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relations with her. My wife, the plaintiff, has been informed that I have had intimate relations with my cousin since the summer of 1914" (*Einstein's Daughter*, p. 87). In a related incident, the biographers add: "The following day Lisbeth and her mother visited Mileva and found her face badly swollen. It seems that Lisbeth may have been suggesting that Mileva had been beaten. Einstein was a powerful man and, for what it is worth, Hans Albert recalled that when he misbehaved his father 'beat me up'. …. It is known that Einstein's divorce papers – which remain under seal in Jerusalem – refer to violence within the marriage" (*The Private Lives of Albert Einstein*, pp. 153-154; See also *Einstein's Daughter*, p. 73). After Mileva suspected an affair between Albert and Anna Meyer-Schmid, Albert complained that this "was typical in a woman of such 'uncommon ugliness,'" adding, "Professor John Stachel says this remark was the first to shock him as he worked through Einstein's papers after his appointment as their editor" (*Private Lives*, pp. 125-126). Mileva describes herself as "starved for love" as early as 1900 (*ibid.*, p. 128). See also *In Albert's Shadow: The Life and Letters of Mileva Marić*, pp. 16-17.

[623] *The Private Lives of Albert Einstein*, p. 172. Yet, Highfield and Carter add: "But there is no evidence that Mileva believed her husband was about to be stolen from her, battered though their marriage was. Einstein…had no plans to leave her. Instead he intended to pursue his affair while remaining her husband. … He remarked to Elsa 'But the order is always to pretend. Only when we are born and when we die are we permitted to act in an honest way'" (*The Private Lives of Albert Einstein*, pp. 163-164); "Mileva would remain a virtual invalid for three years after Albert's decision to end the marriage…" (*In Albert's Shadow*, p. 19). Prior to his involvement with Elsa, Einstein had a short fling with Paula Einstein, Elsa's sister, but soon ended the relationship. He then wondered why he had become involved with her, settling for the rationale that "she was young, a girl, and complaisant. That was enough" (*Einstein's Daughter*, p. 72).
[624] *Einstein's Daughter*, p. 85.

Hans Albert and his father

Albert was not being honest [with Milvea]. By May [1918], he had made it clear that he wanted to marry Elsa's daughter Ilse. Ilse reported to a friend, Georg Nicolai: "Yesterday, suddenly the question was raised about whether A[lbert] wished to marry Mama or me…A[lbert] himself is refusing to take any decision, he is prepared to marry either Mama or me. I know that A[lbert] loves me very much, perhaps more than any other man ever will, he also told me so himself yesterday…"[625]

In the waning months of his time with Mileva, records made public in 1996 show that Einstein gave her a list of conditions in order for her to remain under his financial care:

- You will see to it: (1) that my clothes and linen are kept in order; (2) that I am served three regular meals a day in my room; (3) that my bedroom and study are always kept in good

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[625] *Einstein's Daughter*, pp. 85-86. Zackheim adds: "At the top of the letter, Ilse had written, 'Please destroy this letter immediately after reading it!'" Shortly after Ilse wrote this letter, Albert wrote to Mileva and told her that he had changed his mind about coming to see the boys in the summer. Instead, he had decided to go to Ahrenshoop, a remote village on the Baltic Sea, with Elsa, Ilse, and Ilse's younger sister, Margot" (*ibid*., p. 86). Sixteen years later when Ilse lay dying of cancer in Paris at age 34, Elsa asked Albert to go to her bedside but he refused (*A World Without Time: The Forgotten Legacy of Gödel and Einstein*, p. 148).

order and that my desk is not touched by anyone other than me.

- You will renounce all personal relationships with me, except when these are required to keep up social appearances. In particular, you will not request: (1) that I sit with you at home; (2) that I go out with you or travel with you.

- You will promise explicitly to observe the following point in any contact with me: (1) You will expect no affection from me and you will not reproach me for this; (2) You must answer me at once when I speak to you; (3) You must leave my bedroom or study at once without protesting when I ask you to go; (4) You will promise not to denigrate me in the eyes of the children, either by word or deed.[626]

Mileva was apparently no fool. A few months after receiving the above letter she moved to Zurich with her children and never returned to Einstein.

Things fared no better for Elsa, the eventual winner of the 'Elsa versus Ilse' contest. Einstein persuaded Elsa to divorce her husband, Max Löwenthal, so that the two lovers could marry. But this marriage shortly began to deteriorate due to Einstein's sexual affairs. According to one biographer, "she told him he could have a woman on the side, but only one at a time,"[627] and to her dismay, Einstein's adultery was, indeed, serial.[628] As he had with Mileva, Einstein recast their relationship as one of mere convenience. She died in 1936, nineteen years before Einstein.

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[626] *London Daily Telegraph*, October 30, 1996; *Einstein's Daughter*, p. 77. In one of his love letters to Elsa, Einstein wrote: "I treat my wife as an employee whom I cannot fire. I have my own bedroom and avoid being alone with her" (*Einstein's Daughter*, p. 73).

[627] From biographer Michael Shara, *Discover*, Sept. 2004, pp. 29-30. Highfield and Carter write: "It has to be said that Elsa was not the only one of Einstein's female relatives to catch his eye. It appears that, either during this trip or some time earlier, he had also flirted with her younger sister, Paula" (*The Private Lives of Albert Einstein*, p. 148).

[628] Highfield and Carter note: "Einstein joked that he preferred 'silent vice to ostentatious virtue,' but there was little that was furtive about his affairs. Either they were conducted in open view, or easy clues were left for Elsa to discover. Another incident…gives the impression that Einstein was eager for his wife to know what he was up to…" (*The Private Lives of Albert Einstein*, p. 209).

It is amazing to read what other scientists say about this part of Einstein's life. We encounter nothing short of a willful moral blindness to his immoral exploits. For example, Ludwik Kostro, concealing any unethical behavior on the part of Einstein, writes:

> His wife and two sons left him soon after that, moving back to Zürich, and it was a shock to him. After she left him, he rented a bachelor flat at 13 Wittelsbach-erstrasse.[629]
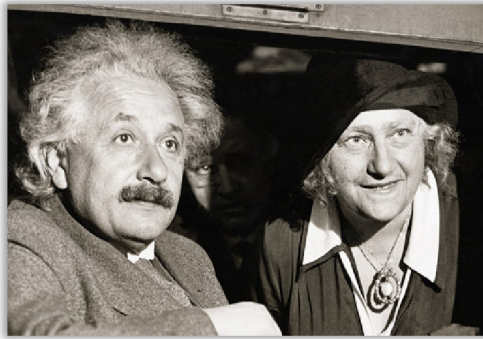
Einstein with his new wife, Else Lowenthal

Yet perhaps the reason Kostro writes such a biased description is that he is merely citing one of the chief biographies of Einstein, which is itself a systematic and deliberate attempt to conceal Einstein's improprieties. The book is *Subtle is the Lord* written by Abraham Pais.[630] The mere title implies that Pais set out to idolize Einstein and make it appear as if his theories were divinely endorsed, if not inspired. Although Roger Penrose is honest enough in the Foreword to admit that: "Einstein was certainly no saint,"[631] his penetration stops there, and following him, Pais fails to mention even one incident of Einstein's unethical or immoral behavior in his entire 552 page treatise. Whenever accusations of plagiarism surface against Einstein, Pais invariably makes it appear as if Einstein miraculously and coincidentally came to the same discovery by his own independent study. Whenever Einstein is guilty of abandoning his family, Pais invariably makes it appear as if Einstein is a dedicated father who is misunderstood. Whenever Einstein is guilty of adultery, Pais glosses over it and divulges no such improprieties. Instead he makes Einstein's wives

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[629] *Einstein and the Ether*, Aperion, 2000, p. 57.
[630] Abraham Pais, *Subtle is the Lord: The Science and Life of Albert Einstein*, 1982, 2005. Kostro cites pp. 224, 240.
[631] *Ibid*., p. ix.

appear as if they are neurotic, referring to Mileva as a "difficult woman, distrustful of other people and given to spells of melancholy,"[632] but never making so much as a suggestion that she might have fallen into such mistrust and depression because her husband was committing heinous sins against her and the family.

Pais is not alone in his exoneration of Einstein. Gerald Holton, the Harvard physicist and scientific historian excuses Einstein's behavior as a mere product of his times. He writes:

> You have to keep in mind that in Europe at the time, for a pursued charismatic man, his behavior wasn't so unusual. Moreover, the letters show that it was generally he who asked to end such [adulterous] relationships.[633]

In addition to his sexual escapades, Einstein was suspected of plagiarism, as well as failing to give scientific credit to Mileva who helped him develop his Relativity theories.[634] As we noted in Vol. 1, Appendix 2, one of the biggest myths surrounding the aura of Einstein is that he was the inventor of the famous $E=mc^2$ formula. In actuality, there were at least a dozen scientists who had either developed or employed the formula prior to Einstein.

Other instances of Einstein's outright plagiarism abound. Although Abraham Pais does his best either to minimize or to make these incidents coincidental, the facts speak for themselves.[635] One of the more notable

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[632] *Ibid.*, p. 301. Pais complete description of these events is limited to pages 300-301. The reader would simply have no inkling to Einstein's malice upon reading Pais' biography.

[633] "Einstein's Theory of Fidelity," *Discover*, October 2006, p. 48. The last of Einstein's love letters were released in the summer of 2006 which, at the request of his stepdaughter, Margot, was to be initiated twenty years after her death.

[634] Highfield and Carter note: "As he grew older, Einstein had begun to express some very bitter feelings towards the opposite sex" (*The Private Lives of Albert Einstein*, p. 209). On the accusations of plagiarism, see C. J. Bjerknes, *Albert Einstein: The Incorrigible Plagiarist*, 2002; R. Carroll, "Einstein's E = mc² 'was Italian's idea,'" *The Guardian*, Nov. 11, 1999; G. H. Keswani, "Origin and Concept of Relativity," *British Journal of the Philosophical Society*, 15:286-306, 1965; Richard Moody, Jr., "Plagiarism Personified," *Mensa Bulletin*, 442, Feb.: 5, 2001; *The Private Lives of Albert Einstein*, pp. 108-109.

[635] Abraham Pais, *Subtle is the Lord: The Science and the Life of Albert Einstein,* 1982, 2005. Pais claims Einstein's ignorance in many instances: "In 1905, at that time [he was] aware only of Lorentz's writing up to 1895" (*ibid.*, p. 21); "…in the period of 1902-04…his knowledge of the writings of Ludwig Boltzmann was fragmentary and he was not at all aware of the treatise by Josiah Willard Gibbs"

instances occurs in September 1924. At a meeting of famous physicists Einstein proposed that the community investigate interference and diffraction phenomena with molecular beams. Louis de Broglie, however, had already been working on the idea for quite a while and eventually published a paper on it in November 1924. As it turns out, de Broglie had sent a copy of the unpublished manuscript to Paul Langevin some months earlier, and Langevin had passed it to Einstein, whereupon Pais records Einstein's reaction that de Broglie's ideas "seemed quite interesting to him."[636] Obviously, Einstein obtained the notion of searching for "interference and diffraction phenomena with molecular beams" from de Broglie's unpublished paper, but he failed to mention de Broglie's work to the September 1924 audience of physicists, thus leaving the impression that this was all his idea. De Broglie himself says: "I am certain that Einstein knew of my Thèse since the spring of 1924."[637] In the face of all this weighty circumstantial evidence, Pais, as he is prone to do in his biography, glosses over them and concludes: "Thus, Einstein was not only one of the three fathers of the quantum theory, but also the sole godfather of wave mechanics."[638]

Physically speaking, the youthful Einstein was the epitome of strength, vigor, and good looks. But as the years wore on, Einstein became grossly unhygienic, refusing to brush his teeth or even change his clothes. The image of the unkempt, wire-haired professor is not the prop of a Hollywood producer but the symptoms of a man who was losing his grip on life.[639]

(*ibid*., p. 55); "In 1905, Einstein was blissfully unaware of the detailed history of Brownian motion. At that time, he knew neither Poincaré's work on relativity…" (*ibid*., p. 94); "By a quite remarkable coincidence, Eq. 5.12 was discovered in Australia at practically the same time Einstein did his thesis work. In March 1905 William Sutherland submitted a paper that contained the identical result…" (*ibid*., p. 92); and claims that Einstein knew nothing of the work of David Hilbert: "Five days earlier, David Hilbert had submitted a paper…which contained the identical equation but with one qualification. Einstein, having learned the hard way from his mistakes a few weeks earlier…" (*ibid*., p. 257), yet in all these cases Einstein's work contains other men's ideas and equations.

[636] *Subtle is the Lord*, p. 438.

[637] Letter to Abraham Pais from Louis de Broglie, September 26, 1978, cited in *Subtle is the Lord*, p.438.

[638] *Subtle is the Lord*, p. 438.

[639] *The Private Lives of Albert Einstein*, Robert Highfield and Paul Carter, 1993, pp. 59-217; *In Albert's Shadow: The Life and Letters of Mileva Marić*, ed. Milan Popocić, 2003, pp. 16-27; "Whose Relativity Was It, Anyway?" Patricia Nemo, *College of St. Thomas Magazine*, Spring 1990, pp. 22-25; "Sex-mad Father of Relativity left family out of equation," *London Daily Telegraph*, Anthea Hall, July

Eventually, the promiscuous lifestyle of his earlier years may have finally caught up with him. Einstein's personal doctor, János Plesch, who knew him quite well, concluded that he died of syphilis, demonstrating from the results of the autopsy that the abdominal aneurysm that took his life is always associated with the tertiary stage of syphilis, which can be 25 years or longer from time of onset. Historians Highfield and Carter write that, in an April 18, 1955 letter to his son Peter, Plesch, remarking on Einstein's sexual escapades, stated:

\"Why shouldn't a healthy and beautiful man have had bad luck in his youthful daredevil days and contracted a lues [syphilis]?" Plesch insisted that Einstein's symptoms were entirely consistent with the disease, and boasted that in all his years of medical practice he had never once been wrong in tracing an abdominal aneurysm to this cause.[640]

25, 1993; "Relatively imperfect genius," *Jewish Chronicle*, Monica Porter, August 8, 1993.

[640] *The Private Lives of Albert Einstein*, pp. 265-266. The biographers add: "It appears that the same thoughts may have been occupying Seelig, for the cause of the aneurysm was a point on which he had been pressing Nathan….One is tempted to wonder whether the possibility of syphilis had occurred to Nathan too. Dr. Harvey has stated that, medically speaking, Plesch 'had justification for thinking along those lines,' but added, 'It is known that tertiary syphilis does cause aneurysms, but not in this location very often'" (*ibid.*, p. 266). Mileva's letters reveal that in Albert's reading of the book *Die Sexuelle Frage*, he had underlined the parts dealing with venereal disease. Zackheim notes: "this highlighted passage about venereal disease suggests that Mileva apparently worried about Albert's sexual life outside their bedroom. Furthermore, Einstein historians believe that Albert frequented prostitutes before he married, and that

Michele Zackheim's research reveals the following:

> He [Plesch] also insisted that Albert had syphilis, the 'gentlemen's disease.' "In my long medical practice I have found, almost without exception, that abdominal aneurysms which Einstein suffered from are syphilitic in origin. It might, of course, be that Einstein was exceptional in that respect too and that his aneurysm was nonspecific. However, an earlier syphilitic infection is also indicated by the fact that he suffered from extensive secondary anemia attacks…I think the infection was acquired during the interval [between his marriages]…. Even though many may shake their heads about this, I am adhering to my thesis.[641]

Mileva may have been aware of it" (*Einstein's Daughter*, p. 268). "…Janos Plesch, who described his friend [Einstein] as a man with a strong sex drive… 'in the choice of sex partners he was not too discriminating,' wrote Plesch… 'Einstein loved women, and the commoner and sweatier and smellier they were, the better he liked them'" (*The Private Lives of Albert Einstein*, p. 206); "Einstein was also voicing deep misgivings about the institution of holy matrimony. He told Plesch that it must have been invented 'by an unimaginative pig,' and…it was 'slavery in a cultural garment'" (*ibid*., p. 210). Deborah Hayden's article, titled "Syphilis in the Einstein Factory," says that the interest level from other biographers regarding the possibility that Einstein contracted syphilis is practically nil. In order to protect Einstein, most have ignored or ridiculed the suggestion, yet Einstein's numerous sexual affairs remain an open book. Some doctors claim that abdominal aneurysms are not all caused by syphilis although they admit that many cases are (from a 6-17-05 letter to me from Deborah Hayden on file, used with permission).

[641] *Einstein's Daughter: The Search for Lieserl*, p. 255. Zackheim adds: "Dr. János Plesch had maintained that Albert contracted syphilis sometime between leaving Mileva and marrying Elsa. But Albert could have contracted the disease prior to 1910, when he began to exhibit active interest in other women. If Albert had contracted syphilis before Mileva became pregnant with Eduard, in November 1909, or even before Lieserl was born, in 1902, he might have passed the syphilis to Mileva, who could have been a latent carrier. She, in turn, could have passed it to a baby *in utero*. The closer to conception that the mother is infected, the greater the risk of congenital syphilis in the fetus, which can result in a variety of birth defects from skin lesions to a failure to thrive to an enlarged liver and spleen to mental retardation. But with a mother who is a latent carrier, a healthy child can be born between two syphilitic children. Hans Albert, Mileva and Albert's only healthy offspring, was a middle child" (*ibid*., p. 268). Despite his candidness about Einstein's syphilis, Plesch had written a much softer biography of Einstein, after having discussed its contents with Einstein. In remarking on the book, Plesch tells Einstein: "You can believe me that while I was writing these seven

For the record, syphilis is purported to be the impetus for the genius, and often the eventual madness, of many notables in history (*e.g.*, Beethoven, Capone, Dostoyevsky, Goya, H. Hughes, Hitler, Joyce, Lenin, Lincoln, Mozart, Napoleon, Nietzsche, Poe, Roosevelt, Toulouse-Lautrec, van Gogh, Wilde, *et al.*).[642] Whether or not this phenomenon had anything to do with Einstein's fantastic Relativity theories, we do not have enough evidence to make a firm conclusion, but the possibility certainly exists.

On the religious side of things, Mileva and her children converted to Catholicism in 1905, a fact little advertised by the secular press, then or now.[643] The year 1905, of course, was when his Relativity theory was introduced to the scientific community. Unmoved by his wife's religious life, Einstein wrote to his confidante Professor Hurwitz: "They've turned Catholic. Well, it's all the same to me."[644]

Einstein was, for all intents and purposes, an atheist.[645] Any notions he had of God were of an entity completely impersonal and uninvolved

hundred pages, I was laughing a lot about how marvelously we are all trained to lie and how little human beings are allowed to state the truth. Our good Ibsen hit the nail on the head when he said, 'Take somebody's life lie away and you will take away his whole life.' The book is written with this compromise" (*ibid.*, p. 249). Unfortunately, the publisher destroyed the book.

[642] *Pox: Genius, Madness and the Mysteries of Syphilis*, Deborah Hayden, 2003, p. 306f.

[643] *Einstein: The Life and Times*, Ronald W. Clark, p. 139.

[644] *Einstein: Life and Times*, p. 139. When Einstein reached his heyday in the world, Cardinal O'Connell of Boston concluded that Relativity theory "cloaked the ghastly apparition of atheism" and "befogged speculation, producing universal doubt about God and His Creation" (*ibid.* p. 502).

[645] *The Private Lives of Albert Einstein*, p. 18. The authors write: "Einstein's views were atheistic in almost every important respect. He found it impossible to conceive of a personal deity, had no belief in an afterlife and considered morality an entirely man-made affair. His worship of cosmic harmony was genuine; his claims that this was the face of God were at best benign affectation." Highfield and Carter add that Einstein's pupil in Zurich, David Reichinstein, writes of a "Messiah-feeling" unfolding in Einstein's psyche, so much so that "his account contains dark hints that Einstein's arrogance bordered on hubris" (*ibid.*, p. 127). "Einstein was well aware that his harsh attitude disturbed people" (*ibid.*, p. 180). After quoting Einstein's statements: "I'm not an atheist, and I don't think I can call myself a pantheist….I am fascinated by Spinoza's pantheism….I believe in Spinoza's God who reveals himself in the orderly harmony of what exists, not in a God who concerns himself with fates and actions of human being," Max Jammer concludes that Einstein was a "practical atheist" because "there is no difference between there being no God to bother about man, and there being a God who does not concern himself with the fates and actions of human beings" (*Einstein and Religion*, pp. 48-50).

with human affairs. In one letter he wrote: "The word God is for me nothing more than the expression and product of human weaknesses, the Bible a collection of honorable but still primitive legends which are nevertheless pretty childish."[646] His closest friends and colleagues, such as "the Austrian socialist Friedrich Adler or the members of the 'Olympia Academy' in Berne, Maurice Solovine, Conrad Habicht, and Michel Angelo Besso…For all of them, the ideologies of Marx and Mach replaced the religion of the Bible."[647] His path toward allowing science to unseat Scripture and the Church as the ultimate authority for any intellectual endeavor that crossed its domain had begun very early in his life. After receiving instruction at Bavarian schools, which included teaching on the Catholic faith (and in particular the traditional six-day creation), "at the age of twelve…he suddenly became completely irreligious."[648] Einstein later reflected:

> Through the reading of popular scientific books I soon reached the conviction that much in the stories of the Bible could not be true. The consequence was a positively fanatic [orgy of] free thinking coupled with the impression that youth is intentionally being deceived by the state through lies; it was a crushing impression. Suspicion against every kind of authority grew out of this experience, a skeptical attitude towards the convictions which were alive in any specific social environment – an attitude which has never again left me…[649]

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[646] Letter wrote in 1954 to the philosopher Eric Gutkind, which recently sold for $404,000 at an auction in London (*New York Times*, May 17, 2008, Dennis Overbye). As for his own race, the Jews, Einstein wrote in the same letter: "As far as my experience goes they are also no better than other human groups, although they are protected from the worst cancers by a lack of power. Otherwise I cannot see anything 'chosen' about them."

[647] Max Jammer, *Einstein and Religion*, p. 29. Jammer adds: "Some authors assign these ideological influences a crucial role in Einstein's intellectual development and regard them, in particular, as the driving force for his creation of the theory of relativity" (*ibid*).

[648] Max Jammer, *Einstein and Religion*, p. 24.

[649] Max Jammer, *Einstein and Religion*, p. 25. Jammer adds: "An immediate consequence of this change of mind was the fact that Einstein refused to become bar mitzvahed…[which] even liberal Jews regard it as a precept that must be obeyed….As far as we know, Einstein never attended religious service and never prayed in a synagogue or at any other place of worship….Einstein's last wish was not to be buried in the Jewish tradition, but to be cremated and his ashes scattered, indicating that he disregarded religious rituals until his death on 18 April 1955" (*ibid*., pp. 25, 27).

At another time he said: "It is quite possible that we can do greater things than Jesus, for what is written in the Bible about him is poetically embellished."[650] Obviously, Scripture's insistence on an Earth-centered cosmos is one idea Einstein had long ago dismissed as a childish fantasy. This presupposition is noted in an address to Princeton Theological Seminary (a seminary which by this time had become very liberal in its theology, denying the inerrancy of Scripture and the literal interpretation of Genesis to make room for the theory of evolution) to which Einstein stated:

> For example, a conflict arises when a religious community insists on the absolute truthfulness of all statements recorded in the Bible. This means an intervention on the part of religion into the sphere of science; this is where the struggle of the Church against the doctrines of Galileo and Darwin belongs.[651]

Einstein excused his immoral life as mere "stupidities" and blamed God for creating him:

> I see only with deep regret that God punishes so many of his children for their numerous stupidities, for which he himself can be held responsible; in my opinion, only his nonexistence could excuse him.[652]

Yet Einstein would later modify his position:

> In view of such harmony in the cosmos which I, with my limited human mind, am able to recognize, there are yet people who say there is no God. But what makes me really angry is that they quote me for support of such views.[653]

At times Einstein wrestled with the concept of God. In one of his later works he writes:

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[650] Quoted in W. Hermanns, "A Talk with Einstein," October 1943. Einstein archive 55-285. Cited in *The Expanded Quotable Einstein*, p. 215.

[651] Albert Einstein, *Ideas and Opinions*, 1984, p. 45.

[652] To Edgar Meyer, a Swiss colleague, January 2, 1915. CPAE, Vol. 8, Doc. 44, *The Expanded Quotable Einstein*, 2000, p. 201.

[653] To a German anti-Nazi diplomat and author, Hubertus zu Löwenstein around 1941. Quoted in Löwenstein's book *Towards the Further Shore*, London, 1968, p. 156. Cited in the *Expanded Quotable Einstein*, p. 214.

The idea of God in the religions taught at present is a sublimation of that old concept of the gods. Its anthropomorphic character is shown, for instance, by the fact that men appeal to the Divine Being in prayers and plead for the fulfillment of their wishes. Nobody, certainly, will deny that the idea of the experience of an omnipotent, just, and omnibeneficent personal God is able to accord man solace, help, and guidance; also, by virtue of its simplicity it is accessible to the most undeveloped mind. But, on the other hand, there are decisive weaknesses attached to this idea in itself, which have been painfully felt since the beginning of history. That is, if this being is omnipotent, then every occurrence, including every human action, every thought, and every human feeling and aspiration is also His work; how is it possible to think of holding men responsible for their deeds and thoughts before such an almighty Being? In giving out punishment and rewards He would to a certain extent be passing judgment on Himself. How can this be combined with the goodness and righteousness ascribed to Him. The main source of the present-day conflicts between the spheres of religion and of science lies in this concept of a personal God.[654]

This rationale for being an agnostic is ironic, in a way, since the complaint of not being able to combine God's omnipotence with man's free will comes from a man who had little problem combining the hitherto incompatible entities of space and time, energy and mass, inertia and gravity, and matter and antimatter. In fact, Einstein was known for trying to simplify things by combining them, as he sought, although in vain, for his Unified Field Theory. As Einstein himself admits about the methodology:

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[654] Albert Einstein, *Out of My Later Years*, 1950, p. 27; and Albert Einstein, *Ideas and Opinions*, 1984, pp. 46-47. In his book *The World as I See It*, Einstein writes: "I cannot conceive of a God who rewards and punishes his creatures, or has a will of the kind that we experience in ourselves. Neither can I nor would I want to conceive of an individual that survives his physical death; let feeble souls, from fear or absurd egoism, cherish such thoughts. I am satisfied with the mystery of the eternity of life and with the awareness and a glimpse of the marvelous structure of the existing world, together with the devoted striving to comprehend a portion, be it ever so tiny, of the Reason that manifests itself in nature" (Citadel Press, translated by Alan Harris, 1956, 1984, originally published in 1934).

[Science] seeks to reduce the connections discovered to the smallest possible number of mutually independent conceptual elements. It is in this striving after the rational unification of the manifold that it encounters its greatest successes…[655]

So why someone who spent his whole life combining incompatible things would suddenly falter when it involved a unification between God's will and man's will, is surprising. Perhaps, with Einstein's apparent fear of being held responsible for his "deeds and thoughts" and having to face the Almighty's "reward and punishment," he is echoing the deepest motives of all men who suppress the evidence of His existence in order to make themselves appear autonomous.

Einstein assured his followers that he, indeed, did not believe in a personal God, and, in fact, had no religious leanings other than, perhaps, the "structure of the world."

It was, of course, a lie what you read about my religious convictions, a lie which is being systematically repeated. I do not believe in a personal God and I have never denied this but have expressed it clearly. If something is in me which can be called religious then it is the unbounded admiration for the structure of the world so far as our science can reveal it.[656]

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[655] Albert Einstein*, Ideas and Opinions*, 1984, p. 49.

[656] *Albert Einstein: The Human Side*, editors: Banesh Hoffman and Helen Dukas, 1981. In the same source, Einstein is quoted as saying: "I do not believe in immortality of the individual, and I consider ethics to be an exclusively human concern with no superhuman authority behind it." To a child who asked if scientists prayed, Einstein responded: "Scientific research is based on the idea that everything that takes place is determined by laws of nature, and therefore this holds for the action of people. For this reason, a research scientist will hardly be inclined to believe that events could be influenced by a prayer, *i.e.* by a wish addressed to a Supernatural Being." Einstein had a particular animosity for the Catholic Church. Another book by the same editors, *Albert Einstein: Creator and Rebel*, contains anecdotes that appear to be for the purpose of creating a cult following for Einstein. Other remarks from Einstein about God include: "Everything is determined, the beginning as well as the end, by forces over which we have no control. It is determined for the insect as well as for the star. Human beings, vegetables, or cosmic dust, we all dance to a mysterious tune, intoned in the distance by an invisible piper" (*Einstein: The Life and Times*, p. 422). In 1921 he replied to a Jewish rabbi: "I believe in Spinoza's God who reveals himself in the orderly harmony of what exists, not in a God who concerns himself with fates and actions of human beings" (*Einstein: The Life and Times*, p. 502). More to the point, Einstein writes: "I cannot conceive of a God who rewards and punishes his

His own reasons for rejecting a personal God are stated quite clearly. Albert Einstein was a humanist who gave no credence to the divine. This is summed up in one short sentence of his: "There is nothing divine about morality, it is a purely human affair."[657] He elaborates on this conviction in the following paragraph:

> To be sure, the doctrine of a personal God interfering with natural events could never be refuted, in the real sense, by science, for this doctrine can always take refuge in those domains in which scientific knowledge has not yet been able to set foot. But I am persuaded that such behavior on the part of the representatives of religion would not only be unworthy but also fatal. For a doctrine which is able to maintain itself not in clear light but only in the dark, will of necessity lose its effect on mankind, with incalculable harm to human progress. In their struggle for the ethical good, teachers of religion must have the stature to give up the doctrine of a personal God, that is, give up that source of fear and hope which in the past placed such vast power in the hands of priests. In their labors they will have to avail themselves of those forces which are capable of cultivating the Good, the True, and the Beautiful in humanity itself. This is, to be sure, a more difficult but an incomparably more worthy task.[658]

All of this, of course, reflects on Einstein's moral life. Instead of allowing the awe-inspiring complexities of the universe to bring him to the foot of God's throne in humble submission, science becomes the insulation to keep him away from God, so that in the end Einstein becomes his own god. In 1930 he wrote the following:

> When one views the matter historically one is inclined to look upon science and religion as irreconcilable antagonists, and for a very obvious reason. The man who is thoroughly convinced of

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creatures, or has a will of the type of which we are conscious in ourselves. An individual who should survive his physical death is also beyond my comprehension, nor do I wish it otherwise; such notions are for the fears or absurd egoism of feeble souls" (*The World As I See It*, Citadel Press, 1956, 1984, p. 5); "The Jewish God is simply a negation of superstition, an imaginary result of its elimination" (*ibid*., p. 91).

[657] Albert Einstein, *The World As I See It*, translated by Alan Harris, 1956, 1984, p. 29.

[658] Albert Einstein, *Ideas and Opinions*, 1984, p. 48.

the universal operation of the law of causation cannot for a moment entertain the idea of a being who interferes in the course of events—that is, if he takes the hypothesis of causality really seriously. He has no use for the religion of fear and equally little for social or moral religion. A God who rewards and punishes is inconceivable to him for the simple reason that a man's actions are determined by necessity, external and internal, so that in God's eyes he cannot be responsible, any more than an inanimate object is responsible for the motions it goes through. Hence science has been charged with undermining morality, but the charge is unjust. A man's ethical behavior should be based effectually on sympathy, education, and social ties and needs; no religious basis is necessary. Man would indeed be in a poor way if he had to be restrained by fear of punishment and hope of reward after death."[659]

Conclusion

In closing this chapter, let us be certain to add that, in spite of the harsh criticisms we levy against the conclusions of modern scientists, we are not disparaging their intellects or their place as human beings. The halls of science house some of the most intelligent men this world has ever known. One glance at their massive treatises and equations tells us that we are not dealing with ordinary human beings. Most of these men are geniuses. But the sad fact is, it doesn't matter how smart you are, how many books you've written, what chairs of science or mathematics you hold, how many Nobel prizes you've won, or how popular you are. The difficult but undeniable truth is: if you start out with the wrong premise, you are going to end up with the wrong conclusion. With the wrong answers, as the saying goes, 'you may be able to fool some of the people some of the time, but you cannot fool all the people all of the time.' The advantage this work has is that it starts with the right premise, for it obtained that premise from divine revelation and was not afraid to accept it at face value, and now all that is left is to work backwards, as it were, and

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[659] Albert Einstein, "Religion and Science," *New York Times Magazine*, November 9, 1930; as originally stated in *The World As I See It*, p. 27. Einstein adds: "Our actions should be based on the ever-present awareness that human beings in their thinking, feeling, and acting are not free but are just as causally bound as the stars in their motion" (Statement to the Spinoza Society of America, Sept. 22, 1932. Einstein Archive 33-291, cited in *The Expanded Quotable Einstein*, p. 209).

verify the premise by using the very tools with which modern man prides himself: science, math, and logic. As Scripture assures us: "But thou hast arranged all things by measure and number and weight."[660]

Perhaps there may be a few who will see the truth, yet the world's scientists, by and large, are the last on our list of concerns. We do not expect those whose careers, salaries, and Nobel Prizes depend upon supporting Copernicanism, Evolution, and Relativity to their dying day, will ever consider that the Earth is motionless and in the center of the universe. As noted earlier, an immobile Earth in the center of the universe would destroy all three legs of *Scientism's* stool in one fell swoop. Sadly, rather than prompting such men to lift their eyes in awe, the information gathered herein may only serve to harden their hearts even more, and thus serve as a testimony against them when they meet their Maker. As such, our book is geared to the next generation of scientists and theologians who are tired of the cosmological shell game that has been going on for the last several centuries.

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[660] Wisdom 11:20 [Douay-Rheims: 11:21].

"Next in line are the scientists…they feel that they are the only men with any wisdom, and all other men float about as shadows….They can never explain why they always disagree with each other on every subject…knowing nothing in general they profess to know everything in particular."

Desiderius Erasmus[661]

"How would this Marxist revolutionary emotion and vision be expressed…in the mind of a young 'revolutionary genius' in physics? The emotions that gave rise to sociological relativity might then seek to express themselves in a physical relativity; transposed and projected upon the study of the physical world, they would issue in an overthrow of absolute space and time, and in a conception of the relativity of length and time measurements to the observer's state of motion."

Lewis Samuel Feuer[662]

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[661] Erasmus' *The Praise of Folly*, trans., J. P. Dolan, p. 142.
[662] L. S. Feuer, "The Social Roots of Einstein's Theory of Relativity," *Annals of Science* 27 (1971), as cited by Max Jammer in *Einstein and Religion*, p. 30.

Appendices

Appendix 1

Philosophical and Scientific Ruminations of Martin Selbrede

As Recorded for the Scientific Documentary,
The Principle in 2012

As Written in the 1994 Paper
"Geocentricity's Critics Refuse to do Their Homework"

Interviewer: Let me just close by talking about how you became a geocentrist, and the theological aspect of your thinking, because I think for most of the geocentrists we've talked to, the process began as a theological process, and based on the idea that one God is responsible for all truths, scientific and theological, that having accepted it as a theological datum, they were able to expect that they would find correlation and support from the scientific evidence. Is this the way it worked for you or did it work some other way?

Selbrede: I was challenged in the area of geocentricity from a theological point of view, and the question was this particular article by Richard Green that was published in a journal in 1982, did this article darken the door and discredit the journal by even mentioning it? In fact, he went out of his way to say perhaps you find it astonishing that I even bring up this question, but he directed me toward, or any other reader for that matter, toward the groups that would analyze parallax and rotations and densities and things of this order. The actual science. And I had enough training in relativity theory to say, well, yes, geocentricity is as valid as heliocentricity. The mathematics should work out, and the dynamics actually work out.

Then of course I've been skeptical of Einstein to begin with for quite a while, so as I worked through the implications I saw not only was there a theological case, but the scientific case is actually being understated in a gross matter and there was far more to be said for the geocentric model than we would normally get. The problem is you have to cross a barrier, which is that resistance barrier, not only personally, but realizing, okay, now what's my reputation going to look like the second I adopt this position.

And it's not pretty. Geocentrism is not pretty, as we say, because you're going to get a lot of heat. You might get heat for a legitimate reason that you don't know what you're talking about and you cannot defend your position, either scientifically or any other way. Or you're going to defend your position quite well and probably catch even more heat, because now you're a dangerous individual, a player that is actually upturning the apple cart if you will in a way that is going to help see, if you will, a reformation in the physical sciences. Because astronomy is ripe for a new Copernican revolution, perhaps back in the other direction.

Interviewer: Martin, you obviously were headed for great things in science, I mean, you attended this seminar at Cal Tech. You were exposed at a very young age to the teachings of some of the giants in the field, why is it that you never pursued a degree in this area?

Selbrede: I don't know.

Interviewer: When it comes to dark matter, I am not somebody that knows the science. My whole concern is we're sitting here looking for something that we haven't found and we're spending millions and millions and dollars on it, if not billions, what is your stance on that? Especially with the economy the way it is worldwide right now?

Selbrede: I think it's a fool's mission to look for dark matter. I don't believe they're going to find it. I think the search for dark matter is a fool's mission. The only reason the people believe that dark matter exists is that the existing philosophies require it. It's not scientifically required at all. The problem is, of course, that we have existing commitments to the age of the Universe, that the Universe is as long as age is an issue, 16 to 20 billion years since its alleged origin back in time primeval, then the dispersion of velocity, dispersion of all these objects doesn't make any sense. Things shouldn't hold together. They should have all fallen apart. So they need to find out how to keep this entire ensemble together for as long—

The search for dark matter is almost certainly a fool's mission. On several accounts. The only thing that drives that is to try to justify the huge ages that are assumed for the Universe. If those ages are abandoned, you don't need that dark matter, things are looking exactly the way they're supposed to be looking right at the moment for a very new creation. Now, this creates all sorts of issues outside the scope of what this film is about, but the reality is that it is a philosophical commitment that drives the search

for dark matter not a scientific commitment. It's simply to justify the long ages of the Universe's existence. And if you drop that and regard – look at just what you see, then you simply say okay the reality is the Universe is not nearly as old as it's thought to be.

Interviewer: With that, you're saying it's philosophical for the search for dark matter. Let's go to something that's been happening with this documentary. We're being told that we should not question dark matter. We should not question the Copernican principle by mainstream because of science, yet they're spending that money looking for something that you're saying is a philosophical search.

Selbrede: What modern science is all about is to circle the wagons around the existing paradigm, and protect it at all costs, because that's what's being propounded by the institution of learning. So dark matter, not having a bunch of commitment behind it, is now the new [Sugalith?] for science. And it's going to stand or fall on this search for something that we've never seen, isn't anywhere near us, and cannot be measured in anything other than by inference for things that are like, I mean, a thousand of light years away.

It is so fundamental, 99% of the Universe is made out of it, and we don't have a single scarp of it here. So this is wishful thinking on the most dynamically monstrous scale, and how it has come to dominant science and the people involved in science. And politicizing science for that matter which how can that lead to good science? When science is politicized? It never does in any other field, why would politics make science run better? And get us better answers? It doesn't. In fact, it can't, because politics is the wrong thing driving the scientific enterprise. It only exists as a doctrine because we have other commitments philosophically that have to be protected, so that we can reference an existing world view that is under stupendous fire from the facts.

Interviewer: We've interviewed a lot of geocentrists and when learning about everything, learning about the geocentric view was mainstream years ago, and now we're trying to come back and say, "You know, this is the way that things are going, and you guys need to look at it." But you're getting punched in the face, let's just say, by science. What do you feel about that? That this was a mainstream idea and now it's not and you're fighting for a place at the table. That's exactly what Bob's saying, he's just fighting to be heard.

Selbrede: Right. What we're hearing is pay no attention to the man behind the curtain, and of course we're drawing back the curtain exactly on what modern science actually teaches. I don't mind being punched in the face by science, I mind being punched in the face by a scientist who is hiding from science and they don't want that to be known. They want to pull the curtain back and say, "You have to trust us because we're the experts, and you don't know anything. So if you want to stand toe-to-toe with us, then we are also the gate keeper. We'll determine who gets a doctorate in astrophysics. And so if someone who wants to get a doctorate is a geocentrist, they probably will have to hide that commitment of theirs as a geocentrist until they get their doctorate. And then they'll be discredited as a doctorate person who needs to have their doctorate rescinded and revoked. Because that's how violent things do get in academia. There is plenty of suppression going on at the academic level. And it's an ugly thing, and science is not served by it. There is a legitimate protection of a paradigm and an illegitimate protection when people are simply circling the wagons because they see that someone is knocking over their rice bowl, and science has now become more of a human enterprise, and unfortunately that brings in the ethical implications of science. And we're not – that's a whole other area of how well do we treat other scientists when they have now take an unpopular position. Or when they challenge the existing model, because now people are upset. They take it personally and they go on the attack. And whole institutions go on the attack.

The Velikovsky Affair, for all that Velikovsky had wrong, he certainly stirred the pot. And the American Academy for the Advancement of Science didn't look that good when they went after that fellow. There was the challenges of whether he should even be allowed to print his books. America is a place where controversial ideas can be printed, not where you say, "Stop the presses or I will not allow Doubleday to print any more university textbooks because I want to suppress that book from being released."

This same approach is prevailing today, about let's go ahead and suppress the geocentrists. Let's not give them the time of day. Let's write them out of the debate, and let's do everything we can to scorn on them. In fact, it's the same strategy that was directed against creationists in the '80s is, "Don't give them the time of day, don't debate them, just heap scorn and take the kid gloves off and treat them dirty." And geocentrists made – and in fact, we're such a small group, I don't think we're going to get enough attention until perhaps this film comes out, and as we make more of a

bigger bust, then they're going to have to literally go to war with us over science itself.

And it'll be equations. The right form of this debate will be scientific one. We're willing to sit at the table. And if they do then I think that's for the betterment of science, but if they don't, then it's going to be volleys across the valley and eventually the facts will win. Because you can only hide from the facts so long. I think that's going to be their problem more than mine. I'm the one bringing them up, they're the ones trying to run from the science, I'm the one trying to bring up their own science back in their face and saying, "Look, this is what you men have been writing for the last two centuries. Here I've documented it, what do you say?"

So this is an endemic problem, because people do science, it's not just done by robots. It's not done by Spock, it's done by someone who has an optional commitment to what they're writing, and they do take it personally.

I believe that if I'm not living for the truth, then I'm simply propagating a fraud, either by default or by enabling it. I don't intend to enable these falsehoods, so the truth is of interest to me. And I think it's ultimately of interest to the human race what the truth is about these matters.

Look, if I'm not living for the truth, then I'm simply propagating a fraud, either by laziness or inaction. So that's what gets me going in the morning, is that these issues need to come out. The human race is in need of the truth on this matter, and it's time for the darkness to pass and the truer light to shine on it.

Interviewer: If your view is right, what do you think that we should do as a human race that we're destroying this Earth, and if we're that special, what is it that we need to do as a human race to fix it?

Selbrede: I think this is one of the great catastrophes of the Copernican Principle, is the notion that we're just an insignificant speck rotating on a insignificant island in the Universe far away from anything that's significant. But if we are significant, and if there's something special about our home, this planet, then those concepts have tremendous implications, and we need to be then focused on our commitments as stewards over the creation that we have to work with.

So I think it changes the entire picture philosophically for humans. So the science now actually drives philosophy, as opposed to the other way

around, which we're seeing today. And I think that's huge. We've got to get away from the Copernican principle and the notion that man means nothing, from just a meaningless molecule to a human being that's in a special location for presumably a special purpose, and therefore men are driven by their purpose, and they can see themselves in a very different light than the fact that they are simply chaotic blobs that no one really cares about.

Interviewer: I wanted to get your opinion about the multiverse as juxtaposed with the Copernican Principle. What do you feel about the multiverse, what do you think about that?

Selbrede: The multiverse is an attempt to take quantum mechanics and give every possible answer as a yes. Each Universe has a different Universe. There's a geocentric Universe in the mutliverses, there's a heliocentric one, there's a Jovicetnric – ones that are Jupiter by this hypothesis.

The multiverse is an attempt by certain quantum theorists to try to have their cake and eat it. In other words every single event can go one or two different directions, and that creates a random Universe. It's called Space Time Foliation, we get whole new levels of space time in each Universe, and then it spins off from the existing one and then it goes its own route. So you can have nice Martin and evil Martin in another Universe. You can have a film on heliocentricity being defended in another Universe because everyone is a geocentric possibly. Of course this is, again, quantum mechanics way of saying, "We can have every possibility covered." That means there is no serious, single reality. And it's simply because quantum mechanics has already been the way to get anything you want. It's premised on all sorts of false notions to begin with. The assumptions are hazardous to your scientific health in my opinion. Yes, it can get all sorts of answers predicatively, but it doesn't provide the mechanisms, and it doesn't determine things properly. So really it's a philosophical sleight of hand, it's a way to generate all sorts of metaphysics out of these equations, but the questions are simply mathematical constructs. They don't represent the reality that we deal with.

In such another multiverse it would be good to kill people and murder, because ethics presumably would also be different in the other Universe. If they're the same, how did they get over to the other side. Plus you have to question the point about can one Universe steal from another? White holes are apparently a link between one to another, so the Paul Universe can

steal from the Peter Universe, and vice versa. What's being crossed between though? How do you get the fundamental laws of nature to actually fall together properly, like conservation of mass and energy, these things that we treat as the most fundamental, hallowed aspects of physical law, that then are put on the slicing block with this notion. So it's simply a sleight of hand to try to avoid answering questions, because saying there's many Universes, doesn't really answer anything, does it? Because it doesn't deal with the Universe we are in, assuming it's even true.

By the way, this polyverse or multiverse really means that you have a pre-existing world view that says the existing Universe is not unique. It's also insignificant. So the basic premise of the multiverse is that our Universe is also insignificant because it's one of zillions of constantly populating, bubbling-up new Universes, simply because someone made a different decision in one Universe and it split off to another one, and that's happening zillions of times every second. So it's an incoherent view in many respects.

Interviewer: What about Bernard Carr? Was it Bernard Carr who said it's the multi Universe or God.

Selbrede: I would agree that the alternative is between a multiverse and God. Because if there's a Universe, then there's the one Universe that God created. And it's not a self-creating thing at all, it presumably does in fact have a creator and man has to deal with that fact, that he is someone's property, and that person may have property rights in us and expect certain things of us and have a purpose for us, and more to the point, we'd be accountable if we're created. I think a multiverse allows us to slip by all accountability, therefore it is appealing to natural man to want a multiverse because it makes man off the hook on his ethical conduct. You can try to re-import it back in, us it's not basic to the Universe, and you don't confront the face of God in a multiverse. You're just the result of a mathematical equation splitting an infinitely long time, versus the handiwork of a creator.

Geocentricity's Critics Refuse to Do Their Homework
By Martin Selbrede

In a surprising turn of events, Dr. Gary North hired Dr. Michael Martin Nieto, theoretical physicist at Los Alamos National Laboratory, to analyze alleged fatal flaws and defects in geocentric cosmology from the standpoint of an astrophysicist. Dr. North paid Dr. Nieto for the resulting essay, entitled "Testing Ideas on Geostationary Satellites," which is incorporated as the bulk of the publication bearing the superscription, "Geocentrism: An Astrophysicist's Comments."

Dr. Nieto interacted with virtually no relevant geocentric material, although it was not only available to Dr. North, but actually forwarded to him in 1992. Dr. North saw fit to return the most technically-oriented and complete videotaped lecture on geocentricity available at that time, without having ever watched it. The video provided up-to-date technical references in answer to Dr. North's many challenges, but he refused to view it. He could have saved himself the money, and Dr. Nieto the trouble, had he not inflicted such blindness upon himself. The response to Dr. Nieto is contained in that video, and we need merely rehearse it here to refute Dr. Nieto's and Dr. North's papers. The fact that Dr. North held that very video in his hands and yet refused to view it, reflects a tragic breakdown of academic and intellectual integrity on his part.

The great irony of Dr. Nieto's essay is his complete reliance on Einstein's General Theory of Relativity. The irony obtains from the fact that general relativity stipulates that any observer can consider himself to be at rest – and that solving Einstein's field equations for his position will properly and satisfactorily describe all phenomena observed from that vantage point. When Drs. North & Nieto assert that if the earth were at rest, geosynchronous satellites would necessarily fall down, they are asserting that general relativity is completely false. Since Dr. Nieto uses 2 of his 7 pages to air alleged experimental proof for general relativity, we observe that a kingdom divided against itself cannot stand, and that Dr. Nieto thereby destroys his own arguments.

In fact, Dr. Nieto appears to be completely unaware of the well-documented key doctrines of general relativity, both as presented by Einstein and Mach, and developed subsequently into our own decade. This failure of scholarship (surprising, since the essentials are taught in freshman-level courses in physics) has led Nieto into multiple errors.

North and Nieto are searching for the mystical geocentric force that holds up geosynchronous satellites, preventing them from falling to the earth given the geocentric hypothesis that they are not orbiting objects.

"Where is this force?" they ask, for they have searched and found it not. So they appeal to their readers to search as well and see for themselves there is no such force, just as the Pharisees challenged, "Search, and look: for out of Galilee ariseth no prophet" (John 7:52). Had the Pharisees glanced at Isaiah 9, they could have spared themselves an embarrassing gaffe. Had Dr. Nieto reviewed Einstein first, he could have done likewise.

The urge to hide the geocentric force acting on the geosynchronous satellite from his readership resulted in the following error by Nieto. Says he, "...one sees that there is no explicit mathematical theory as to why the satellite would stay up there if the universe were geocentric. The authors postulate that maybe there is a sphere of matter (no good, they realize, there is no force inside a sphere of matter), or then maybe there is a ring and maybe this could account for it. They speculate. But they do not show." Actually, we did show, but Dr. North didn't watch.

Einstein taught that there is a force inside a sphere of matter that is in motion. He wrote plainly to Ernst Mach on June 25, 1913, "If one accelerates a heavy shell of matter S, then a mass enclosed by that shell experiences an accelerative force. If one rotates the shell relative to the fixed stars about an axis going through its center, a Coriolis force arises in the interior of the shell, that is, the plane of a Foucault pendulum is dragged around." Geocentrists have never denied the Gaussian proposition that there is no net force inside a stationary shell of matter - but the distinguishing feature of geocentricity is the daily rotation of the universe around the earth. How did Nieto and North miss it? By using return mail.

The magnitude of the force (usually discussed under the heading of "dragging of inertial frames") is cited in many references. Misner, Wheeler & Thorne, in their tome *Gravitation*, pp. 547, quantify the rotational drag by "simple dimensional considerations" and propose that wf, must be identical with ws or, namely, that the angular velocity of a Foucault pendulum equals the angular velocity (speed of rotation) of the stars (i.e., the rest of the universe) (ibid, pg. 548). These well-respected authors (Kip S. Thorne is Cal Tech's black hole and general relativity expert; Wheeler & Misner taught at Princeton, Cal Tech and Oxford) approvingly cite the 1918 work of Thirring (pg. 547) in connection with this force and its computation.

This last circumstance is doubly ironic, since Dr. Nieto's final footnote begins, "There is a gravimagneto effect related to the Earth's rotation, which amusingly draws upon the work by Thirring cited by [Dr. John] Byl:" Dr. Nieto's faulty understanding of basic relativity theory could have been remedied by checking the work by Thirring. Hans Thirring begins by citing Einstein's 1914 paper. Einstein defines K as a Galilean-Newtonian coordinate system, and K_1 as a coordinate system rotating uniformly

relative to K. Since this directly represents the earth (K_1) and the universe (K) in Dr. Nieto's antigeocentric cosmology, I will substitute these identifications for K and K_1 in italics in Einstein's text to make Einstein's position clear to every reader:

> Let the earth be a coordinate system rotating uniformly relative to the universe. Then centrifugal forces would be in effect for masses at rest in the universe's coordinate system, while no such forces would be present for objects at rest with respect to the earth. [The geosynchronous satellite is precisely such an object, at rest with respect to the earth, but viewed as having a centrifugal force acting on it with respect to the universe - MGS.] Already Newton viewed this as proof that the rotation of the earth had to be considered as `absolute,' and that the earth could not then be treated as the `resting' frame of the universe. Yet, as E. Mach has shown, this argument is not sound. One need not view the existence of such centrifugal forces as originating from the motion of the earth; one could just as well account for them as resulting from the average rotational effect of distant, detectable masses as evidenced in the vicinity of the earth, where the earth is treated as being at rest.

In quite precise language, Einstein taught that the centrifugal force on an object in the earth's rest frame (the condition satisfied by the hovering geosynchronous satellite) is inadmissible as evidence of the rotation of the earth, for in the earth's frame that force arises from "the average rotational effect of distant, detectable masses." This 1914 teaching of Einstein is rather old news – and it remains inconceivable that Nieto would cite it, "amusingly enough," without reading it. Or is there a tragic pattern here?

Thirring observed in his opening paragraphs that the complete equivalence between the reference frames, explaining such phenomena as the geosynchronous satellite or Foucault pendulum equally well in a geocentric reference frame, is secured by definition by Einstein's 1915 work: "the required equivalence appears to be guaranteed by the general co-variance of the field equations." This is what geocentrists mean when they assert (much to Dr. North's disdain) that the mathematics is the same for the heliocentric and geocentric models: Einstein's field equations are structured to supply the necessary upward force on the geosynchronous satellite in a geocentric as well as a heliocentric framework. In fact, the only reason Thirring wrote his paper was because the boundary conditions of Einstein's paper were geared for a finite universe, so that Thirring set forth, in his own words, "the mathematical development of a rotational

field of distant masses for a specific, concrete example." After ten pages of tensor analysis, Thirring summarizes: "By means of a concrete example it has been shown that in an Einsteinian gravitational field, caused by distant rotating masses, forces appear which are analogous to the centrifugal and Coriolis forces." Hard again to imagine Dr. Nieto's amusement in citing in his favor a source, even second-hand, that negates his position. Harder yet to imagine Dr. Nieto rejecting Thirring's argument, since it simply (and ably) develops Einstein's own stated position.

Einstein's position has not lacked for continued, and contemporary, treatment by the world's top relativity scholars. Another key (and, in fact, decisive) reference cited in the video North refused to view was taken from the journal, General Relativity and Gravitation, Volume 21, No. 2, 1989, pgs. 105-124. Professors 0. Grön and E. Eriksen, in the article Translational Inertial Dragging, take up, again, the issue of what forces arise within a spherical shell of matter. (Recall that Dr. Nieto wrote, "there is no force inside a sphere of matter.")

Grön & Eriksen inform us that "The rotational inertial dragging effect, which was discovered by Lense and Thirring, was later investigated by Cohen and Brill and by Orwig. It was found that in the limit of a spherical shell with a radius equal to its Schwarzchild radius, the interior inertial frames are dragged around rigidly with the same angular velocity as that of the shell. In this case of "perfect dragging" the motion of the inertial frames is completely determined by the shell." (pg. 109-110).

Intriguingly, the authors point out that "with reference to Newtonian mechanics we talk of inertial force fields in accelerated reference frames. However, according to the general principle of relativity, we may consider the laboratory as at rest. We then talk of gravitational dragging (acceleration) fields. The concept of 'inertial forces,' which may be regarded as a sort of trick in Newtonian mechanics, is thereby made superfluous." What is fascinating here is the recognition that the Newtonian centrifugal force due to inertia (of which Dr. North is so fond) is a fictitious force, and is "a sort of trick." One would have expected the geocentric model of the geosynchronous satellite to be the one filled with tricks and fictional forces, but such is not the case. (The authors intend no derogation of fictitious tricks in the Newtonian case, while buttressing the claim that geocentricity posits actual rather than fictitious forces to account for the behavior of objects such as geosynchronous satellites.)

This is explicitly stated on page 113, where G&E cite C. Møller "in his standard [1952] textbook on general relativity," from chapter 8: "Einstein advocated a new interpretation of the fictitious forces in accelerated systems of reference. The 'fictitious' forces were treated as real forces on the same footing as any other force of nature. The reason for

the occurrence in accelerated systems of reference of such peculiar forces should, according to this new idea, be sought in the circumstance that the distant masses of the fixed stars are accelerated relative to these systems of reference. The 'fictitious forces' are thus treated as a kind of gravitational force, the acceleration of the distant masses causing a `field of gravitation' in the system of reference considered. Only when we work in special systems of reference, *viz*., systems of inertia, it is not necessary to include the distant masses in our considerations, and this is the only point which distinguishes the systems of inertia from other systems of reference. It can, however, be assumed that all systems of reference are equivalent with respect to the formulation of the fundamental laws of physics. This is the so ¬called general principle of relativity."

This quote is important on two counts. (1) The italicized sentence (emphasis apparently in Møller's original textbook) is precisely what Dr. Nieto denies in his argumentation, namely, the general principle of relativity. But on what does Dr. Nieto base his arguments against geocentricity? General relativity!

But count (2) is equally telling: Møller tells us that the only reference frame in which we can exclude consideration of the distant masses of the galaxies is in "systems of inertia," which G&E more carefully define as "frames of reference in which the cosmic mass has no observed rotation or translation acceleration." By this definition, the earth does not fulfill the requirement for being a system of inertia, since the heavens are observed to rotate around it. Therefore, Møller alerts us that we may NOT omit the rest of the universe in deriving the forces acting locally on the earth. Geocentrists assert as much, consistent relativists (*e.g*., Fred Hoyle) assert as much, but inconsistent or forgetful relativists (*e.g*. Nieto) fail to do their homework before taking up the issue.

Grön & Eriksen develop the consequences of Einstein's position to the hilt on pages 117-118 with an ironclad example: "As an illustration of the role of inertial dragging for the validity of the strong principle of relativity, we consider the Moon orbiting the Earth. As seen by an observer on the Moon both the Moon and the Earth are at rest. If the observer solves Einstein's field equations for the vacuum space-time outside the Earth, he might come up with the Schwarzschild solution and conclude that the Moon should fall toward the Earth, which it does not. So it seems impossible to consider the Moon as at rest, which would imply that the strong principle of relativity is not valid.

"This problem has the following solution. As observed from the Moon the cosmic mass rotates. The rotating cosmic mass has to be included when the Moon observer solves Einstein's field

equations. Doing this he finds that the rotating cosmic mass induces the rotational nontidal gravitational field which is interpreted as the centrifugal field in Newtonian theory. This field explains to him why the Moon does not fall toward the Earth.''

This is the decisive answer to Dr. North and Dr. Nieto. The Moon always shows the same face to the Earth, so that from the point of view of the Moon, the Earth is hovering 240,000 miles above it. In this picture, the Earth is to the Moon, what a geosynchronous satellite is to our Earth. The hypothetical Dr. North on the Moon solves his equations and wonders, ''What holds the Earth up? Why doesn't it fall down here?'' And Grön and Eriksen have provided the answer, in complete consistency with the work of Einstein (1913, 1914, 1950), Thirring (1918, 1921), Møller (1952), Misner, Wheeler, Thorne (1973), Brill and Cohen (1966, 1968) and Orwig (1978). Which is only natural, since it is unthinkable that Einstein's disciples would break with him on the central tenet of his general theory. Whereas Dr. Nieto seems to recognize the element of curved spacetime in general relativity, he has failed to grasp the general principle of relativity itself, from which the subsequent geometric model flowed. In fact, he has (inadvertently, I would hope) lashed out at it.

In passing, note that the plane of rotation of the cosmic mass in G&E's example is equatorial for the Moon – general relativity provides for explaining such geosynchronous phenomena only for equatorial satellites. Dr. North wrongly assumes that in the geocentric model one can place geostationary satellites over North Dakota, whereas the geocentric literature has repeatedly taught that the field equations arising stable geostationary satellites only over the equator, and at the same prescribed height as that indicated by the Newtonian methods Dr. North favors. This has been asserted in books, in journals, on audiotapes, and videotapes. You'd have to try real hard to miss it.

While on the subject of Einstein and Thirring, let us examine Dr. Nieto's final footnote: ''There is a gravimagneto effect related to the Earth's rotation, which amusingly draws upon the work by Thirring cited by Byl. Attempts will be made to measure this effect with a gyroscope orbiting about a rotating earth (Schiff gyroscope experiment) and by two satellites (LAGEOS I and III) orbiting about a rotating Earth in complementary orbits. This is a prediction, whose test will hopefully come about this decade.''

Reading this somewhat flippant note, the certainty of the Earth's rotation is flatly assumed as proven, and about to undergo additional, if superfluous, proof. It is made to appear that Dr. John Byl erred by quoting

from a source that is being used to develop an experimental proof of the earth's rotation! But all is not as it seems in footnote 13.

The fundamental reference to experiments like this is found, again, in Misner, Wheeler & Thorne's *Gravitation*, pages 1117-1121, where the experiment alluding to Nieto's complementary satellite orbits (one polar, the other equatorial) is set forth in detail. MW&T tell us that "the Earth's rotation `drags' the local inertial frames along with it. Notice that near the north and south poles the local inertial frames rotate in the same direction as the Earth does (Ω parallel to J), but near the equator they rotate in the opposite direction (Ω antiparallel to J; compare Ω with the magnetic field of the Earth!)" (page 1119). By sending satellites in orbits 90 degrees apart, scientists can maximize the effect they are trying to measure, which is very microscopic indeed (0.1 seconds of arc per year). But Nieto's use of this argument falls to the ground, since the physics being described here are those local to the gyroscope. Whether or not the earth is motionless, the experiment yields the same result. In fact, the very wording of the authors' argument deflates Dr. Nieto's point, since they specify that the motion is relative between the Earth and the distant galaxies. The force that the satellite experiment will be measuring is precisely the kind of force (inertial frame dragging) that general relativity scientists affirm holds up geosynchronous satellites when the earth is taken to be at rest. So, the amusing part of Dr. Nieto's footnote 13 is how badly it appears to have backfired.

If it be objected that a 1973 book, definitive tome though it be, is somewhat dated in dealing with the 13th footnote, the literature is still rich in more recent references. In *General Relativity and Gravitation*, Vol. 20, No. 1, 1988, Cerdonio, Prodi and Vitale published an article entitled "Dragging of Inertial Frames by the Rotating Earth: Proposal and Feasibility for a Ground-Based Detection," pgs. 83-87. The kind of hardware that Dr. Nieto has in mind is there described in depth, where "the effect of rotation results in a net magnetization of the [instrument's ferromagnetic] rod" (pg. 85). The resulting magnetic flux is measured by a device known as a SQUID. Yet, throughout the article, general relativity is assumed, and relative motion is affirmed. The very effect itself is described thus: "The Lense-Thirring field due to the rotating Earth is locally equivalent to a rotation in respect to distant stars..." Another expression is "the time average of the Earth's rotation with respect to distant stars." The choice of coordinate system is arbitrary, and the field mathematics follows after the preference of the physicist. Consult, by way of comparison, the citations of Thirring discussed earlier, on which this paper is dependent.

In short, we have here Thirring cited against Thirring, Einstein cited against Einstein, and general relativity cited against general relativity. Dr. Nieto deliberately and directly undermines his own physics, and his arguments are manifestly self-contradictory. Consistent relativists have never been hostile to geocentricity. Dr. Fred Hoyle pointed out that had the trial of Galileo been held after Einstein published his general theory, it would have resulted in an even draw by mathematical and physical necessity. This is the legacy of general relativity: the overthrow of absolute reference frames, and the democratization of all coordinate systems.

Let it be clearly understood that the presentation of general relativity's teaching on the geocentric model presented herein is central, not peripheral or obscure, in Einstein's theory. It was plainly presented to this author when he learned the fundamentals of general relativity and geometrodynamics at the California Institute of Technology at the age of 16 (as a research fellow for the 1973 California Junior Science & Humanities Symposium, under the supervision of Dr. Kip S. Thorne and his associates - and often studying, in fact, from the galley proofs of Gravitation as it was being completed for publication). We can therefore safely rule out the idea that Dr. Nieto's training somehow glossed over this key proposition, in light of the fact that it is basic to Einstein's theory, and that Dr. Nieto freely cites references from general relativity's body of extant literature. He even indicates that he is actively seeking to improve upon Einstein, which would, presumably, imply some mastery and understanding of the theory one is attempting to supplant.

Therefore, Dr. Nieto's multiple citations from the world of general relativity constitute academic suicide so far as this particular debate is concerned. A geocentrist could have easily quoted the selfsame references as Dr. Nieto did, but in so doing remained consistent with Einstein. (There are, in fact, a number of geocentrists who base their scientific understanding of the geocentric model directly upon general relativity, at least one of which has conveyed this clearly and concisely to Dr. North.)

To summarize: it is impossible to launch an attack on geocentricity on the basis of general relativity, by definition. Proof of a moving earth is simultaneously proof that general relativity is a myth.

This means that Dr. Nieto's analysis is shot through with factual errors in regard to the primary force of his presentation. Some of his errors are relatively innocuous, e.g., his description of Kepler's theory as involving concentric spheres "within which were inscribed regular polygons." (Kepler used Platonic solids and not flat polygons.) Unfortunately, most of the errors (factual, logical, and scientific) are simply fatal.

Dr. Nieto, however, has also evidenced poor research in setting forth geocentricity's distinctives. He asserts at least six times that geocentricity has failed to predict certain phenomena that modem science has correctly predicted. These alleged failures earn geocentricity a demotion to the status of an antirational dogma. Through ignorance of geocentric physics, Dr. Nieto imposes a Procrustean bed on those he criticizes – tantamount to stuffing words into the mouths of geocentrists. The predictive power of geocentricity, and its more comprehensive analytic range, will be addressed below.

First, however, consider Dr. North's accusation that modern geocentricity has failed to produce fruitful results. Citing the parable of the fig tree, wherein "Jesus allowed it only four years of fruitlessness before cutting it down," North finds geocentricity long overdue for immediate termination. His arbitrary time-frame reveals a shallow view of modem physics.

Galileo himself learned that merely setting forth a more elegant and attractive geometry for orbital kinematics was inadequate to prove his heliocentric model: he had to provide a complete, new theory of dynamics to support it. This work, undertaken by one of the great intellects of the period, was decades in the making. The formalism later received its capstone in the work of Newton. This development spanned more than a century of time. Dr. North's "fig tree" view finds its analogue in the vitriolic attacks launched against Galileo by his enemies, whose motivations were political and personal.

The new dynamics of Einstein were born in the work of mathematician Georg Riemann, whose work on space curvature appeared so far removed from any known practical application that it appeared completely useless. Yet, gravitation is now described using his tensor notation, which Einstein incorporated into the heart of his general theory. With Einstein came a new dynamical theory, geometrodynamics, with spacetime geodesics replacing outdated Newtonian trajectories. This revolution took the better part of a century, from the laying of the mathematical foundations in the mid-19th century to the completion of this towering edifice of 20th century physics.

The case is no different with geocentric science: it, too, must develop a brand new dynamical theory to support its description of the behavior of the heavens. Unlike the peaceful development of Einstein's theory, the geocentric model's slow codification is being undertaken under tempestuous circumstances, in the face of ridicule, contempt, and self-indulgent scorn, yet propelled forward by laborers operating near their personal limits of physical stamina. Yet the work goes forward, and should be allowed the time that was accorded the preceding revolutions to bear their fruit. A preliminary overview of progress to date, giving a glimpse of

the dynamical theory being presently developed by modern geocentric scientists, is herein set forth. Where the discussion touches on Dr. Nieto's concerns and challenges, the connection will be pointed out. (Keep in mind that not all geocentrists will agree with every detail of the following summary - it only purports to be representative of the dominant strains of thought among top geocentric scholars.)

Gravity and Related Matters

One would think that the only viable theories of gravitation worth considering were Newton's and Einstein's, given the substance of Dr. North's and Dr. Nieto's critiques. This gross oversimplification merely misleads the unwary reader, historically and scientifically. Newtonian gravity received competition from the LeSagean theory of gravity, and the LeSage hypothesis even received the theoretical attention of Lord Kelvin ("On the Ultramundane Corpuscules of LeSage," Royal Society of Edinburgh Proceedings, pgs. 577-589, 1871). The LeSage theory is a physical theory of gravitation, meaning there is an actual, understandable physical reason why gravitation exists and can be felt (unlike abstract notions such as action-at-a-distance and curved spacetime). The theory has undergone important revisions in the hands of geocentrists over the last decade, but the fundamental idea is retained.

George-Louis Le Sage developed "his" theory in the late 1770's (the work was almost certainly plagiarized). He postulated that the universe is filled with countless infinitesimal particles, which he termed ultramundane corpuscles. These corpuscles are in extremely rapid motion, analogous to molecules in a gas, and are colliding continually with material objects from all directions, so that a net pressure is applied to all objects within this kinetic "ocean" of ultramundane corpuscles.

In the case of a spherical mass in the middle of this corpuscular flux, the net force on the mass is zero, since the pressure is applied to it equally from all directions. However, in the case of two spherical objects near each other within this flux, the one sphere will block some of the corpuscles from colliding with the other, and vice versa. The objects shield one another from a portion of this flux, as determined by their mass and separation, such that there are more corpuscles pushing them together along the line joining their centers than there are keeping them apart. The closer they are, the greater the corpuscular pressure becomes. LeSage calculated the well known inverse-square law from this shielding effect. In his theory, gravity is not a pull – it is an external push. According to this view, a man's weight reflects the difference between how many corpuscles are hitting him from above, compared to how many are hitting him from

below – and is a function of the earth's mass attenuating the upward-directed flux. (In fact, the mathematics of LeSagean mechanics is the mathematics of attenuation.) It is easy to see why the LeSagean theory is termed a physical theory of gravitation: its fundamental principle is simple enough for a child to grasp, without metaphysical mumbo-jumbo.

Advocacy for the theory declined after Lord Kelvin observed that the collisions between the hypothetical particles and normal matter would, over long periods of time, involve a heat transfer sufficient to melt planetary objects. (Subsequent physics showed how such particle collisions can be "elastic" and thus avoid any degradation of flux energy to heat – but by then, LeSage had been forgotten in the stampede to canonize Einstein.)

LeSagean gravitational theory is an important component in the dynamical thinking of most geocentrists, excepting those who prefer basing their position on general relativity. The theory has predictive power, for the equations of attenuation make it clear that the shape and orientation of an object determine the magnitude of force on it. In the LeSagean theory, a barbell held horizontally is heavier than one held vertically, and a feather will drop faster in a vacuum than a small ball of lead – predictions that directly oppose the dynamics of Newton, Galileo, and Einstein. Until the last decade, the predictions of LeSage would have been laughed off the stage, until instruments sensitive enough to detect such anomalies were pressed into service. When these anomalies were discovered, modern science rushed in to herald the discovery of some fifth fundamental force, termed (erroneously) supergravity by some excited researchers. But they had been beaten to the theoretical punch by more than two centuries by the gravitational theory championed by the geocentrists.

The peculiar behavior of pendulums just before and after an eclipse, and within deep mine shafts, has likewise been troubling to the standard gravitational theories, Einstein's included. Sax and Allen's pendulum measurements during the solar eclipse March 7, 1970 were startling, and subsequent measurements by Kuusela (Finland: July 22, 1990 and Mexico: July 11, 1991) still reflected anomalous, though less severe, deviations. (Cf. *Physical Review* D3, 823 and *General Relativity and Gravitation*, Vol. 24, No. 5, 1992, pg. 543-550). Mineshaft measurements of the gravitational constant evaded conventional analysis (Cf. Holding & Tuck, "A New Mine Determination of the Newtonian Gravitational Constant," *Nature*, Vol. 307, Feb. 1984, pgs. 714-716). These anomalies were predicted by the LeSagean theory, not by Newton, not by Einstein.

An ultrasensitive Cavendish torsion balance was pressed into service in the mid-1970's to determine experimentally how sound the inverse-

square law of gravitation was (Long, "Experimental Examination of the Gravitational Inverse Square Law," Nature, April, 1976, Vol. 260, pgs. 417-418). The apparatus revealed systematic discrepancies of 0.37%. Considering how relativity theory makes much ado of infinitesimal anomalies it "predicts," this reported glitch is enormous – and is predicted by the LeSagean model promoted by modem geocentrists.

Here are several key experimental effects predicted and/or adequately explained only by geocentrists pursuing their theory of dynamics: one could legitimately turn the tables on Dr. Nieto and ask, "Where was modem physics? Its theories predicted something other than what was measured!"

Modern physics tends to respond with a yawn to such challenges, and Dr. Nieto's view that the theories that fit the data best are the ones worthy of acceptance is, in fact, naive. When comparisons between theories are made, the faithful will prove loyal to their theories, not the data. When confronted with evidence demonstrating the superiority of one theory over others (*e.g.*, "A Comparison of Results of Various Theories for Four Fundamental Constants of Physics," *International Journal of Theoretical Physics*, Vol. 15, No. 4 (1976), pp. 265-270), the world of science merely shrugged, unmoved in its pre-existing biases. (In the example cited, the best theory, being anti-Einsteinian, gained no adherents for having met the experimental criteria better than did its cousins.) (This author, in phone conversation with a chief research scientist at the Laurence Livermore Labs in 1992, pointed out that the electron diffraction effect had been again recently derived using classical physics. Quantum mechanics was developed in part because classical physics could not account for this effect, but now that this was no longer true, the scientist dismissed the news with an annoyed "So what?" His precommitment to modern QCD theory colored his scientific worldview completely.)

The LeSage theory was developed mathematically, in painstakingly rigorous detail, and then underwent an important conceptual evolution in the mid-1980's. What if the ultramundane corpuscles were compressed to a greater density, so that more of them filled a smaller volume? In fact, what if they were squeezed shoulder to shoulder, so tightly packed that they could only jostle one another, but were no longer free to rocket through space like gas molecules do? Do the same rules of shadowing and attenuation apply now that the so-called LeSagean gas has become an ultradense mass? Would the pressure effects transmit in the same way as the original theory stipulated? Indeed, the same principles hold, except that acoustic pressure waves transmit the background gravitational pressure through this ultradense matrix.

This ultradense medium of geocentric physics is identified as the Biblical firmament. It has a density so great that a teaspoon of the firmament would weigh more than a trillion universes combined. (The computed density is termed the Planck density, 10^{94} g/cm^3.) Such assertions seem to earn Dr. Nieto's label of being merely "ad hoc." But a little research (in contrast to cavalier dismissal) would reveal that the constituent elements of this geocentric postulate can be found in the most highly respected scientific journals and publications. In fact, the literature has been of inestimable help in obliterating objections to the geocentric notion of a physical, ultradense firmament.

In *The Very Early Universe* (Gibbons, Hawking & Siklos, ©1983 Cambridge University Press), M.A. Markov defines a "particle" termed a "maximon," possessing the 10^{94} g/cm^3 density defined above, or more precisely, 3.6×10^{93} g/cm^3 (pgs. 359, 361). He writes, "If a black hole has internal Planck dimensions and an external mass equal to the Planck mass, the matter density in it is quantum (Pq). If it is not decaying, such a black hole represents some degenerate case: it can neither collapse. nor anticollapse if one assumes that the mass density cannot exceed pq. In other words, the requirement of a limiting density is very strong and leads to nontrivial consequences" (pgs. 366-367). Markov then explores the implications of a "liquid" made up of such maximons, and points out that from "a topological point of view the maximon liquid is a model of a quasi-isotropical space" (*ibid*). This citation is important, for geocentrists are often criticized for their description of "empty" space as a medium millions of times denser than lead, leading to the common objection that physical objects could never possibly move through so dense a medium. But the physics affirms the fact that such a medium can function as a space, through which other objects can freely pass. (A maximon is not necessarily a black hole, according to Markov, but "may be a particle of the same Planck dimensions, but with a structure essentially different from a black hole. Their gravitational radius coincides with their Compton length," *ibid*, pg. 365. This is pointed out here to cut short any critique that the firmament model clearly leans on general relativity by relying on the existence of microscopic black holes.)

Note Markov's use of the word, "nontrivial." This word is the most appropriate term one could apply to the firmament of the geocentrists – any object as stupendously massive as the firmament is asserted is to be taken very seriously, since it dwarfs the rest of the universe in comparison. It is ironic that geocentrists are routinely called upon to abandon this "quirky, inconsequential" notion, whereas secular science has continued to probe the idea theoretically and experimentally, while unaware of its ultimate implications.

In short, "empty" space is not a vacuum; it is not a "nothing," it is a "something." Correspondingly, it has properties and attributes that "nothingness" cannot possess. Dr. Robert J. Moon, Professor Emeritus in Physics at the University of Chicago, published an article in *21st Century*, May-June, 1988, pg. 26ff, entitled "Space Must Be Quantized," addressing precisely this issue. He points out that "according to accepted theory, free space is a vacuum. If this is so, how can it exhibit impedance'? But it does. The answer, of course, is that there is no such thing as a vacuum, and what we call free space has a structure. ...[This impedance] equals 376+ ohms." This reactive, energy-storing impedance is a natural corollary of geocentric theory and its ultradense firmament; it has not been accounted for by conventional science, and is not contained within either Newton's dynamics or Einstein's gravitational field equations. Where was conventional science in accounting for this effect?

The ultradense firmament of the geocentrists pops up in the literature in various guises, as theorists attempt to account for the experimental data flooding into the various centers of higher learning. Princeton's John A. Wheeler is credited with being the first to describe what is now called "spacetime foam," the notion that on ultramicroscopic scales empty space is filled with countless ultradense particles popping into existence and then becoming instantly extinct (1957). In 1968 he observed that "the central new concept is space resonating between one foam-like structure and another." Noted astronomer Stephen Hawking developed the implications of this "foam," which is distinctive in that on extremely small scales empty space is jam-packed with violently random activity and enormous mass ("virtual" mass in the modern terminology). (Cf. MW&T, *Gravitation*, pgs. 10, 11, 1180.) The physics at this scale, and the mathematics used to describe it, are daunting even to the cognoscenti. The geocentric firmament differs from the conventional understanding in affirming that the underlying particles are permanent and stable, whereas modern physics prefers to regard them as undergoing continuous and extremely rapid creation and annihilation, like an unstable foam. Both theories put the density of the particles at the Planck density.

In *Physical Review* D, Third Series, Volume 47, Number 6, March 15, 1993, pg. R2166ff, Redmount and Suen explore the question, "Is Quantum Spacetime Foam Unstable?" Utilizing fluctuating black holes and wormholes as constituents of the structure of space is a serious liability, the physicists conclude, because the inherent instability of these structures makes them unsuitable candidates as components of the underlying structure of space. There must be, in fact, "strong constraints on the nature" of the structure of space at scales down to the so-called Planck length (about 10-33 cm), the size of a maximon. This recent research

points away from the Wheeler & Hawking models and toward the firmament of the geocentrists, which does not suffer from the stability problem associated with the hypothetical objects (wormholes, blackholes) populating the general relativity menagerie.

In the geocentric hypothesis, the firmament particles, although unable to "break ranks" because their neighbors are too close, are yet in rapid motion, colliding rapidly and continuously with their neighbors. (The fact that they possess rotational spin, something first proposed by Maxwell, will be taken up a little later in connection with electromagnetic theory.) Their behavior has a somewhat stochastic, or random, nature – as clearly taught as far back as LeSage in 1778. Their behavior is classical, but being as small as they are, they influence and induce other larger particles to behave in ways heretofore thought explicable only on quantum mechanical grounds. And, in point of fact, the tenets of the geocentrists' firmament theory have emerged in connection with quantum mechanics, going as far back as Louis De Broglie's work in the 1920's.

An excellent discussion of this matter is set forth in J. P Vigier's article, "De Broglie Waves on Dirac Aether: A Testable Experimental Assumption." *Lettere Al Nuovo Cimento*, Vol. 29, No. 14, Dec. 6, 1980, pg. 467f. Vigier wrote, "Since Dirac's pioneer work it has been known that Einstein's relativity theory (and Michelson's experiment) are perfectly compatible with an underlying relativistic stochastic aether model. Inherent to this model is Einstein's idea that quantum statistics reflects a real subquantal physical vacuum alive with fluctuations and randomness. This concept of a nonempty vacuum has been recently revived not only to yield a foundation to the stochastic interpretation of quantum mechanics but also to explain causally possible nonlocal superluminal interactions resulting from the Einstein-Podolsky-Rosen paradox. Indeed, if a forthcoming experiment of Aspect confirms their existence, the only way out of the resulting contradiction between relativity and the quantum theory of measurement seems to lie in the direction of an extension of the causal stochastic interpretation of quantum mechanics. This assumes the existence of causal subquantal random fluctuations induced by a stochastic «hidden» thermostat proposed by BOHM, VIGIER and DE BROGLIE." (pg. 467)

Although to the layman the last citation might appear impenetrably dense, the main points can be made clear. There are two schools of thought in the world of quantum mechanics, termed the Copenhagen Interpretation, and the Stochastic Interpretation (sometimes called the Causal Interpretation). The Copenhagen Interpretation is rather counterintuitive and mystical sounding to the layman. One example will suffice: flip a coin and cover it up immediately before looking at it. Is it heads or tails? The

Copenhagen Interpretation asserts that the coin is simultaneously heads AND tails while it is covered, but can be forced to fall back into either heads or tails once you take your hand off it and observe it. It then suddenly flips to a unique state by the mere act of observation.

The Stochastic Interpretation, unsatisfied with this somewhat bizarre worldview, asserts that the various unusual quantum effects measured on subatomic scales have an actual physical cause (hence, Causal Interpretation). If there is difficulty in simultaneously measuring the momentum and position of a subatomic particle (the Heisenberg Uncertainty Principle), it may be due to actual background noise: this is the point of view of the Stochastic Interpretation. This source of noise is the "nonempty vacuum" Vigier refers to, a level of physical reality discernible on ultra-small scales, and freighted with significance.

Vigier's prologue used the word "superluminal," meaning any entities or interactions that travel faster than the speed of light. He pointed out that if Aspect's then-upcoming experiment measured any superluminal interactions, the contradiction between general relativity and the stochastic theory would have to be decided in favor of the stochastic theory. Translation: if Aspect's experimental result is positive, the consequences would be hostile to general relativity and favorable to the firmament model, the one stochastic model that satisfies the stability constraints stipulated by Redmount and Suen in March, 1993.

Vigier reminds us "that Dirac aether rests on the idea that through any point 0 there passes a flow of stochastic particles and antiparticles" (pg. 468), reminiscent of the original LeSage theory. He then introduces spin to the stochastic particles making up what he calls a background sea of activity. He even prefers (pg. 470) that his stochastic particle undergo only short range motions: "contact particle-particle collision type interactions." This is the same restraint geocentrists place on their ultradense firmament model.

Vigier, working with Petroni, published an important article a year earlier than the last reference, in *Lettere Al Nuovo Cimento*, Vol. 26, No. 5, Sept. 29, 1979, pg. 149, entitled "Causal Superluminal Interpretation of the Einstein-Podolsky-Rosen Paradox," wherein he demonstrates that his stochastic model does not encounter the same pitfalls that the competing tachyon theory of Sudarshan, Feinberg, & Recami encounters in explaining faster-than-light interactions and objects. Says he, "We show in particular that superluminal, phase-like, phonon-like, collective motions of the quantum potential in Dirac's aether do net induce the well-known causal paradoxes of tachyon theory" At the conclusion of his exposition he points out. "It is interesting to note that this elimination of causal paradoxes is only possible in a subquantum model built on a Dirac's

vacuum and cannot be applied to theories where superluminal signals are carried by tachyonic particles." He proposes allowing "superluminal signals to be acoustical waves with associated quantum potential..." in harmony with the better attested geocentric firmament model. (Geocentric astronomer Dr. Gerardus Bouw has performed some of the seminal computational work in this area of firmament dynamics in the early 1980's.)

The experiment by Aspect that J. P. Vigier was anticipating was performed, and the results published in *Physical Review Letters*, Vol. 47, No. 7, August 17, 1981, pgs. 460-463. Aspect, with partners Grangier and Roger, introduces his results with a little history: "Since the development of quantum mechanics, there have been repeated suggestions that its statistical features possibly might be described by an underlying deterministic substructure." The apparatus, which performed polarization correlation on photon pairs, involves hitting an atomic beam of calcium with a krypton ion laser and a second Rhodamine laser. The results confirm the existence of superluminal (faster-than-light) interactions, and served to further buttress the stochastic interpretation of quantum mechanics, which, as has been pointed out, has been evolving closer and closer to the geocentrist's firmament hypothesis. (The experiment was conducted again with greater precision, agreeing with the first experiment, and the new results published in *Physical Review Letters* Vol. 49, No. 2, July 12, 1982, again pointing to the geocentrist's firmament model by proving the existence of the quantum potential.)

The issue of superluminal phenomena is significant in light of the common theoretical challenge to geocentric cosmologies that they require every object past Saturn to travel faster than the speed of light in order to complete a daily revolution around the earth. Just as most of the preceding technical citations were provided and explained in the famous videotape that fell on closed eyes, so too are the following references.

In the February 1992 issue of the *American Journal of Physics*, W. M. Stuckey published an analysis titled, "Can galaxies exist within our particle horizon with Hubble recessional velocities greater than c?" (pgs. 142-146). Stuckey proposes to measure the speed at which galaxies are traveling away from us, utilizing their red shift. His test object, a quasar with a red shift of 4.73, is computed to be receding from us at 2.8 times the speed of light. So why is it a problem when geocentrists propose faster-than-light velocities for celestial bodies, and not a problem when mainstream scientists take such measurements in stride?

Stuckey explains that the quasar is fleeing from us so rapidly (at what would at first glance appear to be a completely impossible velocity) due to a property of the space between here and there. The vacuum between us

and the quasar is stretching and expanding, and thus carries the quasar away from us faster than the speed of light. When modern scientists inform us that objects can travel faster than light due to the expansion of space, we marvel at their wisdom and learning. When geocentrists inform us that objects can travel faster than light due to the rotation of space, we marvel at their insanity. Yet, both models stipulate the same origin of the superlight speed, namely, the intrinsic properties of the space in which the objects are placed.

The idea of a rotating universe has been addressed in the secular literature on many occasions. Yu. N. Obukhov, in the recent study "Rotation in Cosmology" (*General Relativity and Gravitation*, Vol. 24, No. 2, 1992, pgs. 121-128), observes that "Since the first studies of Lanczos, Gamow and Gødel, a great number of rotating cosmological models have been considered in the literature. Nevertheless the full understanding of observational manifestations of cosmic rotation is still far from reach. Moreover, there is a general belief that rotation of the universe is always a source of many undesirable consequences. most serious of which are time-like closed curves, parallax effects, and anisotropy of the microwave background radiation. The aim of this paper is twofold – to show that the above phenomena are not inevitable (and in fact, are not caused by rotation), and to find true effects of cosmic rotation." Unfortunately, Obukhov refrains from putting the other foot down: "Here we shall not enter into a discussion of [the] philosophical significance of cosmic rotation (though, in our opinion, the analysis of its relation to the Mach's principle is of great interest)." Nonetheless, he follows the evidence to its conclusion: "As we can see, pure rotation can be, in principle, large, contrary to the widespread prejudice that large vorticity confronts many crucial observations."

Rotating universe models have continued to receive analytic scrutiny (cf. *Soviet Physics Journal*, March 1992, JETP 74 (3), "Accounting for Birch's Observed Anisotropy of the Universe: Cosmological Rotation?", by Panov and Sbytov; also *General Relativity and Gravitation*, Vol. 25, No. 2, 1993, pgs. 137-164, "Synchronized Frames for Godel's Universe," by Novell, Svaiter and Guimaraes). So the question remains: if outer space can stretch faster than the speed of light and carry objects with it, why can't it rotate faster than light and do the same? Sauce for the general relativity goose is sauce for the geocentric gander.

Dr. Nieto raises some observational challenges for geocentric cosmology, beginning with the parallax effect. There are two schools of thought among geocentrists as to how parallax arises (and ;f the quantum mechanicists can have two schools of thought, why not the geocentrists'?). The "pure" form of geocentricity centers the stars on the earth, and

describes the resulting annual stellar shifts by placing the Earth at one sink of a conformal mapping. This procedure has been worked out in rigorous detail for the two-dimensional case by James Hanson, and agrees with the observed phenomena. (This paper regards this model as "pure" inasmuch as it conforms to the original cosmology of Tycho Brahe without modification.) The "modified Tychonic model" centers the stars on the Sun, so that the stars participate in the Sun's annual migration, with the observed parallax being directly predicted by the subsequent geometry. This second model would satisfy the requirements that any consistent relativist would impose on a legitimate geocentric frame of reference, and may well even have direct and indirect Biblical support.

In the geocentric model, the firmament is in daily rotation around the earth, and undergoes annual oscillations as well. This motion of the firmament is evidenced in the Sagnac effect, the well-known Coriolis forces, and by geosynchronous satellites (or, in a more Tychonian vein, geostationarv satellites). In the geocentric model, we agree that if the heavens ceased their rotation, the satellites would fall to the earth. But when the heavens are postulated to be in motion, it is Dr. Nieto's equations that are deficient, not ours.

There are four fascinating aspects of the geocentric model. (I) The notion of a structured firmament analogous to a crystal lattice permits one to consider elementary particles (electrons, protons, neutrons, etc.) to he phonons (quantized vibrations) within that crystal. (Cf. P. J. Bussey, "The Phonon as a Model for Elementary Particles," *Physics Letters* A 176, 1993, pgs. 159-164.) Bussey shows how phonons exhibit all the experimentally measured properties of elementary particles, including particle splitting and wave collapse. The appeal of the theory is in its predictive power and correlation with reality. Its difficulty is that an appropriate medium must exist in which these vibrations are to propagate, namely, a medium having the properties of the geocentrist's firmament. Because the geocentric firmament's fundamental ultramassive particles are packed as tight as atoms within a crystal, it serves as the ideal lattice structure for a phonon-based theory of particle structure to succeed.

The notion of space being some kind of crystal (in harmony with the geocentric and Biblical views of the firmament) is a topic of serious discussion in modern physics. Holland and Philippidis have explored the idea in their article, "Anholonomic Deformations in the Ether: A Significance for the Electrodynamic Potentials," (Hiley & Peat, eds., Quantum Implications, ©1987 Routledge, pgs. 295ff). They write, "In attempting to discover the classical significance of the At, [electromagnetic potential - MGS] we have at our disposal several clues. Bohm has suggested an analogy between the Aharonov-Bohm effect and

the dislocation of a crystal lattice... Dirac showed how an ether which at each point has a distribution of velocities which are all equally probable would be consistent with relativity, and alternative approaches to the quantum theory by Bohm and Vigier have indicated that a suitably fluctuating ether can contribute to an understanding of the micro-domain. We recall that much effort was expended in the nineteenth century in trying to understand electromagnetic processes in terms of stresses set up in an ether treated as an elastic solid."

Philippidis, Dewdney and Hiley pointed out that "as far as the quantum domain is concerned, space cannot be thought of simply as a neutral back cloth. It appears to be structured in a way that exerts constraints on whatever processes are embedded in it. More surprisingly still, this structure arises out of the very objects on which it acts and the minutest change in any of the properties of the contributing objects may result in dramatic changes in the quantum potential... It is clear, therefore, that the quantum potential is unlike any other field employed in physics. Its globalness and homogeneity in the sense of not being separable into well-defined source and field points indicate that it calls for a different conceptual framework for its assimilation." ("Quantum Interference and the Quantum Potential," II Nuovo Cimento, Vol. 52B, No. 1, July 11, 1979).

The firmament of the geocentrists is explored under the name of the quantum potential by some, and by different names by other researchers. G. Gaeta, writing in *Physics Letters* A 175 (1993), pgs. 267-268, wrote of an "unknown medium originating" the observed quantum Brownian noise. Says he, "If we accept this picture, the particles of the EPR experiment are in permanent contact with a NGV stochastic process." This functional synonym for the geocentrist's firmament is named after the scientists whose constraints color its characterization, Nelson, Garbaczewski and Vigier. Gaeta treats this medium as completely universal: "The universality of quantum mechanics corresponds to the universality of the NGV process: this means that no physical system or particle can be regarded as truly isolated, as every physical system or particle - being subject to quantum mechanics – is at least in contact with the universal NGV process."

The concluding paragraph in the article, "Causal Particle Trajectories and the Interpretation of Quantum Mechanics" (*Quantum Implications*, pgs. 169-201) exposes the dilemma for modern physics in telling language: "The interpretation of Bohr and of de Broglie-Bohm-Vigier both emphasize that the fundamentally new feature exhibited by quantum phenomena is a kind of wholeness completely foreign to the post-Aristotelian reductionist mechanism in which all of nature in the final

analysis consists simply of separate and independently existing parts whose motions, determined by a few fundamental forces of interaction, are sufficient to account for all phenomena. The difference arises in the methods for dealing with the situation. One thing however is clear; the organization of nature at the fundamental level is far more complex than mere mechanistic models can encompass. The ghost cannot be exorcised from the machine."

(2) The firmament itself provides for a complete gravitational theory based on the physics of shadowing and attenuation, yielding predictive results beyond those of conventional theory. By introducing the element of spin, and thus angular momentum, to the firmament subparticles, the antisymmetric properties of electromagnetic fields obtain, being construed as a transfer of angular momentum particle by particle and giving rise to the well known perpendicularity of the electric and magnetic fields. In Dr. Bouw's model, the firmament even accounts for the strong nuclear force that holds protons and neutrons together in atomic nuclei: as two nucleons make actual contact, the shadowing effect goes asymptotic according to the known attenuation expression, and the total force is all inward, its magnitude characterized by the Yukawa potential. This model therefore is a nascent unified field theory, or what is now termed a GUT (Grand Unification Theory), that accounts for all available physical effects that can be measured by science, from gravitation, electromagnetism, strong nuclear force, the Uncertainty Principle, elementary particle structure, etc. In other words, the early work of developing a new dynamics is well underway, as propounded at the outset.

The third and fourth developments are recent, homespun insights not heretofore published, and therefore not yet subjected to peer review. Although potentially premature, the benefit from airing them outweighs the risk; I invite the reader to weigh the following notions carefully.

(3) It is often objected that if geocentricity were true, and the rotating heavens were dragging Foucault pendula and weather systems around, why doesn't that force pull on the earth itself and drag it along, causing it to eventually rotate in sync with the heavens? It appears that this straightforward application of torque to the earth should cause it to rotate in turn, but this turns out to be an oversimplification. As the heavens rotate, and the firmament rotates on an axis through the earth's poles, each firmamental particle (the ones comprising the ultradense lattice) also rotates with the same angular velocity. Ironically, this is precisely the reason the earth can't be moved. In MT&W's Gravitation, pg. 1119-1120, we are invited to ponder the following scenario:

"Consider a rotating, solid sphere immersed in a viscous fluid. As it rotates, the sphere will drag the fluid along with it. At various points in the fluid, set down little rods, and watch how the fluid rotates as it flows past. Near the poles the fluid will clearly rotate the rods in the same direction as the sphere rotates. But near the equator, because the fluid is dragged more rapidly at small radii than at large, the end of a rod closest to the sphere is dragged by the fluid more rapidly than the far end of the rod. Consequently, the rod rotates in the direction opposite to the rotation of the sphere. This analogy can be made mathematically rigorous."

Now reverse the situation. If we want to cause the sphere to rotate clockwise, we would need to turn the rods at the poles clockwise, and the ones at the equators counterclockwise. (Consider the equator as a big gear, and the firmamental particles as small gears that engage it. It is intuitively obvious that the small gears must always turn in contrary motion to the large one at the equator.) This picture is clear then: to turn the sphere, the rotation of the particles (MT&W's "rods" and this author's "gears") at the poles must be the opposite of that at the equator.

However, in the case of a rotating firmament, all the particles are rotating in the same direction, with the angular velocity common to the entire firmament. The equatorial inertial drag is in the opposite direction as that acting near the poles. Using calculus, one integrates the effect from the center of the Earth outward in infinitesimal shells, showing that the Earth is in fact locked in place, the resulting inertial shear being distributed throughout the Earth's internal volume. It could be demonstrated that were the Earth to be pushed out of its "station keeping" position, the uneven force distribution would return it to its equilibrium state. Intriguingly, the significance of these internal forces on seismic stress, plate tectonics, and the earth's magnetic field may prove central, if so be that these postulates survive the inevitable peer review to come.

(4) Consider again Grön & Eriksen's position that a rotating cosmic mass imposes an upward force on a geostationary satellite. (They used the Earth as a synchronous satellite for the Moon in their article to illustrate the principle.) They posit that the centrifugal force on the satellite arises from a cosmic non-tidal gravitational field pulling up on the satellite. Consider, then, the behavior of light traveling to the Earth from distant celestial objects: would it not also be subject to the effects of this cosmic nontidal inertial pull? Logic would dictate that, yes, in accordance with the late Dr. Richard Feynman's *Lectures in Physics*, Vol. 2, pgs. 42-10 & 42-11, as well as the extended discussion in MT&W's *Gravitation*, pgs. 1055-

1060, incoming light subject to the induced gravitational field will lose energy and thus decrease in frequency, according to the known relations that govern calculation of gravitational red shifts.

If true, then the rotation of the cosmic mass could be responsible for the red shift heretofore understood as a Doppler consequence of the Big Bang. This in turn would provide a new basis for measuring the distance of celestial objects, one wholly different than the system erected upon the Doppler view of the red shift, which could involve a significant remapping of the heavens.

But more intriguingly, this result, if confirmed, would be hostile to general relativity, because the theory would require the red shift to be observed whether it is the Earth or the heavens that are rotating, whereas on classical grounds it would only be expected if the heavens were rotating, and the result would be the same whether measured from the Earth, from a satellite, or from the space shuttle. At this point in time, the experimental evidence militates against relativity on this effect, so that relativity would either need to neutralize the red shift predicted under a rotating cosmos scenario, or abandon its core postulate.

It would then appear that geocentrists are more than willing to risk making scientific predictions to put their hypotheses to the test. Some have already passed muster, but others are too recent to have gone through the requisite shaking-out period. This is to be expected in the infancy of the development of a new dynamical theory that embraces every aspect of reality, from unthinkably massive and immense objects to the world of the ultramicroscopic reality underlying the atomic realm.

Appendix 2

Gravitational Lensing: Real or Imagined?

Among other things, gravitational lensing is proposed by modern cosmology as evidence for the existence of Dark Matter.
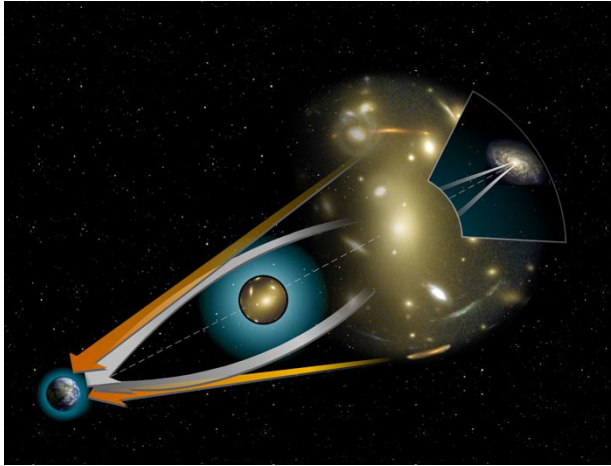
One source states:

A gravitational lens is formed when the light from a very distant, bright source (such as a quasar) is "bent" around a massive object (such as a cluster of galaxies) between the source object and the observer. The process is known as gravitational lensing. Dark matter affects galaxy clusters as well. X-ray measurements of hot intracluster gas correspond closely to Zwicky's observations of mass-to-light ratios for large clusters of nearly 10 to 1. Many of the experiments of the Chandra X-ray Observatory use this technique to independently determine the mass of clusters. The galaxy cluster Abell 2029 is composed of thousands of galaxies enveloped in a cloud of hot gas, and an amount of dark matter equivalent to more than 1014 Suns. At the center of this cluster is an enormous, elliptically shaped galaxy that is thought to have been formed from the mergers of many

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[663] Caption from Wikipedia states: "Bending light around a massive object from a distant source. The orange arrows show the apparent position of the background source. The white arrows show the path of the light from the true position of the source."

smaller galaxies. The measured orbital velocities of galaxies within galactic clusters have been found to be consistent with dark matter observations. Another important tool for future dark matter observations is gravitational lensing. Lensing relies on the effects of general relativity to predict masses without relying on dynamics, and so is a completely independent means of measuring the dark matter.[664]

A more general summation of gravitational lensing states:

A gravitational lens refers to a distribution of matter (such as a cluster of galaxies) between a distant source (a background galaxy) and an observer, that is capable of bending (lensing) the light from the source, as it travels towards the observer. This effect is known as gravitational lensing and is one of the predictions of Albert Einstein's General Theory of Relativity. Although Orest Chwolson is credited as being the first to discuss the effect in print in 1924, the effect is more commonly associated with Einstein, who published a more famous article on the subject in 1936. Fritz Zwicky posited in 1937 that the effect could allow galaxy clusters to act as gravitational lenses. It was not until 1979 that this effect was confirmed by observation of the so-called "Twin QSO" SBS 0957+561. Spacetime around a massive object (such as a galaxy cluster or a black hole) is curved, and as a result light rays from a background source (such as a galaxy) propagating through spacetime are bent. The lensing effect can magnify and distort the image of the background source. Unlike an optical lens, maximum 'bending' occurs closest to, and minimum 'bending' furthest from, the center of a gravitational lens. Consequently, a gravitational lens has no single focal point, but a focal line instead. If the (light) source, the massive lensing object, and the observer lie in a straight line, the original light source will appear as a ring around the massive lensing object. If there is any misalignment the observer will see an arc segment instead. This phenomenon was first mentioned in 1924 by the St. Petersburg physicist Orest Chwolson,] and quantified by Albert Einstein in 1936. It is usually referred to in the literature as an Einstein ring, since Chwolson did not concern himself with the flux or radius of the ring image. More

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[664] http://en.wikipedia.org/wiki/Dark_matter

commonly, where the lensing mass is complex (such as galaxy groups and clusters) and does not cause a spherical distortion of space–time, the source will resemble partial arcs scattered around the lens. The observer may then see multiple distorted images of the same source; the number and shape of these depending upon the relative positions of the source, lens, and observer, and the shape of the gravitational well of the lensing object.[665]

Problems with the gravitational lens thesis begin at the foundation of modern cosmology.[666] Besides the fact that it is built on an unproven premise that redshift indicates distance (a fact that even Hubble admitted in the early stages of his observational findings (and which has been confirmed by Halton Arp's discoveries that high redshift quasars are connected to and thus are the same distance from us as low redshift galaxies and therefore the latter cannot serve as "gravitational lenses" for the former), the whole idea that light is bent by gravity in the manner dictated by the General Theory of Relativity is unproven as well.[667] Hence, when gravitational lensing is based on "Twin QSO SBS 0957+561," which is said to have a redshift of 1.41 and is thus 8.7 billion light years from Earth, whereas the galaxy that is said to be its gravitational lense has a red shift of 0.355 and is 3.7 billion light years from Earth, we must take these statements with a grain of salt.

We must also ask the basic question about gravitational lensing itself. The theory states that because there is a light source behind every galaxy,

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[665] http://en.wikipedia.org/wiki/Gravitational_lens.

[666] Our thanks to Miles Mathis for his critique of gravitational lensing, much of which we include in our appendix. In his conclusion, Mr. Mathis states: "Prima facie, the hypothesis is weak, and the more one studies the examples, the weaker it gets. The theory is never defended in a cogent manner, it is simply asserted, and all anomalies are ignored. The Twin Quasar and Einstein's Cross are not strong examples, but every page on gravitational lensing leads with them. This is itself a tip-off, for if stronger examples existed we would not need to hear of the weak examples….This is how the standard model operates, on all questions. There is no possible defense of its nebulous hypotheses, so its only hope it to reject announcements and papers, to browbeat anyone who sits still for a moment, and to pre-empt discussion by a constant professional patter of propaganda" (milesmathis.com/lens.html).

[667] See Edward H. Dowdye, Jr. "The Shapiro Delay: A Frequency Dependent Transit-Time Effect," Proceedings of the National Philosophy Alliance, July 2011, http://www.worldnpa.org/site/abstract/?abstractid=6105&subpage=pdf.

then that light source should be bent before it reaches our telescopes on Earth. Since every observable galaxy has behind it a source of light, this necessarily means that we should see light being bent around every galaxy in the observable universe. This would result in the sky being filled with duplicate images of these distant light sources and present us with an even more dire version of Olber's paradox. In the end, the gravitational lensing theory suffers from an acute selection bias. Despite these anomalies, we will examine the claims granting for the sake of argument that the foundations are correct.

The Wikipedia source for the Twin Quasar states: "The lensing galaxy with apparent dimension of 0.42 × 0.22 arcminutes lies almost in line with the B image, lying 1 arcsecond off," and is identified as "YGKOW G1 (sometimes called G1 or Q0957+561 G1), is a giant elliptical (type cD) lying within a cluster of galaxies that also contribute to the lensing." As such, the first question is how the lensing galaxy could shift the B image by one arcsecond. The center of mass for the galaxy would need to be off-center by a significant amount, especially since YGKOW G1 is an elliptical galaxy which are known to be very smooth, much more than spiral galaxies in which mass congregates in the arms. Some have noted this problem and answer it by positing that globular clusters help in the lensing. But this solution, of course, only admits to the problem but does not possess proof of its answer since no globular clusters have been found.

Twin Quasar 0957 + 561
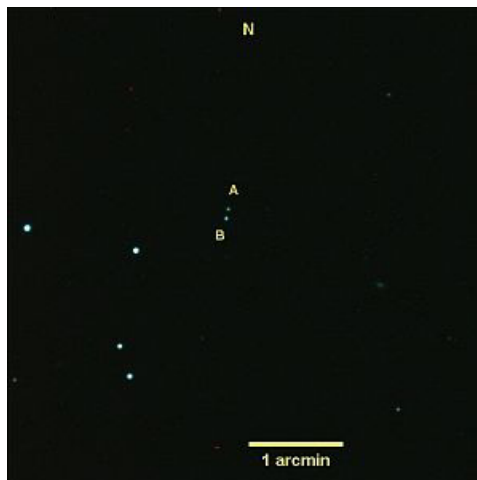
Additionally, an elliptical galaxy would not likely produce a double image (as in the above photography) but a more diffuse circular images since the quasar light is emitted in spherical dimensions. That an elliptical galaxy could magnify the quasar light so precisely as to project two distinct images on Earth is quite an unlikely scenario, especially since the quasar is said to be five billion light years from the lensing galaxy. Since the galaxy is said to be 3.7 billion light years from Earth, this would translate the 1 arcsecond angle of bending to about 18,000 light years, which means that the quasar light is passing by the lensing galaxy at a distance of 18,000 light years. That's quite a stretch, since we know that even star light that passes near the sun is bent only near the surface of the sun.

There is also a problem with how images A and B of the Twin Quasar are situated with the lensing galaxy. A and B are about 6 arcseconds apart and the lensing galaxy is about 1 or 2 arcseconds in width between A and B, which leaves about 3 or 4 arcseconds that image A or B lies from the edge of the lensing galaxy. Since for every arcsecond there is 18,000 light years of distance, then 3 arcseconds would be 54,000 light years and 4 arcsecond would be 72,000 light years that either A or B is from the edge of the galaxy. Bending of light simply cannot occur that far out unless, of course, one abandons both Newtonian and Einsteinian gravity theory.

Einstein's Cross
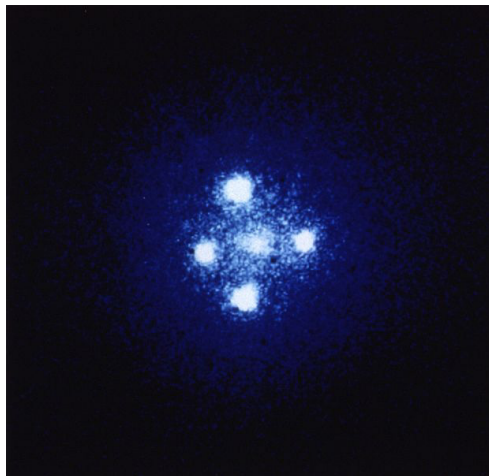
The same Wikipedia article offers "Einstein's Cross" as another example of gravitational lensing. The caption underneath the picture says: "In the formation known as Einstein's Cross, four images of the same distant quasar appear around a foreground galaxy due to strong gravitational lensing." Similar to the images of the "Twin Quasar," the four images of Einstein's Cross are off center. This means that the lensing galaxy is not in the center of the composite image. In fact, the lensing galaxy's center of mass would need to be quite a distance to the left of the galaxy in order to produce the left-weighted position of the upper and lower images. Additionally, in order to produce four distinct images surrounding the center image, the lensing galaxy would at least need to be spherical and at best cubical, but even then we would expect to see some kind of arcing, not to mention at least some images produced in the four corners, giving eight images in all. Rather, we see four distinct images in the vertical and horizontal positions but nothing in the corners except small points of light. The four images themselves are circular and undiffused, thus showing that they are not under the influence of a curved gravitational field at all. An attempted explanation of this anomaly was given at physicsforums.com:
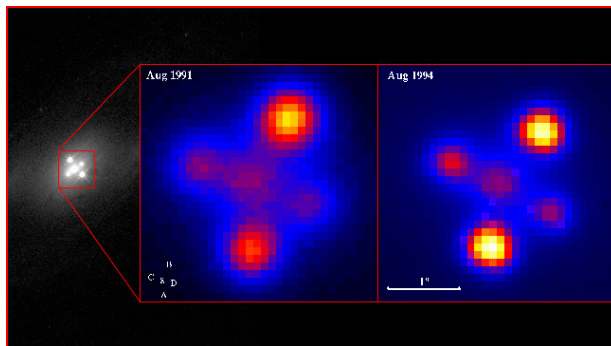
A: Tell me if I've got this right....The light from a distant quasar is bent around a more nearby galaxy, which is acting like a lens producing multible images of the quasar... correct? What's up with this ? Is the lensing galaxy rectangular? Why is the "lensing effect" producing four distinct images and not some distorted circular patterns?

B: It's not rectangular, the lining is just that good, it is an oddity, but one that sheds alot of light, no pun intended, on gravitational lensing.

A: The lining could be perfect and the lensing effect still shouldn't look like that....If the lensing object is spherical it should bend the light from an object behind it equaly in every direction, which will create a "circle of light" around the lensing object, not four distinct copies in a crossformation. Am I mistaken?

B: You took my meaning of lining wrong, its not a straight line, the quasar in the back is off alittle bit, which creates the four points. Actually the light is bent spherecly, [sic] but due to the alignment, it peaks at four points, and the other stuff gets lost in space. That is it is so small it doesn't show up, and if you increase the exposure time, the galaxy in front will saturate the image.

A: Ok, I see... thnx![668]

Mathis comments:

For some reason our forum member is satisfied with that terrible answer: members who argue with the experts are routinely shunned and then banned, so it is best not to make much noise. But let us look at the answer here. The light is bent spherically, but peaks at four points: that is not an explanation, that is a statement. "We see four points, therefore the image peaks at four points." Zero content. Even if the image did peak at four points, for some physical reason not mentioned here, the image would not be expected to "unpeak" right at the top and bottom edge of the images we see. We don't see "peaks," we see spikes surrounded by zero amplitudes. In fact, a quasar "off a bit" from center would not create peaks, much less spikes. It would create a bent image on one side only, or at the most two sides. It could not create four images, since it would have to create unequal bending in order to do so. To make this even sillier, our expert says, "the other stuff gets lost in space." The light in the four

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[668] http://www.physicsforums.com/showthread.php?t=1375

corners is so dim, it gets soaked up by the vacuum, I guess, by some mechanism of light destruction so fundamental it doesn't have to be mentioned. Equally silly is the idea that "the galaxy in front will saturate the image." The galaxy in front is not as bright as the quasars, but if we give it time, it will become brighter than them and fill up all the dark spots, relieving us of our need to look at them and ask questions about them.

Further anomalies of Einstein's Cross for the gravitational lensing theory were noted by others. One site states:

Is the Einstein Cross a gravitational lens (a galaxy-sized fun-house mirror), or is it a redshift anomaly, proving that the "redshift-equals-distance" assumption is fatally flawed?

In the mid-1980's, astronomers discovered these four quasars, with redshifts about $z = 1.7$, buried deep in the heart of a galaxy with a low redshift of $z = .04$. (The central spot in this image is not the whole galaxy, but only the brightest part of the galaxy's nucleus.) This could have been seen as a crucial verification of Halton Arp's discordant redshift associations. It could have been proof that the redshift-equals-distance relationship is fatally flawed. Instead, Einstein's space-warping principle was invoked, and astronomers announced they had discovered a single distant quasar split into four images by the gravity of the foreground galaxy. A galaxy-sized fun-house mirror!

But how well does the image fit the theory? Einstein predicted that light from a distant object that was gravitationally warped around a massive foreground object would form arcs or even a full circle. Here we see four bright spots and no ring-like elongations. In fact, all four of the bright spots are elongated in the wrong direction: they stretch toward the galaxy center.

More observations were undertaken. Using the Hubble Space Telescope, a friend of Arp's documented that quasar D (right side of photo) is physically connected to the nucleus of the galaxy. Later, a high redshift connection was discovered between quasars A (bottom) and B (top) which passes in front of the connection between the nucleus and quasar D. But these

observations went unnoticed: the journal which usually prints results from the Hubble Space Telescope rejected this announcement twice.

Mathematical analysis, too, casts doubt on the gravitational lens theory. The faint foreground galaxy would need to be much bigger and brighter in order to accomplish this lensing feat: In fact, it would have to be 2 magnitudes brighter than "conventional quasars," the brightest objects known.

These two photos show brightness changes observed over a period of three years. The lensing explanation is that the warping of the light varies when individual stars pass in front of the quasar. Arp's explanation is that the galaxy has ejected four quasars, which are growing brighter and moving farther from the nucleus as they age.[669]

Mathis concludes:

Both rings and distinct images can be explained by refraction, since matter can be cast off either in jets or in haloes. Haloes will give us arcs of refraction and jets will give us a distinct area of refraction. But lensing cannot explain the lack of arcing we see in Einstein's cross, since galaxies cannot create square lenses.

So you can immediately see that we don't need an esoteric explanation of bending, when we already have a prosaic explanation. Even before I showed the logical inconsistencies of the theory of lensing, it was much more likely and plausible that rings and arcs and multiple images were caused by refraction than by gravitational bending. Astronomers assigned the phenomena to gravity only because they were already in search of such "proofs." They needed the bending to be caused by gravity, so they ignored the more likely explanations. As in so many other instances, they let the theory determine the data. Instead of having data, and then developing a theory to contain it, they had a theory, and then went in search of data to support it. The science of the hysteron proteron.

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[669] "The Einstein Cross," Jul 26, 2004, http://www.thunderbolts.info/tpod /2004/arch/040726nebula.htm

But now we can see that logic supports refraction, and refutes lensing. This is because refraction can explain the very limited instances of bending we do get. Refraction requires that we have an area of refracting medium, of the right refraction index, at the right distance, and at the right angle, in order to send an image to us. This would be expected to be a fairly rare occurrence, even at universal scales.[670]

Edward Dowdye, former NASA engineer, adds these observations to the issue:

The evidence is all over the celestial sky and the background images of all those lensing galaxies have absolutely nothing at all to do with Gravitational lensing of General Relativity. The modern high resolution telescopy has light amplification powers and is able to view very weak signals and faint images (of few photons per count) making visible what was not visible 50 years ago because the technology was not there yet. What is seen in most cases is the scattering of the light coming from the far background regions or galaxies emitting light to regions of space where there in little or no light at all (complete blackness). The scattered light from the background sources are responsible for the false alarms or the false images. These images are incorrectly interpreted as having something to do with gravitational lensing or light bending effects of General Relativity. All you have to do is change the wavelength or frequency of the observed waves or the images, and then the images will look entirely different. All the features will totally disappear and the feature will no longer be visible in the infrared and the ultraviolet. This is something the mainstream does not want to talk about…these images do not have there counterparts in other regions of the spectrum, namely, the infrared and the ultraviolet. If lensing or light bending of General Relativity is correct then it should work in the infrared as well as in the ultraviolet. The GR effect is supposed to be totally independent of the frequency.[671]

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[670] www.milesmathis.com/lens.html

[671] Private email of July 2, 2012. See Dr. Dowdye's Lecture at http://alhadathnews.com/tube/the-failed-attempts-to-detect-macro-lensing-edward-dowdye-jr-md19m9mHx8GmyN0.html

Appendix 2: Gravitational Lensing: Real or Imagined?

In a paper for the *American Physical Society*, Dowdye states in his abstract:

> Significant findings show that one of the most misunderstood of all observed astrophysical phenomena is that of gravitational lensing. The Mathematical Physics of Gauss' law of gravity, the analogy of the Gauss' law of charges is directly applicable to the gravitational light bending at the sun. Astrophysical observations are consistent with an indirect interaction involving a plasma medium, not a direct interaction in the empty vacuum space above the rim. A century of observations reveal that gravitational light bending effects have been noted to occur predominantly at the thin plasma rim of the sun, not in the vacuum space a fraction of a solar radius above the rim. Light bending as predicted by General Relativity should be an easily detectable at analytical Gaussian spherical surfaces of various radii; at 2R, 3R, 4R and 5R respectively, where R is the radius of the sun. The observational evidence is clearly inconsistent with the light bending rule of General Relativity since this vacuum space and the solar plasma rim are exposed to virtually the same field.[672]

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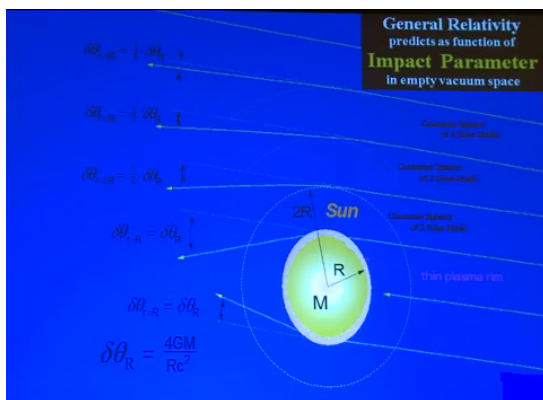
[672] "No Gravitational Lensing in Vacuum Space a fraction of a Solar Radius above Solar Rim," *Bulletin of the American Physical Society*, 42nd Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, Volume 56, Number 5, June 13–17, 2011 (http://meetings.aps.org/Meeting/DAMOP11/ Event/147260); http://www.24-7pressrelease.com/view_press_release.php?rID= 185702; See also "Gravitational Lensing in Empty Vacuum Space Does Not Take Place," *Proceedings of the NPA*, College Park, MD, 2011.

Appendix 3

By Dr. Robert Bennett

Einstein's train derailed; the light clock smashed

ALFA theory has been tested successfully against many classic motion problems in physics – from Newton's Bucket to Ruyong Wang's FOC. Here we pick up the story by applying ALFA to the train gedanken experiment and then the light clock device of relativity, with the same results as before. A practical implementation of the light clock is suggested to validate claims made herein. The analysis again supports a mobile aether that can be dragged along by ambient matter motion and a laboratory frame anywhere on the ground that can – and must – serve as an absolute frame, if the physics laws of motion are to be covariant. It's strange that the effect of a wind vector on sound speed is well known to be $Vsound +- Vwind$; yet the same effects – like Doppler shifts and time delays – are seen when $Vlight +\_Vaether = c +- Vaether$ ... and ignored or rejected.

The Einstein train

Relativity model -We set the scene by referral to a Wiki article[673] on the train model used to explain relativity.....

... a thought experiment consisting of one observer midway inside a speeding train car and another observer standing on a platform as the train moves past. It is similar to thought experiments suggested by .... Einstein in 1917[674].

A flash of light is given off at the center of the traincar just as the two observers pass each other. The observer onboard the train sees the front and back of the traincar at fixed distances from the source of light and as such, according to this observer, the light will reach the front and back of the traincar at the same time.

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[673] http://en.wikipedia.org/wiki/Relativity_of_simultaneity

[674] Einstein's thought experiment used two light rays starting at both ends of the platform. See: Einstein A. (1917), *Relativity: The Special and General Theory*, Springer; Einstein, Albert (2009), *Relativity - The Special and General Theory*, READ BOOKS, pp. 30–33, ISBN 1-4446-3762-2, Chapter IX.

The observer standing on the platform, on the other hand, sees the rear of the traincar moving (catching up) toward the point at which the flash was given off and the front of the traincar moving away from it. As the speed of light is finite and the same in all directions for all observers, the light headed for the back of the train will have less distance to cover than the light headed for the front. Thus, the flashes of light will strike the ends of the train car at different times.

SR model

$t = 0$

$t = 1$ c

$t = 2$

-Vpl
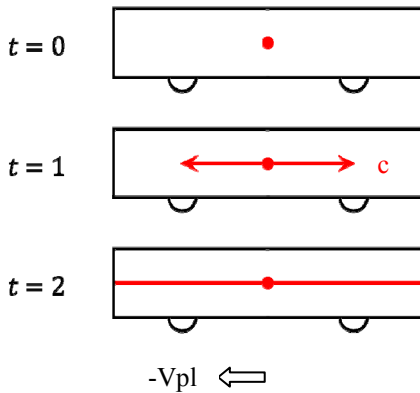
Fig. 1 Train view[675]

Fig. 1 is the train view of the light beams: 2D is the car length measured on the train and on the platform when the train is stopped there, c is the light speed along the red optical paths, by SR axiom 2.

$$-Vpl\ (=\ +Vtr\ ) \tag{1}$$

is the platform speed seen in the train frame, by SR axiom 1. There is no dragged aether; aether does not exist.

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[675] http://upload.wikimedia.org/wikipedia/commons/c/ce/Traincar_Relativity1.svg
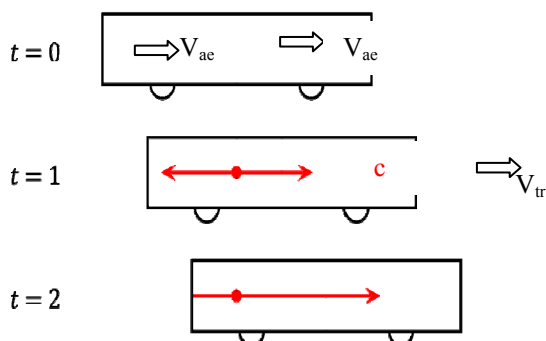
Fig. 2   Platform view[676]

Fig. 2 is the platform view of the light beams; Vtr is the train speed in the Pl frame.

Summary of SR analysis: As explained above, the platform observer sees the simultaneous arrival of the 2 beams, but onboard the light arrives at the back of the train first.

In Fig. 3.

$$Vae > 0, \tag{2}$$

as supported by 6 anisotropy experiments listed by Cahill. Vae is the dragged aether speed, which trails behind the leading edge of the car, and is independent of whether the car is open or sealed.

┊

…indicates the train location when the light beams hit the car.

In the Pl frame:

Df is the distance traveled by the forward light beam; Dr is the distance traveled by the rear light beam when the walls are reached. Vae is the aether dragged by the train….

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[676] http://upload.wikimedia.org/wikipedia/commons/7/72/Traincar_Relativity2.svg

$$Vae = Vtr \tag{3}$$

ALFA uses a special restricted Galilean transform, with absolute time and the absolute reference frame… the lab frame. This may be termed Galilean Absolutism …. The GalAbs transform set.

A 1-Dimenional GalAbs:

$$X'(T') = Xobj, ae(T) + Xae, lab(T) \tag{4}$$

$$T' = T = Tlab \tag{5}$$

It follows that

$$V'(T') = V'(T) = Vobj, ae(T) + Vae, lab(T) \tag{6}$$

When applied to light, where the object is light/photon, then

$$SoL = c + -v, \tag{7}$$

as shown in the ALFA paper.

For this application:

$$tc = tf = tr = t \tag{8}$$

… time is the same in all frames

Absolute time means one time for all. The times for the light beams to hit the walls in the train frame(t_{tr}) and on the platform for the forward(t_f) and rear(t_r) beams are equal for GalAbs.

In the Tr frame:

$$c = D/t \implies D = ct \tag{9}$$

On the platform, for the forward beam:

$$Vf = Vph, ae + Vae, pl = +c + Vae \tag{10}$$

(ph = photon)

So

$$Df = (c + Vtr)t = (v + Vtr)D/c = (1 + Vtr/c)D, \qquad (11)$$

from

$$D = ct \qquad (12)$$

in the Tr frame.

Df is always $> D$ when the train is moving…
E.g., for

$$c = 2Vtr, Df = 1.5\,D \qquad (13)$$

On the platform, for the rear beam:

$$Vr = Vph, ae + Vae, pl = -c + Vae \qquad (14)$$

So

$$Dr = (-c + Vtr)t = (Vtr/c - 1)D \qquad (15)$$

E.g., for

$$c = 2Vtr, Dr = -0.5\,D \qquad (16)$$

In the train frame, light speed

$$Vph, tr = +- c. \qquad (17)$$

The aether co-moves with the train, so

$$Vae, tr = 0 \qquad (18)$$

In the platform/lab frame

$$Vph, lab = +- c + Vae = +- c + Vtr \qquad (19)$$
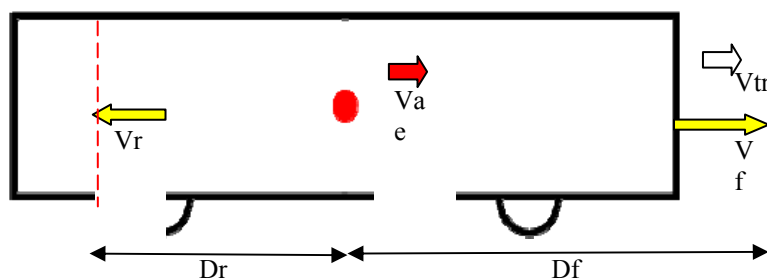
Figure 3: ALFA Model

Relativity predicts that the platform speed measured on the train will be equal and opposite to the train speed seen on the platform….

$$Vpl, tr \ = \ -Vtr, pl \tag{20}$$

This is false …. The platform/lab speed contains the aether speed,

$$Vae, lab \ = \ Vtr. \tag{21}$$

Another way to look at the lab's absolutism is: The laws of physics – the Galilean law of velocity addition – is obeyed in the lab, since

$$Vtotal \ = \ V1 \ + \ V2 \ = \ +- \ v \ + \ Vae. \tag{22}$$

The law of velocity addition is NOT obeyed on the train, since

$$Vtotal \ = \ V1 \ + \ V2 \ = \ -+ \ v \tag{23}$$

And

$$Vtr \ (= \ Vae) \tag{24}$$

is measured, when relativity theory predicts

$$Vtr \ = 0 \tag{25}$$

in the train frame.

The laws of physics are TRUE in the lab frame. The laws of physics are NOT TRUE in the train frame, so any frames moving relative to Earth are not covariant.

There is no time dilation, clock bias, or other tampering with common sense. The distance increases when the light beam moves forward and shrinks when in reverse. So there is length expansion, and a length shrinkage…But the contraction has no conceptual relationship to the Lorentz contraction.

GalAbs coordinates are used , where

$$Vobj, lab \ = \ Vobj, ae \ + \ Vae, lab \tag{26}$$

One more issue: How do we know that the platform/lab is the absolute frame, other than the predicted times and distances are experimentally verified?

The key is to accept the 3 principles:

1. The speed of light in the aether frame always equals c....

$$SoLae = Vph, ae = c \text{ ,always} \qquad (27)$$

2. There is a movable aether that interacts with matter in motion

3. The lab frame is the universal frame that guarantees physical law covariance.

It is accepted that when sound travels relative to a wind, the speed of sound Vs changes because of the air motion Va. The correct value for computing the speed of sound is $Vs + - \boldsymbol{Va}$.

Why is there such resistance to the speed of light being

$c + - Vae$?

Conclusion: Einstein's train problem with simultaneity is solved immediately and trivially. The light beam from the car's center reaches the front and rear of the moving car in the same time as when the car was at rest. The light beam moving toward the front of the train is boosted in speed by the aether dragged by the train; the other beam is retarded by the train's aether wash.

There's no synchronization between locations separated in space, other than the generic aether correction in GPS range formula.

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Light clock model

SR view: refer to an online outline of the relativistic light clock[677]:

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[677] http://galileo.phys.virginia.edu/classes/109.mf1i.fall03 /lectures09.pdf

Appendix 3: Einstein's Train Derailed

Einstein's Light Clock: a blip of light bounces between two parallel mirrors *w* meters apart; each time it hits the top mirror, the photocell moves the clock on one click.

Time between clicks: 2*w*/*c*.
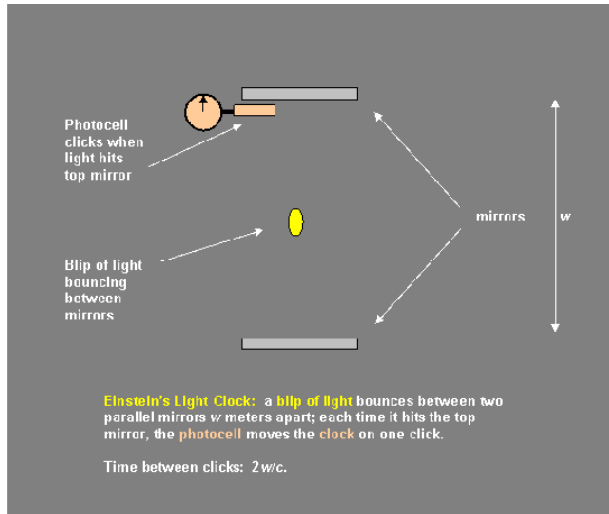
Fig. 4   The light clock frame[678]

In the clock frame of Fig. 4 , the time for one trip is

$$t = w/c. \tag{28}$$

Two identical light clocks: one at rest, one moving relative to us. The light blips in both travel at the same speed *relative to us*, the one in the moving clock goes further, so must take longer between clicks.

t is the time from one mirror to the other.
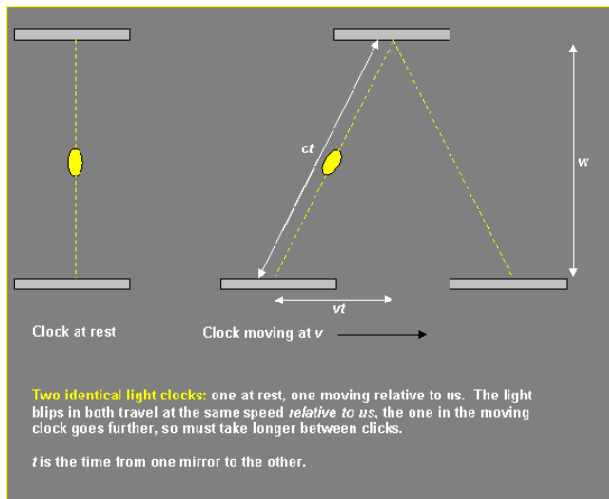
Fig. 5   The light clock lab frame[679], at right

For the lab frame at the right of Fig.5:

$$c^2t^2 = v^2t^2 + w^2 \tag{29}$$

so

$$t^2(c^2 - v^2) = w^2 \tag{30}$$

or

$$t^2\left(1 - \frac{v^2}{c^2}\right) = \frac{w^2}{c^2} \tag{31}$$

Solve tor t…

$$t = \frac{w}{c}\left(1 - \frac{v2}{c2}\right)^{-1/2} \tag{32}$$

As time increases with v, this fictitious effect of stretching time is called 'time dilation'.

Why fictitious?   Read on….

ALFA Model

The clock rest frame is as in SR…the analog of a boat crossing a lake. The lab frame analysis differs sharply from the relativistic view …   ~ boat crossing a river.

S

$\blacktriangleright V = V_{ae} = V_{mir}$

L
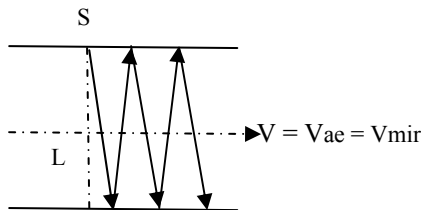
Fig. 6 Light clock lab frame

The light source S is fixed in the lab in Fig. 6. L is the spacing between mirrors. v $(= Vm)$ is the speed of the mirrors past the laser source, equal to the aether drag breeze Vae.

Because of Vae, the light beam is forced to drift a distance d when reaching the opposite mirror, in time t – see Fig. 7.

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[679]   http://galileoandeinstein.physics.virginia.edu/lectures/srelwhat_files   image 017.gif
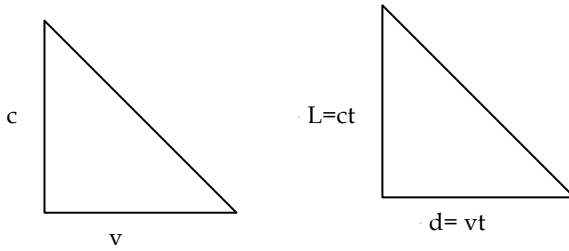
Fig. 7 Light path simplified

The light beam travels along the diagonal hypotenuse at

$$c(1+ v^2/c^2) > c \ ! \tag{33}$$

The drift angle is (v/c) . $\tag{34}$

$$d \ = \ vt \ \ \text{and} \ t \ = \ L/c, \text{so} \tag{35}$$
$$d \ = \ (v/c)L \tag{36}$$

We will suggest a test protocol for this prediction of ALFA. But first….

Proof of the absolute frame:

1- Clock frame: the beam is always vertical; there is no drift motion sideways. So

$$v \ = \ 0 \ …. \ \text{always.} \tag{37}$$

2- Lab frame: If the mirrors move relative to earth, then there is a

$$Vae \ ! = \ 0, \tag{38}$$

which is measured, as Wang's Fiber Optic Conveyor did.

3- SR says that if Vae is measured in the lab, then $-Vae$ will be measured in the clock frame. This contradicts #1 above; the laws of physics are invalid in the clock frame (and in any frame moving relative to Earth). Only the lab frame yields the laws of Newton and Hertz.

ALFA Light Clock test

Getting the mirrors to move at a speed v that will allow measurement of d is a practical problem.

We can replace

$$Vae = Vm \qquad (39)$$

with the speed of a rotor, Vr, whose linear rim velocity will create the aether breeze, as it did in the Sagnac test. The mirrors will stay at rest… and we will also test the aether entrainment claim as a bonus, by using ambient mass motion to drag the aether!

The rotor's plane is parallel to the mirror plane; the rotor is placed above the mirror gap, so that the linear rim velocity will be focused in the mirror channel , duplicating Vae in figure 8.

Fig 8 Rotor and motor: aether motion generator

$$Vr = 2\pi rf, \qquad (40)$$

the rotor's rim velocity, now replaces $Vae(= v)$ ….
The rotor's radius is r, the frequency f.
The drift distance d now becomes

$$d = 2\pi rf \; L/c \qquad (41)$$

Appendix 3: Einstein's Train Derailed

But what is the maximum rim velocity technically possible ?

Probably the ultrahigh centrifuge used in U_{235} separation, which reaches 1500 rps   at 10 cm radius maximum, corresponding to   ~900m/s   or almost 1 km/s. We will try a conservative test value 1/10 that size as a reasonable design parameter….

$$Vae = Vr = 0.1 \ km/s \tag{42}$$

and a mirror spacing of 3 cm = 0.03 m.

$$d \sim 0.1 \ km/s * 0.03 \ m/3 * 105 \ km/s \ \sim 10 - 8 \ m \tag{43}$$

$$t = L/c = 0.03 \ m/3 * 108 \ m/s = 10 - 10 \ s. = 0.1 \ nano \ sec. \tag{44}$$

Let
$$D = nd \tag{45}$$

be the detectable distance desired, and n = # of legs(one-way trips) in D.

$$D = 2\pi rf * nL/c \tag{46}$$

And

$$T = nt \tag{47}$$

is the time to reach D.

A photodetector is placed a distance D downstream from S, determined by a laser-gauge; an electronic timer measures T.

Let D be 10 cm. Then $n = cD/2\pi rfL =$

$$3 * 108 \ m/s * 0.1 \ m/(100 \ m/s * 0.03 \ m) \sim 107$$

$$.. \ 10 \ million \ legs \tag{48}$$

The predicted time to reach D is

$$T = nt = 107 * 10 - 10 \ sec = 10 - 3 \ sec \ … \ a \ milli \ sec. \tag{49}$$

This seems doable ….

List of test equipment:

laser source; 2 mirrors; laser-gauge; precision timer; rotor+motor/sanding disc + electric drill; photo-detector. No interferometer is needed. Any dissident experimenters out there with spare time, an empty garage and extra cash?

Measuring Earth's 'motions'

First, note that

$$v = Vae \tag{50}$$

is directly measurable as D/T as defined above.

Choose a distance D from the source and measure T.

$$\text{Then} \quad Vae = D/T \tag{51}$$

MS claim 1: the Earth rotates
ALFA claim 1: it doesn't.

Orient the light clock N-S ... if there is no drift, then both claims are supported.

Orient the light clock E-W. If the aether wind is 0.47cos(lat) km/s West, then both claims are supported. But we showed that the light clock must use the lab as the absolute frame …..

MS claim 2: the Earth orbits the Sun.
ALFA claim 2: it doesn't

Orient the light clock in the direction of the Earth's orbit:

If the light clock measures $V = 30\ km/s$ then ALFA is refuted

If the light clock measures $V = 0\ km/s$ then MS/Galileo/Copernicus is refuted.

MS claim 3: the Earth is moving through the aether toward Leo.

ALFA claim 3: An aether stream from Leo is moving toward Earth.

Orient the light clock in the direction of Leo in the Virgo cluster:

If the light clock measures $V = 378\ km/s$, blue shifted, then nothing is proven. The relative motion of Earth and Leo will produce the CMB dipole velocity

Wrap-up

The ALFA refutation of the relativistic train and light clock thought experiments doesn't mean that anyone will now listen to logic and empirical proof, to change their own private world with its idealistic paradigm of a Carrollian Wonderland, where time has to expand, rulers shrink, and

$$c + c = c. \tag{52}$$

Welcome to MS science - Mysterious and Speculative physics. *Blinded by the light, they chose to remain in darkness*.

Appendix 4

The Origin of the Equation $E = mc^2$

Tracing the development of the famous $E = mc^2$ equation will help shed some light on the origin of Einstein's ideas. Contrary to popular opinion, $E = mc^2$ did not originate with Einstein. As van der Kamp reveals:

> And then that hackneyed combination of Einstein and the "$E = mc^2$," endlessly bandied about in popular-scientific Western folklore! True, it can be deduced from the theory, but it does not prove STR [Special Theory of Relativity], and does not depend on it, as Einstein himself has admitted. That formula has been derived in at least three non-relativistic ways, and abandonment of STR will leave that Bomb-equation unharmed. Even in a vague manner, to think that somehow Hiroshima in a most horrible way has confirmed the theory to be right is unwarranted.[680]

As for the origin of the formula, it wasn't until five years before his death (1955) that Einstein publicly attributed the basis of $E = mc^2$ to the 1862 charge-momentum field equations of James Clerk Maxwell.[681] Previous to Maxwell was the work of J. Soldner who assigned mass to light and thus could calculate its deflection in a gravitational field.[682] Michael Faraday's 1831 experiments with electricity and induction coils had already introduced the energy/mass relationship, and Maxwell put this in the reciprocal $m = E/c^2$ equation.[683] In fact, one can go back as far as

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[680] *De Labore Solis*, p. 51. Van der Kamp cites Carl A. Zappfe's *A Reminder on E = mc²* for the "three non-relativistic ways," but there are actually a half dozen or more paths to the formula. See text and footnotes.

[681] Albert Einstein, *Out of My Later Years*, Philosophical Library, New York, viii, 282, 1950. Also Edward Schilpp's, *Albert Einstein, Philosopher Scientist*, Library of Living Philosophers, 1949, p. 62, has Einstein quoted as saying: "The special theory of relativity owes its origin to Maxwell's Equations of the electromagnetic field."

[682] J. Soldner, *Berliner Astronomisches Jahrbuch*, 1804, p. 161. Also cited in *Annalen der Physik*, 65:593, 1921.

[683] The derivation of $E = mc^2$ originates from Maxwell's formula [$f = \delta E/c\delta t$] which equates the force exerted on an absorbing body at the rate energy is received by the body. Since force is also the rate of the change of momentum of

Isaac Newton in 1704 for the theoretical relationship between mass and energy.[684] Samuel Tolver Preston used the formula in 1875.[685] Julius Robert Mayer put the formula in terms of ether pressure.[686]

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the body, which, by the conservation of momentum, is also the rate of change in the momentum of the radiation, the momentum lost by the radiation is equal to 1/c times the energy delivered to the body, or M = E/c. If the momentum of the radiation of a mass is M times the velocity c of the radiation, the equation m = E/c^2 is derived.

[684] In Newton's Query 30 he writes: "Gross bodies and light are convertible into one another…" (*Opticks*, Dover Publications, Inc., New York, p. cxv). Newton's *Opticks* also reveal that he believed gravity would bend light. This is further evidence that many of Einstein's ideas are not original. Stephen Hawking adds that "a Cambridge don, John Michell, wrote a paper in 1783 in the *Philosophical Transactions of the Royal Society of London* in which he pointed out that a star that was sufficiently massive and compact would have such a strong gravitational field that light could not escape…A similar suggestion was made a few years later by the French scientist the Marquis de Laplace…" (*A Brief History of Time*, pp. 81-82).

[685] Preston's purpose in the paper *Physics of the Ether* was to dispel Newton's spiritualistic notion of "action-at-a-distance" and replace it with the mechanical concept of ether. The total force required in Preston's following example is said to be equivalent to $E = mc^2$.

> To give an idea, first, of the enormous intensity of the store of energy attainable by means of that extensive state of subdivision of matter which renders a high normal speed practicable, it may be computed that a quantity of matter representing a total mass of only one grain, and possessing the normal velocity of the ether particles (that of a wave of light), encloses a store of energy represented by upwards of one thousand millions of foot-tons, or the mass of one single grain contains an energy not less than that possessed by a mass of forty thousand tons, moving at the speed of a cannon ball (1200 feet per second); or other wise, a quantity of matter representing a mass of one grain endued with the velocity of the ether particles, encloses an amount of energy which, if entirely utilized, would be competent to project a weight of one hundred thousand tons to a height of nearly two miles (1.9 miles)." (S. T. Preston, *Physics of the Ether*, E. & F. N. Spon, London, 1875, #165).

[686] "If a mass M, originally at rest, while traversing the effective space *s*, under the influence and in the direction of the pressure *p*, acquires the velocity *c*, we have *ps* = Mc^2. Since, however, every production of motion implies the existence of a pressure (or of a pull) and an effective space, and also the exhaustion of one at least of these factors, the effective space, it follows that motion can never come

A curious twist in this saga occurs in 1881 with J. J. Thomson in his work with charged spherical conductors in motion, since he derived a slightly higher coefficient, $E = 4/3mc^2$.[687] The same $E = 4/3mc^2$ was found by F. Hasenöhrl in 1904 when he published the first explicit statement that the heat energy of a body increases its "mechanical" mass.[688] The 1905 Nobel Prize winner, Philipp Lenard, a stauch opponent of Einstein, was one of the first to reveal this fact in his 1921 book *Ether and Para-ether*.[689] In the book, Lenard demonstrated how simple it was to arrive at $E = mc^2$ without any reference to Relativity theory – something Einstein would also admit a few years prior to his death. In his 1929 book *Energy and Gravitation*, Lenard honored Hasenöhrl as "the first to demonstrate that energy possesses mass (inertia)."[690]

The history of the 4/3 coefficient is intriguing. Arthur Miller shows both its origin and how Einstein sought to remove it. Although Einstein purports to have legitimately removed it, Miller shows he did not succeed. Einstein had attributed the excess 1/3 to mechanical constraints, but Poincaré had demonstrated earlier that it was due to forces that avoid the explosion of the electron.[691] Engrossed in his General Relativity theory,

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into existence except at the cost of this product, $ps = Mc^2$. And this it is which for shortness I call 'force'" (J. R. Mayer, translated by J. C. Foster, "Remarks on the Mechanical Equivalent of Heat," *The Correlation and Conservation of Forces*, 1867, pp. 331, 336).

[687] Thomson's use of the formula has not escaped the notice of at least some modern physics textbooks. In *Fundamentals of Physics* by Halliday, et al, they state: "A decade before Einstein published his theory of relativity, J. J. Thomson proposed that the electron might be made up of small parts and that its mass is due to the electrical interaction of the parts. Furthermore, he suggested that the energy equals mc^2" (John Wiley, fourth edition, p. 735).

[688] Cunningham, *The Principle of Relativity*, 1914, p. 189. N. M. Gwynne, *Einstein and Modern Physics*, p. 36; F. Hasenöhrl in *Annalen der Physik*, 4, 16, 589, 1905, and Wien. Sitzungen IIa, 113, 1039, 1904. Hasenöhrl's original equation was $8E/3c^3$, which was then changed to $4E/2c^3$. Some sources have ¾ E=mc^2; Kostro has E = ¾ mc^2 (*Einstein and the Ether*, p. 135).

[689] Philip Lenard, *Über Äther und Uräther*, Leipzig, Verlag von S. Kirzel, 1921, cited in Kostro's *Einstein and the Ether*, p. 135.

[690] Philip Lenard, *Über Energie und Gravitation*, Berlin/Leipzig, Walter de Gruyter und Co., 1929, cited in Kostro's *Einstein and the Ether*, p. 136.

[691] Arthur I. Miller, *The Special Theory of Relativity: Emergence and Early Interpretation*, 1998, pp. 338-339. Miller writes: "But where is the 4/3-factor? It is reasonable to conjecture that by May 1907, when Einstein submitted…for publication, he knew full well that the electron's mass occurred in kinematical quantities deduced from its self-fields as 4/3 times its electrostatic mass – for example…the role of Poincaré's stress and very probably of Abraham's (1905)

Einstein did not visit the problem again. Max Von Laue demonstrated that to obtain the final formula $E = mc^2$ "one type of energy…the new physics must eliminate from its list…is kinetic energy."[692] The reason is that if mass is based on energy, as $E = mc^2$ shows, then there cannot be a kinetic energy, $K = \frac{1}{2}mv^2$, which, in turn, depends on the mass. In other words, to obtain $E = mc^2$ one must abandon the most obvious and primary form of energy, kinetic energy.[693]

Prior to this, in 1889 Oliver Heaviside used the $E = mc^2$ principle in his work with capacitors.[694] Henri Poincaré used the rudiments of the $E = mc^2$ formula long before Einstein commandeered it for his Special and General Relativity theories.[695] In 1903 the Italian scientist Olinto De Pretto

which contained a detailed discussion of the necessity for an extra energy to correct the Lorentz-electron's total energy. In fact, Einstein may well have avoided the particular example of Lorentz's electron because of his having been unable to deduce the 4/3-factor from the relativistic kinematics."

[692] Max von Laue in *Albert Einstein: Philosopher Scientist*, ed., P. A. Schlipp, 1988, p. 529. He continues: "…we must explain why Abraham's model of the electron as well as cavity radiation yield the different relationship $m = (4/3) (E_0/c^2)$. The reason is the same in both cases. The electromagnetic field is not capable of existing by itself alone, it requires certain supports of a different nature. Cavity radiation can exist only within an envelope, and the charged sphere would fly apart if it were not for certain cohesive forces. In both cases, motion will give rise to an energy current within the material supports which is directed opposite to the motion. It contributes to the total momentum a negative amount and reduces the factor 4/3 to 1" (*ibid.*, pp. 528-529).

[693] This discrepancy can be seen, for example, in the kinetic energy of the electron in the hydrogen atom compared to the speed of light. The ionization energy of the electron is 13.6 eV or 2.17×10^{-18} joules. Transposing $K = \frac{1}{2}mv^2$ to $v = (2K/m)^{\frac{1}{2}}$, and then making the binding energy of the electron equal to the ionization energy, we have $v = (2 \times 2.17 \times 10^{-18}$ J $/ 9.1 \times 10^{-31}$ kg$)^{\frac{1}{2}} = 2.18 \times 10^6$ meter/second as the velocity of the electron, but this value is 137.6 times slower than c, the speed of light.

[694] *The Flash of the Cathode Rays: J. J. Thomson and His Contemporaries*, 1998, by Per F. Dahl: "...not only did Thomson anticipate Einstein's mass-energy equivalence by 24 years...the expression was also anticipated by Oliver Heaviside in 1889." See also David Bodanis' book, *E=mc²: A Biography of the World's Most Famous Equation*. See a critique of Bodanis' book by Hans Melberg, *How Much Gossip is Required Before Science Becomes Interesting*, Walker Publishing, 2000.

[695] In his 1900 paper "The Theory of Lorentz and the Principle of Reaction," Poincaré derived the expression $M = S/c^2$, representing M as the momentum of radiation, S as its flux, and c as the velocity of light. Poincaré reasoned that, since electromagnetic energy behaved like a fluid with inertia, if it is discharged from a source there must be a recoil, just as there is a recoil when a ball is shot from a

cannon. Using μ for the mass of the recoiling body, and v for its velocity, the equation is $\mu v = S/c^2$. Since $S = Ec$, we have $\mu v = Ec/c^2 = E/c^2$ times c, where the E/c^2 represents the role of mass. When $v = c$, the equation reduces to $E = mc^2$. Poincaré also developed the concepts of relativity and the limit of light's velocity. Einstein makes no reference to Poincaré in his famous 1905 paper, or anyone else. This is all the more significant since Poincaré wrote 30 books and 500 papers, none of which Einstein claimed to have read. Perhaps Poincaré returned the favor to Einstein since, until his death in 1912, he only mentioned Einstein's name in print once, and that was to register an objection (Holton, *Thematic Orgins of Scientific Thought*, p. 249). Regarding the 1905 paper, Clark, an admirer of Einstein, states: "…it was in many ways one of the most remarkable scientific papers that had ever been written. Even in form and style it was unusual, lacking the notes and references which give weight to most serious expositions and merely noting, in its closing paragraph, that the author was indebted for a number of valuable suggestions to his friend and colleague, M. Besso" (*Einstein: The Life and Times*, p. 101). Later, however, Einstein eliminated Besso's name from a paper he submitted to the Berlin Academy in 1915 regarding the perihelion of Mercury, even though the equations were "simply to redo the calculation he had done with Besso in June 1913" (Michel Janssen, "The Einstein-Besso Manuscript," p. 15). As for the 1905 paper, how it is that a 9,000 word paper on one of the most controversial ideas ever presented to mankind made it past the editor of *Annalen der Physik*, the world's leading physics periodical, is anyone's guess. The most likely reason is that Max Planck, the chief editor of *Annalen* in 1905, published it due to his total acceptance of Special Relativity, which he demonstrated by defending it against Kaufmann in 1906. In any case, an editor of a prestigious physics journal should want to know whether anyone prior to Einstein had written about the ideas being presented, especially since the editors themselves were very familiar with the work of Lorentz and Poincaré. When asked about whether his 1905 paper was guilty of plagiarism, Einstein retorted in his 1907 paper: "It appears to me that it is the nature of the business that what follows has already been partly solved by others. Despite that fact, since the issues of concern are here addressed from a new point of view, I am entitled to leave out a thoroughly pedantic survey of the literature…" (Über die vom Relativitätspringzip geforderte Trägheit der Energie," *Annalen der Physik* 23 (4), p. 373). Yet in a 1935 paper Einstein admitted: "…because the *Lorentz transformation, the real basis of special relativity theory*…" ("Elementary Derivation of the Equivalence of Mass and Energy," *Bulletin of the American Mathematical Society* 61:223-230; first delivered as The Eleventh Josiah Willard Gibbs Lecture at a joint meeting of the American Physical Society and Section A of the AAAS, Pittsburgh, December 28, 1934, emphasis Einstein's). There was hardly any way to avoid this realization, since Lorentz's Transformation equation is identical to the equation for Einstein's Special Relativity. My thanks to Richard Moody in *Nexus Magazine*, vol. 11, no. 1, Dec.-Jan. 2004 for many of the above quotes. Against all this is Gerald Holton's view that Einstein never read Lorentz and Poincaré before 1905; that Einstein showed "painful honesty," and that "the

had already published $E = mc^2$ two years before Einstein did, but Einstein did not mention De Pretto in his 1905 paper on Special Relativity, which is odd considering that he spoke fluent Italian and, by his own admission, read all the Italian physics journals.[696] In 1907, Max Planck, expanding the work of Hasenöhrl and using Poincaré's momentum of radiation formula, gave the final derivation of the $E = mc^2$ formula.[697] All in all, $E = mc^2$ is readily derivable apart from the theory of Relativity, as both Joseph Larmor in 1912; Wolfgang Pauli in 1920, Philipp Lenard in 1921, and M. Simhony in 1994, demonstrated independently.[698]

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so-called revolution which Einstein is commonly said to have introduced into the physics in 1905 turns out to be at bottom an effort to return to a classical purity" (*Thematic Origins of Scientific Thought*, pp. 199, 200, 195 in order of ellipses).

[696] Umberto Bartocci, Professor of Mathematics at the University of Perugia, Italy, in his book, *Albert Einstein E Olinto De Pretto: la vera storia della formula piu' famosa del mondo* (translated: "Albert Einstein and Olinto De Pretto, the true history of the most famous formula in the world," Societa Editrice Andromeda, via S. Allende1, 40139) provides documentation that De Pretto published an article in which he gave, in its final form, the equation $E = mc^2$. This article was published on June 16, 1903, and published again in February 27, 1904, the second time in the Atti of the Reale Instituto Veneto di Scienze. De Pretto thereby preceded Einstein's famous 1905 $E = mc^2$ paper by at least a year and half. Could Einstein have copied from De Pretto? No one can prove definitively that Einstein saw De Pretto's article, but Professor Bartocci offers some intriguing speculation. Professor Bartocci traced a link between De Pretto and Einstein, through Einstein's best friend, Michele Besso. As we noted, Besso is the only person credited in the famous $E = mc^2$ paper of 1905. See also R. Carroll's, "Einstein's $E = mc^2$ 'was Italian's idea,'" (*The Guardian*, Nov. 11, 1999, cited in Moody).

[697] Planck writes: "…through every absorption or emission of heat the inertial mass of a body alters, and the increment of mass is always equal to the quantity of heat…divided by the square of the velocity of light *in vacuo*" (M. Planck, Sitz. der preuss. Akademie der Wissenschaften (Berlin), Physik. Math. Klasse. 13 (June, 1907), p. 566. Regarding Einstein's 1905 paper (*Annalen der Physik* 18, 639), Planck shows that, although Einstein came to "essentially the same conclusion by application of the relativity principle to a special radiation process," he did so *by assuming* the existence of one of the mathematical components. Thus Planck continues, "however under the assumption permissible only as a first approximation, that the total energy of a body is composed additively of its kinetic energy and its energy referred to a system with which it is at rest" (cited in *The Einstein Myth and the Ives Papers*, Part II, p. 185).

[698] Larmor in "On the dynamics of radiation," *Proc. Intern. Congr. Math.*, Cambridge, 1912, p. 213; W. Pauli, Jr., "Relativitätstheorie," Encyclopedia Math. Wiss. V-2, hft 4, 19, 679, 1920, as reported by Herbert Ives in *Journal of the Optical Society of America* 42: 540-543, 1952, and cited in *The Einstein Myth*, pp. 84, 109, 184.

Appendix 5

Do the 1919 Eclipse Photographs
Prove General Relativity?

As we noted earlier, Einstein desperately needed some physical proof that gravity bent light in the exact proportion his General Relativity theory predicted so that he could give credence to the idea that gravity and acceleration were equivalent phenomena. In a letter to Ernst Mach he stated that the eclipse results would determine "whether the basic and fundamental assumption of the equivalence of the acceleration of

the reference frame and of the gravitational field really holds."[699] Although a bending of light by gravity would not necessarily prove General Relativity (since non-Relativistic theories could also explain it), it would at least give it enough plausibility to pass the muster of an adoring public. But the physical evidence supporting General Relativity was one of the more biased campaigns of human advertisement the world has witnessed. As one author writes: "In 1911 Einstein predicted how much the sun's gravity would deflect nearby starlight and got it wrong by half."[700] Another from the same magazine writes:

> His second prediction, that light from distant stars would be deflected by the warped space-time around the sun, catapulted him to world fame in 1919, when observations of a solar eclipse seemed to confirm his prediction. But as historians have since shown, the 1919 measurements were equivocal at best.[701]

Paul Marmet adds:

> "…all the experiments claiming the deflection of light and radio waves by the Sun are subjected to very large systematic errors, which render the results highly unreliable and proving nothing" and concluding in his 23-page paper with: "Much of the popularity of Einstein's general theory of relativity relies on the observations done at Sobral and Principe. We see now that these results were overemphasized and did certainly not consecrate Einstein's theory. It is interesting to think of what would have happened if the results had been deemed not good enough…"[702]

Einstein, however, regarded the solar eclipse results of 1919 as irrefutable evidence for his General Theory of Relativity, for it was reputed to prove that gravity bent starlight by precisely the amount

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[699] *Thematic Origins of Scientific Thought*, p. 254.

[700] Karen Wright, *Discover* magazine contributing editor, "The Master's Mistakes," September 2004, p. 50. This would be no surprise to many today.

[701] Robert Kunzig, *Discover* magazine contributing editor, "Testing the Limits of Einstein's Theories," September 2004, p. 54.

[702] Paul Marmet in "Relativistic Deflection of Light Near the Sun Using Radio Signals and Visible Light," writes in his abstract: (Physics Dept., University of Ottawa, no date given at www.newtonphysics).

predicted by the theory. In his 1920 book *Relativity: The Special and the General Theory*, he wrote:

> The relative discrepancies to be expected between the stellar photographs obtained during the eclipse and the comparison photographs amounted to a few hundredths of a millimetre only. Thus great accuracy was necessary in making the adjustments required for the taking of the photographs, and in their subsequent measurement… The results of the measurements confirmed the theory in a thoroughly satisfactory manner."[703]

Previous to this, in 1913 Einstein employed Erwin Freundlich to detect a bending of starlight near the sun, but his photographs failed to provide any such evidence. After this failure, Einstein confided to Freundlich: "If the speed of light is in the least bit affected by the speed of the light source, then my whole theory of relativity and theory of gravity is false."[704] Perhaps this is why in March 1914 Einstein seemed a bit more unconcerned in a letter to his best friend, Michael Besso, stating:

> Now I am fully satisfied, and I do not doubt any more the correctness of the whole system, may the observation of the eclipse succeed or not. The sense of the thing is too evident."[705]

When asked what he would do if the eclipse results were not in his favor, Einstein retorted with one of his more famous quips: "Then I would have been sorry for the dear Lord – the theory is correct."[706] Unless Einstein was joking, this statement shows he had already set in his mind

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[703] Albert Einstein, *Relativity: The Special and the General Theory*, trans. Robert W. Lawson, 1961, Appendix III, pp. 146-147. On the other hand, Einstein admitted: "This awareness of my limitations pervades me all the more keenly in recent times since I see that my faculties are being quite particularly overrated after a few consequences of the general theory stood the test" (letter from Einstein to Lorentz, January 19, 1920, translated by A. Hentschel, *The Collected Papers of Albert Einstein*, Vol. 9, Doc. 265, Princeton Univ. Press, 2004, p. 220).

[704] *Einstein: The Life and Times*, p. 207.

[705] *Thematic Origins of Scientific Thought*, p. 254.

[706] Einstein's answer to the question from doctoral student Ilse Rosenthal-Schneider, in 1919. Quoted in Rosenthal-Schneider, *Reality and Scientific Truth*, p. 74, as cited in *The Expanded Quotable Einstein*, p. 238. Ilse was one of Einstein's love interests prior to his divorce from Mileva Marić. He eventually married Ilse, only after giving the brush off to Ilse's daughter, Elsa. See Volume II, pp. 39-48.

that Relativity was correct before the 1919 eclipse experiments were performed. Eddington also caught this fever. As Stephen Brush states: "Eddington…was already convinced of the truth of Einstein's theory before making the [eclipse] observations."[707] Clark reports much the same:

> Eddington's enthusiasm for the General Theory was illustrated when Cottingham asked, in Dyson's study: "What will it mean if we get double the Einstein deflection?" "Then," said Dyson, "Eddington will go mad and you will have to come home alone."[708]

According to C. W. F. Everitt, a detailed reading of the reports on the 1919 eclipse observations

> leads only to the conclusion that this was a model of how not to do an experiment…It is impossible to avoid the impression – indeed Eddington virtually says so… that the experimenters approached their work with a determination to prove Einstein right. Only Eddington's disarming way of spinning a yarn could convince anyone that here was a good check of General Relativity. The results of later eclipse expeditions have been equally disappointing."[709]

Although Einstein and Eddington were so self-assured, many anomalies and suspicions revolve around May 29, 1919's eclipse photographs. Along with Eddington were three other celebrated British astronomers: Andrew Crommelin, E. T. Cottingham and C. R. Davidson. Eddington and Cottingham did their observations on Principe Island in West Africa, while Crommelin and Davidson did theirs at Sobral, Brazil. Charles Lane Poor offers some sobering comments:

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[707] Stephen Brush, *Why Was Relativity Accepted?* p. 201.

[708] *Einstein: The Life and Times*, p. 285.

[709] C. W. F. Everitt, "Experimental Tests of General Relativity: Past, Present and Future," in Riazuddin, ed., *Physics and Contemporary Needs*, vol. 4, 1980, pp. 529-555. S. Chandrasekhar writes of Eddington: "…had he been left to himself, he would not have planned the expeditions since he was fully convinced of the truth of the general theory of relativity!" (S. Chandrasekhar, *Eddington: The Most Distinguished Astrophysicist of His Time*, 1983, p. 25).

Appendix 5: Do the 1919 Eclipse Photographs Prove General Relativity?

The mathematical formula, by which Einstein calculated his deflection of 1.75 seconds for light rays passing the edge of the sun, is a well known and simple formula of physical optics. Not a single one of the concepts of varying time, or warped or twisted space, of simultaneity, or of the relativity of motion is in any way involved in Einstein's prediction of, or formulas for, the deflection of light. The many and elaborate eclipse expeditions have, therefore, been given a fictitious importance. Their results can neither prove nor disprove relativity theory…. The actual stellar displacements, if real, do not show the slightest resemblance to the predicted Einstein deflections: they do not agree in direction, in size, or the rate of decrease with distance from the sun."[710]

Einstein had referred to 1.7 seconds of arc in his book on Relativity:

…according to the general theory of relativity, a ray of light will experience a curvature of its path when passing through a gravitational field, this curvature being similar to that experienced by the path of a body which is projected though a gravitational field. As a result of this theory, we should expect that a ray of light which is passing close to a heavenly body would be deviated towards the latter. For a ray of light which passes the sun at a distance of Δ sun-radii from its center, the angle of deflection (a) should amount to 1.7"/Δ. It may be added that, according to the theory, half of this deflection is produced by the Newtonian field of attraction of the sun, and the other half by the geometrical modification ("curvature") of space caused by the sun.[711]

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[710] "The Deflection of Light as Observed at Total Solar Eclipses," 1930, *Journal of the Optical Society of America* 20:173-211.

[711] Albert Einstein, *Relativity: The Special and the General Theory*, 1961, Appendix III, p. 145. Johann Georg von Soldner (d. 1833) had already predicted a bending of light around the sun of 0.875 arc seconds, all without the use of Relativity. Einstein doubled Soldner's figure to 1.75'', claiming that 0.875 was attributable to Newtonian physics, but the remaining 0.875 was attributable only to Relativity's "space curvature." Paul Marmet adds: "This amount [1.75''] is twice the one predicted by Einstein in 1908 [A. Einstein, "Jahrbuch der Radioaktiviät und Elektronik," 4, 411, 1908] and in 1911 [A. Einstein, "Über den Einfluss der Schwerkraft auf die Ausbreitung des Lichtes," *Annalen der Physik*, 35, 898, 1911] using Newton's gravitational law. In 1911, Einstein wrote: 'A ray

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Although Einstein predicted the deflection of starlight at the surface of the sun should be 1.75 seconds of arc, what the reports do not readily reveal is that evidence from the 1919 expedition showing deflections greater or less than 1.75 seconds were rejected as "spurious." Even though Einstein insisted "…great accuracy was necessary in making the adjustments required for the taking of the photographs, and in their subsequent measurement," Poor discovered that Eddington discarded 85% of the data from the eclipse photographs taken at Sobral, Brazil, due to "accidental error." The truth is that the displacements of the stars were in every conceivable direction, some in the exact opposite position predicted by Relativity. At a meeting of the Royal Astronomical Society in 1919, Ludwik Silberstein revealed that the displacements were not radial as Einstein's theory claims, often deflecting from the radial direction by as much as 35º, leading Silberstein to conclude: "If we had not the prejudice of Einstein's theory we should not say that the figures strongly indicated a radial law of displacement."[712] As noted, only 15% of the displacements were consistent with Einstein's prediction. After providing the reader with Table III from the official Report of the expeditions,[713] Poor reveals the numerous discrepancies:

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of light going past the Sun would accordingly undergo deflexion to an amount of $4 \times 10^{-6} = 0.83$ seconds of arc. Let us note that Einstein did not clearly explain which fundamental principle of physics used in the 1911 paper and giving the erroneous deflection of 0.83 seconds of arc was wrong, so that he had to change his mind and predict a deflection twice as large in 1916" ("Relativistic Deflection of Light Near the Sun Using Radio Signals and Visible Light," Physics Dept. University of Ottawa, www.newtonphysics, p. 15).

[712] Royal Astronomical Society, December 12, 1919, as cited in *The Observatory*, 43, 548, pp. 33-45, January 1920.

[713] Under the title: "Radial Displacement of Individual Stars," the following information was given in the "Report" authored by Dyson, Eddington and Davidson and presented to the Royal Astronomical Society:

Star	Calculation	Observation
11	0.32"	0.20"
10	0.32"	0.32"
6	0.40"	0.56"
5	0.53"	0.54"
4	0.75"	0.84"
2	0.85"	0.97"
3	0.88"	1.02"

This table shows that, on the average, the observed deflection, as given by the British astronomers, differs by 19% from the calculated Einstein value [1.75"]. In the cases of two stars, the agreement between theory and observation is very nearly perfect, the observed value being only 3% in error: in other cases, however, the differences range from 11% to 60% [and] the rate of decrease from star to star is radically different from that predicted. The difference between the deflection of the star nearest the sun and that of the farthest star should be, according to Einstein, 0.56"; while the observed or measured difference was 0.82", practically 50% out of the way. *The diagrams…show clearly that the observed displacements of the stars do not agree in direction with the predicted Einstein effect*. This point was nowheres [sic] mentioned in the Report, which took up only the amount of the radial component of the actual displacement. But, after the measurements of the plates became available for study, several investigators called attention to this fact of a radial disagreement in direction between the observed and predicted displacements…in the case of the star furthest from the sun to 37°. Thus, even the seven best plates out of thirty-three, which showed star images, give inconsistent results: the observed shifts in the star images, if real, *do not coincide with the Einstein effect either in amount or direction*.[714]

It has been claimed by many that the differences between the observed and predicted shifts are no greater than should be expected…Now this very question was investigated by Dr. Henry Norris Russell, of Princeton University, a most ardent upholder of relativity theory. He studied these star displacements with a view of determining whether the departures from Einstein's predicted effects are real or not, and, if real, of finding some possible explanation for them. As a result of an exhaustive examination of them, he concludes that these differences between the observed and predicted displacements, these non-Einstein displacements, as he calls them, are *real*, and cannot be attributed to mere accidental errors of observation and measurement…Dr. Russell assumes that the most probable

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[714] *Gravitation versus Relativity*, pp. 218-219, emphasis added.

source of these proved non-Einstein deflections is to be found in instrumental errors: in an alteration in the shape of the mirror, caused by the heat of the sun…But one point is perfectly clear. If it be admitted that the heat of the sun so distorted the mirror of the apparatus as to cause errors of 20%, in some cases of 50%, of the measured displacement, then the entire set of plates is worthless for proving the existence or non-existence of the "Einstein effect."[715]

After providing the reader with the results of the photographic plates at both Sobral and Principe,[716] Poor offers the following analysis:

These results, in each case, are the means [average] of the radial components only; nothing whatever being given as to the directions in which the actual displacements took place. The Einstein theory requires a deflection, not only of a certain definite amount, but also in a certain observed direction. To discuss the amount of the observed deflection is to discuss only one-half of the whole question, and the less important half at that. The observed deflection might agree exactly with the predicted amount; but, if it were in the wrong direction, it would disprove, not prove, the relativity theory….Now, the diagrams…of the seven best plates, the seven taken at Sobral with the 4-inch camera, *show clearly and definitely that the observed deflections are not in the directions required by the Einstein theory*…not only that, but every one of the seven plates shows the star deflected in the same direction from that called for by the relativity theory. Similarly for star No. 11, every dot again lies on the same side of the Einstein arrow, and the mean deflection differs by 37° from the predicted. In this case two of the individual plates give deflections practically in the reverse direction to that called for by the theory. The best agreement between theory and observation is given by star No. 4, where the mean difference amounts to about a single degree: but, even in

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[715] *Ibid*., pp. 220-222, emphasis added.

[716] (1) Sobral, 4-inch camera, 7 plates = 1.98" with probable error of about ± 0.12"; (2) Principe, 13-inch astrographic lens, 2 plates = 1.61" with probable error of about ± 0.30"; (3) Sobral, 13-inch astrographic lens, 16 plates = 0.93" with the Report stating: "For reasons already described at length not much weight is attached to this determination."

this case, the individual results differ by as much as 30°. The relativist either totally disregards these discordances in the directions of the observed deflections, or invokes the heating effect of the sun to distort the mirror by just the proper amount to explain them away![717]

Again, disregarding directions entirely, and taking into account only the size of the deflection, it is noted that the disagreement between the three mean results, as given in the Report, is over 100%; the largest value being well over twice that of the smallest. The actual amount of the deflection as obtained with the astrographic lens is 58% of that obtained at Principe and only 47% of that of the 4-inch camera at Sobral. This difference in results is far beyond the limits of accidental errors.[718]

When the deflections of light, as actually observed, are considered both in direction and in amount, the discordances with the predicted Einstein effect become marked, and the plates present little or no evidence to support the relativity theory. Further, if these deflections are real, and not due to instrumental errors (so readily called upon by the relativist to explain everything that the relativity theory cannot account for) then it has not yet been shown that the relativity theory is the only possible explanation. As a matter of fact there are other perfectly possible explanations of a deflection of a ray of light; explanations based on every-day, common-place grounds. Abnormal refraction in the Earth's atmosphere is one; refraction in the solar envelope is another. The atmospheric conditions under which the eclipse plates were taken were necessarily abnormal; and the plates, themselves, clearly show that the rays of light passed through a mass of matter in the vicinity of the sun; a mass of density sufficient to clearly imprint its picture upon the photographic plates. Such is the evidence, and are the observations, which, according to Einstein, "*confirm the theory in a thoroughly satisfactory manner.*"[719]

In his 1970 book, Leon Brillouin made a similar critique:

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[717] *Gravitation versus Relativity*, pp. 223-225, emphasis added.
[718] *Gravitation versus Relativity*, p. 225.
[719] *Gravitation versus Relativity*, p. 226.

These were very inaccurate experiments with individual errors of 100% and averaged errors of 30%. The theory is not safe because it assumes an ideal vacuum near the sun's surface, while we can observe very powerful explosions of matter and radiations from the sun.[720]

Einstein predicts the deflection of a light ray passing near the surface of the sun, but we obtain a similar result if we consider a light ray as a beam of photons hv with masses hv/c^2. Only the numerical coefficient is different, and Einstein's prediction is twice as large as that in the computation with photons. Here the experimental results are actually very poor with errors of 100% magnitude…looking candidly at these observations, one feels that very large sources of error are obviously playing a substantial role, and our present knowledge of the turbulent flow in the solar atmosphere yields the most probable explanation. The Shapiro experiment is certainly safer than the deflection of light rays.[721]

Poor's explanation is even more detailed, showing from the science of optics what is a perfectly logical explanation to the many and varied deflections obtained in Eddington's series of photographs:

The Sobral photographs show clearly that the rays of light, in their course from the distant stars, passed through masses of matter near the sun. This matter was sufficiently dense and reflected enough sunlight to imprint its image upon the photographic plates, and there can be no question as to its existence and its presence in the paths of the light rays. Further, whenever a ray of light passes from free space into, or through a medium of any kind of density, such ray is refracted, or bent out of its straight course. The path of such a ray becomes curved, and the amount of refraction, or curvature, depends on the density of the medium into which the ray passes and the angle at which it meets the surface. This is the fundamental law of physics: upon the refractive effects of different media are based our optical instruments and experiments: eye-glasses, cameras, microscopes, telescopes; all depend upon the refractive effect of

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[720] Leon Brillouin, *Relativity Reexamined*, NY, Academic Press, 1970, p. 54.
[721] *Ibid.*, p. 98.

glass upon the ray of light. It is certain, therefore, that the rays of light, in passing through the solar envelope, suffered a refraction, or bending, of some kind and amount. This fact is as well established as the sun itself. The sole question is whether this refraction was sufficient in amount and in direction to account for the observed displacements of the star images. This possibility of accounting, in a perfectly normal way, for the observed light deflections has been dismissed by the relativist in a few words as a matter scarcely worth mentioning.[722]

While it is certain that the rays suffer some refraction in passing through the solar envelope, it is claimed by most astro-physicists that the effect is so small as to be negligible in comparison with the observed deflections. This idea is so firmly fixed that the possibility of explaining any portion of the deflections by refraction was dismissed by the British astronomers in their Report with a scant phrase or two. The entire question depends upon the possibility of the solar envelope having density large enough to bend a ray of light by the required amount, and this in turn upon what that density really is. It can readily be shown by the ordinary formulas of optics that a lens of matter of a density of about $1/140^{th}$ that of air at standard pressure and temperature would deflect a ray of light by about 1", the amount observed in the case of the star nearest the sun.[723]

While, thus, there is a very open question as to the amount of refraction which would be caused by a medium of varying density, there is on the other hand practically no question as to the direction in which the bending will take place. This is purely a matter of geometry, and depends upon the fundamental law, that the incident ray, the normal to the surface, and the refracted ray, all lie in the same plane….In the case of the photographs taken at Sobral during the eclipse of May 29, 1919…an approximate solution can be made with great simplicity. For, assuming the solar envelope to be an ellipsoid of revolution with

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[722] *Gravitation versus Relativity*, p. 240.
[723] *Ibid*., pp. 240-241.

its axis coinciding with that of the sun, the axis of figure would be practically at right angles to the line of sight.[724]

In light of Poor's devastating analysis, Sir John Maddox, editor of *Nature*, wrote: "They [Crommelin and Eddington] were bent on measuring the deflection of light….What is not so well documented is that the measurements in 1919 were not particularly accurate."[725] G. Burniston Brown adds:

> Initially stars did appear to bend as they should, as required by Einstein, but then the unexpected happened: several stars were then observed to bend in a direction transverse to the expected direction and still others to bend in a direction opposite to that predicted by relativity."[726]

Scientific American, obtaining their report directly from Crommelin's own words, shows that even the photograph used for the tally had a significant margin of error:

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[724] *Ibid.*, pp. 247-248. Poor then adds three tables which show the contrasting results between Einstein's relativity and Poor's refractive index of the solar envelope and residual matter. Regarding Table IV of the perihelia of Mercury, Venus, Earth and Mars, using the sum of squares to gauge the accuracy of the results, Einstein's theory comes in at a whopping 473 off the observed values, while Poor's is only 14 (*ibid.*, p. 234). Regarding Table VI of the stars' Computed Departures from Radiality, Einstein's theory deviates by 2,489 from observed values, while Poor's only by 410 (*ibid.*, p. 251). In regard to Longitude of Node and Inclination, Poor's results come within 84% and 80%, respectively, when compared to Newcomb's observational figures published in 1895 (*ibid.*, p. 253). As N. Martin Gwynne notes: "The reader will doubtless not be surprised to learn that the predictions resulting from Poor's formula were many, many times more accurate than those produced by Relativity Theory. Moreover the same explanation (the assumption of the self-same solar atmosphere), enabled him also to predict correctly the perihelion of Mercury and without, incidentally, being thrown into confusion by the perihelia of the other planets. The same assumption, in other words, gave as satisfactory an answer as could be desired in two radically different investigations" (private paper).
[725] "More Precise Solar-limb Light Bending," *Nature* 377:11, 1995.
[726] "What is Wrong with Relativity," *Bulletin of the Institute of Physics and Physical Society*, 1967, pp. 71-77.

The resulting shift at the limb is 1.98'', with a probable error of 0.12''. It will be seen that this result agrees very closely with Einstein's predicted value of 1.75''.[727]

Eddington's experimental results from Principe Island, West Africa are dubious at best. On the day of the eclipse, May 29, 1919, the team was greeted with heavy rain. According to Clark, events occurred with a lick and a promise:

> Not until 1:30 P.M., when the eclipse had already begun, did the party get its first glimpse of the sun. "We had to carry out our programme of photographs on faith," wrote Eddington in his diary. "I did not see the eclipse, being too busy changing plates, except for one glance to make sure it had begun and another halfway through to see how much cloud there was. We took sixteen photographs. They are all good of the sun, showing a very remarkable prominence; but the cloud has interfered with the star images. The last six photographs show a few images which I hope will give us what we need…".[728]

One might think that the mission would have been aborted, considering the minimal number of samples Eddington managed to put together. Of the six salvageable photographs, Eddington admits, seemingly without the slightest shame, that he based his conclusion on *only one of the six salvageable photographic plates*, while he rejected the other plates that did not give the results he expected. As he records it: "But one plate that I measured gave a result agreeing with Einstein," from which he then exclaims, "it was the greatest moment of [my] life."[729] But even Relativists

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[727] *Scientific American Supplement*, December 6, 1919, as cited in *Scientific American*, September 2004, p. 104.

[728] *Einstein: The Life and Times*, p. 285.

[729] *Einstein: Life and Times*, pp. 285-286. The photographic plate considered as successful measured a displacement of 1.61'' ± 0.30''. So even in the plate he depended on to "prove" Relativity, it is only the margin of error (0.30'') Eddington granted to himself for the final calculations that brought the result within respectable range of Einstein's 1.75'' prediction. If Eddington had taken the minus side of the margin of error, the result would have been a dismal 1.31'' and no confirmation of Relativity could be extracted from it. In any case, the other five plates that Eddington discarded measured 0.93'' or less. In proper scientific procedure, it is the five measuring 0.93'' or less which would serve as the control and the 1.61'' as the anomaly, but Eddington conveniently reversed that protocol.

admit: "…it is absolutely crucial to obtain as many photographs with as many star images as possible. To this end, of course, it helps to have a clear sky."[730] When compared to a June 30, 1973 expedition led by Burton F. Jones that "hoped to gather over 1,000 star images,"[731] this makes Eddington's adventure into a virtual sham. Incidentally, Will reveals that the results of the 1973 eclipse showed 0.95 ± 0.11 arc seconds times Einstein's figure of 1.75, thus offering what he says is only a "modest improvement." With such a wide deviation, not surprisingly, the 1973 expedition was called the "swan song for this type of measurement."[732] That the public could be bamboozled in 1919 into believing that Relativity was proven by one mere photograph, which in itself was interpreted with obvious bias, and in the midst of five others that clearly nullified the theory, shows the influence Eddington carried in that day, as well as the utter mystique of the Relativity theory.

The questionable tactics that occurred in the 1919 eclipse expeditions also occurred in 1922 efforts in Australia. After putting the evidence of their photographs on a graph, the results show 44 data points below the curve and only 25 points above, which means that whoever created the graph did not choose the proper median curve, apparently in order to give the impression that the results conformed with Relativity theory. As Arthur Lynch writes:

> The results of the observations are shown on a chart, by a series of dots, and by tracing connections between these dots it is possible to obtain a "curve" from which the law of deviation is inferred. But the actual charts show only an irregular group of dots, through which, if it be possible to draw a curve that seems to confirm the theory of Relativity, it is equally possible to draw

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It just so happens that a deflection of 0.93'' is almost identical to the prediction of Newtonian physics and astronomically far from Einsteinian physics.

[730] Clifford M. Will, *Was Einstein Right? Putting Relativity to the Test*, New York: Basic Books, Inc., Publishers, 1986, p. 77.

[731] *Was Einstein Right*? p. 80.

[732] *Ibid*., p. 80. B. F. Jones' paper, "Gravitational deflection of light: solar eclipse of 30 June 1973. Plate reductions, says "About 160 stars were measured on each plate." But the paper reveals that, no matter how careful the experiments were conducted, they were not able to get the Einstein figure of 1.75. Jones shows low readings from a PDS microphotometer of 1.49 ± 0.20 to a high of 1.89 ± 0.18, concluding at the end of the paper that a "1.66 ± 0.18 arcsec" is the final averaged result (*The Astronomical Journal*, Vol. 81, No. 6, June 1976, pp. 455-463).

a curve which runs counter to the theory. Neither curve has any justification.[733]

Sir Edmund Whittaker, who wrote one of the more popular yet comprehensive volumes on the history of physics, and who was no enemy of Relativity, nevertheless stated in 1952:

> While it must not be regarded as impossible that the consequences of Einstein's theory may ultimately be reconciled with the results of observations, it must be said that at the present time there is a discordance.[734]

Despite these discrepancies, American astronomer W. W. Campbell made an announcement in 1923 that Einstein's predictions had been confirmed by the 1922 results.

Astronomer Robert Dicke (who, *contra* Relativity, revealed that Mercury's perihelion was due in part to the sun's oblateness), writes:

> Owing to the short duration of the eclipse and the consequent absence of repetitions of the observation, there has always been considerable doubt about the freedom of the final results from systematic errors. Furthermore, the results derived from past solar eclipses…have scattered a great deal. The accuracy of the gravitational deflection of light determined from total eclipses is probably no better than 20 per cent."[735]

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[733] Arthur Lynch, *The Case Against Einstein*, p. 264. F. Schmeidler of Munich University Observatory did a similar plot of the 92 stars from the 1922 photos, a plot which showed the same helter-skelter results ("The Einstein Shift an Unsettled Problem," *Sky & Telescope*, 27(4), 217, 1964).

[734] Edmund T. Whitaker, *A History of Ether and Electricity*, vol. 2, p. 180.

[735] "Solar Oblateness and Gravitation," *Gravitation and the Universe*, p. 27. In addition to Eddington's poor photography, his calculation of the deflections is contingent upon determining the star's distance from the limb of the sun. For example, a star which is close to the limb will be deflected about 1.75′′, but a star twice the distance from the limb will be deflected half as much. Hence, determining how close a star is to the limb of the sun is absolutely crucial. Obviously, Eddington did not have nearly enough evidence to begin a calculation as sensitive as this one.

Appendix 5: Do the 1919 Eclipse Photographs Prove General Relativity?

Dicke's chart shows six eclipse tests between 1919 and 1952, each with several results. Beginning with the 1919 eclipse, the results are as follows in seconds of arc:

- Trial 1: 1.87-2.12
- Trial 2: 2.00-2.25
- Trial 3: 2.05-2.30
- Trial 4: 1.87-2.05
- Trial 5: 1.27-1.87

Only Trial 5 comes within range of Einstein's 1.75 prediction, and that is only because 1.75 comes between the lower and upper limit of the actual deflections. As Guggenheimer stated in 1925:

> An examination of the various tables of the deflections observed shows that many of them are far away from the quantities predicted. The quantity approximating the predicted one [1.75 sec.] is obtained by averaging a selected few of the observations.

The 1922 eclipse (Australia):

- Trial 1: 1.37-2.17[736]
- Trial 2: 1.62-1.80
- Trial 3: 1.15-2.37
- Trial 4: 1.95-2.35
- Trial 5: 1.62-2.05

The 1929 eclipse (Sumatra):

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[736] It is interesting to note that supporters of General Relativity will record the results of these eclipse photographs in such a way as to make them appear to be very close to Einstein's prediction of 1.75''. For example, in Trial 1 from Australia, the data shows a range from 1.37'' to 2.17'', which means that there were many data points, some above and some below the median line. But when the same event is recorded in Relativity textbooks the figure given is 1.77'' ± 0.40'', since 1.77 is between 1.37 and 2.17. In other words, there may have been no results showing a 1.77'' deflection, but the author merely took the average of the high (2.17'') and low (1.37'') data and recorded it as 1.77'', since that figure is close to Einstein's prediction of 1.75''. In addition, the reader is expected to assume that the ± 0.40'' margin of error has no effect on the conclusion.

- Trial 1: 1.62-1.87 and 2.12-2.37
- Trial 2: 1.80-2.20
- Trial 3: 1.85-2.05

The 1936 eclipse (One in USSR and two in Japan):

- Trial 1: 2.40-2.95
- Trial 2: 2.30-3.10
- Trial 3: 1.25-2.30

The 1947 eclipse (Brazil):

- Trial 1: 1.70-2.25
- Trial 2: 1.85-2.60

The 1952 eclipse (Sudan):
- Trial 1: 1.60-1.80
- Trial 2: 1.20-1.50

Misner, Thorne and Wheeler quote Dicke's results as follows:

> The analyses [of the experimental data] scatter from a deflection at the limb of the sun of 1.43 seconds of arc to 2.7 seconds [compared to a general relativistic value of 1.75 seconds]. The scatter would not be too bad if one could believe that the technique was free of systematic errors. It appears that one must consider this observation uncertain to at least 10 percent, and perhaps as much as 20 percent." This result corresponds to an uncertainty in γ of 20 to 40 percent.[737]

In brief, no one has obtained 1.75, not even Arthur Eddington. As we will discover in the precession of Mercury, however, for a given radius of the star from the sun (*viz.*, 6.956×10^{10} cm), General Relativity is locked into one precise numerical value, 1.75 seconds of arc. If it is higher or lower, General Relativity is disqualified. In 1960, H. Von Klüber had already outlined why such tests were futile for Relativity. Among the difficulties are the refraction of light in the sun's corona; distortions in the optics caused by temperature changes during the eclipse; changes in scale

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[737] *Gravitation*, p. 1104.

between the eclipse and the control photographs; distortions in photographic emulsion while drying; and errors in measuring the images on the photographs.[738] By a series of graphs showing plots of the eclipse data, von Klüber shows how tenuous Eddington's claims really are.

For example, in the 1936 Sternberg graph it shows eleven star rays bent away from the sun and fifteen towards it, thus revealing 42% of the deflections were in the opposite direction of Einstein's prediction. In addition, the three points on the upper left show a much sharper upturn to the deflection pattern than what is represented by the dotted line. Similarly, in the 1936 Sendai graph, there are no points of less than four solar radii that would justify drawing the hyperbola with a sharp upward slope. Other eclipse results show the same problems. In the 1947 Yerkes I graph, nineteen light rays are bent away from the sun and twenty-eight toward, showing the same ~ 41% deviating from Einstein's prediction. In addition, the hyperbola of the graph is deceptive, since there are in reality only fourteen points above the line and twenty-four below, and thus it is not representative of the mean curve.

Undaunted, modern scientists were still determined to "prove" Relativity. Another eclipse test was performed in 1973 but with even more dismal results. In this graph, the General Relativity prediction represented by the sharp rise in the hyperbola is hardly justifiable, since the two shaded points indicate the largest errors on the graph. On a statistical basis, a straight line intersecting the sun's limb at ~ .7 arc seconds is more likely.[739]

We should not be surprised at these inaccuracies. As Alan MacRobert, senior editor of *Sky and Telescope*, notes:

> Rare is the night (at most sites) when any telescope, no matter how large its aperture or perfect its optics, can resolve details finer than 1 second of arc. More typical at ordinary locations is 2 or 3 arc-second seeing, or worse.[740]

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[738] "The Determination of Einstein's Light-Deflection in the Gravitational Field of the Sun," *Vistas in Astronomy*, Pergamon Press, London, 3:47-77, 1960.

[739] Graph taken from J. B. Zirker, *Total Eclipse of the Sun*, 1995, p. 179. As Zirker notes: "As you can see, the scatter is fairly large at large distances, and the position of the curce depends strongly on one or two point close to the sun" (*ibid.*, p. 178).

[740] "Beating the Seeing," *Sky and Telescope*, 89, 4, pp. 40-43, 1995.

Appendix 5: Do the 1919 Eclipse Photographs Prove General Relativity?
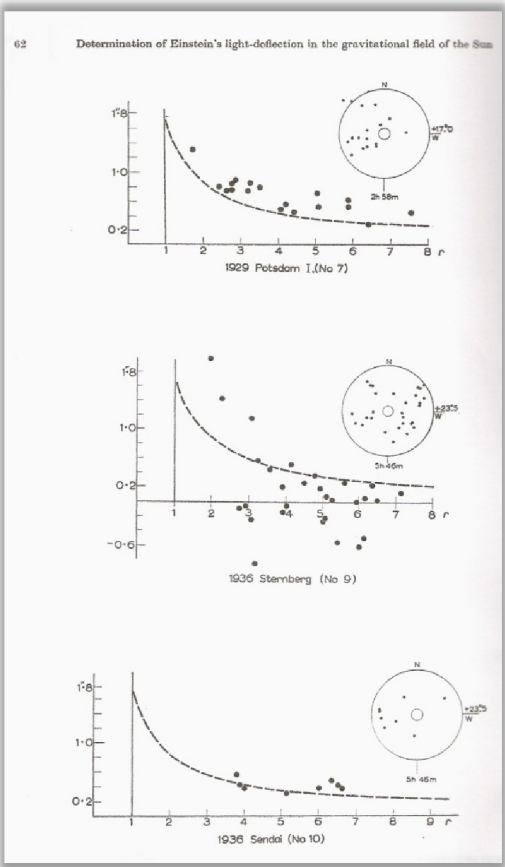
62 Determination of Einstein's light-deflection in the gravitational field of the Sun

1929 Potsdam I. (No 7)

1936 Sternberg (No 9)

1936 Sendai (No 10)

Appendix 5: Do the 1919 Eclipse Photographs Prove General Relativity?

Fig. 9.4. Star deflections versus distance from the Sun, photographed during the 1973 eclipse. (*Courtesy of the Texas Mauritanian Eclipse Team and* The Astronomical Journal.)
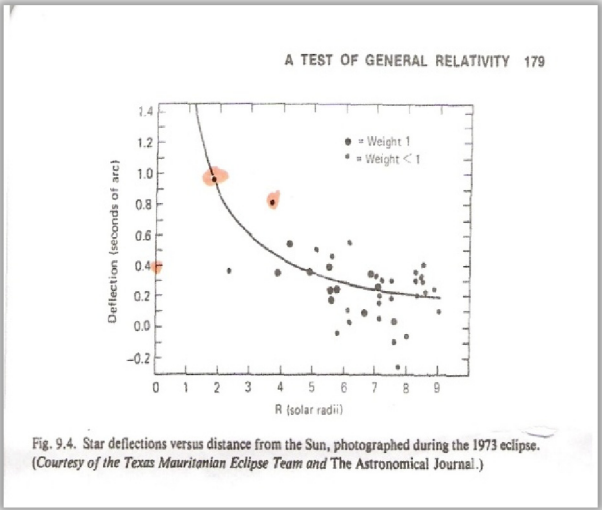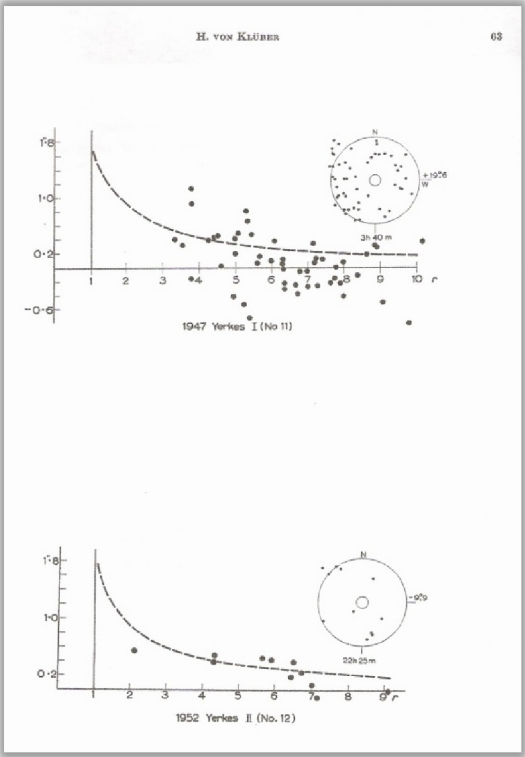
Appendix 5: Do the 1919 Eclipse Photographs Prove General Relativity?

While the eclipse experiments were fading, Relativists then began a series of experiments using light from quasars and radio waves near the sun. But again, "the primary factor limiting the accuracy was the solar corona, the hot, turbulent gas of ionized hydrogen at 2 million degrees that extends out to several solar radii from the sun."[741] Regarding the sun's corona, other physicists address the additional claim by Relativists concerning the Viking space probe. In words that disclose the evidential poverty of General Relativity to explain the results, Marmet and Couture conclude:

> …all the experiments claiming the deflection of light and radio waves by the sun are subjected to very large systematic errors, which render the results highly unreliable and apparently incorrect…. There is a desperate situation among scientists for not being able to show, with the most sophisticated technology, what is considered to be the basic principle of general relativity on which rely most of modern science, while this was claimed to be demonstrated by Eddington in 1919 using a simple four inch amateur size telescope."[742]

Added to this is the fact that even if General Relativity comes close to the proper value of light deflection near the sun, still, other physicists claim that the same phenomenon can be explained just as easily from the Newtonian perspective, and thus leaves General Relativity without one of its most famous proofs. As physicist Stan Gibilisco puts it:

> The amount of change in the positions of stars near the sun was very close to the function predicted by the general theory of relativity. Scientists who supported this theory considered the experiment a great triumph. But other evidence had to be found to provide more conclusive proof of the theory. Newton's theory also would predict the same effect, and while the deviation in stellar positions predicted by Newton was only half the observed

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[741] *Was Einstein Right*? p. 85.

[742] Paul Marmet and Christine Couture, "Relativistic Deflections of Light Near the Sun Using Radio Signals and Visible Light," *Physics Essays*, 12, 1, pp. 162-173, 1999. http://itis.volta.alessandria.it/episteme/marm1. html or see http://www. newtonphysics .on.ca/Eclipse/Eclipse .html. Also see: "The Deflection of Light by the Sun's Gravitational Field" by Paul Marmet for one of the better critiques. http://www.newtonphysics.on.ca/Einstein/App endix2 .html.

amount, and only half the amount predicted by general relativity, the error could be traced to a simple miscalculation by Newton concerning the intensity of the sun's gravitational field. Some effect had to be observed that would agree with the general theory of relativity, but was entirely neglected by the physics of Newton. The orbit of the planet Mercury proved to be the answer to this search.[743]

The Strange "2" Factor

Suffice it to say, Mercury's perihelion does not offer any proof for General Relativity, as we will discover in the next Appendix. Be that as it may, the history of the analysis of light deflection near the sun is by far one of the more confusing assortment of claims and counter-claims that have filled the landscape of theoretical physics. The story starts in 1801 with Johann von Soldner's attempt at calculating the deflection of starlight near the sun.[744] Based on the corpuscular theory of light, Soldner understood light to have mass, and mass is subject to Newton's law of gravitation. But this is where the confusion starts. In 1923, Robert Trumpler notes the following:

> In setting up the differential equations for the motion of the particle he erroneously used for the gravitational force the expression
>
> $$2gr^{-2}$$

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[743] Stan Gibilisco, "Understanding Einstein's Theories of Relativity," 1983, p. 146. Peter Rowlands says much the same: "In fact, all the standard experimental results which are used as tests of the general theory can be derived by using nothing more complicated than Newtonian gravity and special relativity" ("A simple approach to the experimental consequences of general relativity," *Space Physics*, June 13, 1996, p. 50). L. I. Schiff adds: "Since the first two of the three 'crucial tests' can be derived from the equivalence principle and special relativity without reference to the geodesic equation or the field equations of general relativity, it follows that only the orbit precession really provides a test of general relativity" ("On Experimental Tests of the General Theory of Relativity," Institute of Theoretical Physics, Standford University, October 6, 1959, p. 343).

[744] *Astronomisches Jahrbuch für das Jahr*, C. F. E. Späthen, Berlin, 1801, pp. 161-172, translation provided by Stanley Jaki in *Foundations of Physics*, Vol. 8, Nos. 11/12, 1978, pp. 939-950.

The factor 2 has no justification and should be omitted. Designating by ω the angular deflection of light from a star at infinity until it reaches the surface of the attracting body Soldner derived the formula

$$\alpha = tang\ \omega = \frac{2g}{v\sqrt{v-4g}}$$

where v = speed of light

which he applied to the earth and the sun. On account of the mistake mentioned his result for the sun (half deflection) ω = 0".84 is twice too large. Correcting Soldner's formula and using modern constants a ray of light just grazing the sun's surface is deviated from infinity to infinity by the angle α = 0".87 if the corpuscular theory of light and Newton's law of gravitation are adopted.[745]

H. von Klüber reiterates Trumpler's words in his 1960 paper:

Soldner (1801) investigated the behavior of a light-ray in a gravitational field of the classical Newtonian type, assuming the corpuscular theory. Unfortunately, his formula contains the erroneous factor 2. Correcting for this, and using modern constants, it can be shown that light coming from a star, and just grazing the limb of the sun before reaching an observer on the Earth, should be deviated by an angle of 0".87.[746]

In his original 1801 paper, Soldner seems to defend the two-factor:

If one were to investigate by means of the given formula how much the moon would deviate a light ray when it goes by the moon and comes to earth, then one must, after substituting the corresponding magnitudes and taking the radius of the moon for unity, double the value found through the formula, because a

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[745] "Historical Note on the Problem of Light Deflection in the Sun's Gravitational Field," *Science*, August 31, 1923, pp. 161-162.
[746] "The Determination of Einstein's Light-Deflection in the Gravitational Field of the Sun," p. 47.

light ray, which goes by the moon and comes to the earth describes two arms of a hyperbola.[747]

Soldner's reasoning is true even in General Relativity, since the angle of deflection should be the difference in the direction of the two asymptotes. Hence, Soldner's results could be interpreted such that ω = 0".87 is half of the deflection caused by the sun, and thus a full deflection would amount to 1".74. Or if we use Soldner's original figure of ω = 0".84, it is about half of 1".70.[748]

Interestingly enough, in 1911 Einstein published an article in *Annalen der Physik*[749] based on an entirely different approach than Soldner's, which included the idea that the speed of light changes near the sun due to varying strengths of gravity depending on where the light is passing. Using the Huygens principle of a light ray's path, Einstein used the equation:

$$\alpha = 1/c^2 \int_{\theta=-1/2\pi}^{\theta=1/2\pi} \frac{kM}{r^2} \cos\theta \ ds$$

$$= \ \alpha = 2kM/c^2\Delta$$

where

k = constant of gravitation
M = mass of attracting body
Δ = distance of light ray from attracting body
c = speed of light

In this equation Einstein obtains $\alpha = 4 \times 10^{-6}$ or 0".83 seconds of arc, but, like Soldner's, can be also adjusted to 0".87 based on a more accurate mass for the sun. In remarking on this value, Einstein wrote to Erwin Freundlich in 1913:

That the idea of a bending of light rays was bound to emerge at the time of the emission theory is quite natural, as is the fact that

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[747] Jaki's translation in *Foundations of Physics*, *op cit.*, p. 947.
[748] Richard de Villamil, in a letter to Arvid Reuterdahl, argues that Soldner made the simple mistake of not differentiating the original equation properly (August 24, 1925/1926, Department of Special Collections, O'Shaughnessy-Frey Library, University of St. Thomas, MN, pp. 2-3, letter on file).
[749] *Annalen der Physik*, 35, 898, 1911.

the numerical result is exactly the same as that according to the equivalence hypothesis.[750]

The first question that arises here is one of priority. Since Soldner was the first to calculate how light would bend around the sun, it requires a citation to Soldner's work, but no such reference appears in the 1911 *Annalen* article. This is similar to the same failure Einstein demonstrated when he did not give any credit in his 1905 paper to the work of Henrick Lorentz or Henri Poincaré in the area of Relativity theory. Other scientists were well aware of Soldner's work. For example, Franz Johann Müller wrote a paper on Soldner's work in 1914.[751] Arthur Eddington, gravity in an article in the *London Times* of 1919, even recognized Newton's priority regarding at least the query of how light would behave around the sun.[752]

The second question concerns why Einstein's prediction of "0.83, which is based on the "equivalence" principle of Relativity theory, is identical to Soldner's value. If Einstein had access to Soldner's "0.84 when he wrote his 1911 paper (and not noticed Soldner's "two-factor" error), it seems he would have done whatever he could to make an "equivalence" calculation commensurate with "0.84. He could do this by matching the initial integral equation, which results in: $\alpha = 2kM/c^2\Delta$, to Soldner's algebraic expression $\alpha = 2g/v\sqrt{v - 4g}$

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[750] *The Collected Papers of Albert Einstein*, Volume 5, Document 468, Princeton University Press, 1995, p. 351, cited in C. J. Bjerknes' *The Manufacture and Sale of St. Einstein*, p. 2141.

[751] F. J. Müller, *Johann Georg von Soldner*, Geodät, Kastner and Callwey, München, 1914. Yet in defense of Einstein, Abraham Pais says: "In 1911 Einstein did not know of Soldner's work. The latter's paper was in fact entirely unknown in the physics community until 1921," although Pais admits that "Soldner, who in 1801 became the first to answer Newton's query on the bending of light" (*Subtle is the Lord*, p. 200). Von Klüber says only that Einstein "probably" didn't know anything of Soldner's work (*op. cit.*, p. 47).

[752] The article was titled: "Einstein's Theory of Space and Time," and stated: "The deflection of the star images means a bending of the ray of light as it passes near the sun, just as though the light had weight which caused it to drop towards the sun. But it is not the bending of light that threatens the downfall of Newton. On the contrary, were Newton alive he would be congratulating himself on his foresight. In his 'Optiks' we read: -- 'Query 1. Do not bodies act upon light at a distance, and by their action bend its rays, and is not this action strongest at the least distance?' Weight of light seemed less strange to Newton than to us, because he believed light to consist of minute corpuscles, whereas for us the bending of a wave of light is a much more difficult conception."

In his 1915 paper, however, Einstein would change this equation so that it doubled the 0.83 value to 1.7. But by now, those who cared to study the issue probably knew that Soldner had only calculated half the deflection, and that a full deflection would equal 1.7. Nevertheless, Robert Trumpler defended Einstein's doubling of the value by saying:

> The increase of this value over that in Einstein's 1911 paper is not due to any mistake in calculation in the earlier paper but is an effect of the difference between Einstein's and Newton's law of gravitation, as the 1916 deflection is essentially based on the principles: (1) Light is subject to gravitation. (2) Gravitation follows Einstein's law instead of Newton's.[753]

But Einstein's sudden doubling of the light-bending angle did not escape the scrutiny of other physicists. Arvid Reuterdahl remarked:

> In *Science* (August 31, 1923), Dr. Robert Trumpler calls attention to the error in Soldner's work. Note that it is Soldner that is wrong despite the fact that Einstein's 1911 formula is identical with that of Soldner. It is also curious that when Einstein tried again in 1916 to produce a formula it did not agree with his first effort, in fact, the 1916 formula gives a value twice as large as the one in 1911. Both are right according to the Einsteinians: – two equals one.[754]

Subsequent studies on this problem are confusing, at best. In 1959, L. I. Schiff accounted for Einstein's doubling of the angle by saying that the 1911 value was based only on time dilation whereas the 1916 value was based on both time dilation and length contraction.[755] As such, he also

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[753] "Historical Note on the Problem of Light Deflection in the Sun's Gravitational Field," *Science*, August 31, 1923, p. 162.

[754] A. Reuterdahl, "The Einstein Film and the Debacle of Einsteinism," *The Dearborn Independent*, March 22, 1924, p. 15, cited in Bjerknes, pp. 2144-45. Bjerknes says Reuterdahl is relying on Philipp Lenard's "confusing analysis" of Soldner's paper and concludes: "Reuterdahl…mistakenly believed that Soldner's result matched Einstein's 1911 prediction, when in fact it comes closer to Einstein's revised 1915 prediction. (Abraham Pais [Subtle is the Lord, pp. 199-200] and many others have made the same mistake Reuterdahl made" (*The Manufacture of St. Einstein*, p. 2145).

[755] L. I. Schiff, "On Experimental Tests of the General Theory of Relativity, Standford University, October 1959, pp. 340-343.

claimed that the angle for the bending of light is derivable from the equivalence principle as opposed to the field equations from General Relativity. In 1968, Sacks and Ball criticized the solution because Schiff used the equivalence postulate improperly by extending it to include the Lorentz contraction. In the same year, Tangherlini derived the 1916 value by adding the 1911 Einstein deflection to the Soldner deflection.[756] In 1978, Comer and Lathrop also dismissed Schiff's attempt by saying he incorrectly used the local equivalence principle, which they replaced with a combination of the equivalence principle and infinitely fast particles in a geodesic, requiring the full use of the field equations of General Relativity.[757] In 1984, M. Strandberg asserted that Special Relativity and the local equivalence principle are the only equations needed to get the 1916 value since the former has "unexploited" properties that allow it to predict global effects that were once thought to be the sole domain of General Relativity.[758] In 1989, Tian and Li claimed to have found the rest mass of a photon and thus derive its speed and deflection in a gravitational field.[759] In 1966, P. Rowlands posited that Newtonian physics combined with Special Relativity could explain the light deflection and thus produce the 1916 value.[760]

A less confusing attempt at accounting for the doubling of Einstein's light-bending value is that offered by Misner, Thorne and Wheeler, at least from the perspective of General Relativity. These authors offer two distinct views of the situation: (a) the linear view that analyzes light bending from the sun to the outskirts of the solar system, and (b) the post-post-Newtonian (PPN) view from the sun to earth. The latter case is relevant to this discussion because it may explain the "2" factor. In this scenario, the authors show that the Earth observer intercepts the light deflection half-way through its course, the total course not being

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[756] As noted in M. W. P. Strandberg's "Special relativity completed: The source of some 2s in the magnitude of physical phenomena," Massachusetts Institute of Technology, March 29, 1985, p. 323.

[757] Robert P. Comer and John D. Lathrop, "Principle of equivalence and the deflection of light by the sun," Williams College, March 29, 1978.

[758] M. W. P. Strandberg, "Special relativity completed: The source of some 2s in the magnitude of physical phenomena," Massachusetts Institute of Technology, March 29, 1985, pp. 321-327.

[759] Renhe Tian and Zhuhuai Li, "The speed and apparent rest mass of photons in a gravitational field," Beijing Normal University, June 5, 1989, pp. 890-892.

[760] Peter Rowlands, "A simple approach to the experimental consequences of general relativity," *Space Physics*, June 13, 1996, pp. 49-55.

accomplished until well outside the gravitational potential, *i.e.*, outside the solar system.[761] The equation for finding…..

"the deflection angle measured at the Earth is

$$\delta\alpha = \frac{(1+\gamma)M\odot}{b}\,(1 + \cos\alpha)$$

which, "ranges from zero when the ray comes in opposite to the sun's direction…to the 'classical value' of ½(1 + γ) × 1".75 when the ray comes in grazing the sun's limb."[762]

But if that is the case, then the equation Einstein used in 1915 to arrive at "1.7, namely:

$$\alpha = 4k\mathrm{M}/c^2 r$$

must be adjusted for an Earth observer, and the adjustment results in precisely half of the total deflection, that is, half of 1.7 is ~ 0.84. Of course, this would make the sighting on Earth of anything near the accepted value of 1".75 (including Eddington's) either ficititious or the mere result of an already-programmed doubling adjustment in the calculations. This is why von Klüber can say:

"…and using modern constants, it can be shown that light coming from a star, and just grazing the limb of the Sun before reaching an observer on the Earth, should be deviated by an angle of 0".87.[763]

It is, perhaps, the same reason that Misner, Thorne and Wheeler can say that the maximum deflection of a light ray from a star that just grazes the sun, <u>as seen by an observer on Earth,</u> will be:

$$\tfrac{1}{2}(1 + \gamma) \times 1".75$$

wherein the coefficient "½" would be numerically equivalent to a half-deflection. The same authors more or less confirm this reasoning for us

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[761] Misner, Thorne and Wheeler, *Gravitation*, pp. 1101-1103.
[762] *Gravitation*, p. 1103.
[763] *Op cit.*, p. 47.

since in their linear calculation of the bending of light (a calculation that has the light beam passing the sun and proceeding to beyond the solar system), the final equation is: "For the sun…

$$\frac{4M}{\ell}$$

> …For light grazing the sun, $\ell = R_\odot$, this gives $\Delta\varphi = 4M_\odot/R_\odot$ radians = 1".75, which is also the prediction of general relativity, and is consistent with the observations."[764]

So it appears that Soldner's original value was correct, and that General Relativity confirms this by its own PPN analysis of the situation.

Interestingly enough, the difference in the linear analysis and the PPN analysis of light bending near the sun brings up an interesting anomaly in the theory of General Relativity. As it stands, the theory uses an Earth-based observer for its PPN analysis, but by its own admission the velocity of light on Earth is less than c. According to General Relativity, the true value of c can only be demonstrated outside the solar system where there is no gravitational potential. Consequently, the varying positions throught the year of the sun, the moon and the planets relative to the Earth should cause periodic fluctuations in the velocity of light on Earth. Although these fluctuations would be small, nevertheless, modern instruments boast of knowing the speed of light to at least eight significant figures, if not more. Yet the fact is, no one has shown evidence of these periodic fluctuations; no one seems concerned about not finding them; and the most important fact of all is that General Relativity does not even predict that there will be such fluctuations.

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[764] *Gravitation*, p. 185.

Appendix 6

Does Mercury's Perihelion Prove General Relativity

Einstein also claimed that his prediction of the perihelion of Mercury supported his theory of General Relativity, but this assertion is disproven by the same inaccuracies and biases appearing in the eclipse photographs. By all accounts, determining the complete reasons for the perihelion of Mercury is a formidable task. Based on the gravitational contributions of each of the planets (Pluto excluded), most of Mercury's perihelion is accounted for by Newtonian physics, but a residual remains (about 10% or less).[765] Newtonian physicists tried many and various means to find the reason for the residual, hypothesizing such things as interplanetary movements; the existence of another planet (Vulcan); readjusting the square of the inverse square law to 2.0000001574 instead of 2.0, all with only marginal success. Still today, due mainly to unknown variables in the data, as well as the arbitrary means of interpreting the data, Mercury's residual perihelion remains perplexing. There is at least a four-body calculation (the sun, Venus, Earth, Jupiter) if not a ten-body calculation (the sun, Earth and the eight planets) involved. In Newtonian physics, calculation of gravitational attraction between two bodies is relatively simple, but when three or more bodies are in the mix, Newton's formula is virtually useless. As Poor states: "Under certain special conditions, mathematicians have been able to find an approximate solution of the problem, but even such approximate solution is extremely intricate. No solution of the general problem has been found."[766]

The first attempt to measure Mercury's perihelion was made in 1843 and then again in 1859 by the French mathematician Urbain Leverrier. He

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[765] Earth and each of the planets cause gravitational perturbations on each other. Additionally, the sun's oblateness will also add to the general perturbation. The contributions to the perturbations on Mercury, amount to the following (as measured in arc seconds per century): Venus: 277.856; Earth: 90.038; Mars: 2.536; Jupiter: 153.584; Saturn: 7.302; Uranus: 0.141; Neptune: 0.042; Sun's oblateness: 0.010 (as measured prior to the 1960s). These figures add up to 531.509 as the total perturbation on Mercury. But since Mercury's precession is 574.10 arc seconds, this leaves 42.591 arc seconds unaccounted for. NB: the perturbations in the geocentric system (whether Ptolemaic or Tychonic) would be precisely the same.
[766] *Gravitation versus Relativity*, p. 123.

began by analyzing records of sixteen of Mercury's transits across the sun dating from 1677 to 1848. Calculating the entry and exit times of Mercury's transit allows a determination of the planet's angular position within one arc second. After taking account of the gravitational attraction of Venus, Earth, and Jupiter, Leverrier had a residual figure of 38'' (arc seconds) per century, but he could not account for the discrepancy only by the perihelion, and thus he began to examine Mercury's eccentricity. He then included 400 meridian transits of Mercury between 1801 and 1842, which he obtained from the Paris Observatory, and upon finding an eccentricity of 22'' he then added the two figures (38'' + 22'') and concluded that the amount of precession was 60'' per century. After preparing his final tables, however, he arbitrarily eliminated the 22'' of eccentricity, leaving 38'' as the final sum.[767]

In 1895, Simon Newcomb became the next scientist to attempt to find the reason for Mercury's residual perihelion. Working with Leverrier's 38'' figure, Newcomb arbitrarily decided to reduce the eccentricity, which in turn increased the rotation, and he obtained residual figures of between 41'' and 43''. Hence, the 43'' remained in the textbooks (at least up until Einstein), as the residual perihelion of Mercury not accounted for by Newtonian physics.[768] At that time, however, Newcomb suggested that the sun's oblateness might provide the solution to the remaining puzzle. This would be a significant hypothesis, since both Newtonian and Relativistic calculations of perihelion assume a spherically symmetrical sun.

In Einstein's attempt to account for the residual perihelion there has been some suspicion that, knowing the accepted value in advance (43 arc seconds), he juggled his figures to meet those expectations. That Einstein was already aware of the needed figure was made plain in his book on Relativity:

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[767] N. T. Roseveare, *Mercury's Perihelion from Le Verrier to Eintein*, Oxford University Press, 1983; L. V. Morrison, C. G. Ward, "An analysis of the transits of Mercury: 1677-1973," *Notes of the Royal Astronomical Society* 173, 183-206, 1975.

[768] S. Newcomb, "Tables of Mercury," *Astronomical Papers of American Ephemeris Nautical Almanach*, 6, Washington, 1895-1898. The advance of Mercury's perihelion was calculated by Newtonian physics to be 531.509 arc seconds per century. This falls about 43 seconds short of the observed value, which is 574 arc seconds. As it is commonly understood, the total apparent precession of Mercury's perihelion (as observed from the Earth) is 5600"/100years. Of this, 5025'' is attributed to the Earth's precession (precession of equinoxes) and 531.509'' due to planetary perturbations of Mercury's orbit. This leaves 43"/100 years unexplained.

In point of fact, astronomers have found that the theory of
Newton does not suffice to calculate the observed motion of
Mercury with an exactness corresponding to that of the delicacy
of observation attainable at the present time. After taking
account of all the disturbing influences exerted on Mercury by
the remaining planets, it was found (Leverrier: 1859; and
Newcomb: 1895) that an unexplained perihelial movement of the
orbit of Mercury remained over, the amount of which does not
differ sensibly from the above mentioned +43 seconds of arc per
century. The uncertainty of the empirical result amounts to only
a few seconds.[769]

The original Einstein-Grossmann theory accounted for only 18'' of
the residual 43'' of Mercury's perihelion, which is documented in the
original Einstein-Besso manuscripts made public in 1914 by Dutch
physicist Johannes Droste. Einstein subsequently retracted the paper,
changed his Relativistic field equations no less than three times, and
resubmitted them three times, respectively, to the Berlin Academy before
the final result of 43'' was achieved.[770] Still, Charles Lane Poor adds that
in arriving at the 43'' Einstein did not use the unit of time required by
Relativity theory; rather, he used the commonly accepted Newtonian unit
of time. Poor also adds that Einstein insisted "in clear unequivocal
language" in the Preface of the book that, of all the planets, only Mercury
presented anomalous data.[771] Yet Newcomb's 1894-1895 data of 60,000
observations records discordances in the motions of other planets, totaling
eleven in all, and four of which he considers highly significant. Thus Poor
concludes: "Can it be possible that he [Einstein] has never read the very
papers upon which the astronomical proof of the Relativity Theory is
supposed to be based?"[772]

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[769] Albert Einstein, *Relativity: The Special and General Theory*, Appendix III.

[770] Michel Janssen, "The Einstein-Besso Manuscript: A Glimpse Behind the
Curtain of the Wizard," Fall 2002, p. 12-15, and "What Did Einstein Know and
When Did He Know It? A Besso Memo Dated August 1913."

[771] Einstein writes in the Preface: "The sole exception is Mercury, the planet
which lies nearest the sun. That for all the planets, with the exception of Mercury,
this rotation is too small to be detected…" In a July 30, 1921 letter Einstein
writes: "The perihelial movement of Mercury is the only anomalous one in our
planetary system which has been sufficiently attested" (*Gravitation versus
Relativity*, pp. 185-186).

[772] *Gravitation versus Relativity*, p. 187.

Physicist Tom Van Flandern studied Einstein's calculations and found there were "three separate contributions to the perihelion; two of which add, and one of which cancels part of the other two; and you wind up with the right multiplier." The same article reports that Van Flandern approached a University of Maryland colleague who had known Einstein in their respective work at Princeton's Institute for Advanced Study regarding how, in his opinion, Einstein had arrived at the accepted figure of 43 arc seconds. The colleague replied that it was his impression that "knowing the answer, he jiggered the arguments until they came out with the right value."[773] Poor says much the same, but points out an added twist in Einstein's deception:

> Yet this coincidence of figures is largely due to the astuteness of Einstein in quoting the result of Newcomb's preliminary investigation, and in ignoring the classic work of Leverrier and the final results of Newcomb. According to Einstein the results of the astronomical investigations into the motions of Mercury are summed up as: "it was found (Leverrier – 1859 – and Newcomb – 1895) that an unexplained perihelial movement of the orbit of Mercury remained over, the amount of which does not differ sensibly from the above mentioned +43 seconds of arc per century. The uncertainty of the empirical result amounts to a few seconds only." Leverrier in 1859 found 38'': Newcomb in 1895 found 41.6''; quantities quite different from the 43'' quoted by Einstein…The coincidence of figures, the supposed agreement between observation and the relativity theory, vanishes the moment the real facts are stated.[774]

The problem for Einstein is, once he chooses 43'' as the final figure, it cannot be changed in the future, since the equations he formulated from the General Relativity theory will not allow him to do so. Thus, if the real figure turns out to be anything more or less than 43'', Relativity is automatically disqualified as providing an explanation to Mercury's perihelion. As Relativist Clifford Will admits: "…the prediction of general relativity is fixed at 43 arcseconds; it can't be fiddled with."[775] Poor adds: "There is no flexibility in the Einstein formulas, no constant of uncertain

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[773] Physicist Tom Van Flandern. Article written by Tom Bethel, "Rethinking Relativity," *The American Spectator*, April 1999.
[774] *Gravitation versus Relativity*, p. 187.
[775] *Was Einstein Right?*, p. 101.

value, no possibility of adjustment."[776] Being caught in such a corner, Relativists will create quite a fuss over anyone who claims to have an alternate figure, as we shall see below.

It is worthy of note that already in 1898 Paul Gerber had produced the equation that accounted for the precession of Mercury without any use of Relativistic tensor equations, since they would not be available until 1916. Gerber did, however, use one of the assumptions of Einstein's General Relativity, that is, gravity traveled at the speed of light. Gerber published his finding in Mach's *Science of Mechanics*. It wasn't until Einstein published the same equation in *Annalen der Physik* 18 years later that the editors of *Annalen* reprinted Gerber's equation, pointing out that Einstein should have given credit to Gerber. Although he was an avid reader of Mach's writings, Einstein claimed ignorance of Gerber's previous work (the same reason he gave when it was discovered that his Relativity equation was identical to Lorentz's Transformation equation produced 10 years earlier).

Subsequent calculations of Mercury's perihelion were made after Einstein supported the 43'' figure. In 1930, the figure was raised to 50.9.[777] Just prior to the 1960s, it was set back at 32.0. These wide-ranging values are due to the procedural difficulties stemming from having to account for all the mass and movements in the solar system. In reality, depending on how one views or juggles the figures, one can make the residual perihelion vary quite extensively. Charles Lane Poor shows, for example, that the original calculations by Leverrier had the perihelion of Mercury literally dancing in the sky. He writes:

> The extreme complexity of the problem may be best illustrated by giving the actual expression for the position of the perihelion of Mercury, as affected by the action of Venus alone. This is taken from the work of Leverrier…These show that from February 25 to July 19 the perihelion was moving backward, while during the next period it was moving forward, but on December 10th it was still behind where it had been earlier in the year. All this is complicated enough, but it only accounts for the action of Venus; it requires twenty-one similar terms to account for the action of the Earth, sixteen for Jupiter, six for Saturn, and one for Uranus.[778]

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[776] *Gravitation versus Relativity*, p. 187.
[777] H. R. Morgan, *Journal of the Optical Society of America*, 20, 225, April 1930.
[778] *Gravitation versus Relativity*, p. 143.

By the 1960s, the figure was put at 39.6. Astronomer Robert Dicke (an important person in his own right since his work superseded the crucial experiments of Roland von Eötvös) proposed, after his intensive study, that the oblateness of the sun was responsible for a significant portion of the residual perihelion of Mercury. Dicke and his partner Goldenberg found that the sun's polar axis is shorter than its equatorial axis by approximately 40 parts per million, thus making the sun oblate, and accounting for at least 3.4'' of Mercury's residual perihelion.[779] This new evidence brought the residual down from 43.0 to 39.6, thus making Einstein's attempt at securing 43'' through General Relativity somewhat dubious. Moreover, Dicke's adjustment of 3.4 arc seconds could just as easily been used to offset the 50.9 or the 32.0 figures, thus making them 47.5 and 28.6, respectively.

Robert Clark describes the outcome of Dicke's work: "Dicke began a series of experiments in the mid-1960's whose results brought a headline in *Nature* of 'Einstein in Crisis?'"[780] *Nature* followed in the article stating:

> In spite of the great aesthetic and philosophical appeal of Einstein's general theory of relativity, it is still, after 50 years of widespread acceptance, one of the least well-founded theories in physics as far as experimental confirmation is concerned.[781]

Some astronomers, lending their support to Relativity, doubted Dicke's findings, arguing that the sun's oblateness could not account for such a large portion of the residual perihelion. Suffice it to say, the war was now in full swing. Dicke was definitely a threat to Relativity, since a deviation as large as 3.4'' would immediately topple General Relativity. In 1974, Dicke published a complete reanalysis of the data, and came up with the same result.

Afterward, Dicke and several other astronomers found that in addition to the oblateness, the sun's gravitational quadrupole moment, its rapid internal rotation, and its oscillations in diameter and rate of rotation, all

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[779] "Solar Oblateness and Gravitation," *Gravitation and the Universe*, pp. 30f. In a report dated January 13, 1967, to the American Physical Society, Dicke and Goldenberg report: "New measurements of the solar oblateness have given a value for the fractional difference of equatorial and polar radii of $(5.0 \pm 0.7) \times 10^{-5}$. A corresponding discrepancy of 8% of the Einstein value for the perihelion motion of Mercury is implied" (*Physical Review Letters*, 18, 313). NB: 8% of 43.0 is 3.4.

[780] *Nature* 202, 1964, pp. 432f.

[781] *Einstein: The Life and Times*, p. 767.

play a part in determining the residual figure of 39.6 arc seconds. If the sun's inner core rotates faster than its exterior, this will cause a precession of the orbits of the planets and explain a significant portion of the residual perihelion. Dicke postulated that the interior core of the sun, at least out to one half its radius, rotates twenty times faster than the exterior. Ian Roxburgh was one of the first to make this evidence public. His abstract reads:

> The hypothesis that the inside of the Sun is rotating much more rapidly than the surface layers…The angular velocity of the inner region is estimated and it is shown that the rotational distortion of the Sun produces a perihelion advance of the planets. If the angular velocity inside the Sun has the same magnitude as in a typical rapidly rotating star, then the anomalous advance of the perihelion of Mercury, usually counted as one of the crucial tests of general relativity, can be explained by the gravitational effect of the rotating Sun.[782]

Subsequent experiments performed in 1973-1982 by Henry Hill gave results that were five times smaller than Dicke's but still fifty-times larger than the conventional value. Dicke came back in 1985 with further experiments and stated that the results yielded 12 parts per million rather than the original 40 parts per million.[783] These results show the extreme

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[782] Ian W. Roxburgh, "Solar Rotation and the Perihelion Advance of the Planets," *Icarus*, 3:92, 1964.

[783] R. H. Dicke, J. R. Kuhn, K. G. Libbrecht, "The variable oblateness of the Sun: measurements of 1984," *Astrophysical Journal*, 311, 1025-1030 (1986); R. H. Dicke, J. R. Kuhn, K. G. Libbrecht, "Is the solar oblateness variable? Measurements of 1985," *Astrophysical Journal*, 318, 451-458, 1987; J. R. Kuhn, K. G. Libbrecht, "Oblateness of the Sun in 1983 and Relativity," *Nature*, 316, 687-690, 1985; L. Campbell, J. C. Mc Dow, J. W. Moffat, D. Vincent, "The Sun's Quadrupole Moment and Perihelion Precession of Mercury," *Nature* 305:508, 1983; Anna Maria Nobili and Clifford M. Will, "The Real Value of Mercury's Perihelion Advance," *Nature* 320, 39-41, 1986; D. O. Gough, "Internal rotation and gravitational quadrupole moment of the Sun," *Nature*, 298, 334-339, 1982; S. Pireaux, J. P. Rozelot, S. Godier, "Solar quadrupole moment and purely relativistic gravitation contributions to Mercury's perihelion Advance," *Astrophysics and Space Science* 284, 1159-1194, 2003; M. Bursa, "The Sun's flattening and its influence on planetary orbits," *Bulletin of the Astronomical Institute Cze.*, 37, 5, 312-313, 1986; J. V. Narlikar, N. C. Rana, "Newtonian N-body calculations of the advance of Mercury's perihelion," *Notes of the Royal*

difficulty in obtaining accurate and reliable results. As Relativity supporter Clifford Will admits: "It is ironic that after seventy years, Einstein's first great success remains an open question, a source of controversy and debate."[784]

In the face of the foregoing evidence, there has been an inordinate amount of pressure put on the scientific community not only to maintain a residual perihelion for Mercury of 43 arc-seconds, but to attribute it solely to General Relativity and to minimize any findings from the sun's inherent characteristics that provide an alternative answer.

In the face of these difficulties, some have suggested using the perihelia of Venus, Earth or Mars to help prove Relativity theory. But this presents an even worse dilemma for Relativity, considering the anomalous results of Einstein's predictions for the perihelia of the other planets. Indeed, it is puzzling why Relativists would want to open this Pandora's Box at all. Perhaps they are hoping that no one will investigate the original records of Relativity's predictions, but, unbeknownst to most, the investigation has already been done. A person close to the scene and one who obtained General Relativity's original perihelia predictions was celestial mechanic Charles Lane Poor of Columbia University. Poor first reveals Einstein's admission: "The only secular perturbation is a motion of the perihelion."[785] Poor interprets this statement as follows:

> Thus the relativity theory cannot explain, or account for, any of the observed discrepancies in the motions of the planets, other than those in the perihelia. But it is clear that, under the Relativity theory, the perihelia of all the planets must rotate by various amounts depending upon their respective distances from the sun. The amounts of such rotations can be readily calculated from the formula given by Einstein for the case of Mercury.

Astronomical Society 213, 657-663, 1985; Ronald L. Gilliland, "Solar Radius Variations over the Past 265 Years," *Astrophysical Journal* 248:1144, 1981; "The Sun Shivers on a 76 Year Cycle," *New Scientist*, 92:165, 1981; David W. Hughes, "Solar Size Variation," *Nature* 286:439, 1980; David W. Dunham, *et al*, "Observations of a Probable Change in the Solar Radius between 1715 and 1979," *Science* 210:1243, 1980; Leif M. Robinson, "The Disquieting Sun: How Big, How Steady?" *Sky and Telescope*, 63:354, 1982; S. Sofia, "Solar Radius Change between 1925 and 1979," *Nature* 304:522, 1983.

[784] *Was Einstein Right?* p. 107.
[785] As quoted in *On Einstein's Theory of Gravitation and its Astronomical Consequences*, by W. de Sitter, in *Monthly Notices*, Royal Astronomical Society, vol. lxxvi, No. 9, p. 726, as cited in *Gravitation versus Relativity*, p. 190.

Poor then shows that Einstein's results vary widely from those of Newcomb. For example, Relativity would predict a +8.6'' perihelion for Venus, but Newcomb recorded -7.3''. In other words, Relativity would predict a perihelion for Venus that was going in the opposite direction of what was actually observed. As Poor describes it:

> The perihelion of this planet is rotating more slowly than the computations indicate it should, the difference being –7.3'' per century. The Einstein formulas would increase the theoretical speed of rotation by an additional 8.6'', thus making the total discrepancy between observation and theory 15.9 or 37% of the entire observed motion. The Einstein formulas, in this case, make a bad matter worse; they give the orbit a rotation in the direction opposite to that which is required to fit the observations. Thus the Relativity theory is not sufficient to explain the discordances in the planetary motions. It accounts approximately for only one among the numerous discrepancies of the perihelion of Mercury. It fails completely to explain any position of several well-tested irregularities and it doubles the observed discrepancy in the motion of Venus.[786]

Some advocates of Relativity attempt to cover up these inconsistencies, as seen, for example, in Hugh Ross' assertion that General Relativity found a precession for Venus of "8.6," a figure, according to his endnotes, that he obtained from Steven Weinberg's *Gravitation and Cosmology*.[787] Perhaps because they were trying to save face for Relativity theory, neither of the two authors mention the observational figure of –7.3.

Poor also reports that Einstein's Relativity predicted a perihelion for Mars of +1.3'', but the observational figure is +8.1'', a difference of 623%.[788] Not surprisingly, Weinberg and Ross leave out General Relativity's anomalous prediction, replacing it with the precession of the

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[786] *Gravitation Versus Relativity*, New York: Putnam and Sons, 1923, p. 194.

[787] *Gravitation and Cosmology*, New York: John Wiley, 1972, p. 198. Ross says that the observed value of Venus' perihelion is "8.4'' ± 4.8" and that General Relativity's prediction was "8.6''."

[788] *Gravitation Versus Relativity*, p. 191. In addition, the observed value of Mercury's nodal precession is +5.1 ± 2.8 and Venus' is +10.2, but Relativity calculated zero for both.

asteroid Icarus.[789] Einstein's formula also makes an erroneous prediction of Earth's perihelion, assigning a figure of +3.8'' when, according to heliocentric mechanics, it is actually 5.9''. Also, Newcomb was able to measure the nodes of Mercury (5.1'') and Venus (10.2'') as well as the eccentricity of Mercury (0.88''), but Einstein's formula simply isn't able to make such calculations with a value greater than zero.

Other anomalies in Relativity's ability to calculate the perihelion of the heavenly bodies crop up from time to time. For example, for the binary DI Herculis, composed of two stars which circle each other in about 10.5 days, General Relativity predicts that the orbit should rotate by 4.27º per century, but the actual value is 1.05º. Many such discrepancies occur in other binary systems.[790] The discrepancies are more frequent when the gravitational field is stronger, as it is in binary systems, yet ironically General Relativity was invented in order to explain the phenomenon of gravity.

Lastly, Poor wrote two devastating critiques of Einstein's use of the perihelion of Mercury to prove Relativity theory. The first was written in 1923 titled "Relativity: An Approximation," presented to the American Astronomical Society; the other in 1924 titled "The Relativity Motion of Mercury: A Mathematical Illusion," presented to the Physics Colloquium of Columbia University. The former is included at the end of this Appendix.

The Brans-Dicke Challenge to Einstein

In the 1960s, one of the premier astronomers of the day, Robert H. Dicke, put forth a challenge to General Relativity based on Mach's principles. Our purpose in revealing the challenge, however, is not to propose that Brans-Dicke offered a viable alternative to General Relativity; rather, it is to show that the new theory forced Relativists to cease basing their theory merely on mathematics and demanded that they provide the world with real physical evidence for their beliefs. For our interests, it matters little which theory eventually wins in the minds of modern scientists. Rather, our interest lies in seeing one form of relativity

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[789] *The Fingerprints of God*, p. 46. Icarus, technically known as 1566 Icarus, an asteroid discovered by Walter Baade in 1949, intersects the sun-Earth semi-major axis.

[790] Robert Naeye, "Was Einstein Wrong?" *Astronomy*, 23:54, 1955, as cited in *The Biblical Astronomer*, Vol. 6, No. 77, 1996.

challenge another form, and in the process, expose both for the erroneous concepts they present.

Robert Dicke's first challenge to General Relativity regarded the perihelion of Mercury. Dicke found that, contrary to the theory of General Relativity, part of Mercury's residual perihelion was due to the sun's oblateness as well as its fast rotating inner core. With Carl Brans, Dicke put forth another challenge, much more formidable. Based on Mach's principles, they offered a theory of gravity which was opposed to the one established by General Relativity.[791] They posited that the gravitational force between two bodies should be determined not only by the two bodies themselves, but also by the distant matter in the universe (*e.g.*, stars, galaxies, etc.).[792] In effect, as Brans writes, they were proposing "to find a physical basis for inertial reaction forces,"[793] a force of nature that had eluded a convincing explanation from the time of Aristotle, through Newton and down to Einstein. Dennis Sciama had also suggested the same

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[791] C. Brans and R. H. Dicke, "Mach's principle and a relativistic theory of gravitation." *Physical Review* 124 (1961): 925-35. SCI reported that Brans and Dicke's article was cited in over 565 publications between 1961 and 1983. See also R. H. Dicke, "Dirac's cosmology and Mach's principle," *Nature* 192 (1961): 440-41.

[792] Dicke wrote in his autobiography: "…the laboratory, Earth and Solar System could not be isolated even in principle from the rest of the universe" (*R. H. Dicke, A scientific autobiography*, unpublished manuscript on file in the Membership Office of the National Academy of Sciences, 1975). Dicke proposed considering the gravitational constant, *G*, as the ratio of gravitational to inertial mass. As Brans put it: "Any influence of the universe structure on inertial forces would then show up in terms of *G*, expressed in 'standard' units for which inertial mass is defined as constant. This also was consistent with Dirac's conjecture $1/G \sim M/R$." To calculate the gravitational effect of the universe on two bodies, one would need to determine the radius of the universe, multiply the radius by the square of the speed of light, and then divide the result by the mass of the universe, and then multiply by the volume of a sphere. The resulting number should equal the gravitational constant, *G*, which is 0.0000000667 cm^3/grams/second^2. Dicke came within a factor of 100 using a 10 billion light-year radius and 200 grams per cubic million kilometers. Of course, if Dicke's radius is decreased and the grams/million kilometers^3 increased in line with the parameters of a smaller yet denser geocentric universe, the resulting factor would be a lot closer to the gravitational constant. For example, attaining *G* for a 90 parsec radius universe, the mass of the universe is 1.31×10^{61} grams.

[793] Carl H. Brans, "Citation Classic," in *Current Contents*, March 7, 1983, p. 24.

in 1953.[794] To the consternation of General Relativity advocates, the Brans-Dicke theory has a built-in mathematical variable that will not allow the theory to be disproved.[795] As Clifford Will describes:

> …the scalar-tensor theory was every bit as valid mathematically as general relativity, and was capable of making detailed predictions for the outcomes of experiments…the theory could do anything general relativity could do.[796]

Although various experiments were performed to distinguish between General Relativity and Brans-Dicke, the precision needed to do so was so high that it simply was not feasible. As Clifford Will puts it:

> The problem of Mercury's perihelion shift and the solar oblateness remained unresolved; if anything it was now even more contentious, because the prediction of the Brans-Dicke theory with ω larger than 500 for Mercury's perihelion shift is indistinguishable from that of general relativity, so if the solar oblateness were to be as large as the original Dicke-Goldenberg 1966 value, both theories [General Relativity and Brans-Dicke] would be in violation of experiment. Could one say that the scalar-tensor theory was completely dead? Not exactly. Because

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[794] Dennis W. Sciama, "On the Origin of Inertia," *Monthly Notices of the Royal Astronomical Society*, 113:34-42, 1953; and *The Unity of the Universe*, New York, Doubleday, 1961.

[795] As Brans put it: "I started from this point, looking for field equations which would contain $1/G$ as a field quantity, and having mass as a source. A simple division of the Einstein Lagrangian by G, to isolate it from the matter Lagrangian, so that matter will be conserved as usual, came to mind quickly as a starting point. An extra term, involving φ and its derivatives, must then be added with its form determined by dimensional arguments. However, its numerical coefficient could not be determined and was left as a free dimensionless constant. Standard Einstein theory is recovered in the limit as this constant, ω, approaches ∞. Thus, in principle, with no independent guide to the value of ω, no experiment with finite error can rule out the scalar-tensor theory in favor of Einstein's" (Carl Brans, "Citation Classic," in *Current Contents*, March 7, 1983, p. 24).

[796] Clifford Will, *Was Einstein Right?*, p. 154. Will relates that "…the joke that used to go around Kip Thorne's relativity research group at Caltech: On Monday, Wednesday, and Friday, we believe general relativity; on Tuesday, Thursday, and Saturday, we believe the Brans-Dicke theory (on Sunday, we go to the beach)" (p. 156).

ω is adjustable, the predictions of the theory can be made to be as close as desired to those of general relativity….At this point a certain subjectivity must enter the decision as to what is viable and what isn't.[797]

What Will suggests as the judge of the issue is Occam's razor, claiming that General Relativity is the simpler approach. In the end, Will has no proof to protect Einstein's theory. He is left with relativistic mathematical formulae against relativistic mathematical formulae, both claiming to provide the definitive answer, yet neither being able to disprove the other by direct physical evidence.

Relativity: An Approximation
By Charles Lane Poor[798]

The generalized theory of relativity has been accepted as proved; proved by the motions of Mercury and by the bending of light rays near the edge of the sun; phenomena that, according to the relativists, cannot be explained or accounted for by the ordinary methods of astronomical research. Now, how does the relativity theory explain these motions of Mercury, this deflection of light? In what way do the formulas of relativity differ from those of the old fashioned classical mathematics of Newton, La Place, and Leverrier?

The formula of relativity, upon which is based the relativist's explanations of these phenomena, is found, upon analysis, to be nothing more nor less than an approximation towards the well known formula of Newtonian mathematics. The relativity formula, as used in the astronomical portion of the theory, contains not the slightest trace of the basic postulates of relativity, of warped space, or the mythical fourth dimension. It is a formula of Newtonian gravitation, purely and simply; but an approximate formula, derived by a series of approximations.

In deriving the formulas for the transmission of light throughout space and for the motion of one particle of matter about another, the relativity mathematician encounters a serious difficulty. His formula, derived from the postulates of relativity, indicates that light travels with different speeds in different directions, that the velocity of light depends upon the direction

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[797] Clifford Will, *Was Einstein Right*?, p. 158.
[798] A paper presented to the American Astronomical Society, 13th meeting, 1923, Mount Wilson Observatory, California.

of transmission. That such a mathematical result represents the facts of nature is highly improbable, for in free space there is no difference between right and left, between north and south, or east and west; there is no reason why a ray of light should travel faster to the north than to the south. To overcome this mathematical difficulty, or inconvenience, as he calls it, the relativist makes a substitution, or approximation. Instead of using the direct distance between the centers of two particles of matter, the relativist adds a small, a very small, factor to this distance; or, as Eddington puts it, "*we shall slightly alter our co-ordinates.*" Such an approximation is very common among physicists: it is done every day to simplify troublesome formulas. The only precaution necessary in such a procedure is to remember always that the final result is necessarily approximate, and, before drawing any conclusion, to thoroughly test the effects of the approximation.

Now the quantity, *m*, which is thus added to the distance to simplify the relativity equation, represents the mass of the attracting body, expressed in linear relativity units. It is really very small indeed in all physical problems of the laboratory. For all ordinary masses of matter, such as can be handled and experimented with on the earth, this little quantity is very much less than the billionth part of an inch; for the earth itself it is only about one-sixth (1/6) of an inch. As applied to the earth as a gravitational body, the approximation really consists in adding $1/6^{th}$ of an inch to each and every distance measured from the center of the earth. As the radius of the earth is some 4,000 miles, it is easy to see that for bodies near the surface of the earth this approximation amounts to less than one part in a billion, a quantity absolutely inappreciable in any physical problem; in the case of the motion of the Moon about the earth, this little distance is less than one part in seventy-five billion.

To the physicist such a degree of approximation is amply sufficient; no laboratory methods can measure with this degree of accuracy. But it is radically different in astronomy: distance and motion are on enormous scales and time continues on interminably, and a minute approximation might become evident in the motions of the planets.

Now it must be clearly understood that this minute approximation is the *sole appreciable difference* between the so-called Einstein law of motion and the old fashioned mathematics of Newton. By omitting this approximation and using the exact distance between the centers of the two bodies the Einstein formula becomes identical with that of Newton: on the other hand, if, in the Newtonian formula the approximate distance be used, then this formula becomes identical with Einstein's. There is no essential

difference between the two formulas: Einstein's formula is an approximation towards Newton's; except for the approximation, it is Newton's. In the Einstein formula for the orbit of a planet there is not the slightest trace of relativity; there is no warped space, no fourth dimension; there is nothing but every-day, ordinary Newtonian gravitation, but *approximate gravitation.* The approximation is in the Einstein equation; not in the Newtonian.

When the motions of the planets about the sun are considered, it must be remembered that the sun is many thousands of times larger than the earth, and, therefore, the little quantity, m, becomes proportionally larger, being in fact about nine-tenths of a mile. And the relativity approximation consists, in this case, of using in their formulas, not the actual distance of a planet from the center of the sun, but that distance increased by nine-tenths (0.91) of a mile. This same distance, this 9/10ths of a mile, is added to the distance of each and every planet, to that of Mercury, to that of Venus, of Jupiter and of Saturn. In all real astronomical work the position of the center of a planet is always determined from the center of the sun; the center of the sun is the fundamental point of reference in the solar system. No other point is ever used in actual astronomical observations, calculations, or tables; the actual distance of a planet from this point is measured, or calculated, or tabulated. But the relativity approximate formula does not give this actual distance: in the case of each and every planet it gives this distance increased by 9/10th of a mile.

The Motion of the Perihelion of Mercury

It is this approximation, which gives rise to the apparent, or so-called, Einstein motion of an elliptic orbit. According to the Newtonian formula the elliptic orbit of a planet (when the interaction of the other planets is omitted) is fixed in space; according to the Einstein formula the elliptic orbit is in slow motion, so that the perihelion appears to advance. But the Newtonian formula is mathematically exact; the Einstein formula contains an approximation, and the apparent theoretical Einstein rotation of an orbit, the theoretical Einstein advance of the perihelion is due, entirely, to the approximation so contained in his formula. The theoretical orbit of a planet is fixed in space, as shown by the mathematically exact Newtonian formula; there is no Einstein motion of the perihelion; the so-called Einstein rotation of an orbit is a mathematical illusion, caused by using an approximate formula.

But, while the Einstein motion is pure illusion, there is an actual motion of the perihelia of all the planets. When the mutual interactions of the planets, one upon another, are taken into account, then it is found that the orbits of all of them are in motion; the simple elliptic orbits writhe and squirm, so to speak, under the additional forces of the planets themselves. Not a single orbit is at rest, not a single orbit is a true ellipse. The orbit of Mercury, for example, swings around at the rate of 576 seconds of arc per century; that of Mars at the rate of 1606 seconds per century. Leverrier in 1859 computed the action of each and every planet upon the orbit of Mercury, and found that these attractions would account for only 538 seconds or arc, thus leaving an unexplained 38 seconds in the centennial advance of Mercury's perihelion. This is the celebrated discordance, which has been so stressed by Einstein and his followers. Leverrier explained it by the action of an unknown planet, or of masses of matter, between Mercury and the sun. While it is now known that no large planet is there, yet observations and photographs, without number, show clearly the presence of great masses of scattered matter in the very places that Leverrier indicated as necessary to explain this motion of Mercury.

But the relativity approximate formula gives rise to an apparent, or fictitious, motion of the orbit of Mercury of some 43 seconds of arc per century. And it is this approximate coincidence of figures, 43 seconds of illusion as against 38 seconds of actuality, which has been used by Einstein and is followers as proof, conclusive, of the relativity theory. As the relativity advance, as this 43 seconds, is a mere mathematical illusion, as there is, in reality, no such thing as the Einstein rotation of an orbit, this approximate coincidence of figures has no bearing, whatsoever, upon the truth or falsity of the relativity postulates.

The Deflection of Light

There is nothing new in the idea that light may be bent, or deflected, from its course by the action of gravitation. Sir Isaac Newton certainly suspected that bodies might act upon light at a distance, and by their action bend its rays. Such action and such bending, of course, was predicated upon the theory that light consists of material particles of matter, shot forth form the luminous source. Such a material particle, or corpuscle, passing near the sun or other large gravitational mass would naturally describe a planetary orbit about such body, and the bending of the ray would be the amount of curvature in such orbit. The character of the orbit and the amount of curvature, or bending, of the orbit depends entirely upon the

velocity with which the particle passes the attracting body. At a certain rather low velocity, the path of the particle is a circle about the gravitating centre: as the velocity increases the circle becomes an ellipse, a parabola, and finally a hyperbola. With each further increase in speed the arms of the hyperbola open out more and more and the path approaches nearer to a straight line.

The velocity of light is so great that the path of a particle, traveling about the sun with that speed, will be an hyperbola, the arms of which are so widely separated as to make the path almost, but not quite, a straight line.

The corpuscular theory of light, as held by Sir Isaac Newton, explained all the optical phenomena known to him. But, during the years which elapsed after his death, new facts were learned and new experiments made. Facts and experiments, which could not be explained or accounted for on this theory, gradually led to the acceptance of the then rival, wave or undulatory, theory of light. With the passing of years, with each new experiment, the wave theory of light became more and more firmly established, until it became one of the fundamental theories, or concepts, of modern science.

Therefore von Soldner's paper on the bending of light rays, which was published in 1801, attracted very little attention. For in this paper he assumed the corpuscular theory of light and calculated the amount that a ray should be bent in passing near the sun. He treated light as being material, a particle of light being attracted by the sun in the same way as a planet, and obeying the same laws of motion. He treated the problem of finding the light deflection in exactly the manner one would treat the path of a minute planet, which travels about the sun with the speed of light. He applied to the problem the ordinary, every-day, formulas of Newtonian gravitation.

It can be readily shown that, under the Newtonian laws of motion, a minute planet, traveling about the sun with the speed of light in a path which just grazes the surface of that luminary, will travel in an hyperbolic orbit; in a curve which is almost, but not quite a straight line. A very simple calculation shows that the total amount of bending in such path amounts to only 0.87 seconds or arc. This is the so-called "Newtonian" deflection. If the Newtonian, or corpuscular theory of light be true then all rays of light, grazing the edge of the sun, will be bent, or deflected from their straight paths by this amount, by 0.87 seconds of arc.

Now Einstein, in his generalized theory of relativity, introduces a factor two (2) into the formula for the bending of light rays, and gives the

total deflection of a ray, passing the sun, as double the above amount, as 1.75 seconds of arc. This theoretical Einstein bending of a light ray is found, by Eddington and others, from the relativity equations by the use of the celebrated principle of equivalence. Under this principle of relativity, the track of a ray of light "*agrees with that of a material particle moving with the speed of light.*" The principle of equivalence, so stated, appears to be nothing more nor less than an assumption of the truth of the corpuscular theory of light; yet the relativist never distinctly acknowledges this assumption, never distinctly states which theory of light is to be accepted. To explain certain phenomena the wave theory seems to be used by the realtivists; other phenomena, under the principle of equivalence, by the corpuscular theory. Is not the principle of equivalence, so used, a handy device for passing readily form one theory to another as necessity drives?

But let us assume, with the relativist, the validity of the principle of equivalence, and from this principle find from the relativist's own formulas the track of a ray light. The fundamental formula of relativity dynamics is given by Eddington and it differs from that of Newtonian mathematics by a single small term (which has been shown to be the result of an approximation). From this fundamental differential formula the relativist finds the path of a planet, and the track of a ray of light; finds the motion of the perihelion of Mercury, and the deflections of the rays from distant stars as they pass near the eclipsed sun. According to the principle of equivalence there is no essential difference between these two cases: Mercury travels about the sun at the distance of many millions of miles and at a comparatively slow speed; the ray of light grazes the edge of the sun and travels at a terrific velocity. But the same formula applies to both cases; substitute in it the speed and distance of Mercury for the motions of Mercury; substitute in it the speed and distance of the ray of light and obtain the track of such ray.

Now Eddington integrates this fundamental equation of relativity dynamics and finds the complete path of any body, Mercury, Jupiter, or a material particle travelling with the speed of light. This complete and general orbit of any body, of Mercury or of a ray of light, is given by Eddington in his discussion of the motion of the perihelion of Mercury, and this orbital equation of relativity, so given by Eddington, differs from the ordinary equation of celestial mechanics by a single small term, by the term which gives rise to the so-called relativity motion of the perihelion. According to repeated statements of Einstein, of Eddington and of other relativists, according to the printed formulas of relativity, the relativity orbit, or path of a body is identical with that of Newtonian mathematics,

with the single exception of this perihelial motion. This complete formula for the orbit of a body is used by the relativists to find the so-called motion of the perihelion of Mercury, to find the celebrated 43 seconds of arc, upon which is based the Mercurial proof of the Einstein theory.

But, upon the equivalence principle, this same orbital equation should give the track of a ray of light, passing near the sun. Substituting in this equation the distance of the ray from the sun's centre and its speed, the resulting orbit, or track of a ray is a hyperbola, and the total deflection, or bending is easily shown to be 0.87 seconds of arc, agreeing identically with that found from the Newtonian equation. This is necessarily so, for the two equations are the same, with the exception of the small term, which gives rise to the motion of the perihelion. In the case of Mercury, this minute term appears to give a motion of the perihelion of 0.103 seconds of arc in one revolution of the planet in its orbit (42.7 seconds per century): in the case of a ray of light, the same term amounts to about only *thirty-five millionths* (0.000,035) of a second of arc, a quantity absolutely negligible.

That is, the very formula, used by the relativists to prove their theory by the motion of Mercury, *disproves* their computed value for the light deflection. This equation, their own equation, gives the so-called Newtonian value, 0.87 seconds of arc, for the bending of a ray of light by the gravitational action of the sun.

The relativist, however, does not use this orbital equation in his calculations of the amount of the light deflection. He reverts to the fundamental differential equation and integrates it in an entirely different manner for the track of the light ray. This second method of integrating the fundamental equation is, however, frankly approximate and gives a result which applies solely to light. Before beginning the integration, Eddington discards a term from the fundamental equation as being, in the case of light, infinitely small in comparison with other terms in the equation. This simplifies the equation, and the integration of the thus mutilated equation results in a curved path, which may approximate that of a light ray, but which is clearly approximate. The total bending, resulting from the use of this approximate path, is the relativity figure of 1.75 seconds of arc.

The validity of this method depends upon the question as to whether the discarded term is really very small with respect to those retained, or not. The omitted term is a constant, while the value of the term retained varies with the movement of the light particle along the curved orbit. A very simple comparison[11] of this rejected term with the one retained shows that, in the most favorable case, the term, *I/P,* which Eddington omits as

negligibly small, is two-thirds (2/3rds) as great as the term which he retains. Two-thirds can hardly be called negligibly small in comparison with unity. Further, except for a minute portion of the curve near perihelion, the omitted term *I/P* is actually very much *larger* than the term, $3mu^2$, which is retained. Eddington, in fact, omits as negligibly small, the large, important term of the equation, and retains the insignificant term.

It would thus seem that the approximation used by Eddington to integrate the equation for the deflection of light is *invalid*, and that the resulting value for the bending of the light ray is erroneous. Both methods of integrating the fundamental relativity equation cannot be right: one or the other must be wrong. The first and more general method, as we have seen, is used by the relativist to obtain the so-called relativity motion of the perihelion of Mercury, but this method gives the deflection of light only 0.87 seconds of arc; the second method is restricted to light, is frankly approximate, and gives the amount of the deflection as 1.75 seconds. The same equation is handled by the relativist in two different ways and gives two radically different results. Which result is correct?

The relativist apparently checks his invalid calculation by the use of an entirely different method, a physical method of determining the deflection. But the method is faulty and contains obvious errors, and the fundamental formula for the velocity of light, upon which the entire method is based, is in direct contradiction to the principle of equivalence, for it shows that the speed of light *decreases* as it approaches the sun, while the equivalence principle demands that such velocity should increase.

It would thus seem that the calculations by which Eddington finds the deflection of light equal to 1.75 seconds of arc are invalid. The principle of equivalence, if true, shows that the total bending of a ray of light, passing near the sun, is 0.87 seconds of arc, and not the 1.75 seconds, as claimed by the relativists.

Conclusions

1. The fundamental formulas of relativity dynamics contain an approximation; the *r* of these formulas is not the direct distance between the centres of two particles of matter; it is this distance increased by a minute quantity.

2. The relativity formulas can be obtained directly from the corresponding Newtonian formulas by the introduction of the relativity approximation.

3. The relativity motion of the perihelion of an orbit is a mathematical illusion, due entirely to the use of the relativity approximation. The elliptic orbit of a particle of matter is fixed in space (when the interaction of the other planets is omitted).

4. The supposed confirmation of the Einstein theory by the motion of the perihelion of Mercury depends entirely upon the use of the approximation in the relativity formulas: when the approximation is removed from the formulas, all appearances of confirmation vanish.

5. Under the generalized theory of relativity, through the principle of equivalence, a ray of light, passing near the sun, will be bent by the same amount as under the corpuscular theory of light. The theoretical bending being thus the same for these two theories, a deflection, observed at an eclipse, cannot be used to prove the truth of the relativity theory as against that of the corpuscular theory of light.

6. The figure, 1.75 seconds of arc, given by the relativists for this deflection is obtained by approximate and invalid calculations. The relativists own formulas give, as they should under the principle of equivalence, 0.87 seconds, and not 1.75.

The amount of deflection observed at the 1922 eclipse cannot be explained, either by the Einstein theory or by the corpuscular theory of light. Such deflection, if confirmed by later eclipses, will have to be explained on other grounds, by some purely physical cause, or by a combination of causes.

Appendix 7

Does the Hefele-Keating Experiment Prove General Relativity?

Ever since Einstein proposed his General Relativity theory in 1916 the science community has been trying to offer observable proof for its claims. The bending of light near the sun, the residual perihelion of Mercury, the time dilation of μ-mesons and a few other candidates, have tried but failed to provide the necessary proof. As noted earlier, it is not difficult to make it *appear* as if proof exists, since the mathematics on either side of the equation can easily be adjusted to fit with the proposed theory. Accordingly, Relativist Clifford Will admits: "General Relativity has passed every solar-system test with flying colors. Yet so have alternative theories."[799] Obviously, the mathematics of General Relativity and the "alternative theories" all work, but at most only one theory can represent the true reality. Besides mathematics, however, there are other "adjustments" that scientists employ to get the "right" result. Such is the case with the Hefele-Keating experiment.

As we know, Relativity proposes that time runs slower for an object in motion than for an object at rest. To help prove this postulate, in October 1971, J. C. Hefele and Richard E. Keating placed cesium beam atomic clocks upon commercial jets, having one jet fly eastward and one jet fly westward.[800] To minimize the effects of the Earth's magnetic field, the clocks were triple-encased. Another clock was placed at ground level and kept in place at the United States Naval Observatory. When the clocks were compared, Hefele and Keating reported that the flying clocks differed from the ground clock within the margin of error predicted by the theory of Relativity. According to Relativity, the eastbound clock should have lost 40 ± 23 nanoseconds while the westbound clock should have gained 275 ± 21 nanoseconds. The results were reported as follows: the eastbound clock had lost 59 ± 10 nanoseconds and the westbound clock increased by

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[799] Clifford Will, "The Confrontation Between Gravitation Theory and Experiment," General Relativity: An Einstein Centenary Survey, ed., Stephen W. Hawking, Cambridge University Press, 1979, p. 62.

[800] J. C. Hefele and R. E. Keating, "Around-the-world atomic clocks: predicted relativistic time gains," *Science*, Vol. 177, 1972, pp. 166-168.

273 ± 7 nanoseconds when compared with the ground level clock.[801] These results were released to the world press and treated as just another expected "proof" of Relativity. The truth of what occurred, however, is far different.

First, as in the case of Eddington's eclipse photographs and the calculations on the perihelion of Mercury, the Hefele-Keating experiment was the victim of an inordinate amount of convenient "adjustments." Considering the fact that the differences between classical and Relativistic predictions are very slight, tampering with the evidence can easily swing the results in the favor of one side or the other. As such, Hefele and Keating note that they made many "corrections" for the aircraft's height, direction, speed and latitude. Some of these corrections are based on the so-called "Relativistic" effects associated with an object in motion, and thus the corrections become a case of begging the question.[802] More egregious is the fact that Hefele and Keating did not use all the data they collected. Louis Essen, world renowned for his work in atomic time-keeping, notes that when all of the Hefele-Keating data is summed up, the values change to 134 nanoseconds (ns) for the westward bound clock and

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[801] A nanosecond is one thousand millionth (10^{-9}) of a second. As reported by Hefele-Keating, the predicted results were a product of "Gravitational time dilation" (eastward: 144 ± 14 ns; westward: 179 ± 18 ns) and "Kinematic time dilation" (eastward: -184 ± 18 ns; westward: 96 ± 10 ns), producing a "Net effect" prediction of -40 ± 23 ns eastward; and 275 ± 21 ns westward.

[802] Hefele-Keating registered small changes in gravitational field due to changes in altitude above the Earth by using the relativistic time dilation formula of $T = T_O (1 + gR/c^2)$, where T is the time dilation and T_O is the "proper time" measured in the rest frame of the event. A planned jet flight of 41.2 hours and average altitude of 8900 meters determines the above predicted figures of "eastward: 144 ns"; whereas the flight westward of 48.6 hours and an average altitude of 9400 meters determines the above predicted figures "westward: 179 ns." For the Kinematic time dilation, Hefele-Keating used the standard relativistic formula $T = T_O/\sqrt{(1-v^2/c^2)}$. But because neither the jet nor the Earth's surface are inertial frames, they use the center of the Earth as the inertial frame and the results are calculated as if the master clock were there. This transposes the above equation to $T_S = T_O [1 + R^2\omega^2/2c^2]$, where T_S is the time at the surface of the Earth, T_O is the proper time, R is the Earth's radius, and ω is the angular velocity of the Earth's rotation (assuming diurnal motion occurs). For the airborne clock the formula is $T_A = T_O [1 + (R\omega + v)^2/2c^2]$. Hefele-Keating then note that there is no significant change of R between the Earth's surface and the jet and thus develop the formula $T_A - T_S = T_O [2R\omega v + v^2/2c^2]$ and then replace T_O with $-T_S$ to represent the transition from "Earth center time" to "Earth surface time" to acquire $T_A - T_S = -T_S [2R\omega v + v^2/2c^2]$.

–132ns for the eastward bound clock, approximately a 50% difference in both directions from what was predicted by Relativity. Essen concluded: "I suggest that the theoretical basis of their predictions needs careful scrutiny and that the experimental results given in their paper do not support these predictions."[803] Heeding Essen's words, Alphonsos G. Kelly secured the original documents of the Hefele-Keating experiment from the United States Naval Observatory. Kelly concluded in his abstract:

> The original test results were not published by Hefele and Keating in their famous 1972 paper; they published figures that were radically different from the actual test results which are here published for the first time. An analysis of the real data shows that no credence can be given to the conclusions of Hefele and Keating.[804]

The errors of the cesium clocks were so numerous that Kelly concluded they simply could not be used to provide reliable data. For example, the clocks were often discovered to be out of synch. Hefele and Keating knew about this problem going into the experiment, since they write:

> No two 'real' cesium beam clocks keep precisely the same time, even when located together in the laboratory, but generally show systematic rate (or frequency) differences which in extreme cases may amount to time differences as large as 1 second per day.[805]

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[803] *Creation Research Society Quarterly*, 14:46, 1977, as cited by Malcolm Bowden, adding: "Essen…said his comments had been submitted to a journal but were rejected."

[804] Alphonsos G. Kelly, "Hefele & Keating Tests; Did They Prove Anything?" HDS Energy Ltd, Celbridge, Co. Kildare, Ireland, p. 1, nd.

[805] As cited in "A New Interpretation of the Hefele-Keating Experiment," Domina Eberle Spencer and Uma Shama, p. 1, nd. Spencer and Shama add: "Short term fluctuations in rate are caused mainly by shot noise in the beam tubes. Cesium beam clocks also exhibit small but more or less well defined quasi-permanent change in rate." Kelly adds from the 1970 Winkler, *et al* report: "In a sample of 45 such clocks used at several stations, one failure per six clocks was experienced over two years…During January 1970, three clocks had changed by +16ns, +18ns and –68ns per day. Two others were removed due to poor timekeeping…" (G. M. R. Winkler, R. G. Hall and D. B. Percival, Meterologia 6, No. 4, 126-134, 1970). Beehler's 1965 report stated that the accuracy of smaller portable clocks [used on

Kelly concluded the clocks would need to be at least 100 times more accurate to obtain reliable results. This anomaly is compounded by the fact that scholarly texts have consistently quoted the Hefele-Keating experiment as proof of Relativity, and, as of Kelly's writing, the *Science Citation Index* contained over 1000 references to the 1972 Hefele-Keating experiment. Ironically, Hefele remarks about the anomalies in their experiment in a 1971 report, but these concerns are not published in the 1972 paper released to the public. Hefele writes:

> Most people (myself included) would be reluctant to agree that the time gained by any one of these clocks is indicative of anything…the difference between theory and measurement is disturbing.

More specifically:

> Particularly in the case of [clock #] 361 after the eastbound flight, it is quite uncertain what the rate is after the flight…Portable cesium clocks cannot be expected to perform as well under traveling conditions as they do in the laboratory. Our results show that changes as large as 120 nsec/day may occur during trips with clocks that have shown considerably better performance in the laboratory.[806]

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the aircraft] is worse, by a factor of two, than large stationary clocks (R. E. Beehler, R. C. Mockler and J. M. Richardon, Meterlogia 1, No. 3, 114-131, 1965). Kelly adds:

> H & K [Hefele and Keating] claimed that they chose the four clocks because they showed a steady drift rate for at least 24 hours before the tests. It was hoped that they would continue as a steady rate during the tests…Three of the four clocks were so poor in this regard as to render them useless...Clock 120 was a disaster; it had a change from losing 4.50 ns per hour to losing 8.89 ns per hour on the Eastward trip; on the Westward trip it altered from losing 8.88 to losing 4.56 ns per hour. An examination of Table 1 shows that, with the single exception of clock 447, the drift rates were so far from being steady as to render the results totally useless….That erratic clock had contributed all of the alteration in time on the Eastward test and 83% on the Westward test, as given in the 1971 report. Discounting this one totally unreliable clock, the results would have been within 5 ns and 28 ns of zero on the Eastward and Westward tests respectively" (*ibid*., pp. 2, 3, 6).

[806] As cited in Kelly's *Hefele and Keating Tests*, p. 3.

Considering the drift rates and fluctuations, Kelly shows that Hefele and Keating's predicted result of –40ns eastward is easily accounted for if the actual flight time of 65.4 hours is divided by a drift rate of merely 0.6ns per hour. Likewise, the predicted result of 275ns westward would be accumulated in actual flight time of 80.3 hours at a slight drift rate of +3.4ns per hour. But more important is the manner in which Hefele and Keating obfuscated the blatant contradictions in their data. Kelly notes that Hefele and Keating's "corrections" were shocking. For example, for the eastward traveling clock #408, they "corrected" the reading from +166ns to –55ns; for the westward traveling clock #361, they "corrected" the reading from –44ns to +284ns; for the westward traveling clock #447 the change was from +26ns to +266ns, yet their 1972 published paper said "no significant changes in rate were found for clocks 408 and 447 during the westward trip." Kelly remarks: "This barefaced manipulation of the data was outrageous," adding elsewhere:

> The trend [of Hefele and Keating's data] was derived from the *average* of the four clocks. The results from the individual clocks were not disclosed; they are published here for the first time…Taking the mathematical average…is meaningless; on the Eastward trip, clock 408 gained 166ns, while the theory forecast a loss of 40ns; on the Westward trip clock 361 lost 44ns, while the theory forecast a gain of 275ns![807]

Kelly notes that Hefele and Keating recognized these unpredicted anomalies and at first tried to compensate for them by taking an average of the drift rates, but, as they said themselves, they soon realized this was a mere rationalization that "depended on the unlikely chance that only one rate change occurred during each trip and that this change occurred at the midpoint of the trip." Astoundingly, Hefele and Keating ignore their own warnings and publish their graphs based upon the very method they themselves had rejected as deficient, and then proceeded to describe them as "convincing qualitative results"! As Kelly notes: "It was published

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[807] Kelly, *Hefele and Keating Tests*, p. 4. Kelly details the results from the trial data that Hefele and Keating did not disclose in their report: Clock #120: lost 196ns, lost 52ns, lost 57ns, gained 413ns, gained 240ns, gained 277ns; Clock #361: lost 54ns, lost 110ns, lost 74ns, lost 44ns, gained 74ns, gained 284ns; Clock #408: gained 166ns, gained 3ns, lost 55ns, gained 101ns, gained 209ns, gained 266ns; Clock #447: lost 97ns, lost 56ns, lost 51ns, gained 26ns, gained 116ns, gained 266ns.

because it looked convincing and not because it gave a legitimate picture of the test results. To the unsuspecting reader, these graphs looked like proof of the success of the tests." His final remark is: "Only one clock (447) had a fairly steady performance over the whole test period; taking its results gives no difference for the Eastward and the Westward tests." Not surprisingly, Kelly notes that Hefele and Keating did a similar test a year prior in 1970 and found that there was no discernible time dilation in the cesium clocks. It seems that after obtaining such null results they were determined to find positive results in the following year.[808]

Essen and Kelly are not the only ones to examine the original data of the Hefele-Keating experiment. Among the more prominent is Domina Spencer, who with Parry Moon, has been critiquing Relativity theory since the 1950s. Spencer's abstract assures us that, after her analysis of the raw data supplied to her by Dr. Keating:

> Thus, one of the essential experimental supports of the relativistic theory of time dilation is shown to be invalid. Instead, the original data provide additional strong support of the reality of the universal time postulate on the velocity of light.[809]

So not only is the Hefele-Keating experiment non-supportive of Relativity theory, in an ironic twist of fate it has brought us back to the universal time clock of Isaac Newton. In this area Spencer and Moon have done considerable work.[810] Remarking on the misinterpretations of Hefele and Keating on their own experiment, she writes:

> In order to obtain the time changes predicted by Einstein's theory of relativity, Hefele and Keating do something which is

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[808] Kelly, *Hefele and Keating Tests*, p. 7.
[809] Domina Eberle Spencer and Uma Shama, *A New Interpretation of the Hefele-Keating Experiment*, p. 1, nd.
[810] P. Moon, D. E. Spencer, "On the establishment of universal time," *Phil. Sci.*, Vol. 23, 1956, p. 216; P. Moon, D. E. Spencer and E. E. Moon, "Universal time and the velocity of light," *Physics Essays*, Vol. 2, 1989, p. 268f; P. Moon and D. E. Spencer, "Binary stars and the velocity of light," *Journal of the Optical Society of America*, Vol. 43, 1953, p. 635f; P. Moon, D. E. Spencer and E. E. Moon, "The Michelson-Gale experiment and its effect on the postulates of the velocity of light," *Physics Essays*, Vol. 3, 1990, p. 431f; P. Moon, D. E. Spencer and U. Y Shama, "The Sagnac effect and the postulates on the velocity of light," *Physics Essays*, Vol. 4, 1991, p. 249f; D. E. Spencer and U. Y. Shama, "Stellar Aberration and the Postulates of the Velocity of Light," *Physics Essays*, 1996.

very surprising. They assume that, although the data…are never linear, somehow when the airplane is in motion the curves become linear. And they assume that the slope of this straight line is the average of the data for the 25 hours before the trip. Has the clock a foreknowledge that it is about to travel on an airplane around the world?[811]

All this analysis may be beside the point when we consider the contradiction that is inherent in the actual foundation of the Hefele-Keating experiment. Hefele and Keating claimed to be measuring the time dilation of cesium clocks in motion against a stationary cesium clock at ground level, but the whole basis of Relativity theory is that one cannot determine, or even regard, one location as being at rest while the other is in motion. This objection was clearly denunciated in a comprehensive critique written by W. A. Scott Murray.[812] Hefele and Keating seem to have anticipated the objection and thus try to circumvent it by stating:

Because the Earth rotates, standard clocks distributed at rest on the surface are not suitable in this case as candidates for coordinate clocks of an inertial space. Nevertheless, the relative timekeeping behavior of terrestrial clocks can be evaluated by reference to hypothetical coordinate clocks of an underlying nonrotating inertial space.

Yet they proceed to admit that:

It is important to emphasize that special relativity purports to describe certain physical phenomena only relative to (or from the point of view of) inertial systems, and the speed of a clock relative to one of these systems determines its timekeeping behavior.[813]

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[811] Domina Spencer, "A New Interpretation of the Hefele-Keating Experiment," p. 2.

[812] W. A. Scott Murray, "If you want to know the time…" *Wireless World*, December, 1986, pp. 28-31.

[813] J. C. Hefele and R. E. Keating, "Around-the-world atomic clocks: predicted relativistic time gains," *Science*, Vol. 177, 1972, pp. 166-168. W. A. Scott Murray develops this line of critique in "If you want to know the time…" *Wireless World*, December 1986, vol. 92, n 1610, 28-31.

Appendix 7: Does the Hefele-Keating Experiment Prove General Relativity?

The fact is, however, that there is no inertial system from which Hefele and Keating can measure their so-called time dilation, unless, of course, they are willing to adopt a motionless Earth as the base for their ground clock. Of course, if they admit the Earth is motionless, it makes experiments designed to prove Relativity an exercise in futility.

Appendix 8

Does the Global Positioning System
Prove General Relativity?

The Global Positioning System (GPS), although invaluable in providing us with a very precise navigation system is, nevertheless, understood by science to be a large-scale version of Sagnac's rotating interferometer, and thus a thorn in the side of Relativity theory. This was proven in 1984 when GPS technician D. W. Allan and a team of international scientists measured the same effect on light as Sagnac did in 1913.[814] In this instance the Global Positioning Satellites, whose distance above Earth is approximately 24,000 km (app. 14,900 miles), act as a giant interferometer, so to speak. When an electromagnetic signal is sent from the ground station to the GPS, the signal takes 0.08000 seconds to arrive. However, since the GPS is rotating around Earth, some of the signals sent from the ground will arrive either at an approaching or a receding GPS satellite. Allan and his colleagues found that microwave beams sent to an approaching GPS satellite take 50 nanoseconds less time to reach the satellite than beams sent to a receding satellite. The 50-nanosecond difference in travel time of light would equal, proportionately, the 0.05 - 1.0 fringe shift in the 1913 Sagnac experiment. Once again, we have confirmation that the speed of light is not the same for all observers. Unfortunately, these facts are not advertised either by the Relativists or GPS mechanics. Rather than admit this flaw in Special Relativity, the 50-nanosecond difference is now automatically built into the computer programs for the GPS since each GPS unit must, without exception, take into account the Sagnac effect (that light beams emitted on a rotating device do not travel the same distance in the same time if they are sent out in opposite directions) in order for the GPS to keep accurate time and determine proper coordinates on Earth.

To keep the GPS within at least a meter of determining a designated location on Earth, the GPS clock must be accurate to within 4

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[814] D. W. Allan, D. D. Davis, M. Weiss, A. Clements, B. Guinot, M. Granveaud, K. Dorenwendt, B. Fischer, P. Hetzel, S. Aoki, M. K. Fujimoto, L. Charron, and N. Ashby, "Accuracy of International Time and Frequency Comparisons Via Global Positioning System Satellites in Common-View," *IEEE Transactions on Instrumentation and Measurement*, IM-34, No. 2, 118-125, 1985. (BIN: 689); Also cited in *Science*, 228: 69-70, 1985.

nanoseconds, which requires a time stability ratio on the order of $1:10^{13}$, and thus atomic clocks are employed for this purpose (*e.g.*, cesium clocks). Even then, the GPS requires frequent uploads of "clock corrections" to keep everything in synch. When the clocks are in synch, still, it is an inevitable occurrence that GPS signals directed to an approaching ground station arrive at least 50 nanoseconds prior to signals sent to a receding ground station. Even when making adjustments for the Doppler effect and gravitational redshift, there still remains a margin of error due to the Sagnac effect. If these factors are not taken into account, a GPS could be off by as much as 11 km (6.8 miles) in one day. Relativists, assuming their theory to be correct, explain these differences by claiming they are due to "relativistic" effects (*e.g.*, "time dilation") upon light moving in a non-inertial frame. This is precisely the explanation that D. W. Allan proposed in 1984. This explanation, of course, is simply begging the question, since one cannot use as proof that which has not first been proven. Here is how one Relativist explains his methodology:

> …the simplest approach is to use an approximate solution of the [General Relativity] field equations in which Earth's mass gives rise to small corrections to the simple Minkowski metric of Special Relativity, and to choose coordinate axes originating at the planet's center of mass and pointing toward fixed stars. In this Earth-centered inertial reference frame (ECI), one can safely ignore relativistic effects due to Thomas precession or Lense-Thirring drag. The gravitational effects on clock frequency, in this frame, are due to Earth's mass and its multipole moments.[815]

One wonders, with the assortment of intersecting theories described above, why the author thinks this is "the simplest approach." We notice that his proposed solution not only appeals to remedies that are themselves imprecise (*e.g.*, "approximate solution of [GTR] field equations") or speculative ("Minkowski metric of Special Relativity," or "Lense-Thirring drag"), but also shows his dependence on an "Earth-centered" inertial frame in order to allow his "relativistic" theories to explain how the GPS functions. The author confirms his objective in another paragraph:

> …the leading contribution to the gravitational potential Φ is the simple Newtonian term $-GM_E/r$. The picture is Earth-centered, and it neglects the presence of other Solar System bodies such as

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[815] Neil Ashby, "Relativity and the Global Positioning System," *Physics Today*, May 2002, p. 3.

the Moon and the Sun. That they can be neglected by an observer sufficiently close to Earth is a manifestation of general relativity's equivalence principle. In the ECI frame, the only detectable effects of distant masses are their residual tidal potentials.[816]

We notice here that the goal is to obtain an "Earth-centered" inertial frame, and thus he uses Newtonian formulas rather than Relativistic formulas since the latter are much more complicated. So far, the GPS technician has shown that he is partial to a geocentric map, but allows himself the prerogative of translating Earth-centered mechanics into a Relativistic framework to explain the same effects from a non-centered, non-inertial Earth frame. The reason he must do so is that it is next to impossible to make accurate measurements when the objects one is trying to measure keep moving, as the Earth does around the sun in the heliocentric system. Moreover, without giving his reader any details, the technician also allows himself to justify his use of a geocentric frame by employing the same "detectable effects of distant masses" and their "tidal potentials" from the sphere of stars surrounding Earth as geocentric scientists do. In other words, many geocentrists hold that the forces we experience on Earth (*e.g.*, gravitational tidal effects, centrifugal, Coriolis and Euler forces, *etc.*) are due to the rotation of billions of stars around the Earth as they distribute their enormous gravitational effects and angular momentum.[817] In fact, in Ashby's reference to "general relativity's equivalence principle," it is conceded by Relativists that a fixed-Earth around which the stars rotate (*e.g.*, geocentrism) is precisely "equivalent"

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[816] *Ibid*., p. 4. It is also interesting that Ashby's footnote on the "equivalence principle" cites "N. Ashby, B. Bertotti, *Physical Review D* 34, 2246 (1986)" as supporting documentation for the principle, yet Bertotti is well-known in geocentric circles as providing one of the best mathematical models of a geocentric universe, which was published nine years before Ashby wrote the above article with Bertotti (Barbour and Bertotti, *Il Nuovo Cimento* B, 38:1, 1977). In this mathematical treatise, Barbour and Bertotti employ Machian physics to show the equivalence of the heliocentric system and a geocentric system. See the further treatment of Barbour and Bertotti in Chapter 9.
[817] Heliocentrists are quite aware of this "enormous" force of gravity, since they hold that the sun is held in its 300 km/sec orbit by the gravity at the center of the Milky Way, and the Milky Way itself is moving at a clip of 600 km/sec because it is being pulled by gravity toward the constellation Orion, and such is the case for all the galaxies and various other objects in the universe – all are caused to move by gravity, and a gravity which propagates instantaneously (something Relativity has yet to answer).

to a fixed-star system and a rotating Earth (*e.g.*, heliocentrism). Thus, Ashby would have to admit that the "fixed stars" to which he referred in the above opening paragraph would not be fixed in an "Earth-centered inertial" frame since, if Earth is in the inertial position, the stars must be moving against that inertia.

The author reinforces our analysis of his methodology in another revealing paragraph:

> Computations of satellite orbits, signal paths, and relativistic effects appear to be most convenient in an ECI frame. But navigation must generally be done relative to the Earth's surface. So GPS navigation messages must allow users to compute the satellite positions in a fixed-Earth, rotating coordinate system, the so-called WGS-84 reference frame.[818]

That is, navigators working on the surface of the Earth would find it difficult to keep track of satellites moving against an inertial Earth because the satellite's positions would constantly be shifting as the satellite orbited the Earth. Thus, the WGS-84 coordinate system was invented. This system makes it appear as if the satellites are moving precisely the same speed as the Earth's rotation. In other words, the WGS-84 (World Geodetic System of 1984)[819] is the "coordinate system" which is fixed to the Earth. Thus,

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[818] *Ibid*., p. 5. Related to this is Gerardus Bouw's observation of the history of satellite operation: "Now some will argue that since the satellites sent up by NASA use heliocentrically-derived equations, that our space program is a testimony to the success of heliocentrism; but this erroneously assumes that the geocentrically derived equations would be different. Such has been shown not to be the truth. The equations of motion are identical in both models. At least a half-dozen scientific papers since 1916 have shown that to be the case. The only differences between the two models are philosophical and theological" (*Bulletin of the Tychonian Society*, No. 46, 1988, p. 32).

[819] WGS84 is an "Earth-Centered, Earth-Fixed" (ECEF) Cartesian coordinate system. Satellite coordinates are computed relative to the ECEF. The Cartesian coordinates consist of the x-axis extending from the center of the Earth outward through the intersection of the equator and the Prime Meridian (longitude = 0°), and z-axis outward along the Earth's spin axis - through the north and south poles. The y-axis is orthogonal (perpendicular) to both x-axis and z-axis. The entire coordinate system rotates with the Earth, and is thus, "Earth-fixed." Satellite positions (and predicted positions) are determined in ECEF time-position quadruples: (x, y, z, t), *i.e.*, x-y-z ECEF coordinates, a function of time. The four defining parameters of the WGS84 ellipsoid are: Semi-major axis (a): 6378137m. Ellipsoid flattening (f): 1/298.257223563 (derived from the value of the normalized second degree zonal harmonic coefficient of the gravitational field: -

one could say that the satellites are moving in a one-to-one correspondence with the Earth's rotation, or, from the geocentric perspective, one can say that the Earth and the satellites are motionless. Ashby then explains the WGS-84 reference frame more specifically:

> The navigation messages provide fictitious orbital elements from which a user can calculate the satellite's position in the rotating WGS-84 frame at the instant of its signal transmission. But this creates some subtle conceptual problems that must be carefully sorted out…For example, the principle of the constancy of *c* [speed of light] cannot be applied in a rotating reference frame, where the paths of light rays are not straight; they spiral.[820]

In reality, the orbits are "fictitious" because the satellites are not really going the same speed as the Earth's supposed rotation. Along the way, the author has admitted one of the anomalies of Relativity theory, that is, that the speed of light is not constant in a rotating frame of reference. This is the salient fact that the 1913 Sagnac experiment demonstrated, but the author doesn't seem bothered by the fact that he has no explanation why the constancy of light does not hold up in such cases, except to say that light has a problem staying at *c* when it is required to move in curved paths. Interestingly enough, in his famous 1905 paper, Einstein attempted to apply his Special Theory of Relativity to systems in rotation, as he did, for example, when he compared a clock at the North Pole with a clock circling the equator. But he found that his theory couldn't explain how light moved in rotating systems, so the General Relativity theory was invented in order to answer Sagnac's results. Since General Relativity incorporates the remaining universe, the Relativist

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484.16685 × 10^{-6}). Angular velocity of the Earth (w): 7292115 × 10^{-11} rad/sec. The Earth's gravitational constant (atmosphere included) (GM): 3986005 × 10^{-8} m^3/sec^2. GPS receivers receive the transmission time from each satellite using the synchronization capabilities of each message signal. The receiver then records the time the signal was received and, based on the travel time at the speed of light, the distance traveled between the satellite and the GPS receiver is determined. Given 4 satellites in view of a GPS receiver of unknown location, 4 ranges are explicitly known via the timing of the transmitted messages. As before, satellite vehicle x, y, and z coordinates in ECEF-space are known through the satellite ephemeris messages transmitted by each satellite. After unknown position coordinates are determined in the ECEF reference, a coordinate rotation matrix rotates each of the ECEF-matrix row vectors into local coordinates, *i.e.*, latitude, longitude, and elevation with respect to the WGS-84 datum.
[820] *Ibid*., p. 5.

could now appeal to the "distant rotating masses" (*i.e.*, the "fixed" stars which suddenly were not so "fixed") that produce "counter-rotation effects" upon Earth. This explanation, if one recalls, is the same one that Ashby proposed as an explanation for an "Earth-centered inertial" system in "general relativity's equivalence principle" in which the "detectable effects of distant masses are their residual tidal potentials."

The author now gets to the heart of the matter regarding the Sagnac effect:

> One of the most confusing relativistic effects – the Sagnac effect – appears in rotating reference frames. The Sagnac effect is the basis of ring-laser gyroscopes now commonly used in aircraft navigation. In the GPS, the Sagnac effect can produce discrepancies amounting to hundreds of nanoseconds.[821]

It is only "confusing" to Relativists because they can't explain Sagnac's effects without resorting to obtuse tensor calculus and the invoking of "conditions" they have no way of proving true, invariably resorting to circular reasoning. In other words, they have no physical explanation for why one beam in Sagnac's interferometer traveled slower than the other beam; rather, they only account for Sagnac's effect (and they must or else their GPS satellites will be off by "hundreds of nanoseconds") by creating "relativistic" mathematical equations. But mathematical equations explain very little about the causes for a particular phenomenon. Equations only make one side equal to the other, but with integers on either side that do not necessarily represent the physical processes taking place.

In regard to the "fixed-earth" concept, the author reminds his readers:

> Observers in the non-rotating ECI inertial frame would not see a Sagnac effect. Instead, they would see that receivers are moving while a signal is propagating. Receivers at rest are moving quite rapidly (465 m/s at the equator) through the ECI frame. Correcting for the Sagnac effect in the Earth-fixed frame is equivalent to correcting for such receiver motion in the ECI frame.[822]

Here the author is admitting that if the system is not rotating, there would be no Sagnac effect, yet it would appear as another effect (*i.e.*,

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[821] *Ibid.*, p. 5.
[822] *Ibid.*, p. 6.

"receiver motion"). He still hasn't explained why a Sagnac effect exists in a rotating system (except to point out the anomaly of Relativity theory that light doesn't behave the same when it is not moving in straight lines). What he has failed to consider is that these anomalies are not "relativistic" effects, but *physical* effects caused by the medium through which light must travel, the very thing that Sagnac demonstrated by his 1913 experiment. Sagnac's experiment did not prove "time dilation" or "rotational effects" but, through a device showing that when light came up against a medium or a force that impeded its speed and made it arrive at the destination in more time than expected, it demonstrated none other than the presence of absolute motion in a space, a motion that Einstein dismissed as "relativistic." Answering this by appealing to "time dilation" is merely an attempt to paint the phenomenon by the phenomenon itself, which doesn't explain anything, except one's biased perceptions.

In another paragraph, Ashby tries to cover over the inadequacies of Relativity to answer the GPS anomalies:

> The Sagnac effect is particularly important when GPS signals are used to compare times of primary reference cesium clocks at national standards laboratories far from each other….A Sagnac correction is needed to account for the diurnal motion of each receiver during signal propagation. In fact, one can use the GPS to observe the Sagnac effect. Of course, if one works entirely in the nonrotating ECI frame, there is no Sagnac effect.[823]

Two experts in the field of GPS mechanics answer Ashby's claims by an even more acute interpretation of the Sagnac experiment. Wang and Hatch state that:

> The simplest interpretation of the result [of the Sagnac experiment] is that the speed of light remains constant relative to the center of rotation and, thus, not of constant speed relative to the rotating detector. Special Relativity (SRT) claims the Sagnac effect is due to the rotation. Since rotation is not relative, the Sagnac effect can be due to non-isotropic light speed and still be consistent with Special Relativity. The effect of the movement of the receiver during the transit time of a GPS signal is referred to in the GPS system as the one-way Sagnac effect. However, it is not at all evident that the Sagnac effect is due to rotation…the

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[823] *Ibid*., p. 6.

Sagnac effect exists not only in circular motion, but also in translational motion.[824]

The authors leave no escape, since Ashby can no longer hide behind Relativity's appeal to "rotational" motion as its only handicap. Since translational motion also produces a Sagnac effect, Ashby has no safe havens to which he can retreat. Along these lines, Wang and Hatch add the following:

> We have even more convincing data that Ashby's claim is false. NavCom Technology, Inc. has licensed soft-ware developed by the Jet Propulsion Lab (JPL) which, because of historical reasons, does the entire computation in the ECI frame. Because of some discrepancies between our standard earth-centered earth-fixed solution results and the JPL results, we investigated the input parameters to the solution very carefully. The measured and theoretical ranges computed in the two different frames agreed precisely, indicating that the Sagnac correction had been applied in each frame.

> As the discussion of the Sagnac effect indicates, the fundamental question regarding the speed of light is the following: Is the speed of light constant with respect to the observer (receiver) or is it constant with respect to the chosen inertial ECI frame? Clearly the GPS range equation indicates the speed of light is constant with respect to the chosen frame…The JPL equations, used to track signals from interplanetary space probes, verify that the speed of light is with respect to the chosen frame. In the JPL equations, the chosen frame is the solar system barycentric frame….Clearly, the JPL equations treat the speed of light as constant with respect to the frame – not as constant with respect to the receivers.[825]

In other words, the Jet Propulsion Laboratory employs the Earth Centered Inertial frame (ECI) for probes sent out near the Earth (as does

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[824] Ruyong Wang and Ronald R. Hatch, *Conducting a Crucial Experiment of the Constancy of the Speed of Light Using GPS*, ION GPS 58th Annual Meeting / CIGTF 21st Guidance Test Symposium, 2002, p. 500.

[825] Ruyong Wang and Ronald R. Hatch, *Conducting a Crucial Experiment of the Constancy of the Speed of Light Using GPS*, ION GPS 58th Annual Meeting / CIGTF 21st Guidance Test Symposium, 2002, p. 500.

NASA and the GPS), yet they claim to use the "solar system barycentric frame" for deep space navigation. But Wang and Hatch tell us: "the Jet Propulsion Lab…because of historical reasons, does the entire computation in the ECI frame." So, not only does the Jet Propulsion Lab use the ECI frame exclusively, Wang and Hatch tell us that the Lab corrects the calculations in its "solar system barycentric frame" so that they match the ECI frame! In other words, the ECI frame is the standard, and thus, use of the solar system barycentric frame is superfluous. Once the Lab's computer makes the corrections to the solar system barycentric frame, in reality the deep space navigation is actually using the ECI frame – a fixed Earth. The public wouldn't have been made privy to this sleight-of-hand manipulation except for the fact that two knowledgeable insiders, Wang and Hatch, have told the real story. In effect, the Earth Centered Inertial frame (*e.g.*, geocentrism) is the only frame that will allow the GPS and various space probes to work properly.

Ashby later writes:

> The Sagnac effect also occurs if an atomic clock is moved slowly from one reference station on the ground to another. For a slow clock transport, the effect can be viewed in the ECI frame as arising from a difference between the time dilation of the portable clock and that of a reference clock whose motion is solely due to Earth's rotation. Observers at rest on the ground, seeing these same asymmetric effects, attribute them instead to gravitomagnetic effects – that is to say, the warping of spacetime due to spacetime terms in the general-relativistic metric tensor. Such terms arise when one transforms the invariant ds^2 from a nonrotating reference frame to a rotating frame.[826]

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[826] *Ibid.*, p. 6. To counter this, Van Flandern cites the phenomenon wherein a high-altitude GPS clock runs 46,000 nanoseconds faster per day than a clock at ground level. He attributes this difference not to Relativistic effects, but to the fact that the gravitational field is weaker at high altitudes, and thus the atom exchange in atomic clocks have less gravity against which they must travel, and therefore run faster. However, since the GPS clocks are orbiting the Earth at about 3 kilometers per second, they pass laterally through the gravitational field, and thus tick 7,000 nanoseconds slower than stationary clocks. The difference between 46,000 and 7,000 is 39,000 nanoseconds. To offset this figure, engineers reset the GPS clock rates, decreasing them before launch date to 39,000 nanoseconds per day. In this way they can tick at the same rate as the ground clocks, and it can be claimed that the system "works." Van Flandern points out, however, if one uses Einstein's theory, then one would expect that, since the clocks all move very rapidly and with varying speeds relative to the observer on Earth against which the true speed

And later:

> Generally, however, the transmissions arrive at different times. The navigation messages then let the receiver compute the position of each transmission event in the Earth-fixed WGS-84 frame. Before equations can be solved to find the receiver's location, the satellite positions must be transformed to a common Earth-centered inertial frame, since light propagates in a straight line only in an inertial frame.[827]

Although Ashby's presuppositions make him oblivious to it, here we see the reality of absolute space is such a constituent fabric of the universe that the Sagnac effect even occurs in the inner recesses of atoms. Of course, the Relativist chalks this up to "the warping of spacetime" because he simply has no *physical* explanation for what is occurring, so he is forced to change space and time by means of tensor mathematics to mask the physical effects. What he misses is that, if the Sagnac effect is produced in something as small as atoms, then something even smaller is colliding with those atoms, and this is the same reason that Michelson and others had always measured a small positive result in the interferometer experiments. The positive result, as we have seen over and over again, was small enough to escape being explained by the translational motion of the Earth, but large enough to indicate that there was indeed an Earth in the midst of a moving universal medium. The Earth remained in the center of the medium the same as a ship anchored at sea in the eye of a hurricane. This is the position which does not have to appeal to "fixed-Earth" frames merely for "convenience," but because it is, indeed, the state of affairs in the universe. Ashby continues:

> The receiver must then keep track of its own motion during this receiving interval and make appropriate corrections. These

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is measured, relativistic corrections would have to be made on a continual basis, and thus render the GPS non-functional. As it turns out, no such corrections are needed after the GPS are launched. Van Flandern concludes: "They have basically blown off Einstein" (Tom Bethel, "Rethinking Relativity," *The American Spectator*, April 1999). Others, such as Neil Ashby, refute this by reminding critics that, because the GPS have eccentric orbits, they have frequency variations due to varying speeds and heights, which then require a "relativistic" correction (letter on file, Feb. 21, 2005). But Van Flandern's remark is not concerned with "corrections" but with the overall wiring, as it were, of the GPS in ideal conditions.

[827] *Ibid.*, p. 8.

corrections are again proportional to $1/c^2$, that is to say, they are also relativistic ….Historically, there has been much confusion about properly accounting for relativistic effects….In the special case of two inertial frames in relative uniform motion, these are the familiar Lorentz transformations.[828]

Relativistic coordinate time is deeply embedded in the GPS. Millions of receivers have software that applies relativistic corrections. Orbiting GPS clocks have been modified to more closely realize coordinate time. Ordinary users of the GPS, though they may not need to be aware of it, have thus become dependent on Einstein's conception of space and time.[829]

So, once again, we see the convenient "Lorentz transformations," invented in the late nineteenth century specifically for the purpose of avoiding (borrowing GPS terminology) the "Earth-centered, Earth-fixed" implications of the Michelson-Morley experiment. As we noted earlier, they have already pre-programmed the GPS to account for the 50-nanosecond differential and no one is the wiser.

But it is the author's last statement that is even more troublesome. In reality, the only reason people have become "dependent on Einstein's conception of space and time" is that the modern science establishment will entertain no other answers to the Sagnac effect than the tensor calculus and non-Euclidean geometry of General Relativity theory. Even though it is only a theory, it has entrenched itself as the *sine qua non* of the world of physics, and its relativism has seeped deep into the psyche of man. It purports to have been verified by experiment, but the experiments, as one can easily see by reading Ashby's description of the GPS, are merely self-serving opportunities to interpret things as "relativistic." It is uncanny how Relativists have literally stolen experimental facts, which were originally understood and accepted as disproving Relativity, and, by a wave of their mathematical wand, turned them into proofs for the same. In actuality, it is Relativity that avoids the real implications of the Sagnac effect, yet it has the temerity to steal an "Earth-centered, Earth-fixed coordinate system" from geocentrism in order to make its GPS navigable. Life certainly is ironic.

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[828] *Ibid*., p. 8.
[829] *Ibid*., p. 10.

Einstein's quest was to make Maxwell's equations work with no ether. This was no small task, since Maxwell's equations depend explicitly on ether. As Herbert Dingle writes:

> …Einstein's relativity theory, designed to save Maxwell's equations, could do so only by sacrificing the ether which was the basis of Maxwell's theory….Einstein, as he said [see pp. 159-60 of Arthur Eddington's *The Mathematical Theory of Relativity*], designed his theory to conform to the Maxwell-Lorentz electromagnetic theory which he accepted as equivalent to "certain."[830]

One of the ironies in this whole escapade of Einstein's resorting to his "relativistic" solution to solve Maxwell's equations is that he knew of another "thought" experiment that employed a non-relativistic solution, but refused to consider using it. As one physicist put it:

> But one can readily construct other thought experiments in which the observables do depend on absolute motions – or that they actually do not require exploitation of the full apparatus developed by Lorentz that gets its final expression in Einstein's theory of relativity. That there were other problematic thought experiments readily at hand had been pointed out clearly by August Föppl (1894)…[831]

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[830] *Science at the Crossroads*, pp. 133, 142. Lorentz was using his "transformation" equations to solve the problems presented by Maxwell's equations, and the Fizeau, Airy and Michelson-Morley experiments. In his work *Versuch* (1895), Lorentz develops his idea of "corresponding states" so that one can transfer back and forth between Maxwell's equations and Fizeau's "partial drag," Airy's stellar aberration, and Michelson-Morley's "null" results of Earth's movement through the ether. In each case, Lorentz, because he assumes the Earth is moving 30 km/sec, must dilate time and shorten lengths to make things fit.

[831] "Einstein's Investigations of Galilean Covariant Electrodynamics Prior to 1905," John D. Norton, University of Pittsburgh, Dept. of History and Philosophy of Science, Jan. 28, 2004, p. 8. Gerald Holton makes a convincing case that Einstein was very familiar with Föppl's arguments but rarely mentioned Föppl's name (*Thematic Origins of Scientific Thought*, pp. 218-225). Föppl based his "thought" experiment on two adjacent charges, at rest and in motion. Norton argues that "The result is that the forces acting and thus the motions resulting would allow a co-moving observer to distinguish whether the pair of charges is moving through the ether or is at rest." In a full appendix he concludes that "the

Appendix 9: The Background of General Relativity

In order to conceptualize his theory, Einstein created one of his famous *Gedankenexperimenten* (*i.e.*, thought experiments), which reveals keen insights to his thinking process, as well as the connection between Special and General Relativity. In a newly discovered handwritten explanation titled *General Relativity Theory*, he writes:

> According to Faraday, during the relative motion of a magnet with respect to a conducting circuit, an electric current is induced in the latter. It is all the same whether the magnet is moved or the conductor; only the relative motion counts, according to the Maxwell-Lorentz theory. However, the theoretical interpretation of the phenomenon in these two cases is quite different.

> The thought that one is dealing here with two fundamentally different cases was for me unbearable. The difference between these two cases could not be a real difference but rather, in my conviction, only a difference in the choice of the reference point. Judged from the magnet, there were certainly no electric fields, [whereas] judged from the conducting circuit there certainly was one. The existence of an electric field was therefore a relative one, depending on the state of motion of the coordinate system being used, and a kind of objective reality could be granted only to the *electric and magnetic field together*, quite apart from the state of relative motion of the observer or the coordinate system. The phenomenon of the electro-magnetic induction forced me to postulate the (special) relativity principle. The difficulty that had to be overcome was in the constancy of the velocity of light in vacuum which I had first thought I would have to give up. Only after groping for years did I notice that the difficulty rests on the arbitrariness of the kinematical fundamental concepts.

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principle of relativity fails for the observables in the case of the two charges" and that "Maxwell's equations (M1) and (M3) are all that is needed to compute the original field and the new magnetic field arising when the charges are set in motion" (pp. 9, 53-54). In his analysis, Föppl admits the insurmountable difficulty of a science which has "no recourse to an absolute motion in space since there is absent any means to find such a motion if there is no reference object at hand from which the motion can be observed and measured." This, of course, is precisely the argument of geocentrism at the core. Föppl holds that the ether "question forms perhaps the most important problem of science of our time" (*Einführung in die Maxwellsche Theorie der Elektrizität*, pp. 307-309, Leipzig: B. G. Tuebner, cited in Holton, *Thematic Origins of Scientific Thought*, pp. 221, 235).

When, in the year 1907, I was working on a summary essay concerning the special theory of relativity…I had to try to modify Newton's theory of gravitation in such a way that it would fit into the theory [of relativity]. Attempts in this direction showed the possibility of carrying out this enterprise, but they did not satisfy me because they had to be supported by hypotheses without physical basis. At that point, there came to me the happiest thought of my life, in the following form:

Just as is the case with the electric field produced by electromagnetic induction, the gravitational field has similarly only a relative existence. *For if one considers an observer in free fall, e.g., from the roof of a house, there exists for him during his fall no gravitational field – at least in his immediate vicinity.*[832]

We see that the General Theory of Relativity was already in the works as early as 1907, and both it and the Special Theory of Relativity were created by "thought" experiments, with little, if any, physical proof for their validity. The only "proof" Einstein had at his disposal in 1907 was the result of the Michelson-Morley type of experiments that, to his satisfaction, demonstrated that ether did not exist and that the speed of light was constant, the very two ingredients that, according to his above words, Einstein needed in order shore up his theory. As we noted earlier, however, these were merely Einstein's assumptions, or should we say, forced answers, to a problem that could have easily been solved by admitting to a stationary Earth. If Earth was motionless in space, there would be no need to eliminate "absolute rest"; no reason to dispense with a universal medium in space that connects all events (*i.e.*, ether); and no reason to shorten lengths or dilate time.[833]

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[832] "Fundamental Ideas and Methods of Relativity Theory, Present in their Development," Part II, pp. 20-21, translated from the German by Gerald Holton from Einstein's own handwriting, dated circa 1919, italics are Einstein's. Stored in the Einstein Archives at the Princeton Institute for Advanced Study, cited on pp. 381-382 of *Thematic Origins of Scientific Thought*.

[833] Of course, even from a heliocentric perspective, Einstein's theory had its internal contradictions. Herbert Dingle, certainly no sympathizer to geocentrism, shows this quite well: "However, there was an apparent absurdity that did not escape such notice as was taken of the theory, and that was that its two postulates…seemed to contradict, not some independent fact or idea, but each other. If the velocity of light was finite, and there was no ether with respect to which it had that finite velocity, the only apparent alternative was that each beam

Moreover, in the phenomenon Einstein describes concerning the magnet and the conductor, there would be no "relative motion of the observer or the coordinate system," since with a stationary Earth and its stationary space nothing is "relative." All motion and all time, that is, the man falling from his roof as well as the magnet and the conductor, can be measured in absolute terms with a motionless Earth being the universal and unchanging reference point. The ether surrounding Earth serves as the universal conduit for all these events, and thus there is no mysterious Newtonian "action-at-a-distance," but a real time-and-space simultaneity that far exceeds Einstein's limit of the speed of light (we will address the mechanics of simultaneity in subsequent chapters).

The "Observers"

We also see that Einstein invariably employs the "observer" as the ultimate basis for judging these issues, but never reveals that his "observer" is a finite creature with very limited abilities and a confined perspective out of which he has to make such crucial judgments. Further, this "observer" has no foundation upon which to test his judgments against the other "observers" he sees observing. The only thing necessary for Relativity is that the observer has truth in his own little world, and light coming into his retina will magically create this manufactured state of mind for him. Relativists were quite satisfied with this choice. As Eddington put it:

> Newtonian mechanics proceeds on the supposition that there is some super-observer. If he feels a field of force, then that force really exists….It is quite possible that there might be a super-observer, whose views have a natural right to be regarded as the truest, or at least the simplest. A society of learned fishes would probably agree that phenomena were best described from the point of view of a fish at rest in the ocean. But relativity mechanics finds that there is no evidence that the circumstances of any observer can be such as to make his views pre-eminent…the super-observer….I fear that the time has come for his abdication.[834]

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of light had that velocity only with respect to its own source, and this the theory denied" (*Science at the Crossroads*, p. 156).

[834] Arthur Eddington, *Space, Time and Gravitation*, pp. 67-68.

The development from Special Relativity to General Relativity was practically inevitable, for Einstein recognized the flaws in the former quite early. As theoretical physicist Lee Smolin writes:

> Special relativity was the result of 10 years of intellectual struggle, yet Einstein had convinced himself it was wrong within two years of publishing it. He rejected his own theory, even before most physicists had come to accept it, for reasons that only he cared about…Why? The main reason was that he wanted to extend relativity to include all observers, whereas his special theory postulates only an equivalence among a limited class of observers – those who aren't accelerating.[835]

We see that Einstein's reliance on the "observer" finally showed its limitations – something he did not foresee before he invented his theory. In essence, the failure of Special Relativity drove Einstein to invent General Relativity, the ultimate theory in which the phenomenon of acceleration was supposedly answered. Why is acceleration the lynch-pin? Apparently because Einstein believed that in Special Relativity the equivalence principle he treasured so much could be sustained only between a stationary observer and an observer in uniform motion, but not an observer who is accelerating. Special Relativity holds that an observer at rest and an observer in uniform motion will see the light beam moving at the same speed. This equivalence is allowed, says the theory, because the observer in motion will create, by the mere act of moving, a certain space-time path that the light beam will follow towards him. In other words, space and time are adjusted for a moving observer just enough so that he will see the light beam traveling at the same speed as a motionless observer. A motionless observer, of course, will not change the space-time continuum and thus the path of light need not be adjusted for him.

Why, then, was acceleration a problem for Special Relativity? Because the mathematics of Special Relativity did not incorporate the phenomenon of gravity, and since, according to Einstein, gravity and acceleration were phenomenologically equivalent (that is, the observer cannot tell if is he falling in an elevator or accelerating at the same rate in some other place), then Special Relativity did not have an answer for acceleration, and thus it had no way to describe how an accelerated observer would see a light beam. Would the light beam seem to go slower? Some physicists tried to solve this problem for Einstein by reworking the components of Special Relativity, but Einstein rejected them because they

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[835] Lee Smolin, *Discover Magazine*, Sept. 2004, p. 38.

infringed on his cherished principle of "equivalence." Without "equivalence" there would be an absolute frame of reference (*i.e.*, the "unthinkable" immobile Earth). In order to preserve equivalence, Einstein had to invent a whole new theory – General Relativity. It was "general" because it was more comprehensive. The General Theory added a very important and needed postulate – that gravity would bend light because it would bend the space in which light traveled. This would serve as the answer to the dilemma, as Eddington put it, since the "Newtonian picture of gravitation as a tug is inadequate. You cannot deflect waves by tugging at them, and clearly another representation of the agency which deflects them must be found."[836] Hence, if there were "equivalence" between gravity and acceleration, then acceleration would also bend light. This now became Einstein's answer to what the accelerated observer would see when he watched a light beam. The faster he accelerates, the more the light beam would bend toward him, for his acceleration creates a proportionate curve of the space-time path that the light beam must follow, and thus, he would see the light beam going the same speed as both the observer at rest and the observer in uniform motion. Mathematically, everything was made to fit. Unfortunately, it was only because of Einstein's misinterpretation of the interferometer experiments that led him to base everything on the speed of light, and which led him to make time and space variable. As Lee Smolin describes it:

> General Relativity is the most radical and challenging of Einstein's discoveries…The theory goes much deeper: It demands a radical change in how we think of space and time…All previous theories said that space and time have a fixed structure and that it is this structure that gives rise to the properties of things in the world, by giving every object a place and every event a time…General relativity is not about adding to those structures…It rejects the whole idea that space and time are fixed at all. Instead, in general relativity the properties of space and time evolve dynamically, in interaction with everything they contain.[837]

The consequences of this theory are profound. Simple values that we use in common experience no longer hold true in Relativity. For example, even the value of π, which is 3.14 on Earth, will be different on Mars and

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[836] Arthur Eddington, *The Nature of the Physical World*, 1929, p. 122.
[837] Lee Smolin, *Discover*, September 2004, p. 39.

Jupiter, and everywhere else in the universe. Partially quoting from Einstein, Charles Lane Poor explains:

> The general result, however, is that "the geometrical properties of space are not independent, but they are determined by matter."….Since the time of Euclid we have been taught to think that for every circle, wheresoever situated, on the Earth, about the sun, near Venus, or in the vicinity of the North Star, the circumference is 3.141592+ times the radius [sic]. Not so in the relativity theory, every gravitational field has its own system of geometry.[838]

Obviously, if everything is relative to its gravitational field, then π is also relative. Using the mathematics of Minkowski's "space-time" and Riemann's non-Euclidean geometry, Einstein could hide the anomalies in complicated tensor formulas. As Arthur Eddington described it:

> But space-time is a four-dimensional manifold embedded in – well, as many dimensions as it can find new ways to twist about in. Actually a four-dimensional manifold is amazingly ingenious in discovering new kinds of contortion, and its invention is not exhausted until it has been provided with six extra dimensions, making ten dimensions in all. Moreover, twenty distinct measures are required at each point to specify the particular sort and amount of twistiness there. These measures are called coefficients of curvature. Ten of the coefficients stand out more prominently than the other ten. Einstein's law of gravitation asserts that the ten principal coefficients of curvature are zero in empty space. If there were no curvature, *i.e.* if all the coefficients were zero, there would be no gravitation. Bodies would move uniformly in straight lines. If curvature were unrestricted, *i.e.* if all the coefficients had unpredictable values, gravitation would operate arbitrarily and without law. Bodies would move just anyhow. Einstein takes a condition midway between; ten of the coefficients are zero and the other ten are arbitrary. That gives a world containing gravitation limited by a law. The coefficients are naturally separated into two groups of ten, so that there is no difficulty in choosing those which are to vanish.[839]

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[838] *Gravitation versus Relativity*, p. 47. Poor meant "times the diameter."
[839] Arthur Eddington, *The Nature of the Physical World*, 1929, p. 120.

Reading between the lines, as it were, we can see that General Relativity's explanation of gravity is nothing more than working backwards from what is already known about the measured force of gravity, and then spreading out those results over twenty "coefficients of curvature." As one author put it: "If written out in full instead of in the compact tensor notation, they would fill a huge book with intricate symbols."[840] With twenty variables at his disposal (courtesy of Riemann), Einstein is bound to reach a mixture that coincides with what we observe of gravity in nature. The theory is very pliable since one can work wonders with mathematics from already-known absolutes. But what it gains in convenience it loses in practical reality. As mathematician Morris Kline sees it:

> …Riemann's 1854 paper convinced many mathematicians that a non-Euclidean geometry could be the geometry of physical space and that we could no longer be sure which geometry was true. The mere fact that there can be alternative geometries was in itself a shock. But the greater shock was that one could no longer be sure which geometry was true or whether any one of them was true…Mathematicians were in the position described by Mark Twain: "Man is the religious animal. He's the only one who's got the true religion – several of them."[841]

So modern man is left with a clear choice. Either π is the same everywhere in the universe and space is space and time is time, and neither is increased, decreased or modified, or Relativity is correct and everything is up for grabs. In Relativity theory it is as if life were a haunted house of mirrors in which no image stays the same. Einstein could not live in a universe where time, space and light were all constant, because, by misinterpreting Michelson's interferometer experiment and consequently rejecting an immobile Earth, he had no universe to accommodate all three as invariables. The only thing absolute for Einstein is his concept of space-time, since, ironically, he dictates that the changes that will occur in such a nebulous dimension are absolute. The way out of this dilemma, however, may be something equally repugnant to modern man: he has to admit that Copernicus was wrong. Adopting an immobile Earth will be the only way of keeping π the same everywhere, for geocentrism is the only way to vanquish Einstein's haunted house of mirrors.

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[840] Banesh Hoffmann, *Albert Einstein, Creator and Rebel*, 1979, p. 122.
[841] Morris Kline, *Mathematics: The Loss of Certainty*, p. 88.

The Failure of General Relativity

Ironically, as Einstein saw the inherent flaws of Special Relativity, he also began to see flaws in General Relativity. The mathematics that seemed so helpful in arriving at two theories that were lacking definitive experimental proof was eventually the same math that showed the inherent anomalies of the theories. For all its muscle in purporting to understand gravity, General Relativity broke down completely in instances where gravity was very strong. Not even a mathematical fudge factor could save it. Consequently, General Relativity led to the phenomenon of black holes – the theoretical vortex where gravity was so strong that not even light could escape its clutches; and without light maintaining its constant speed *c*, Relativity had nothing upon which to hang its hat. Because "space-time" is infinitely "curved" inward in a black hole, all matter within its vicinity, including light photons, is sucked in, eventually leading to the popular but undefined entity called a "singularity," which, as we take away the cosmetics of language, actually translates into a total contradiction for the theory of Relativity. As physicist Andrei Linde admits:

> A second trouble spot [for the Big Bang] is the flatness of space. General Relativity suggests that space may be very curved, with a typical radius on the order of the Planck length, or 10^{-33} centimeters. We see, however, that our universe is just about flat on a scale of 10^{28} centimeters, the radius of the observable part of the universe. This result of our observation differs from theoretical expectations by more than 60 orders of magnitude.[842]

"Sixty orders of magnitude"? It is unusual for modern periodicals to divulge such gapping holes in the Big Bang universe prophesied by

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[842] Andre Linde, "The Self-Reproducing Inflationary Universe," *Magnificent Cosmos, Scientific American*, 1998, p. 99. Linde adds another remarkable observation: "A similar discrepancy between theory and observation concerns the size of the universe, a third problem. Cosmological examinations show that our part of the universe contains at least 10^{88} elementary particles. But why is the universe so big? If one takes a universe of a typical initial size given by the Planck length and a typical initial density equal to the Planck density, then, using the standard Big Bang theory, one can calculate how many elementary particles such a universe might encompass. The answer is rather unexpected: the entire universe should only be large enough to accommodate just one elementary particle – or at most 10 of them. It would be unable to house even a single reader of *Scientific American*, who consists of about 10^{29} elementary particles. Obviously, something is wrong with this theory" (*ibid*).

General Relativity. But what is also not being told to the public about "singularities" is that any object approaching the event horizon of a black hole will grow in mass without limit. Consequently, according to the physics of black holes, it is impossible for any mass to enter a black hole. Objects approaching a black hole must slow down and be refused entry, not accelerate and gain mass.

This was the dead end post of modern cosmology. As *Scientific American* put it: "After all, relativity is riddled with holes – black holes…Clearly the theory is incomplete."[843] *Time* magazine added that black holes were "mere mathematical figments" which "so far can be shown only as solutions to the complex equations of general relativity – and very troubling solutions at that."[844] According to his colleague John Moffat:

> Einstein didn't like black holes. The real motivation for "generalizing" his gravity theory was to see if he could find, as he called them, "everywhere regular solutions" that fit the equations.[845]
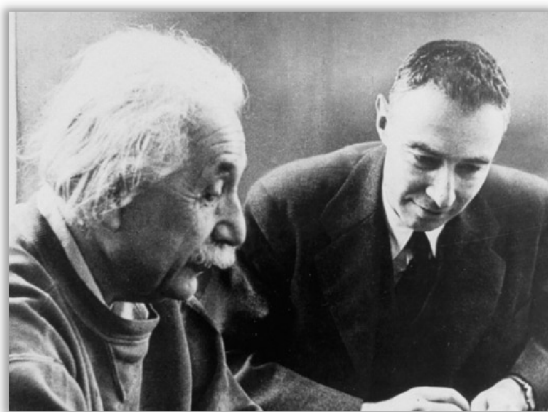
Thus, it was Einstein's quest to eliminate black holes altogether. In 1939 he published an article in *Annals of Mathematics* arguing that black holes would not be formed by the collapse of a star, but the record shows

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[843] George Musser, "Was Einstein Right?" *Scientific American*, Sept. 2004, p. 89. Hawking adds: "Thus, general relativity brings about its own downfall by predicting singularities" (*Black Holes and Baby Universes*, p. 92).
[844] *Time*, "Those Baffling Black Holes," September 4, 1978, pp. 56-62.
[845] Tim Folger, "Einstein's Grand Quest for a Unified Theory," *Discover*, September 2004, p. 64.

he was thoroughly unsuccessful. A few months later Robert Oppenheimer and Hartland Snyder corrected Einstein's math, concluding that black holes do, in fact, exist in Relativity theory. This once again shows how mathematics can be shaped to provide evidence for two diametrically opposed theories.

The battle between **Einstein and Oppenheimer** is a *Catch-22* situation for Einstein's followers, for if black holes do not exist (and they have never been proven, experimentally, to exist)[846] then there is no ultimate proof for the existence of General Relativity (since the theory predicts they must exist); but if black holes do exist, then General Relativity brings us to a dead end in understanding gravity and the universe at large, since in these "singularities" the laws of physics totally break down. In a singularity gravity becomes a repulsive force rather than an attractive force. Thus, a trap has been set for Relativistic physics out of which there is no escape. Perhaps if these physicists would cease creating universes merely out of mathematical preferences and begin depending on verified experimental evidence, they would at least come to some semblance of truth as to how the universe is constructed. One author put it:

> Mathematics should be used to describe the operation of models, not to build them…equations cannot be made to substitute for the concepts which underlie them. And equations are generally blind to limitations of range and physical constraints. They are too general, and simply lack the sort of specificity that true, intuitive understanding demands. Every equation has a domain of applicability – usually the range of the observations and little, if anything, more…If an equation can be extrapolated outside its domain and gives a singularity (basically, a zero divisor), that singularity does not exist in nature; instead, the model needs modification. Up to now this rule has always proved true. But advocates of "black holes" in the universe would have us believe that the equations which predict them can be relied upon far outside the domain of the observations used to derive those equations.[847]

Others go behind the mystique of General Relativity and show that it is merely a repackaging of old ideas in new mathematics. Reginald Cahill writes:

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[846] See Stephen Crothers interview at http://www.youtube.com/watch?v=fsWKINfQwJU

[847] Van Flandern, *Dark Matter, Missing Planets and New Comets*, 1993, p. xxi.

It has been repeatedly claimed that the Hilbert-Einstein General Theory of Relativity has been confirmed many times, but this is untrue. All but one of the so-called tests merely used the geodesic equation which determines the trajectory of a particle or an electromagnetic wave in a given metric; that metric has in all cases been the external Schwarzschild metric, but apparently unknown to most is that this metric is nothing more than the Newtonian 'inverse square law' in mathematical disguise, namely, with the metric expressed in terms of the particular velocity vector flow field corresponding to Newton's inverse square law. So these tests of GR were confirming, at best, the flow formalism for gravity, together with its geodesic equation, and had nothing to do with the dynamical content of GR.[848]

As we can easily see, reality is far different from Einstein's pliable world of mathematics. By giving us knowledge of an immobile Earth, the "Good Lord"[849] shows us not only that heliocentrism and relativity are wrong, but that, as the celestial bodies revolve around the Earth, we are to use them to keep track of space and time. That being the case, we know they are accurate.[850] God, of course, also knows the absolute universal time, and gives us clear indications that such precision not only exists, but that this timetable is shared between the divine world and the human world.[851] The sun, moon and stars were placed in the cosmos as timekeepers (Genesis 1:14-18), and they are so accurate that if one wants

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[848] Reginald T. Cahill, *Novel Gravity Probe B Gravitational Wave Detection*, School of Chemistry, Physics and Earth Sciences, Flinders Univ., Australia, August 21, 2004, p. 4.

[849] "The Good Lord" was the term Einstein used when he was confronted with the uncertainties of Quantum Mechanics, stating: "the Good Lord did not play dice with the universe" (*Einstein: The Life and Times*, p. 414).

[850] Genesis 1:14-17; Psalm 104:19; Sirach 43:6.

[851] "All things are the works of the Lord…and whatever he commands will be done in his time. No one can say, 'What is this?' 'Why is that?' for in God's time all things will be sought after" (Es 39:16-17); "…for he has appointed a time for every matter, and for every work" (Ec 3:17); "But thou hast arranged all things by measure and number and weight" (Ws 11:20); "And he made from one every nation of men to live on all the face of the Earth, having determined allotted periods and the boundaries of their habitation" (Ac 17:26), *cf.*, Gn. 7:10; 8:10; 18:14; 21:2; Ex 9:5; 12:40; Lv 25:8; Js 10:10-12; Jb 14:5; Ps 119:90-91; Jr 33:20; Dn 2:21; 8:14; Mt 20:3-6; 24:36; 26:45; 27:45; Lk 22:59; Jn 1:48; 4:52-53; 13:1; Ac 1:7; 17:26; Gl 4:4; 1Tm 2:6; Ap 8:1; 9:15; 11:2-3, 11; 12:6; Es (Sr) 48:23; Ws 8:8; 33:8.

to know the beginning day of creation he only needs to count back three twenty-four hour days and he will know the exact time that the Earth was "without form and void" on the First Day of creation. Similarly, by means of the firmament we can understand the existence of absolute space. Space is not "curved," it is linear, just as we see on Earth.[852] Whenever a Relativist says: "space is curved," this merely begs the question: "Curved in relation to what?" If the Relativist says: "time slows down," we respond: "Slows down in relation to what?" If he says that he has a "preferred frame of reference" we ask "what frame, and in reference to what?" Every proposition a Relativist utters assumes there is an absolute against which he can measure his proposition. To put it another way, the whole theory of Relativity, ironically, is based on the assumption that something is at rest. Even if he says "the speed of light is my absolute," we respond: "the speed of light in relation to what?" And if he is someday so bold as to assume he has a "what," we are still going to ask him "what in relation to what?" and thus require him to prove his "what" over against any other possible "whats." If he says, "the universe is at rest" then he is once again on our side, since he has already admitted there is no difference between a rotating Earth in a fixed universe as opposed to a fixed Earth in a rotating universe.[853] God has sprung a trap for modern man, and Relativity is its name.

Conversely, by the record of meticulous genealogies and chronologies in Holy Writ we know from whence our beginnings occurred. Unfortunately, since the world has been deceived into thinking that the Earth is moving, it is forced to resort to all the contortions and hypotheticals in Einstein's foregoing paragraphs. God gave mankind a

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[852] Genesis 1:6-9; 14-17; Psalm 19:1; 150:1; Sirach 43:1, 8.

[853] Take, for example, Eddington's explanation of gravity by means of radial curvature. He writes: "The radius of spherical curvature of every three-dimensional section of the world, cut in any direction at any point of empty space, is always the same constant length." Two pages later Eddington admits: "There is no such thing as absolute length; we can only express the length of one thing in terms of the length of something else." Yet Eddington fails to explain how he knows the length of the "something else." (*The Nature of the Physical World*, 1929, pp. 139, 141). In another place he admits: "Our simple solution has been to give up the idea that one of these is right and that the others are spurious imitations, and to accept them *en bloc*; so that distance, magnetic force, acceleration, etc., are relative quantities, comparable with other relative quantities already known to us such as direction or velocity. In the main this leaves the structure of our physical knowledge unaltered; only we must give up certain expectations as to the behaviour of these quantities, and certain tacit assumptions which were based on the belief that they are absolute" (*ibid*, p. 35).

fixed Earth precisely so we would not be forced into such contortions. The immobile Earth gives us the surest foundation from which to measure the rest of the universe. If the Earth is fixed, we can find the position and distance of any point in the universe by triangulation. Even if we were situated in some remote part of the universe and couldn't see the Earth, we could still determine location based on previous triangulations from positions that had seen the Earth. Moreover, once we assume a fixed Earth, we can take the *ad hoc* Lorentz transformations out of all physics equations. If present-day physicists, astrophysicists and astronomers would accept this one crucial premise, they could solve most, if not all, the mysteries they see in the universe. As Scripture testifies boldly:

> Tremble before him, all the Earth; he has made the world firm, not to be moved….Through all generations your truth endures; fixed to stand firm like the Earth….But you have disposed all things by measure and number and weight…Indeed, before you the whole universe is as a grain from a balance, or a drop of morning dew come down upon the Earth. But you have mercy on all, because you can do all things; and you overlook the sins of men that they may repent.[854]

Unfortunately, modern man has a distaste not only for divine revelation but for physical absolutes, for they invariably translate into moral and ethical absolutes, and eventually they lead to the one Absolute to whom man refuses to bow.

More Trouble Ahead

The anomalies and contradictions in Relativity are endless. For all Einstein's remarks about dispensing with ether, we find him having to support a similar concept in order to help his General Relativity theory pan out. He writes:

> According to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, there exists an ether. According to the general theory of relativity space without ether is unthinkable; for in such space there would not only be no propagation of light, but also no possibility of existence for standards of space and time (measuring rods and clocks), nor

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[854] A scriptural medley taken from 1 Chronicles 16:30; Psalm 119:90; Wisdom 11:20 (NAB).

therefore any space-time intervals in the physical sense. But this ether may not be thought of as endowed with the quality characteristic of ponderable media, as consisting of parts which may be tracked through time. The idea of motion may not be applied to it.[855]

So Einstein gets to have his cake and eat it, too. As he once used mathematics, he now twists and turns language itself to get to the position that will make his theory work. Knowing that he cannot escape the concerns of Newton, Maxwell and the pre-Michelson-Morley physics establishment, Einstein resigns himself to accepting that some kind of ether exists, and thus it must have enough "physical qualities" so that it can "propagate light" and serve as the "standard…for measuring rods and clocks…and time intervals in the physical sense," but by some as yet unproven premise we are assured by the same course of logic that such a versatile substance is not "ponderable," has no "parts," and has no "time." What an amazing world Einstein created for himself. Of course, avowed Relativists just shirk off such paradoxes by claiming that the rest of us "just don't understand the theory," but it should be quite apparent by now that this excuse has joined the ranks of those viewing the emperor and his new clothes.

In that light, perhaps these words from Einstein will now make more sense: "When I examine myself and my methods of thought I come to the conclusion that the gift of fantasy has meant more to me than my talent for absorbing positive knowledge"[856] Or perhaps the following will shed even more light:

Nature is the realization of the simplest conceivable mathematical ideas. I am convinced that we can discover, by means of purely mathematical constructions, those concepts and those lawful connections between them which furnish the key to understanding of natural phenomena. Experience may suggest the appropriate mathematical concepts, but they most certainly cannot be deduced from it. Experience remains, of course, the sole criterion of physical utility of a mathematical construction. But the creative principle resides in mathematics. In a certain

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[855] Albert Einstein, "Geometry and Experience," in *Sidelights on Relativity*, 1983, p. 30, cited in *De Labore Solis*, p. 65.
[856] *Einstein: The Life and Times*, p. 118.

sense, therefore, I hold it true that pure thought can grasp reality, as the ancients dreamed.[857]

Consequently, from this point onward, everything gets very complicated and confusing in Relativity theory, for it must answer questions about which it simply could not find logical solutions.[858] As Dingle puts it:

> First, the facts show, I think beyond question, that the traditional proud claim of Science that it acknowledges the absolute authority of experience (*i.e.*, observation and experimentation) and reason over all theories, hypotheses, prejudices, expectations or probabilities, however apparently firmly established, can no longer be upheld…instead of enabling the full implications and potentialities of the fact of experience to be realized and amplified, it has been held necessarily to symbolize truths which are in fact sheer impossibilities but are presented to the layman

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[857] *Thematic Origins of Scientific Thought*, p. 252.

[858] Some of these include the following items, some of which have already been addressed in the main body of this volume: (1) how to determine which clock ticks more slowly, A or B, when both are in uniform relative motion (*cf.*, *Science at the Crossroads*, Herbert Dingle, Western Printing, 1972, p. 81); (2) how a person traveling 99% the speed of light could never get one fraction closer to a light particle traveling ahead of him, and in fact, the light particle would continue to *increase* its distance from the person by 300km/sec (*The Einstein Myth and the Ives Papers*, Part 1, p. 3); (3) the decrease in light's measured speed over the course of 150 years (*cf.*, experiments with quasar light, August 2002, *Nature*, Paul Davies (winner of the 2002 Michael Faraday prize) from Macquarie University, Australia; *Science* 1927; *Nature* 1934 citing M. Gheury de Bray in *L'Astronomie*, which showed by statistics since 1849 that light was slowing down by four kilometers per second every year; (4) experiments in which light reacts faster than *c* (*cf.*, Lijun Wang at NEC Research Institute, Princeton, where light was made to travel $300 \times c$; (5) xenon experiments showing light's speed being dependent on its source (*cf.*, 1962, *New Scientist* (16:276) citing W. Kantor of the US Navy Electronics Laboratory in the *Journal of the Optical Society of America* (vol. 52, no. 8, p. 978); (6) the ability of photons to correlate their movements even when separated by time and distance (*cf.*, 1982, John Stewart Bell experiment conducted at the Institute of Theoretical and Applied Optics, Paris; (7) how to explain rotation. For example, it is known that signals from a Global Positioning Satellite (GPS) approaching a ground station arrive 50 nanoseconds less than a GPS receding from the ground station, and thus the constancy of the speed of light seems not to hold. The same effect was demonstrated by Georges Sagnac in 1913 and predicted by Albert Michelson (See section on Sagnac in Chapter 5).

as discoveries which, though they appear to him absurd, are nevertheless true because mathematical inventions, which he cannot understand, require them….the theory of relativity is believed to be so abstruse that only a very select body of specialists can be expected to understand it. In fact this is quite false; the theory itself is very simple, but it has been quite unnecessarily enveloped in a cloak of metaphysical obscurity which has really nothing whatever to do with it.[859]

Ironically, Relativity did not have the adherents it sought, at least prior to the famous 1919 eclipse photographs of the bending of starlight near the sun produced by Arthur Eddington, which is a story in itself (see Volume II: "Einstein: Everything is Relative"). Prior to 1919, most of the major players in physics either rejected or did not fully embrace Relativity. Ernst Mach rejected it outright. Henri Poincaré never publicly supported Einstein in print. Henrick Lorentz encouraged Einstein, but never fully embraced Relativity. Walter Ritz, who at first collaborated with Einstein, expressed his doubts about Special Relativity as early as 1909.[860] Max

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[859] Herbert Dingle, *Science at the Crossroads*, pp. 12-13, 16. Due to his opposition to Einstein, until his death, Dr. Dingle was shunned by the press and was consistently denied publication of his papers in the prestigious periodicals, *Nature* and *Science*. After many appeals, *Nature* finally published Dingle's critique of Einstein (*Nature*, 195, 985 (1962); and 197, 1287 (1963)). As Dingle writes, his efforts "received only one reply from an acknowledged authority, namely, Professor Max Born…". Born did not deny Dingle's critique of Einstein, but only said it was not expressed clearly. Dingle continues: "It is understandable that there should be hesitation in believing that a theory so firmly established, and apparently supported by a great weight of evidence, should be disproved as simply as my letter suggested, but it is equally hard to believe that, if such a simple disproof contained a fallacy, no exposure of that fallacy (which, it may be added, there have been numerous private but unsuccessful attempts to extract from recognized authorities), should have been forthcoming. This criticism of the theory, in various forms, has been published repeatedly, during a period of almost nine years, in physical, astronomical and philosophical journals and in four books, in Britain and in America, without eliciting a single published comment. Reluctance to correct errors in such matters is not a customary feature of scientific discussion, so the natural inference is that there is here no error to correct" (*Science at the Crossroads*, p. 228).

[860] W. Ritz, *Annales de Chimie et de Physique*, vol. 13, 145 (1908). Just prior to Ritz's death, he and Einstein published an account of their controversies concerning their respective relativity theories (W. Ritz and A. Einstein, *Physique Zeitschrift* 10, 323, 1909). Ritz's contentions with Einstein were especially regarding the issues surrounding absolute motion and the emission theory of light.

Planck, although he accepted Special Relativity, rejected General Relativity. Ernest Rutherford called it "nonsense."[861] Frederick Soddy said it was an "arrogant swindle," and "an orgy in amateur-physics."[862] Albert Michelson, who performed one of the very experiments that led to Einstein's theory, said he was sorry that his work may have had a part in creating such a "monster."[863] Finally, as he found himself shifting back and forth in the maze created by Einstein, one day supporting him, the next day entertaining doubts, in one of his more somber moments, Arthur Eddington stated:

> For the reader resolved to eschew theory and admit only definite observational facts, all astronomical books are banned. There are no purely observational facts about the heavenly bodies. Astronomical measurements are, without exception, measurements of phenomena occurring in a terrestrial observatory or station; it is only by theory that they are translated into knowledge of a universe outside.[864]

Ritz's hypothesis was supposedly disproved by the Alväger, Nilsson, Kjellman experiment when gamma radiation with spectrum shifts traveled at the same velocity as beams from particles showing no spectrum shift, but as Dingle writes: "But suppose the beams had traveled with different velocities. Then the electromagnetic theory would have been disproved, and so the evidence that the sources were particles moving with the supposed velocities would have disappeared. Such an experiment therefore could not possibly have tested Ritz's hypothesis" (*Science at the Crossroads*, p. 234). See also Walter Kaufmann's 1906 experiment (fn. 52), which is evaluated by Ritz in the above publication *Annales de Chimie*, that helped determine the nature of the electron and thus deny the validity of the Lorentz-Einstein theory, at least until Max Planck helped to revive it. (For an in-depth analysis of the Ritz-Einstein controversy, see John D. Norton's, "Einstein's Investigations of Galilean Covariant Electrodynamics Prior to 1905," University of Pittsburgh, Dept. of History and Philosophy of Science, rev. Jan. 28, 2004, pp. 12-22).

[861] Quoted in the *Economist*, provided by Martin Gwynne. Herbert Dingle adds: "Lord Rutherford…could be more accurately described as scornful rather than as critical of the relativity theory" (*Science at the Crossroads*, p. 96).

[862] "The Wilder Aspects of Atomic Disintegration," *New World Pub.* St. Stephens House, Westminster S. W. I, 1954.

[863] R. S. Shankland, "Conversations with Einstein," *American Journal of Physics*, 31:56, 1963, cited in *Thematic Origins of Scientific Thought*, pp. 249, 270.

[864] Quoted in *Cosmology*, by Edward R. Harrison, 1981, p. 226, cited in *De Labore Solis*, p. 44.

As the saga continues, the problems mount for Einstein. He needs some kind of evidence that gravity bends light (and in the exact amount that Relativity predicts), and he also needs evidence that there is no absolute motion and no ether, otherwise, his "thought" experiments will remain just that – thoughts. This is why the Michelson-Morley experiment becomes extremely important to him, as it does for everyone else in the Relativistic camp, both then and now, for it will be the only "proof" for a long time to come. It is the same reason the Michelson-Morley experiment, and its dozens of repetitions over the years, have attained such popularity in the literature of modern physics. In retrospect, the Michelson-Morley experiment would determine, once and for all, whether Maxwell's equations were true in the observer's frame of reference, and thus show whether that particular frame was moving or not. Naturally, if one is moving through a medium, the wave he observes will vary depending upon the direction he is moving.

However, since the observer is on Earth, a null result to the Michelson-Morley experiment would offer the distinct possibility that the Earth was not moving. Of course, that solution would not be accepted. Science had to search for another solution – one that could save Maxwell, Copernicus and Galileo, and the face of modern science. Arago's, Hoek's and Airy's experiments had already shown that Michelson-Morley should give a null result, but the powers-that-be insisted on checking it again and again because they simply couldn't believe what their eyes were telling them. But since science could not change the results, it chose to believe that the Earth's motion could not be detected in the ether rather than accepting that the Earth was not moving in an ether, and therefore it concluded that Maxwell's equations will work in any inertial frame and are not dependent on ether. Lorentz added the "transformation" equations, which shortened the lengths and the time of objects going through ether. All was well, at least for a while.