FLAWS IN BLACK HOLE THEORY AND GENERAL RELATIVITY

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Black Hole and Big Bang Mutually Exclusive

BLACK HOLE UNIVERSE

1) is spatially infinite
2) is eternal
3) contains only *one* mass
4) is not expanding
5) is asymptotically flat

BIG BANG UNIVERSE

1) is spatially finite or infinite
2) is of finite age
3) contains radiation and many masses
4) is expanding
5) is not asymptotically flat

Thus the black hole and big bang are mutually exclusive!

NOTES

- *"The Einstein equations are nonlinear. Therefore for gravitational fields the principle of superposition is not valid."* (Landau, L. and Lifshitz, E., The Classical Theory of Fields, 4th English Ed.,Elsevier Ltd., Oxford, UK, 1975). Therefore, if **X** and **Y** are different solutions then the linear combination $a\mathbf{X} + b\mathbf{Y}$ is NOT a solution (a and b scalars).
- There are no known solutions to Einstein's field equations for two or more masses and no existence theorem for two or more masses.
- Multiple black holes and multiple masses are obtained by inadmissibly applying the Principle of Superposition.

The Black Hole Violates the Physical Principles of General Relativity

"*Black holes were first discovered as purely mathematical solutions of Einstein's field equations. This solution, the Schwarzschild black hole, is a nonlinear solution of the Einstein equations of General Relativity. It contains no matter, and exists forever in an asymptotically flat space-time.*" (Dictionary of Geophysics, Astrophysics, and Astronomy; Edited by Richard A. Matzner, CRC Press LLC, Boca Raton, USA, 2001)

• According to Einstein his Principle of Equivalence and his Special Relativity must hold in sufficiently small finite regions of his gravitational field which can be located anywhere in his gravitational field. (Einstein, A., The Meaning of Relativity, Science Paperbacks and Methuen & Co. Ltd., 1967)

• Now both the Principle of Equivalence and Special Relativity are *defined* in terms of the *a priori* presence of multiple arbitrarily large finite masses and photons. Therefore, neither the Principle of Equivalence nor Special Relativity can manifest in a universe that contains no matter, or in a universe that is alleged to contain only one mass (such as the alleged black hole).

Black Hole Universe Contains No Mass

Einstein's field equations, "*... couple the gravitational field (contained in the curvature of spacetime) with its sources.*" (Foster, J. and Nightingale, J.D., A Short Course in General Relativity, Springer-Verlag, New York, 1995)

spacetime geometry = - κ x material sources

$$G_{uv} = -\kappa T_{uv} \qquad u,v = 0,1,2,3$$

Einstein says if ***material sources* = 0**,

***spacetime geometry* = 0**

$$Ric = R_{uv} = 0$$

But Einstein also says that this describes the field '*outside a body*'. What then is the SOURCE of the gravitational field *outside a body*? In relation to Hilbert's solution for *Ric* = 0 Einstein asserted "*… M denotes the sun's mass centrally symmetrically placed about the origin of coordinates.*" (Einstein A., The Meaning of Relativity, Science Paperbacks, Methuen & Co., 1967)

The argument is contradictory; just a subtle play on the words '*outside a body*'.

***Ric* = 0 contains no material sources by mathematical construction.**

Mass is inserted into the Black Hole using Newton's Escape Velocity

Newton's expression for *escape velocity* is arbitrarily inserted *post hoc* into Hilbert's solution to obtain a massive source to satisfy the words '*outside a body*'. First consider Hilbert's solution ($c = G = 1$) (Hilbert's solution is NOT Schwarzschild's solution),

$$ds^2 = \left(1 - \frac{2m}{r}\right) dt^2 - \left(1 - \frac{2m}{r}\right)^{-1} dr^2 - r^2 \left(d\theta^2 + \sin^2 \theta \, d\varphi^2\right)$$

$$0 \le r$$

$r = 2m$ is claimed to be a coordinate singularity and marks the 'Schwarzschild radius' (the radius of event horizon), and $r = 0$ is claimed to produce an infinitely dense point-mass singularity (the mass of the black hole).

"*The work that Roger Penrose and I did between 1965 and 1970 showed that, according to general relativity, there must be a singularity of infinite density, within the black hole.*"

(Hawking, S. W., The Theory of Everything, The Origin and Fate of the Universe, New Millennium Press, Beverly Hills, CA, 2002)

Hilbert's metric is deceptive. Rewrite it with c and G explicitly so that nothing is hidden.

Mass is inserted into the Black Hole using Newton's Escape Velocity

$$ds^2 = c^2\left(1-\frac{2Gm}{c^2 r}\right)dt^2 - \left(1-\frac{2Gm}{c^2 r}\right)^{-1} dr^2 - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right)$$

$$0 \le r$$

The components of the metric tensor are easily read off:

$$g_{00} = \left(1-\frac{2Gm}{c^2 r}\right) \qquad g_{11} = \frac{-1}{\left(1-\frac{2Gm}{c^2 r}\right)} \qquad g_{22} = -r^2 \qquad g_{33} = -r^2\sin^2\theta$$

It is claimed* that at $r = 2Gm/c^2$, $g_{00} = 0$ and $g_{11} = -1/0 = -\infty$, and that this value of r gives the radius of the event horizon ('Schwarzschild radius'). However, solving for c,

$$c = \sqrt{\frac{2Gm}{r}}$$

Newton's escape velocity - an implicit 2-body relation in a solution for an alleged 1-body universe!

* Dirac, P.A.M., General Theory of Relativity, Princeton Landmarks in Physics Series, Princeton University Press, Princeton, NJ, (1996).

Black Hole 'Escape Velocity' is a Contradiction

On the one hand, by means of Newton's implicit 2-body expression, it is claimed that the black hole has an escape velocity $\geq c$.
"***black hole*** *A region of spacetime from which the escape velocity exceeds the velocity of light.*" (Dictionary of Geophysics, Astrophysics and Astronomy; Matzner, R.A., Ed., CRC Press LLC, Boca Raton, LA, 2001)

However, on the other hand it is also claimed that the nothing can even leave the black hole:
"It means that the boundary of the black hole, the event horizon, is formed by rays of light that just fail to get away from the black hole. Instead, they stay forever hovering on the edge of the black hole." (Hawking, S. W., The Theory of Everything, The Origin and Fate of the Universe, New Millennium Press, Beverly Hills, CA, 2002)

Thus, the alleged black hole has an escape velocity yet, simultaneously, nothing can even leave it! This is a contradiction.

r is neither a radius nor a distance in Hilbert's metric

The quantity *r* has been variously and vaguely called "*a distance*", "*the radius*", "*the radius of a 2-sphere*", "*the coordinate radius*", "*the radial coordinate*", "*the Schwarzschild r-coordinate*" , "*the radial space coordinate*", "*the areal radius*", "*the reduced circumference*", "*the shortest distance a ray of light must travel to the centre*", and even "*a gauge choice, it defines the coordinate r*".

Consider the surface in the spatial section of Hilbert's metric:

$$ds^2 = r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right)$$

Gaussian curvature *K* is an **intrinsic geometric property of a surface**, independent of any embedding space. It can be calculated by:

$$K = \frac{R_{1212}}{g}$$

Applying to this surface,

$$K = \frac{1}{r^2} \qquad \text{so} \qquad r = \frac{1}{\sqrt{K}}$$

The Black Hole Singularity is Fictitious

Since $Ric = 0$ contains no material sources, Hilbert's solution contains no material sources, and so the black hole has no 'infinitely dense' singularity. Furthermore, when $r = 0$,

$$g_{00} = \left(1 - \frac{2Gm}{0}\right) \qquad \text{and} \qquad g_{11} = \frac{-1}{\left(1 - \frac{2Gm}{0}\right)}$$

These quantities are *undefined* since division by zero is undefined. Furthermore, r is not the radius or even a distance in Hilbert's solution. Despite these simple facts, it is claimed that:

"*Once a body of matter, of any mass m, lies inside its Schwarzschild radius 2m it undergoes gravitational collapse . . . and the singularity becomes physical, not a limiting fiction.*"
(Dodson, C. T. J., and Poston, T., Tensor Geometry - The Geometric Viewpoint and its Uses, 2nd Ed., Springer--Verlag, 1991)

"The black hole's singularity is a real physical entity. It is not a mathematical artifact . . . " (Carroll B. W. and Ostlie D. A., An Introduction to Modern Astrophysics, Addison--Wesley Publishing Company Inc., 1996)

The Black Hole is Not Consistent with Newton

It is frequently alleged that Newton's theory predicts the black hole: *"Laplace essentially predicted the black hole…"* (Hawking, S. W. and Ellis, G. F. R., The Large Scale Structure of Space-Time, Cambridge University Press, Cambridge, 1973)

BLACK HOLE	**MICHELL-LAPLACE DARK BODY**
No escape velocity	Escape velocity
Gravitational collapse	No gravitational collapse
Infinitely dense singularity	No singularity
Event horizon	No event horizon
Can be seen by no observers	Can always be seen by a class of observers
In a one body universe	In an multi-body universe
Superposition does not apply	Superposition does apply
In an asymptotically flat spacetime	Not in an asymptotically flat spacetime
In a 4-D pseudo-Riemannian spacetime	In a 3-D Euclidean space

$r = \frac{2Gm}{c^2}$ has nothing to do with the black hole. It is the critical radius for the formation of theoretical Michell-Laplace dark body of Newton's theory.

Big Bang is a One Mass Model

Big Bang cosmology models the universe as being entirely filled by a single indivisible homogeneous continuous distribution of matter with uniform macroscopic density and pressure. Multiple masses and radiation are obtained by applying the Principle of Superposition, which however does not hold in General Relativity. The Big Bang universe cannot therefore contain black holes and does not permit the manifestation of the Principle of Equivalence and Special Relativity.

General Relativity Violates the Usual Conservation of Energy and Momentum

To try to satisfy the requirement of the usual conservation of energy and momentum Einstein introduced his 'pseudotensor' (it is not a tensor), denoted by the symbol:

$$t_{\mu}^{\sigma}$$

Einstein calls the components of the pseudo-tensor *'the "energy components" of the gravitational field.'* (Einstein, A., The Foundation of the General Theory of Relativity, *Annalen der Physik*, 49, 1916, section 15)

General Relativity Violates the Usual Conservation of Energy and Momentum

Einstein writes the total energy-momentum of this gravitational field as

$\mathfrak{E} = \left(t_\mu^\sigma + T_\mu^\sigma\right)$ and his conservation thereof as the **ordinary** divergence,

$$\frac{\partial\left(t_\mu^\sigma + T_\mu^\sigma\right)}{\partial x_\sigma} = 0$$

and says, *"Thus it results from our field equations of gravitation that the laws of conservation of momentum and energy are satisfied."* He also says of this equation that, *"… we have to introduce the totality of the energy components of matter and gravitational field."*

(Einstein A., The Foundation of the General Theory of Relativity, *Annalen der Physik*, 49, 1916, section 17)

General Relativity Violates the Usual Conservation of Energy and Momentum

Einstein's pseudotensor is defined by this expression,

$$\sqrt{-g}\, t_v^u = \frac{1}{2}\left[\delta_v^u L - \left(\frac{\partial L}{\partial g_{,u}^{sb}}\right) g_{,v}^{sb}\right]$$

where

$$g_{,v}^{sb} = \frac{\partial g^{sb}}{\partial x^v}$$

$$L = -g^{\alpha\beta}\left(\Gamma_{\alpha\kappa}^{\gamma}\Gamma_{\beta\gamma}^{\kappa} - \Gamma_{\alpha\beta}^{\gamma}\Gamma_{\gamma\kappa}^{\kappa}\right) \qquad \Gamma_{bc}^{a} = \frac{1}{2} g^{ad}\left(\frac{\partial g_{dc}}{\partial x^b} + \frac{\partial g_{bd}}{\partial x^c} - \frac{\partial g_{bc}}{\partial x^d}\right)$$

Note that *L* and *g* are functions solely of the components of the metric tensor and their first derivatives.

We can contract this pseudotensor by setting $v = u$.

General Relativity Violates the Usual Conservation of Energy and Momentum

Contracting Einstein's pseudotensor produces an **invariant** t, thus:

$$\sqrt{-g}\, t_u^u = \frac{1}{2}\left[4L - \left(\frac{\partial L}{\partial g_{,u}^{sb}} \right) g_{,u}^{sb} \right] \qquad \text{where} \quad t = t_u^u$$

Performing now the calculation of the second part inside the brackets gives:

$$\left(\frac{\partial L}{\partial g_{,u}^{sb}} \right) g_{,u}^{sb} = 2L$$

Substituting this result into the expression above and rearranging gives the invariant:

$$t = \frac{L}{\sqrt{-g}}$$

Thus, t is composed of solely the components of the metric tensor and their first derivatives. However, such invariants **do not exist!** (Ricci-Curbastro, G., Levi-Civita, T., *Méthodes de calcul différentiel absolue et leurs applications*, Matematische Annalen, B. 54, 1900, p. 162)

General Relativity Violates the Usual Conservation of Energy and Momentum

Thus Einstein's field equations **must** take the following form*,

$$\frac{\left(G_{\nu}^{u} + \Lambda\, g_{\nu}^{u}\right)}{\kappa} + T_{\nu}^{u} = 0$$

Compare with $\left(t_{\mu}^{\sigma} + T_{\mu}^{\sigma}\right) = \mathfrak{L}$

Einstein's field equations are also a total energy equation. The total energy is always zero. The energy-momentum tensor, Einstein's tensor and hence the metric tensor must **vanish identically!** The usual conservation of energy and momentum is violated. Gravitational energy cannot be localised (i.e. Einstein's gravitational waves do not exist).

* Λ is the so-called 'cosmological constant'.