

Copernican Myopia.....

By Richard K. DeLano

A Response to Dr. Tom Bridgman

January 17, 2011

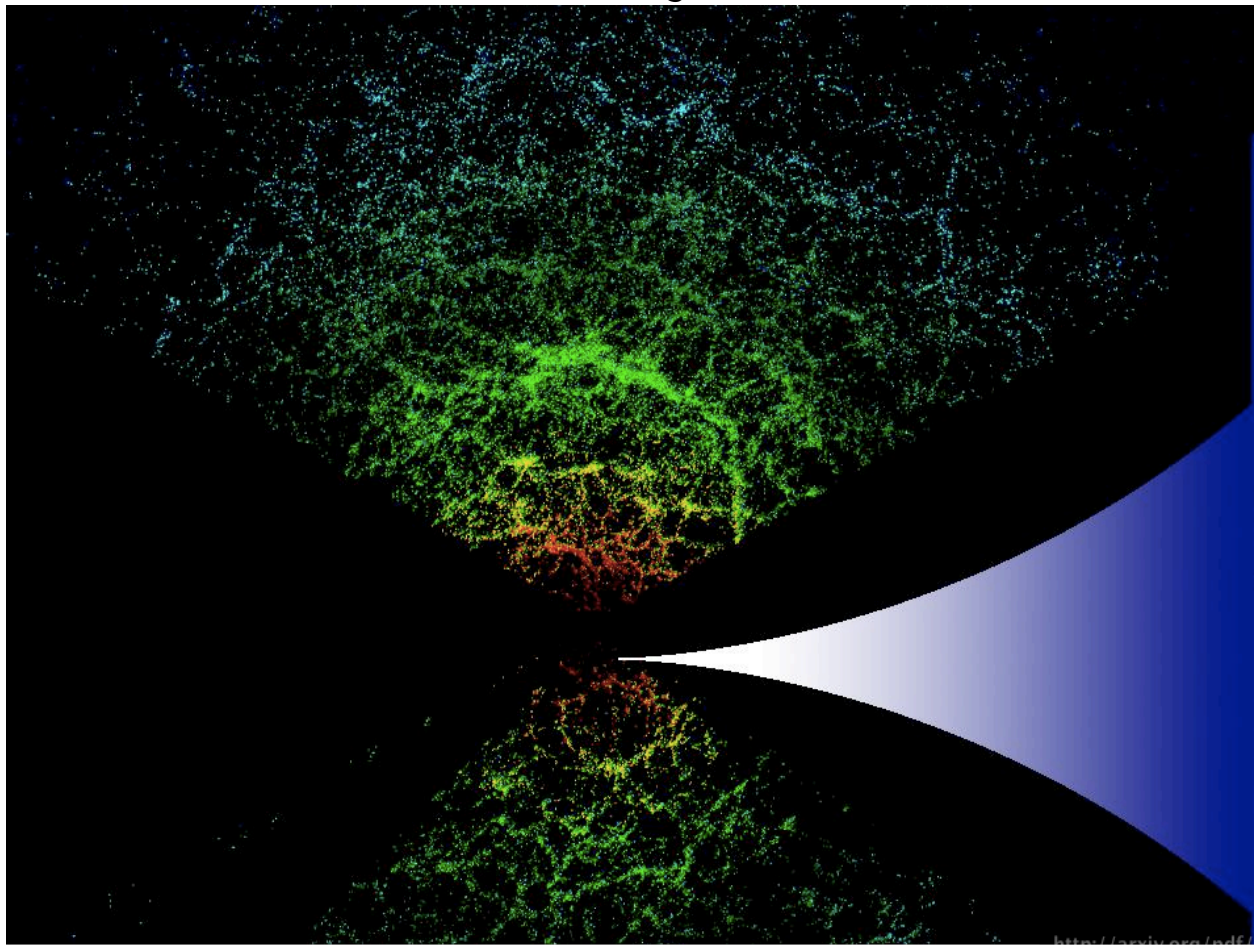
(Note: Just as this response was being prepared for uploading, a brief new post appeared on Dr. Bridgman's website. Since it advances nothing substantially new, essentially merely reiterating the assertion #2 below, it will be answered separately).

An initial combox exchange on [this website](#) has developed, in the aftermath of [GeoCathCon I](#), into [an article](#) purporting to dismiss the geocentric implications of reported periodic galaxy count/redshift abundances in the Sloan Digital Sky Survey, as well as in [other studies published in peer-reviewed journals](#) over the last several decades.

Dr. Bridgman's latest communications having become decidedly acidic in tone, let's by all means have some fun here; after all it's not as if this were [Astrophysics and Space Science](#), or [Physical Review D](#), right?

We begin with Dr. Bridgman's attempted explanation of periodic redshift abundances in [recent SDSS images like this one](#).

Here is a detail from the above-linked image:



Tom advances the following claims:

1. There is no apparent concentric shell structure centered on the observer in the SDSS image, and those who see such structure are suffering from [pareidolia](#).
2. For redshifts to be 'quantized', they would have to only occur at certain discrete values.
3. For redshift peaks reported in Hartnett, Hirano 2008 to be valid, all of these values, and their integral harmonics, should be visible in this graphic as well-defined walls of galaxies.

These three claims will be refuted here, not by fiddling with computer graphics- precisely the kind of “seeing what we want to see” pareidolia Tom

condemns!- but instead by [citation](#) of [peer-reviewed papers](#) from leading scientific journals.

If Tom were able to refute these studies, one assumes he would do so, perhaps by publishing his computer generated graphics at ArXiv.org, or perhaps Astrophysics and Space Science, or the Monthly Notices of the Royal Astronomical Society, or some other peer-reviewed journal.

He has not chosen to attempt this.

Certain other of Tom's arguments, not directly relevant to the question of the SDSS image and its geocentric implications, will also be addressed.

First, as to Claim Number One:

Tom Bridgman:

In a couple of comments sections of this blog ([links](#)), Mr. Rick DeLano claims that, despite evidence to the contrary, he SEES periodicities in some of the skymaps produced by such groups as the Sloan Digital Sky Survey ([SDSS](#)). In particular, he mentions skymaps such as those available at the SDSS at [links](#) like the one reproduced here. [I suggested Mr. DeLano conduct an exercise with this graphic to test his statement](#) but I find no evidence that he has actually done so. A LOT of bad science is driven by researchers claiming they 'see' something in a dataset that can't be objectively identified (see [Pathological Science](#), [Pareidolia](#)).

Rick DeLano:

Dr. Tom Bridgman's [very first link above](#) shows that it is not only Mr. Rick DeLano reporting these periodicities in the [SDSS images](#). In fact Rick is merely the messenger in this case, bearing the (apparently extremely unwelcome) news to Tom, in the form of the following quote:

“...there is visible evidence in the raw data for an apparent concentric shell structure centered on the observer.”-----“[Galaxy redshift abundance periodicity from Fourier analysis of number counts N\(z\) using SDSS and 2dFGRS galaxy surveys](#)” J.G. Hartnett K. Hirano Sep 2008

Now it is true that Rick sees this “apparent concentric shell structure centered on the observer” quite clearly in the [SDSS image](#).

So do Professors Hartnett and Hirano.

Click on the zoom tool included in the [link](#) and judge for yourself.

Tom cannot see it.

At all.

Claims it’s an illusion.

In fact, he claims that all who notice this concentric shell structure- including Rick DeLano, Professors Hartnett and Hirano, and presumably even the referees who have accepted Hartnett and Hirano’s 2008 study for publication in [Astrophysics and Space Science](#) and Hirano’s new 2010 paper in [Physical Review D](#) are- all of them!- suffering from a form of delusion: [pareidolia](#).

I am reminded of an old joke- the one with the punchline: “Who are you going to believe, honey, your eyes, or me?”

Let’s subject Tom’s remarkable hypothesis to initial examination based upon his own criterion:

If these concentric shell structures are illusion- mere “wishful thinking” imposed, in Tom’s words above, as “*something in a dataset that can’t be objectively identified*”- well.

In that case Hartnett and Hirano will have quickly reported back that it’s exactly that simple- no rigorous analysis of the dataset will support the visually-suggested periodicities.

The reader who has clicked the link and used the zoom tool is probably not going to be surprised to learn that [Hartnett and Hirano have instead proceeded to precisely the opposite conclusion](#):

“A Fourier analysis on galaxy number counts from redshift data of both the Sloan Digital Sky Survey and the 2dF Galaxy Redshift Survey indicates that galaxies have preferred periodic redshift spacings of $\Delta z=0.0102$, 0.0246 , and 0.0448 in the SDSS and strong agreement with

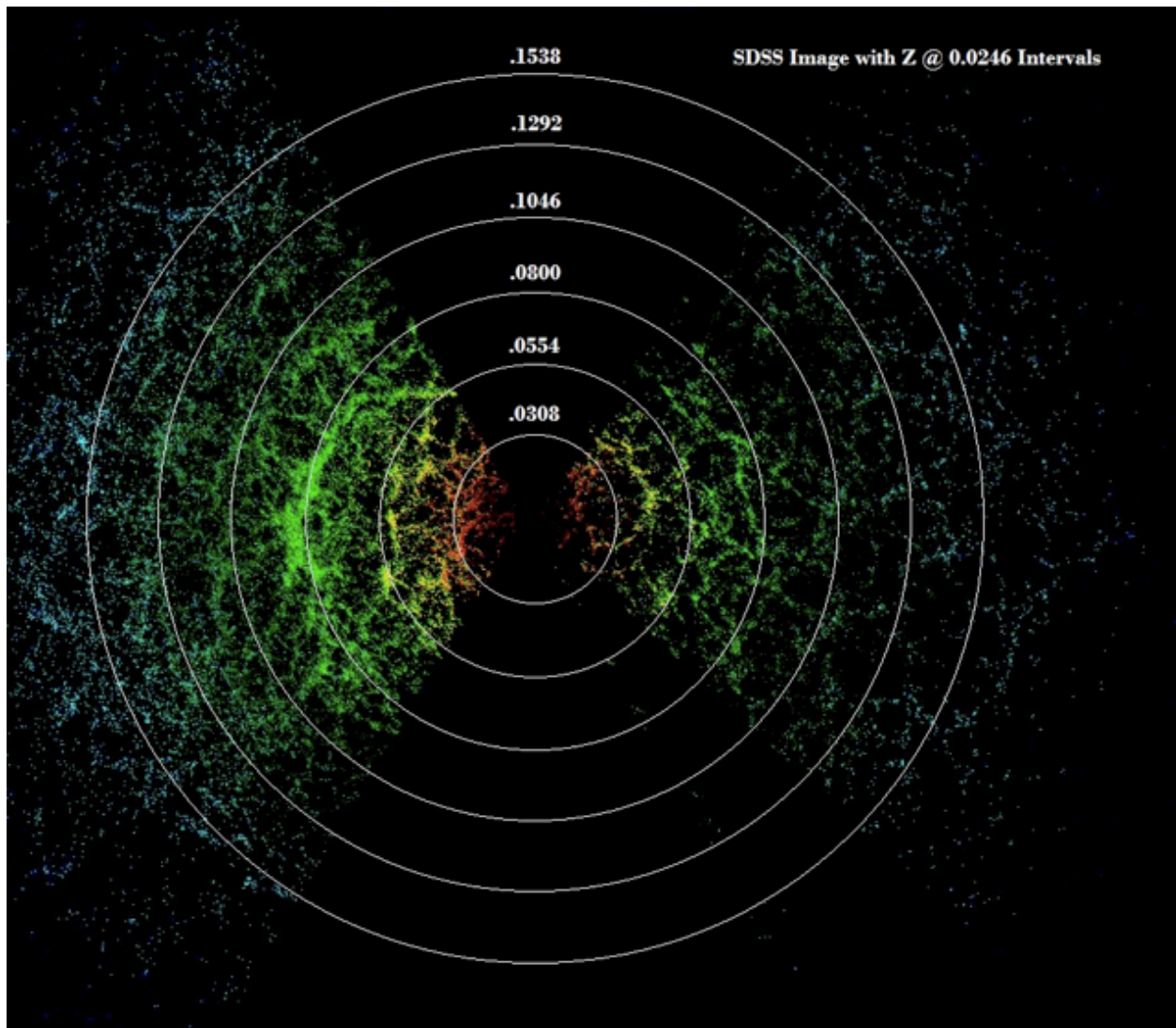
the results from the 2dF GRS. The redshift spacings are confirmed by the mass density fluctuations, the power spectrum $P(z)$ and N calculations.....”

The authors go on to state:

“The Great Wall is shown in the second and third quadrants as indicated. In those two quadrants it is evident to the eye that there is general concentric structure with a spacing of about $75 h^{-1} \text{ Mpc}$.”

[See for yourself, in Figure 1](#)

Next, we apply the **objective analysis above** to the image, by plotting both inward and outward from the Great Wall structure, visible on the left at approximately $z = 0.08$, using Hartnett and Hirano’s strongest reported redshift peak, $\Delta z = 0.0246$:



We see excellent agreement between the reported periodic redshift value $\Delta z = 0.0246$, and the concentric shell structures, thus providing **objective evidence** in support of the referees' decision to publish the Hartnett and Hirano study in [Astrophysics and Space Science](#), and Hirano's November 2010 followup paper referencing the same data in [Physical Review D](#).

The authors have conducted multiple separate analyses of the SDSS dataset, **including 2d and 3d analyses**, and all these analyses have **independently** found "something in the dataset"- which translates visually into a concentric shell structure centered on the observer- something that is objective, that can be identified, that **has been** identified, and- crucially, for purposes of examining Tom's claim here- something that **has been published in a peer reviewed scientific journal**.

Indeed, Hartnett/Hirano 2008 cite [a full 3D power spectrum analysis of the SDSS data](#) (Tegmark, et al 2004) which shows, in its Figure 5 and Figure 6, concentric shell structures centered on the observer remarkably similar to those shown by Hartnett/Hirano in their Figure 1.

The reader is invited to compare these images, and the SDSS images above.

So much for pareidolia.....

Tom is simply determined **not** to see any concentric shell structure, since such periodic, Earth-centered structure contradicts the predictions of the Copernican (cosmological) principle, and opens the door to a serious examination of alternative interpretations of the data. Hartnett and Hirano propose that the universe may have undergone oscillating expansion rates in past periods.

A simpler explanation would be that Earth is **in fact right where these images suggest it is: in the center of the Universe.**

Tom has yet to refute a syllable of Hartnett and Hirano's study- I know because [I have asked him a number of times to do so](#) , as here on November 8, 2010:

 **Rick DeLano said...**

Tom: Have you ever demonstrated in any way at all, that Hartnett (or the other, scores and scores of peer reviewed scientific studies which employ Fourier analysis) have failed to test and secure their analyses against the flaws you point out?

You certainly have not done so in the case of Hartnett.

You in fact have not done so in the case of any of the hundreds of peer reviewed papers which have incorporated Fourier analysis in examining the question of periodicities in preferred galaxy count over redshift.

It is important to emphasize on this score that **neither Tom Bridgman nor anyone else has published any scientific study identifying any such errors in the Hartnett/Hirano paper.**

If they had, Tom would have cited them.

Tom ignores the rigorous exposition of the data analyses performed by these scientists in a peer-reviewed and published paper in ***Astrophysics and Space Science***, and instead tosses about [a pseudo-psychological bit of folderol](#).

Thus, Hartnett and Hirano's peer reviewed and published objective analysis of the evidence stands, and Tom Bridgman's ridiculous and now falsified claim (on a self-published blog) of "pareidolia", falls.

That is Strike One.

Now, as to Claim Number Two:

Tom Bridgman:

Since Mr. DeLano is unwilling or unable to make any actual effort to validate his claim in an objective way, I will examine the claim in detail here, performed the test which I described to him.

Rick DeLano:

Tom, still choosing to ignore the objective validation presented in [my first comment to him](#), instead invokes some imaginary obligation on my part to fiddle with a graphics tool.

What good will that possibly do, if Tom denies the concentric structure clearly visible in the image in the first place, ascribing it to a pathology, and apparently a contagious one, given how many others see clearly what he insists is not there?

Our first graphics tool in this case will be our own two eyes, and once Tom has insisted that he cannot see what Rick, Hartnett, Hirano, and the referees at *Astrophysics and Space Science* and *Physical Review D* all see (including, I expect, the gentle and patient reader, who has already clicked the link and employed the zoom tool, and seen it too!)- well.

In that case fiddling around with the image to make it more in accord with what Tom would like to see is unlikely to get us anywhere.

Our disagreement must be resolved on **objective** grounds- that is, on the analysis of the data itself- in order to determine **which** visual interpretation accords with **objective** analysis of the data.

Based on [the evidence presented](#), the **objective** analysis supports Rick, not [Tom](#).

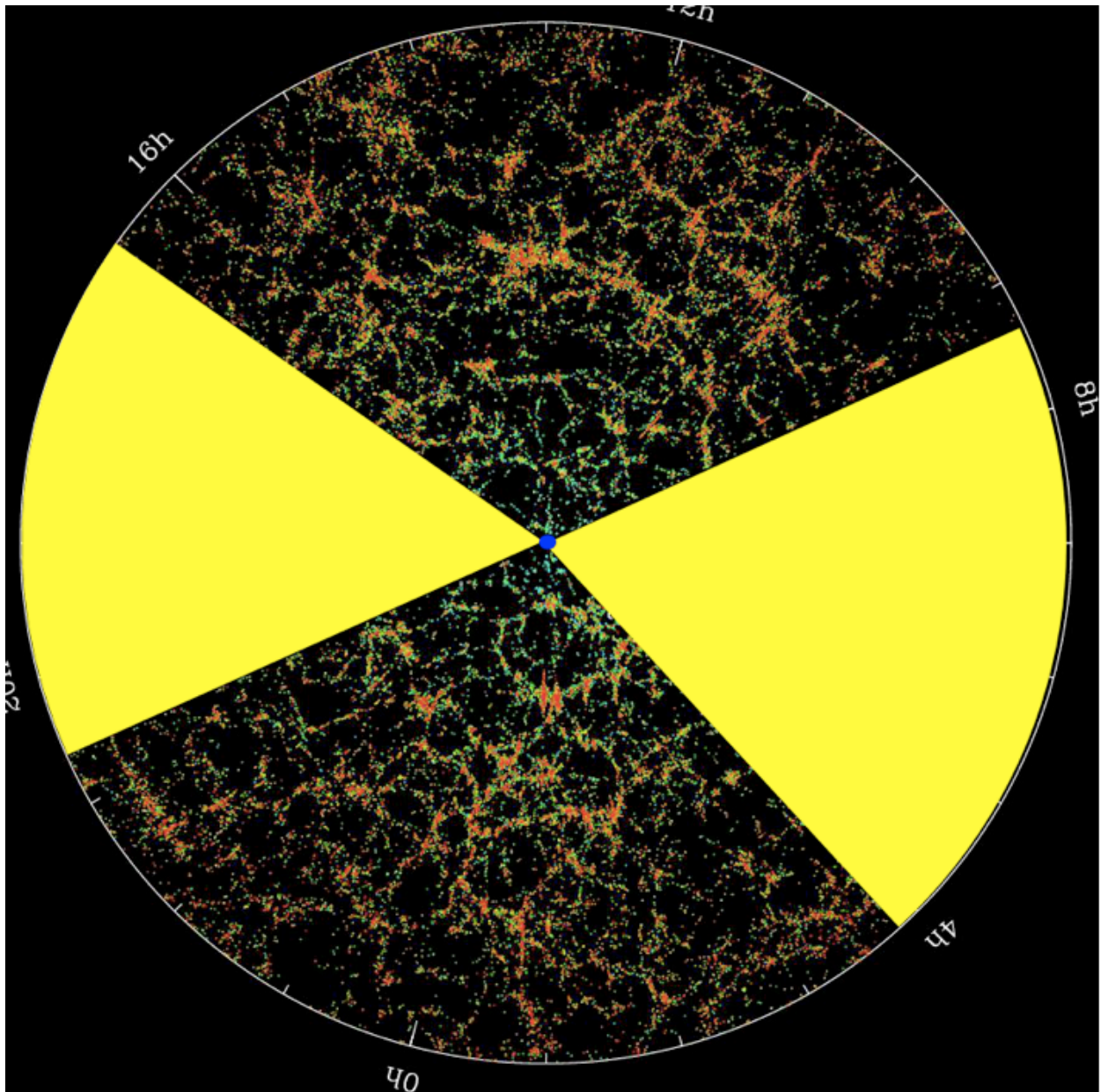
Therefore, my actual obligation consists in reiterating that Tom has yet to even engage, much less refute, the objective validation of the claim; that is, the peer reviewed and published scientific conclusions presented in the Hartnett/ Hirano study.

Tom Bridgman:

Let's examine the issues in several steps to make sure we have a reasonably complete understanding of the data we are examining.

What does the SDSS plot represent in its projection from a 3-dimensional space?

I have taught several astronomy classes and occasionally found that students unfamiliar with the ways in which 3-D datasets are sometimes projected into a 2-dimensional page genuinely do not understand what they are seeing.



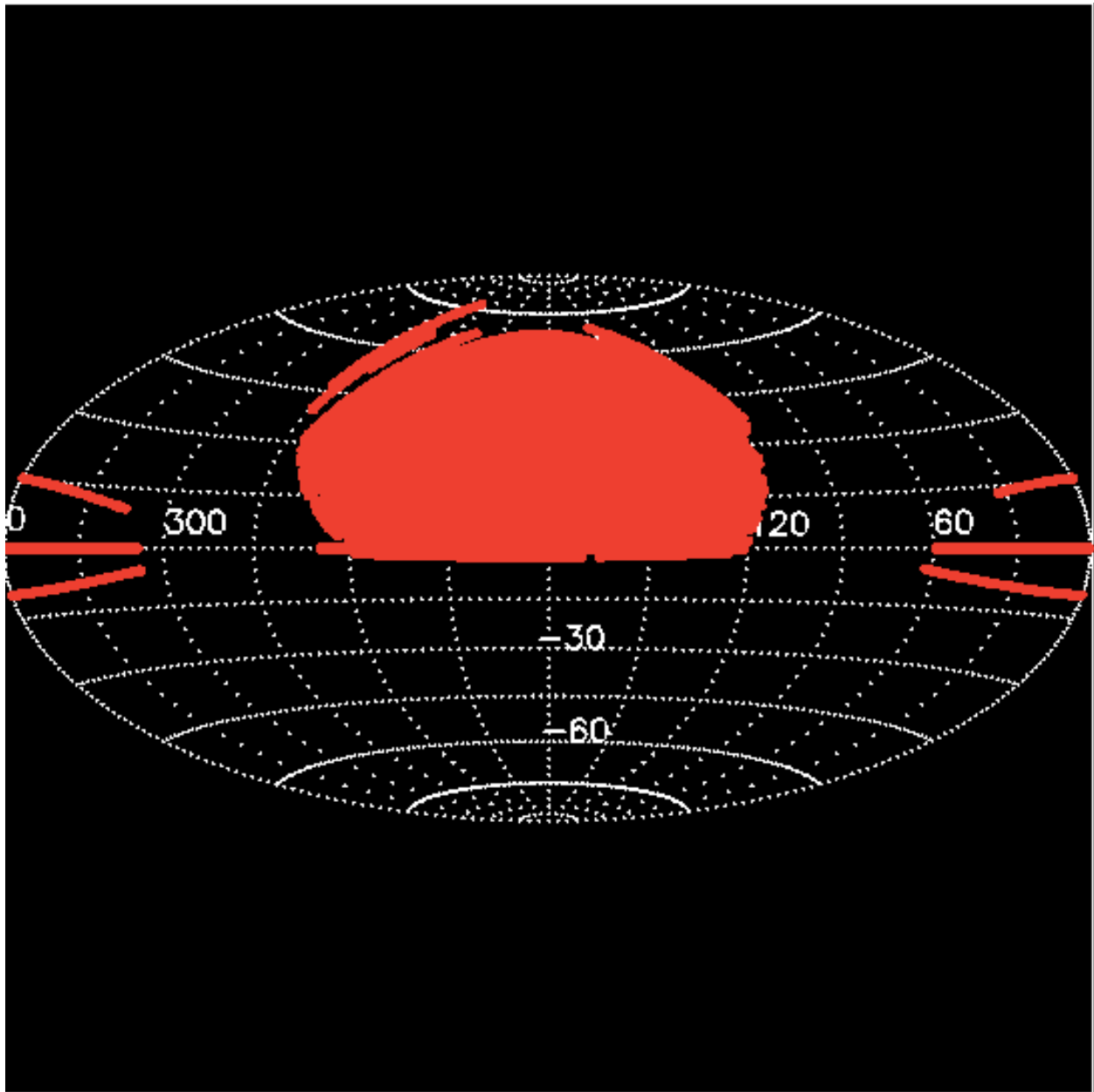
The SDSS plot is a 'slice' of the sky 1.25 degrees above and below the celestial equator. In this case, the two-dimensional plot of galaxies on the sphere of the sky is projected in to the third dimension with the value of the redshift, z , which is a proxy for the distance of the galaxy from the observer. Once extended into three dimensions, a slice is cut through the sphere, creating a circular plane on which we will project a small amount of data above and below the slice. In this construction, the Earth is in the center of the sphere is represented by the blue dot in the center of the plot. The pie-slice shaped regions marked in yellow are areas where data could not be collected because the Milky Way obstructs too many of the more distant objects. This map represents a very small section of the entire sky visible from Earth, so one

needs to exercise caution when extending anything 'seen' in this dataset to the entire sky.

Rick DeLano:

First, it is important to note that while the image above indeed represents a “slice” of the SDSS data, the full SDSS data upon which Hartnett and Hirano perform their analyses covers **more than a quarter of the whole sky!**

Here is the [image](#) from the [SDSS Data Release 7 webpage](#) which shows the extent of coverage:



Now, when Tom says that we need to exercise caution in extending what we see- even over more than a quarter of the sky!- to the whole sky, what he says is quite true.

It is also quite true, however, that we have made crucial assumptions (such as the cosmological or Copernican principle itself) based on **much earlier, smaller and less extensive datasets.**

Why was it OK to extrapolate the data to the whole sky back then, when we had nothing but solar system observations to support our Copernican assumptions, but it is not OK now, when we can see that at least a quarter of the whole sky is not homogeneous, is not “Copernican”?

These earlier Copernican assumptions predicted an homogeneous universe, but that is not what we are finding.

The evidence against Tom’s implicit suggestion that we don’t see this periodic structure at medium-to- large scales in the universe is even more daunting, because there is very recent evidence- for example [here](#) and [here](#) -of similar non-homogeneous structure on even much larger scales than we see in this SDSS image; even on much larger scales than those represented in the [full SDSS Data Release 7](#) .

Again, this evidence is in stark contradiction to the homogeneity predicted (or, more accurately, assumed) under the Copernican (“cosmological”) principle.

Scientific studies are intended to test what we have assumed by comparing it to what we can see, and what we see,

1. In these [SDSS images](#);
2. In the [much more extensive analysis of the full SDSS dataset by Hartnett and Hirano](#); and
3. In [these papers](#) reporting similar, non-homogeneous structure at even much larger scales than those included in SDSS,

is very much at variance with the Copernican Principle’s assumption of an homogeneous universe, as explained here by Stephen Hawking:

“.....we shall interpret the Copernican principle as stating that the universe is approximately spherically symmetric about every point (since it is approximately spherically symmetric around us).” ---Hawking, S.W. and Ellis, G.F.R., *The Large Scale Structure of Space-Time*, Cambridge University Press, Cambridge, p. 134, 1973. Their reference is to: Bondi, H., *Cosmology*, Cambridge University Press, Cambridge, 1960.

Professor Hawking continues with this thought and develops it further, in his “A Brief History of Time”:

“.....We have no scientific evidence for, or against, this assumption. We believe it only on grounds of modesty: it would be most remarkable if the universe looked the same in every direction around us, but not around other points in the universe.” --Stephen Hawking “A Brief History of Time” 1988 p.42

It is precisely because the concentric shell structure visible in the SDSS images would **not be visible** from galaxies far removed from Earth, that the Copernican principle itself is called into question by the SDSS (as well as other deep space observations).

In fact, we are now in possession of precisely that “most remarkable” evidence Professor Hawking claimed we lacked when he wrote his book in 1988. The universe **does** look different around us, than it looks around other points in the universe, and the SDSS image provides us with a visual representation of this (most remarkable!) development.

On this point, it is important to also consider that the assumptions built in to the selection parameters of the SDSS and similar sky surveys **tend to minimize and blur all these periodicities**, since the selection process **incorporates the assumption** that the Big Bang, expanding, Copernican principle universe is true.

This is worth spending a moment to really “get”, because once this is understood, the remarkable challenge this concentric shell structure and preferred redshift periodicity presents to the assumed Copernican Principle universe will become even more obvious.

Hartnett and Hirano address this issue near the beginning of their study:

“When modeling the large scale structure of the cosmos the cosmological principle is assumed, therefore what we see must be biased by our viewpoint.”

Indeed, this cosmological (Copernican) principle is mathematically **built in to the SDSS survey procedure itself:**

“In the usual analysis the spatial two-point or autocorrelation function is used to define the excess probability, compared to that expected for a random distribution, of finding a pair of galaxies at a given separation (Baugh 2006). The power spectrum is *predicted by theories*

for the formation of large scale structure in the universe and compared with that measured, or more precisely calculated from the available data.” (emphasis added)

In other words, even these remarkable SDSS images of concentric shell structures centered upon Earth are themselves biased toward Copernican assumptions about the Universe and how its structures have formed. The SDSS images partially reflect this “autocorrelation function”, which is not based so much on actual measurements as upon calculations of what the Copernican principle suggests ought to be there.

Additionally, a [Gaussian windowing function](#) is selected and employed when calculating the systematic density fluctuations. This choice has the effect of “smoothing out” any fine detail.

These sorts of built-in assumptions, therefore, will tend to “blur out” or minimize the periodicities that, nonetheless, are found to be unambiguously present in the SDSS data by Hartnett and Hirano.

The crucial point is this:

Apart from Copernican assumptions, the most natural interpretation of this evidence is that **Earth is at the center of the galaxy distribution.**

This point is driven home strongly in a 2010 paper by Professor Hirano, which has been recently published in the peer-reviewed journal [Physical Review D](#):

“A widespread idea in cosmology is that the universe is homogeneous and isotropic above a certain scale. This hypothesis, usually called the cosmological principle (e.g., [1]), is thought to be a generalization of the Copernican principle that “the Earth is not in a central, specially favored position”. The assumption is that any observer at any place at the same epoch would see essentially the same picture of the large scale distribution of galaxies in the universe.

However, according to a Fourier analysis by Hartnett & Hirano [2], the galaxy number count N from redshift z data (N - z relation) indicates that galaxies have preferred periodic redshift spacings.....A natural interpretation is that *concentric spherical shells of higher galaxy number densities surround us, with their individual centers situated at our location.*” (emphasis added)

Let's review.

These Earth-centered periodicities are present in raw data of the SDSS, and Hartnett/Hirano's three separate analyses of the SDSS data, including similar peaks confirmed by analysis of the combined SDSS and [2 degree Field Galaxy Redshift Survey](#).

There are remarkably similar periodicities visible in the full 3D power spectrum (Tegamrk et al 2004) reproduced in Figures 5 and 6 of that study.

This **objective** evidence of Earth-centered periodicities is especially compelling, since the “**built-in**” selection parameters will tend to **minimize** and “**blur out**” such periodicities in the raw data.

Let's also examine one very significant, and very current, additional line of evidence showing that not only the SDSS dataset, but also other anomalies- such as the remarkable assumption that the universe must be composed 95% of hypothesized entities like cold dark matter and dark energy in order to explain Type 1a Supernovae observations- have led researchers such as Timothy Clifton of Oxford University to advance frankly anti-Copernican solutions **independently** of Hartnett and Hirano's exhaustive analyses of the SDSS data.

Clifton's [paper published in Physical Review Letters](#) shows that the Copernican Principle itself is now being called into question by researchers struggling with these **additional** vexing problems:

“A fundamental presupposition of modern cosmology is the Copernican Principle; that we are not in a central, or otherwise special region of the Universe. Studies of Type Ia supernovae, together with the Copernican Principle, have led to the inference that the Universe is accelerating in its expansion. The usual explanation for this is that there must exist a ‘Dark Energy’, to drive the acceleration. Alternatively, it could be the case that the Copernican Principle is invalid, and that the data has been interpreted within an inappropriate theoretical frame-work. If we were to live in a special place in the Universe, near the centre of a void where the local matter density is low, then the supernovae observations could be accounted for without the addition of dark energy.”---Timothy Clifton, Pedro G. Ferreira, and Kate Land 2008

Oxford Astrophysics, Physics, DWB, Keble Road, Oxford, OX13RH, UK <http://arxiv.org/pdf/0807.1443v2>

So Dr. Bridgman is going to have to go back to the drawing board and come up with something a whole lot more credible than “pareidolia”, given the evidence he has failed to address so far.

And this is just a sampling of that evidence.

There is much more.

Tom Bridgman:

What is meant by 'quantization' in the rigorous scientific sense?

Historically, describing a physical quantity as 'quantized' has meant that it has discrete measured values. In atomic physics, the energy levels of atoms are described as quantized because they would correspond to a fixed energy in each state. In the case of a hydrogen atom, the electron energy levels were proportional to $1/n^2$, where n is an integer, 1,2,3,4,... Intermediate values, such as energies corresponding to $n=1.2$ or 5.7 , are never observed.

Rick DeLano:

Since we are discussing galaxies, not atoms, it would be reasonable to suppose that the term is to be understood as it is employed, and has been employed, in the **cosmological** literature.

To determine how this term has historically been employed in the **cosmological** literature, let us consult cosmologists W. M. Napier and B. N. G. Guthrie, writing in *Astrophysics and Space Science* Volume 244, Issue 1-2, pp. 57-63, way back in 1990, under the title, appropriately enough, "Testing for Quantized Redshifts":

"...the redshifts of galaxies are **periodic or 'quantized'**, tending to occur at intervals....." (emphasis added)

Of course the level of quantization in Napier and Guthrie's study is much smaller than anything Hartnett and Hirano are looking at in the SDSS data, but it is immediately clear that the terms "**periodic OR quantized**" refer to the **same** cosmological phenomenon, contrary to Tom's claim above.

Napier and Guthrie continue:

"The **quantization** claim is extraordinary, and if confirmed would have profound repercussions for cosmology. Given the perceived success of standard paradigms, a correspondingly high standard of proof would be required before the alleged **periodicity** could be accepted (say at the

level where a cosmological model which failed to incorporate it would lack credibility). Testing for the **quantization** is however a 'clean', well-posed statistical problem....”

Here again, the terms "quantization" and "periodicity" are used interchangeably, and refer to the same phenomenon.

Just as a point of interest, here is the paper's conclusion, concerning the alleged redshift quantization/periodicities:

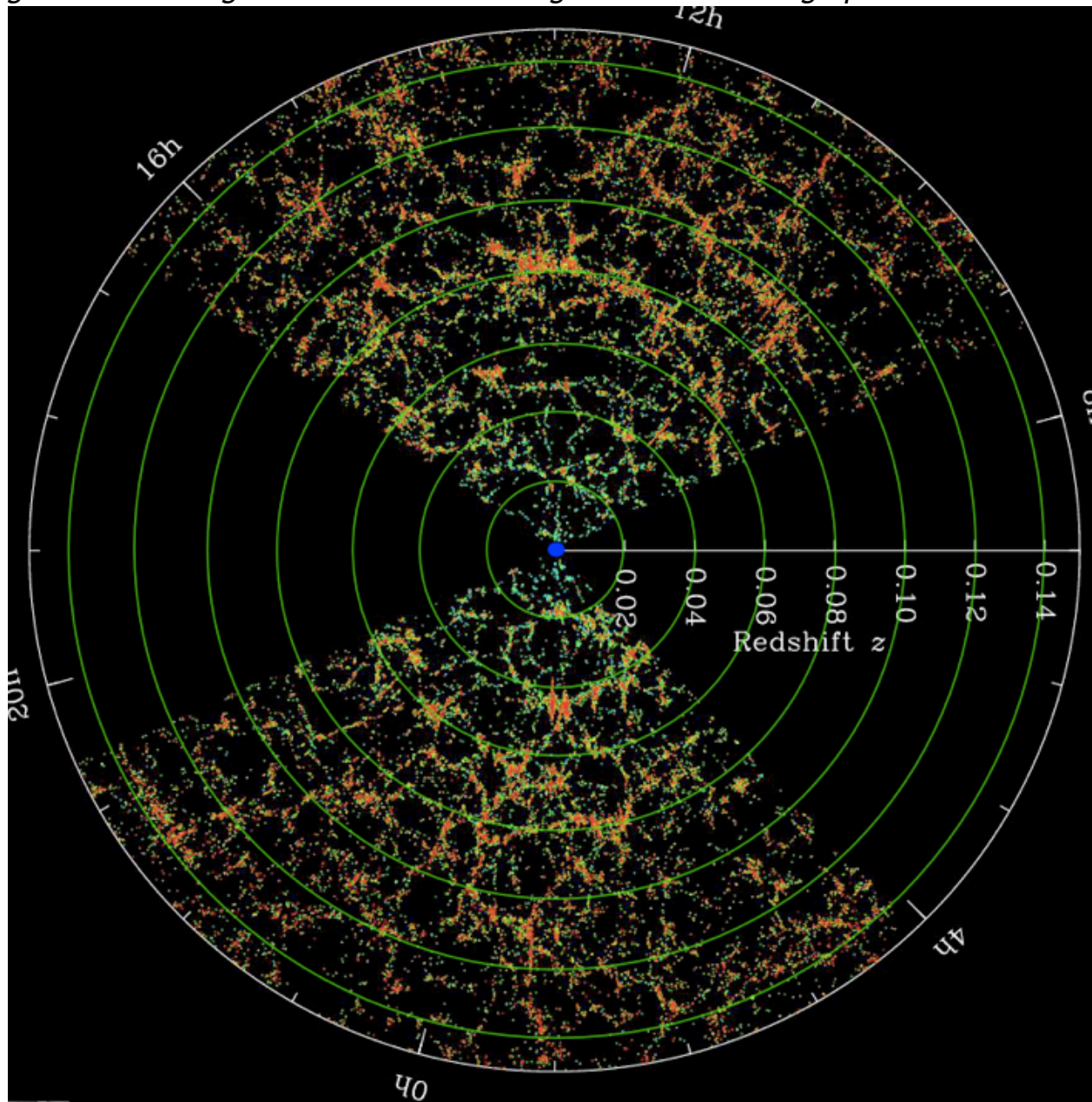
“The existence of a galactocentric redshift quantization is confirmed at a high confidence level.”--(W. M. Napier and B. N. G. Guthrie, op cit)

But Tom would rather define these terms differently, as if they referred to two completely distinct phenomena. In this way he can proceed to attempt to employ them in ways never seen in the literature. **Why?**

Tom Bridgman:

For redshifts to be 'quantized', they would have to only occur at certain discrete values. For example, if redshifts were quantized in steps of $z = 0.02$, we would expect to only see galaxies with redshifts that were integral multiples of this value. For a quantized redshift of $z=0.02$, we would only find

galaxies on the green circles surrounding the Earth in the graphic below:



Rick DeLano:

Pardon me, but this is pure balderdash.

I mean, think about it- if Dr. Bridgman were even remotely close to correct in his above claim, how in the world could Hartnett and Hirano's papers ever have passed muster with the referees at *Astrophysics and Space Science*, and *Physical Review D*?

No astrophysicist or peer-reviewed cosmological redshift researcher has ever made the claim Tom advances above.

Instead, we see from the 1990 paper written by actual researchers in the field above, that:

“the redshifts of galaxies are **periodic or ‘quantized’, tending to OCCUR** at intervals...”-- Napier, Guthrie, op cit (emphasis added)

Having first advanced the absurd claim that Hartnett and Hirano are suffering from “pareidolia”, instead of bothering to refute their published data, Tom now sets out to redefine the very words employed in the cosmological literature, thus setting up another, equally absurd “straw man”, by insisting upon invented “criteria” never employed in the literature by any peer-reviewed published author on the subject!

It is worth taking a moment here to examine whether this can reasonably be attributed to an honest error on Tom's part.

During the combox exchange [here](#), this above assertion of Tom's was advanced in the form of a (woefully inaccurate) claim of something supposedly said by Tifft:

 **W.T."Tom" Bridgman said...**

Tifft interpreted his 'quantization' as sharp, concentric shells and this IS the use in the literature. If you don't mean sharp, concentric shells, then don't use the term 'quantization'. The graphic at SDSS looks nothing like concentric shells.

Instead, we find that Tifft is explicitly cited in the very paper which blows Tom's above- attempted straw man into a million tiny pieces:

“the redshifts of galaxies are **periodic or ‘quantized’**, **tending to OCCUR** at intervals of $\sim 72\text{km s}^{-1}$ within binaries, groups and clusters (Tifft 1976, 1977, 1980:.....)”-- Napier, Guthrie, op cit

Now how in the world did Napier and Guthrie get published in a peer reviewed journal (as opposed to Tom’s personal science blog), stating that redshift quantization **and** periodicity- the terms are used interchangeably as we have seen- both **tend to occur** at certain intervals, if Tom is right in his contrary claim below?

Tom Bridgman:

“For a quantized redshift of $z=0.02$, we would only find galaxies on the green circles surrounding the Earth in the graphic below.”

The answer is, they could not have been published, if Tom were right in his misapprehension of Tifft’s papers.

It is instead Tom who has got it wrong.

Again.

[Here is the smoking gun.](#)

See for yourself, by scrolling down to Figure 1.

Tifft’s 1976 paper, cited by Napier and Guthrie above, appears in *Astrophysical Review*.

Figure 1 shows the (amazingly small) galaxy distribution available at that time.

Notice that it is very much like the distributions treated in later papers like Napier and Guthrie, or indeed in Hartnett and Hirano, except that this one is much smaller.

That is, it, like the other distributions reported, **tends to occur** around certain preferred redshift values.

Tifft’s Figure 1, along with Tifft’s commentary, shows that Tom has constructed a straw man. Tom’s claim has never been advanced by Tifft.

Tiftt, to the contrary, tells us that he understands redshift quantization/ periodicity exactly as Napier and Guthrie do (and exactly as Hartnett, Hirano, and Rick DeLano do for that matter):

“Three distinct foreground groups are present **near** 100, 2550, and 4700 km s⁻¹”

Tiftt himself contradicts Tom’s assertion above, and in the comments box exchange.

That is Strike Two.

Tom Bridgman:

In the plot above, there is not even the suggestion of alignment of galaxies along these curved lines. Note that Hartnett & Hirano, using power spectral analysis ([Galaxy redshift abundance periodicity from Fourier analysis of number counts N\(z\) using SDSS and 2dF GRS galaxy surveys](#)) reported redshift periodicities at $z = 0.0102, 0.0246, \text{ and } 0.0448$. All of these values, and their integral harmonics, should be visible in this graphic as well-defined walls of galaxies confined between the green circles. As I will illustrate in the coming posts, many different things can create peaks in power spectra.

Rick DeLano:

Yes, Tom, many things can create peaks in power spectra, **including of course preferred periodic distributions of galaxy count/redshift**, which is exactly what Hartnett and Hirano have in fact shown to be causing the peaks in their survey of the SDSS dataset. The mere fact that you might program your computer to create false peaks, does not constitute evidence that Hartnett and Hirano have botched up their power spectra as you would have (intentionally) botched up yours in such a case.

This is the whole point- they have published, and their work has been accepted, in peer reviewed journals. You, on the other hand, have advanced hand-waving objections about undemonstrated mistakes on your (self published) science blog, and have never so much as suggested a hint of evidence that these peer-reviewed and published scientists have made any errors of procedure.

The claim that “all of these values, and their integral harmonics, should be visible in this graphic as well-defined walls of galaxies confined between the

green circles” is merely a re-statement of your grave misapprehension of the peer-reviewed periodic redshift literature from Tifft all the way up to Hartnett and Hirano, none of which remotely suggests such constraints.

As we have seen, the mathematical assumptions underlying the SDSS survey procedures themselves, notably including the Copernican assumption underlying the two-point correlation function discussed above, would tend to “blur out” all such periodicities, and so **the fact that they are clearly evident even after the incorporation of such procedures** renders the periodic structures visible in the image (and rigorously derived through data analyses by Hartnett and Hirano) all the more striking.

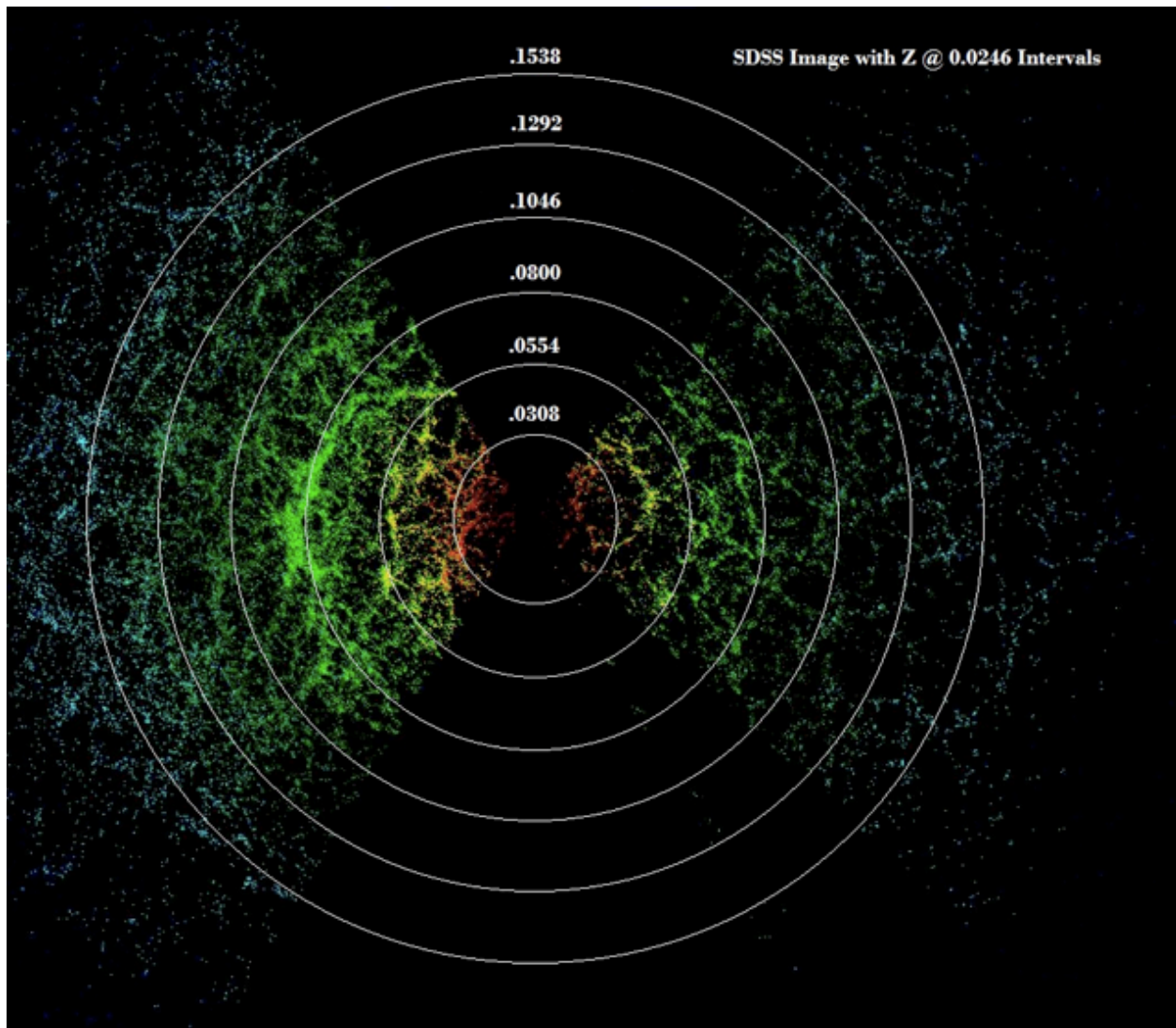
Tom has advanced, yet again, a straw man argument here.

That is Strike Three.

In response to the claim that there is “not even the suggestion of an alignment of galaxies along these curved lines”: the alignments would be expected to tend to occur along z-values consistent with the periodicities defined in the paper, not along the default reference z-value circles drawn by Tom.

The apparent concentric shell structure can be confirmed by the naked eye, simply by looking at the marked tendencies of galaxies to cluster along the concentric shells.

The graphic below again shows that, even though the analysis of the full SDSS data by Hartnett and Hirano is based on much more complete data than this image, nonetheless the tendency toward preferred galaxy count/redshift at the strongest indicated periodicity ($\Delta z = 0.0246$) is **clearly visible** even in this small visually-depicted “slice” of the data:



Tom has claimed- despite visual and data analysis evidence to the contrary- that the preferred values do not exist. Hartnett and Hirano have scientifically demonstrated- based on recognized and peer-reviewed scientific analysis- that they do.

Since Tom likes to toss about diagnoses when confronted with scientific evidence he **refuses to see**, let me suggest that the problem in this case might stem from a different affliction: [myopia](#).

Tom Bridgman:

Yet we see many of these 'walls' of galaxies cutting across the green circles, in violation of the claim that the distribution is spherically symmetric around the Earth.

Rick DeLano:

Tom claims there is no spherical symmetry about Earth (!) in the images.

If true, Tom now would be a candidate for the Nobel Prize, since he would have refuted the cosmological or Copernican Principle all by himself, armed with nothing more than his computer graphics software- and all accomplished on a science blog no less!

Obviously, he hasn't shown any such thing.

Remember Steven Hawking's definition, earlier:

“.....we shall interpret the Copernican principle as stating that the universe is approximately spherically symmetric about every point (since it is approximately spherically symmetric around us).” ---Hawking, S.W. and Ellis, G.F.R., *The Large Scale Structure of Space-Time*, Cambridge University Press, Cambridge, p. 134, 1973. Their reference is to: Bondi, H., *Cosmology*, Cambridge University Press, Cambridge, 1960.

Tom now employs the same approach he tried to use above, with regard to “quantization”. Notice how Tom leaves out that crucial itty bitty little word that Steven Hawking is careful to include:

*“.....we shall interpret the Copernican principle as stating that the universe is **approximately** spherically symmetric about every point (since it is **approximately** spherically symmetric around us).”*

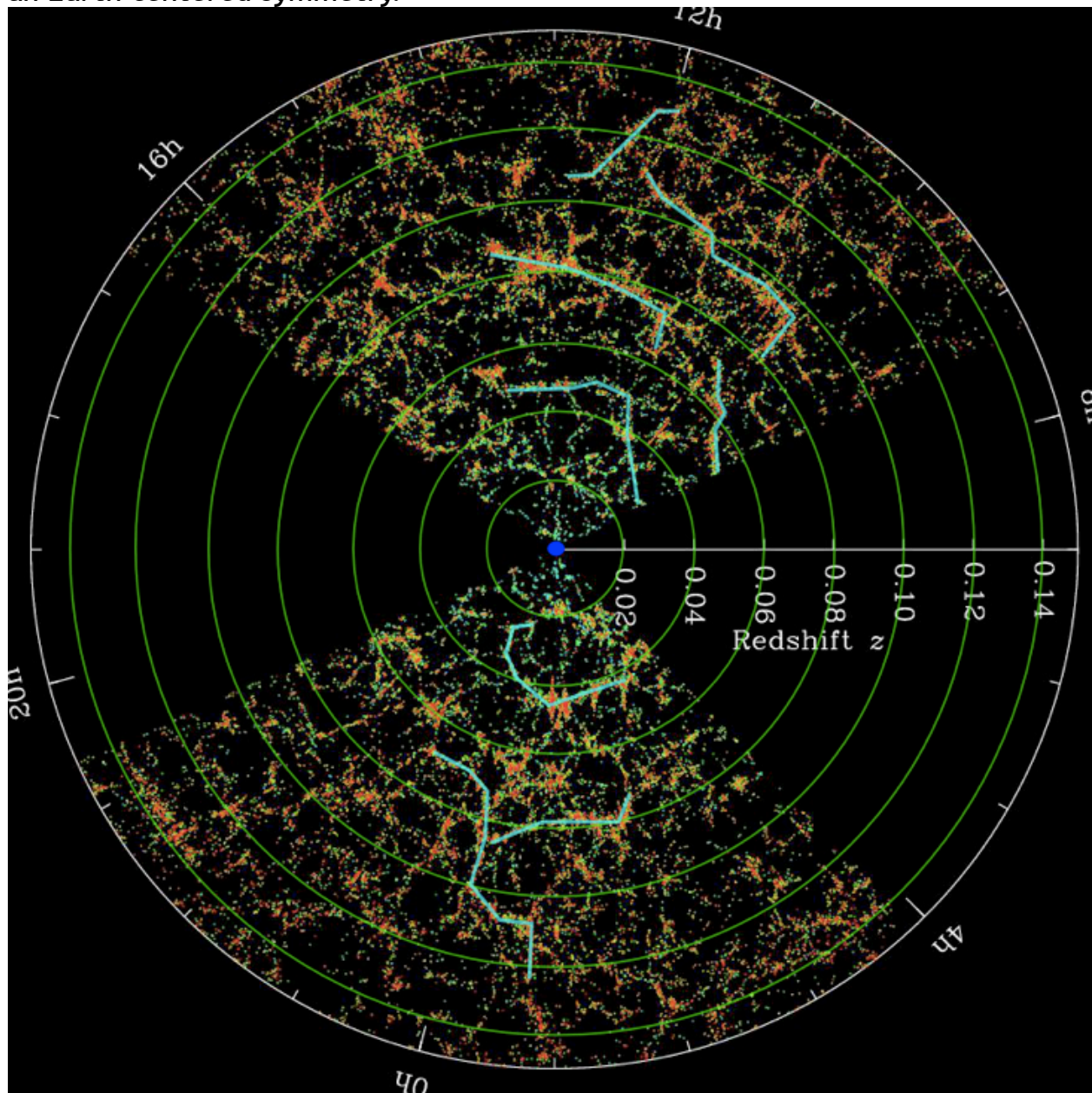
Tom again wants to “move the goalposts”, and to establish criteria which are in fact straw men of his own concoction.

That is Strike Four, and Tom's out.

We tidy up some minor details below:

Tom Bridgman:

Here's some structures I've identified in the SDSS map. None of them exhibit an Earth centered symmetry.



Rick DeLano:

Gee, Tom, wonder why you haven't published this remarkable finding?
Hmm....maybe because you would be required to scientifically demonstrate that these "structures" represent "*something objective in the dataset*"?
Something confirmable through multiple analysis of 1d, 2d, and 3d datasets,

including mass density correlations, Fourier analysis, and $N(z)$ analysis? You know, something like the concentric shell structures centered on the observer in the SDSS image, objectively confirmed by Hartnett and Hirano?

Nice try.

We'll be waiting for the preprint off ArXiv.

But we won't hold our breath.

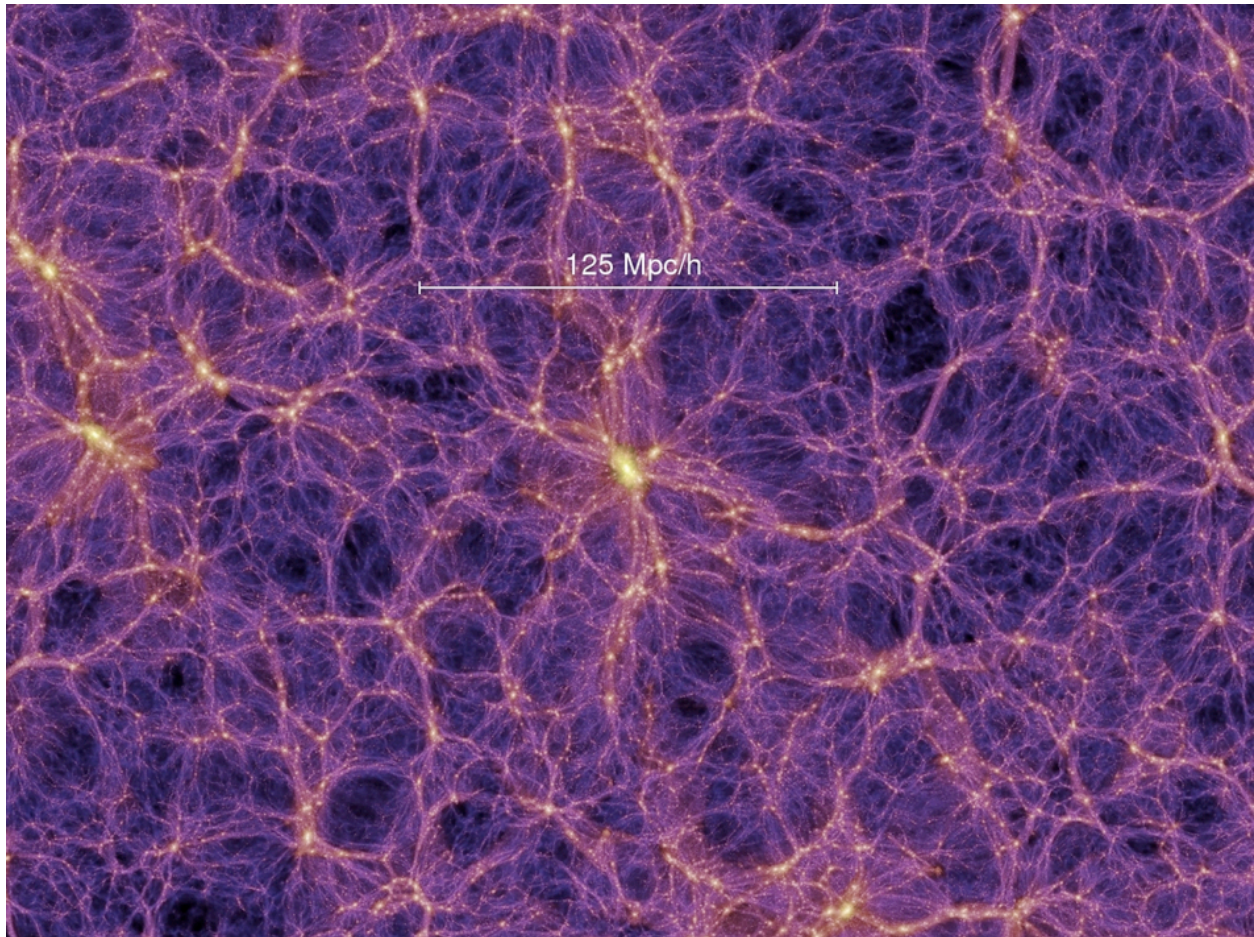
Tom Bridgman:

What is meant by 'periodicity' in the rigorous scientific sense?

Substances that support wave-type motions, such as gases and fluids, can support various periodic behaviors, both in time and space. In fact, Fourier analysis was developed to mathematically handle just these types of physics problems. The superposition of these wave motions will create density enhancements in otherwise uniform gases and fluids.

Is there structure in the SDSS survey?

Absolutely! Modern cosmological simulations predict a pattern of clumping under gravity (including some energy loss by radiative processes in the plasma, which forms due to the energy release of the collapse). Here is a snapshot from one of the modern simulations (see more at [Simulating the joint evolution of quasars, galaxies and their large-scale distribution](#)) which exhibit some similarity to a collection of soap bubbles, where the bubbles enclose 'empty' voids with membranes and filaments of soap and water.



Rick DeLano:

Tom, this is all wonderfully interesting, and you are a wizard with those computer graphics tools. Of course, your **simulated, computer-generated** “bubble universe” above looks nothing at all like the SDSS images we are discussing here.

These sorts of simulations *assume* an initial Dark Matter distribution and then let the software evol it.

Nice trick, eh?

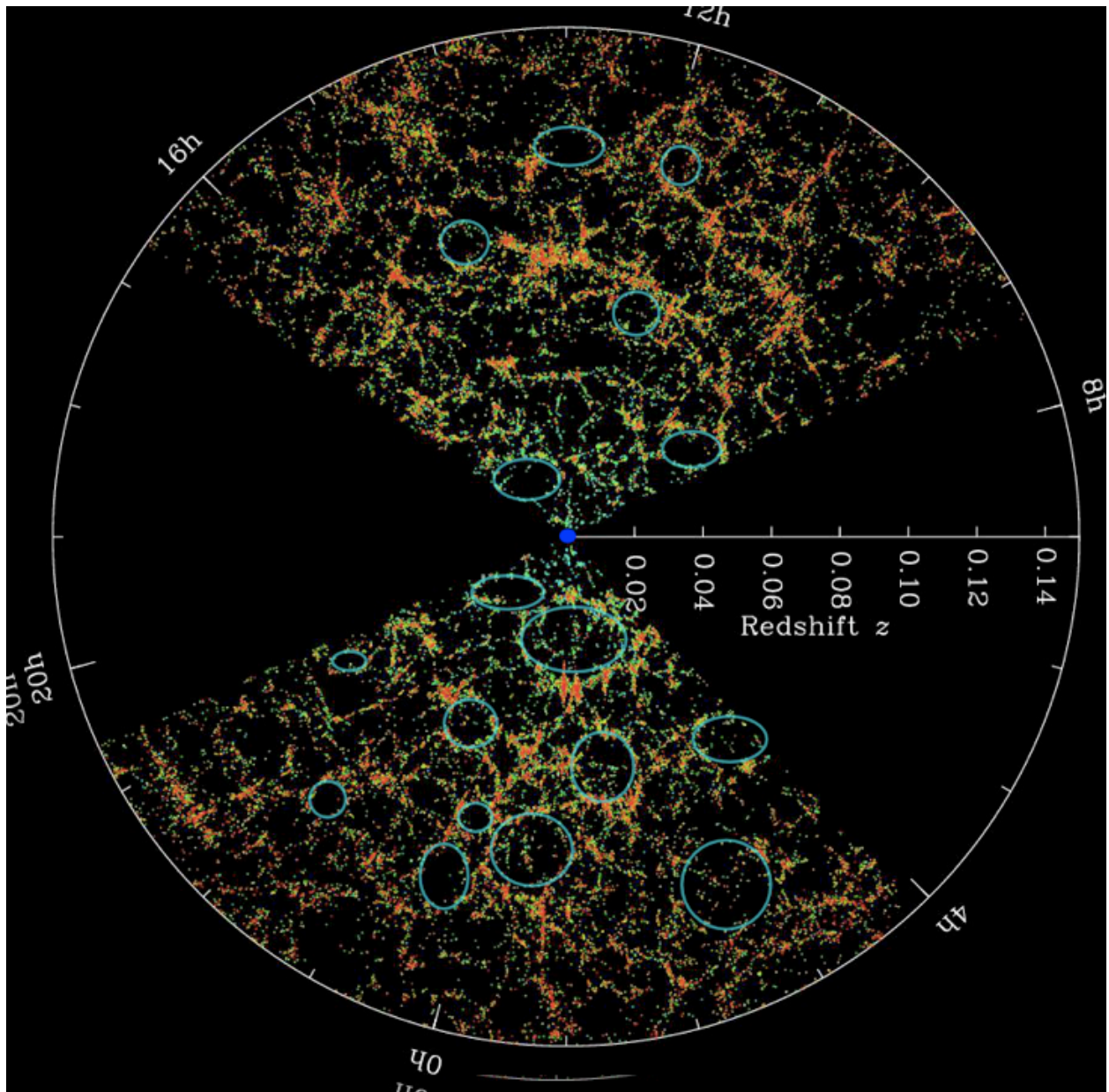
How do you know what distribution to start with? Oh, just play around with it and see what you get, keep fiddling with it until it kinda sorta looks the way you think might help.....

But Tom's fictitious bubble universe above lacks- now wait for it- **the concentric shell structure centered on the observer** we find over here in the **real** universe- you know, the one visible in the SDSS image and objectively validated by Hartnett and Hirano!

Nice colors though.

Tom Bridgman:

It is possible to identify a number of apparent cross-sections of 'bubbles' in the structure. I mark just a few in the graphic with light-blue ovals, but many more, with overlaps can clearly be identified. These are like the slices through many of the cosmological simulations



[Click for larger version](#)

This is a slice through the data incorporating distances inferred from the galaxy's redshift value.

Rick DeLano:

Now all you need to do is derive an explanation for the distribution of your bubbles- taking into account the periodicities in galaxy distributions in the same image of course- by application of the relevant data analysis tools

required of actual researchers who actually get published in actual peer reviewed journals concerning these important matters.

In the absence of such, it doesn't seem that you have much of a point here when it comes to answering Hirano and Hartnett's rigorously demonstrated SDSS galaxy redshift periodicities centered on Earth, do you?

What happens when you look through the data in directions perpendicular to this, if you were to see these galaxies projected on the sky at night? Does it retain a similar bubble-like structure?

Tom Bridgman: Here's a sample from the [NYU value-added catalog](#).

This is how the SDSS galaxy distribution would look if we could see it projected on a section of the sky about 100 degrees x 60 degrees in area. The animated gif steps through the data at different values of redshift, z . We see structures, very similar to the filaments and bubbles in the SDSS projection in z , out to about $z = 0.2$, suggesting that the structures we observe look the same from at least two very different directions. Beyond $z = 0.2$, the galaxies become too sparse to identify any structure.

Rick DeLano:

This does nothing to refute Hartnett/Hirano, indeed this is just the same evidence we have already seen (although from an earlier Data Release, DR 2 as opposed to the [more recent DR 7](#) used in the images linked above) presented sequentially by z -value instead of concentrically by z -value.

The gif steps here show the same evidence of concentric bands as in the SDSS image, except in the gif sequence they are presented sequentially on top of each other, instead of laid out in a complete picture as [here](#), and rotated so as to be perpendicular to the SDSS image mapping (the concentric bands are now on the sides instead of on top and bottom).

Notice how the gif steps show the same strong preferred distributions around the z values consistent with, for example, the concentric shells already referenced in Hartentt/Hirano.

Tom Bridgman:

[Astronomy Picture of the Day](#) also recently posted a release of the 2MASS survey that plotted [one million galaxies on the sky](#). I leave it as an exercise to the reader to identify structures (walls & bubbles) in this map. The structures revealed in this map resemble those in the SDSS survey in angle and z plotted above, consistent with the idea that the universe is homogeneous.

Rick DeLano:

Amazingly, Tom's own link states:

"Are the nearest galaxies distributed randomly? A plot of over one million of the brightest "extended sources" detected by the [Two Micron All Sky Survey](#) (2MASS) shows that they are not."

So I guess it's no longer a question of whether there are departures from homogeneity- since even Tom's own link explicitly states that there are- but instead whether these constitute a threat to Tom's cosmological position, whatever that might be.

Judging from Tom's reaction to the Hartnett/Hirano and other periodic redshift literature referenced here, it certainly appears that they do!

Tom Bridgman:

Does the structure in the SDSS surface exhibit a high degree of symmetry around the Milky Way Galaxy?

There is a selection effect created by the fact that observers look outward from the Earth radially and this places us in the center of the data, with everything else scattered beyond that.

Rick DeLano:

Another possibility is that we are at the center of the Universe. Every time we have looked deeper into space, we have found more evidence that this is indeed the case. Beginning with Edwin Hubble's "nebulae", back in the first half of the 20th century, these deep space observations have tended to reaffirm his initial, almost desperate reaction:

“The departures from uniformity are positive; the numbers of nebulae increase faster than the volume of space through which they are scattered. Thus the density of the nebulae 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 representing effects of spatial curvature.” --E. Hubble *The Observational Approach to Cosmology*, 1937, p.58

The concentric shell structure identified in the SDSS data by Hartnett and Hirano- structure plainly evident even to the naked eye, and strongly confirmed by peer-reviewed published data analysis- lends new support to this **geocentric** view, especially when considering the fact that the SDSS data are compiled under Copernican assumptions such as the two-point correlation function.

Tom Bridgman:

These plots only go out to $z = 0.14$ (or about $0.14 \cdot (3e5 \text{ km/s}) / (72 \text{ km/s/Mly}) = 580$ million light years). You can obtain a more accurate distance using the [cosmology calculator](#) at [Ned Wright's Cosmology Tutorial](#) site. The SDSS survey extends far beyond this. To use this aspect of the geometry to claim the Earth is the center of the Universe is as bizarre as standing on a mountaintop, noticing that your view extended equally in all directions around you, and then declaring YOU are the center of the universe.

Rick DeLano:

We have already established that Hartnett/Hirano's study includes the **full SDSS dataset**, not merely the slice of it in the image. Non-homogeneous, explicitly non-Copernican, periodicities have been shown through analysis of the entire SDSS dataset, and indeed have been shown in other studies to extend to redshift values [far](#), [far beyond it](#).

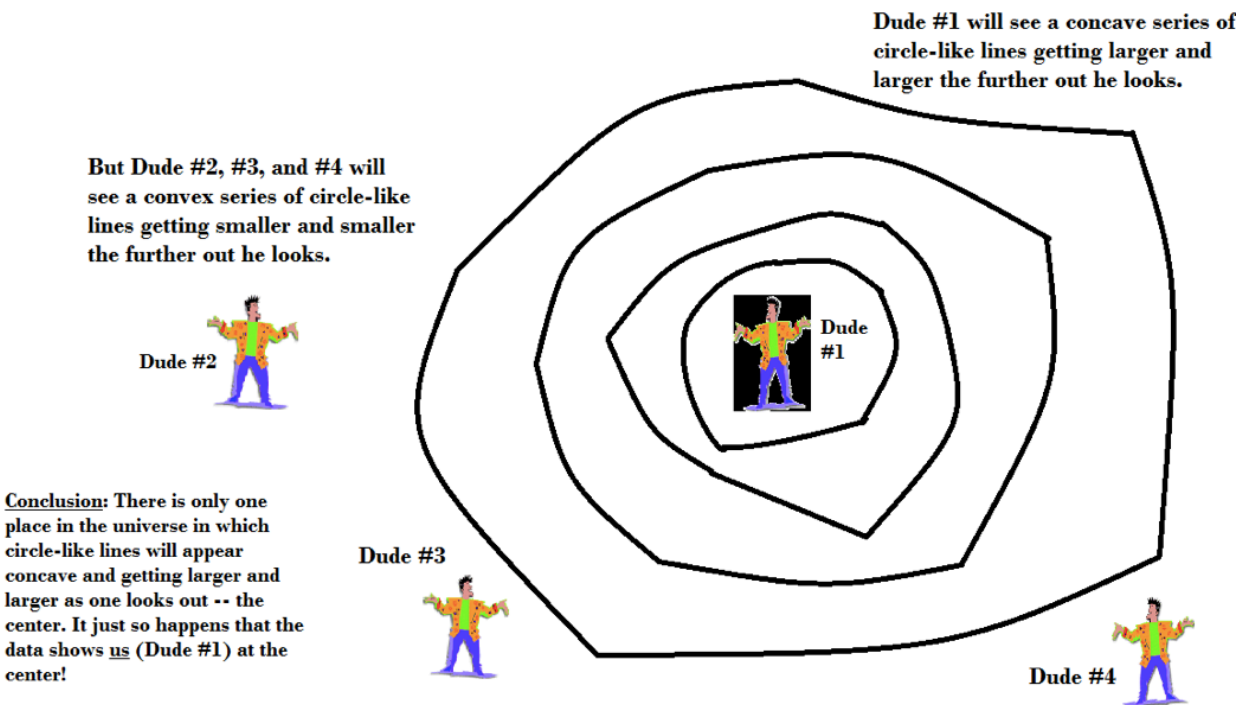
But here is what is really bizarre.

Tom refuses to notice or acknowledge this extremely salient point: the SDSS image shows that other galaxies we can see would not see the same view we do.

This is a direct contradiction of Hawking's elucidation of the Copernican principle, above.

Seriously, Tom- try this, just one time.

Look at the shell structures, and notice that if you were to place yourself, say, in one of the galaxies off toward one of the edges of the image, **you would not see the same concentric shell structures we see from the center- that is, from Earth.**



This is **exactly the opposite** of what the Copernican principle assumes, remember?

“.....we shall interpret the Copernican principle as stating that the universe is approximately spherically symmetric about every point (since it is approximately spherically symmetric around us).” ---Hawking, S.W. and Ellis, G.F.R., The Large Scale

Structure of Space-Time, Cambridge University Press, Cambridge, p. 134, 1973. Their reference is to: Bondi, H., Cosmology, Cambridge University Press, Cambridge, 1960.

“.....We have no scientific evidence for, or against, this assumption. We believe it only on grounds of modesty: it would be most remarkable if the universe looked the same in every direction around us, but not around other points in the universe.” --Stephen Hawking “A Brief History of Time” 1988 p.42

This is your Copernican dilemma, Tom, and you need to address it, substantively and objectively, and dispense with the hand-waving incantations of “pareidolia”.

Indeed, it is an excellent and useful analogy to imagine ourselves standing on a hilltop, and surveying an endless expanse of featureless desert.

We cannot know from this observation that we are in the center- after all, there might be another hill out there somewhere, beyond our observable surroundings.

But we can know, and in fact we **do** know- it would be folly to ignore it!- that we clearly **do** occupy a special, a unique position, with regard to **all that we can observe**.

We have already seen [the evidence](#) that this periodic structure extends even much further out into the universe than the SDSS image shows.

And once the interested reader turns his or her attention to the astonishing geocentric alignments in the Cosmic Microwave Background (the so-called “Axis of Evil”).....well.

That’s the real killer.

But that’s another post, and will be kept in reserve for now (these astonishing geocentric alignments in the CMB are covered in my presentation at GeoCathCon I, available [here](#)).

Tom Bridgman:

So I've tried to identify the 'concentric/geocentric structures' claimed by Mr. DeLano and others, but no objective tests seem to support the claim.

Rick DeLano:

To the contrary. All the **objective** tests in this exchange support the claim.

Hartnett and Hirano have published a study recounting each and every step taken in these objective tests.

All Tom has supplied is computer-generated pareidolatry, which does nothing at all to address the objective results reported in Hirano/Hartnett and the many other studies reporting periodic, Earth-centered redshifts.

Since Tom's computer graphics do not address the scientific evidence presented here, it is instead he who has failed to address the objective tests.

Tom Bridgman:

This suggests that the 'concentric structures' are a form of [pareidolia](#) and only exist in the mind of the observer who wishes them to exist.

Rick DeLano:

The denial of the concentric structures, visible to the naked eye and confirmed by extensive data analysis in published scientific studies, suggests instead a form of [myopia](#), related to a strong determination in the mind of Tom Bridgman to ignore them.

Tom Bridgman:

As I have demonstrated above, this was a very simple set of tests, which I performed with very simple, and freely available, graphics tools. Yet Mr. DeLano was unable, or unwilling, to do it himself. Why?

Rick DeLano:

Since your graphics do not address in any way at all the scientific evidence which has been staring you in the face since my [first comment](#) posted on your blog months ago, let me, in turn, ask....why?

You have promised many times to refute Hartnett and Hirano, and identify their errors.

Yet you still have not done so.

Why?

No one else has published anything along these lines either, Tom.

Why?

We are all still waiting for you to fill this void with something more substantial than (computer generated) bubbles.

Let us know when your paper is up on ArXiv.org, or accepted for publication in Physical Review D.....

Until then!