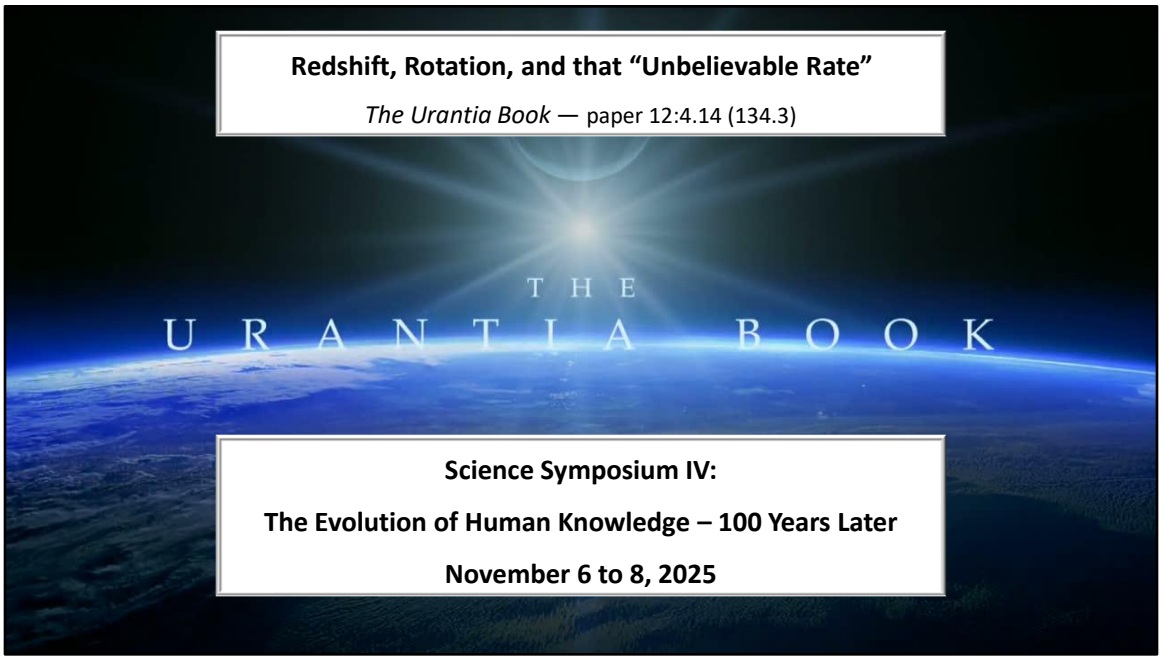
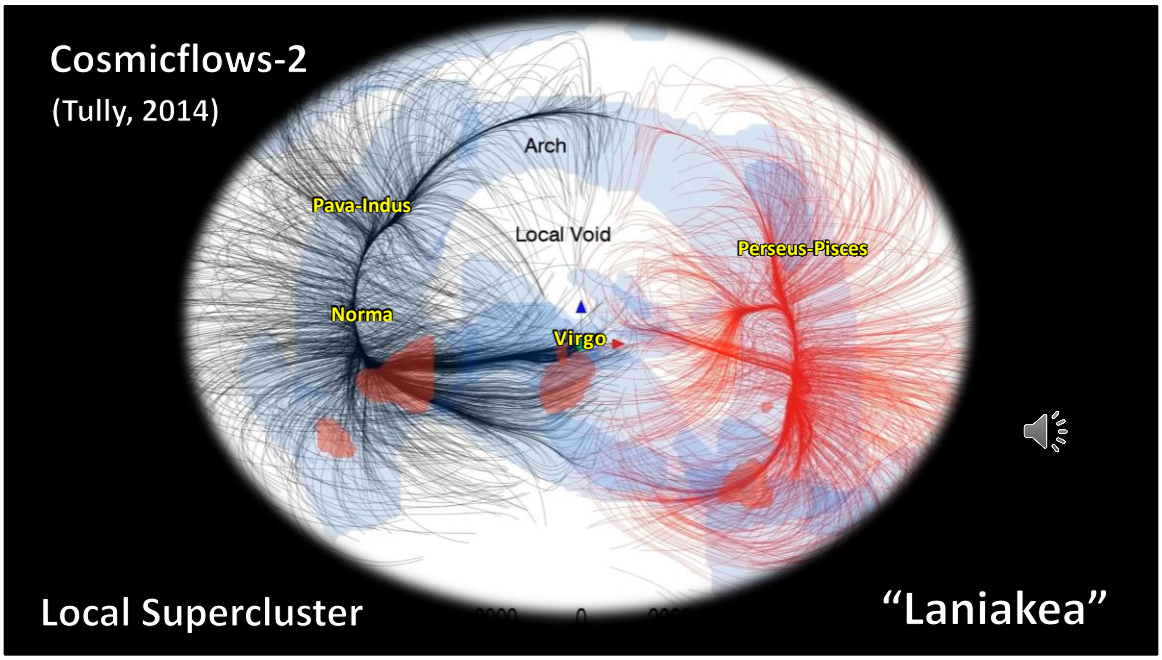


Science Symposium IV:
The Evolution of Human Knowledge – 100 Years Later
November 6 to 8, 2025

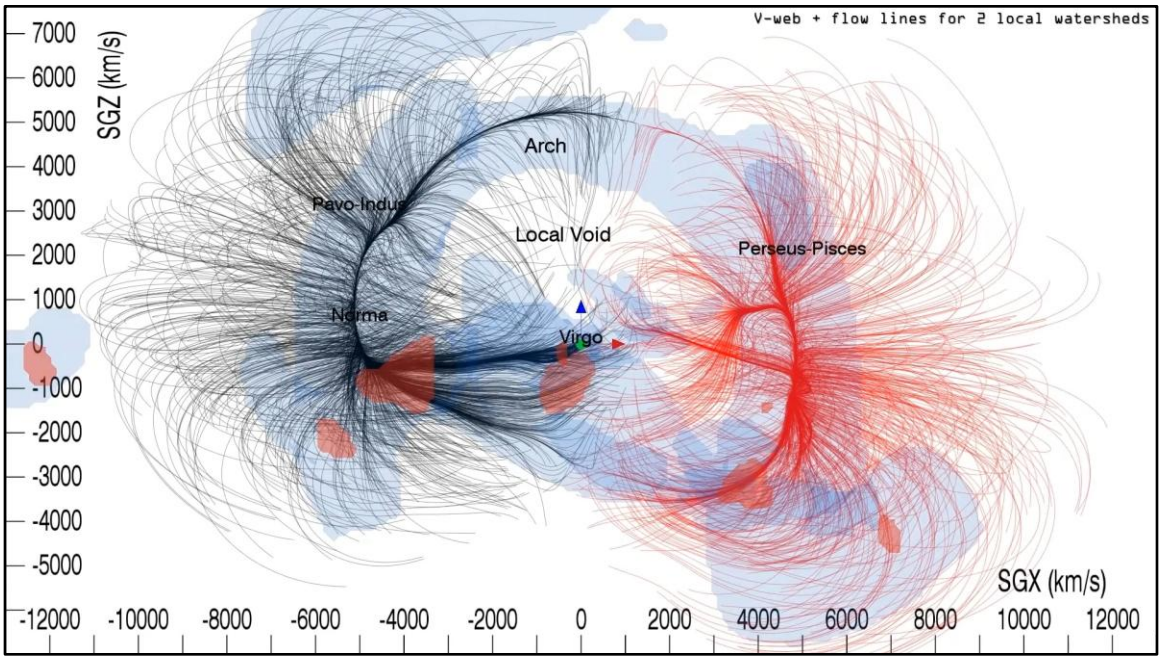
REDSHIFT, ROTATION, AND THAT "UNBELIEVABLE RATE"

A presentation by Nigel Nunn



Redshift, Rotation, and that “Unbelievable Rate”

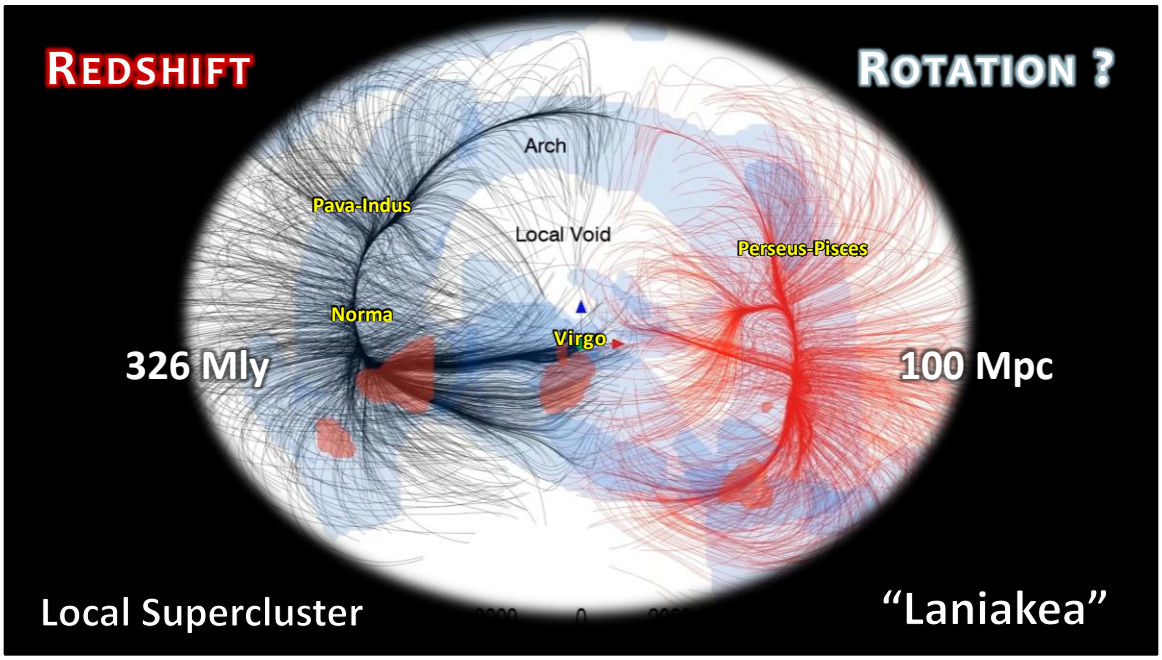
In 2014, astronomer Brent Tully and his group presented this model of a local “**cosmic flow**”.



[**MOVIE**]

This was their attempt to map the distribution and motion of all the energy, mass and matter within our local supercluster of galaxies, so-called “Laniakea”.

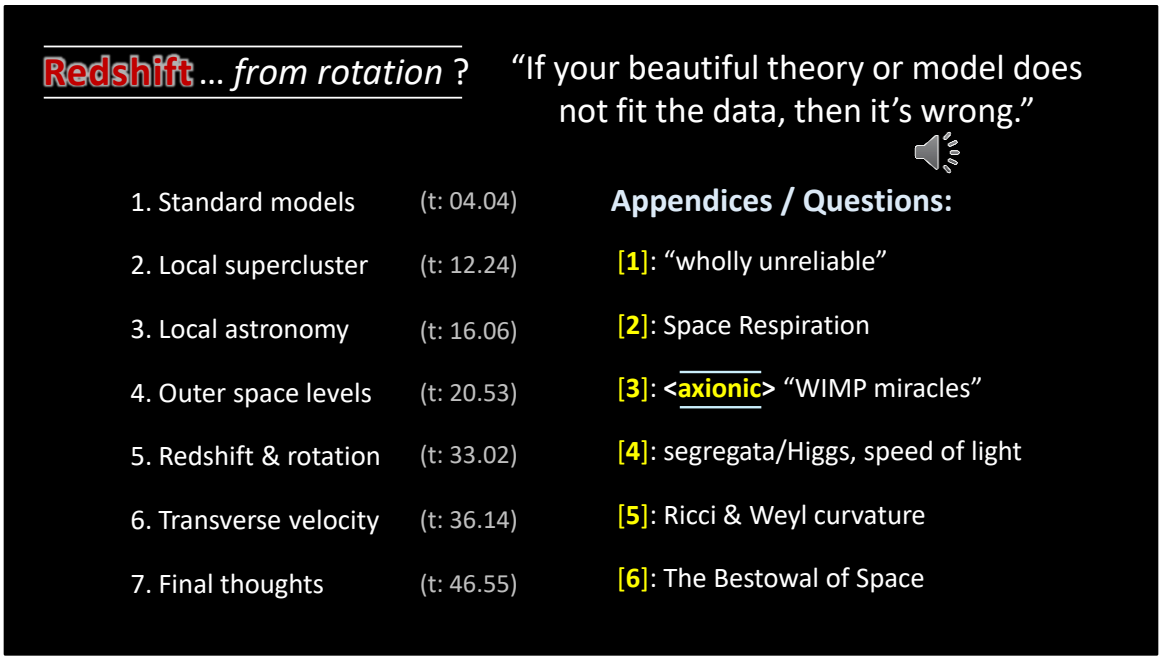
Now, within this local region of space astronomers have a number of techniques for measuring distance, and for proving that this local bubble of space is expanding. However, as we probe …



… deeper into space, native cosmology increasingly depends not on actual measurements of distance, but on assumptions about **redshift**.

Regarding redshift, the Urantia Book makes an extraordinary claim: that the enormous redshifts of galaxies in deep space are due NOT to a **runaway expansion**, but to a number of causes, the greatest of which is **rotation**.

By combining a system of rotations with an expansion and contraction of all space, these papers provide a fresh explanation for the pattern of redshifts we observe. And in the same way that Kepler’s simple insight changed our model for the solar system, these fresh ideas about redshift imply a remarkable new model for cosmology.



But how on earth do you get **redshift** from **rotation** ?

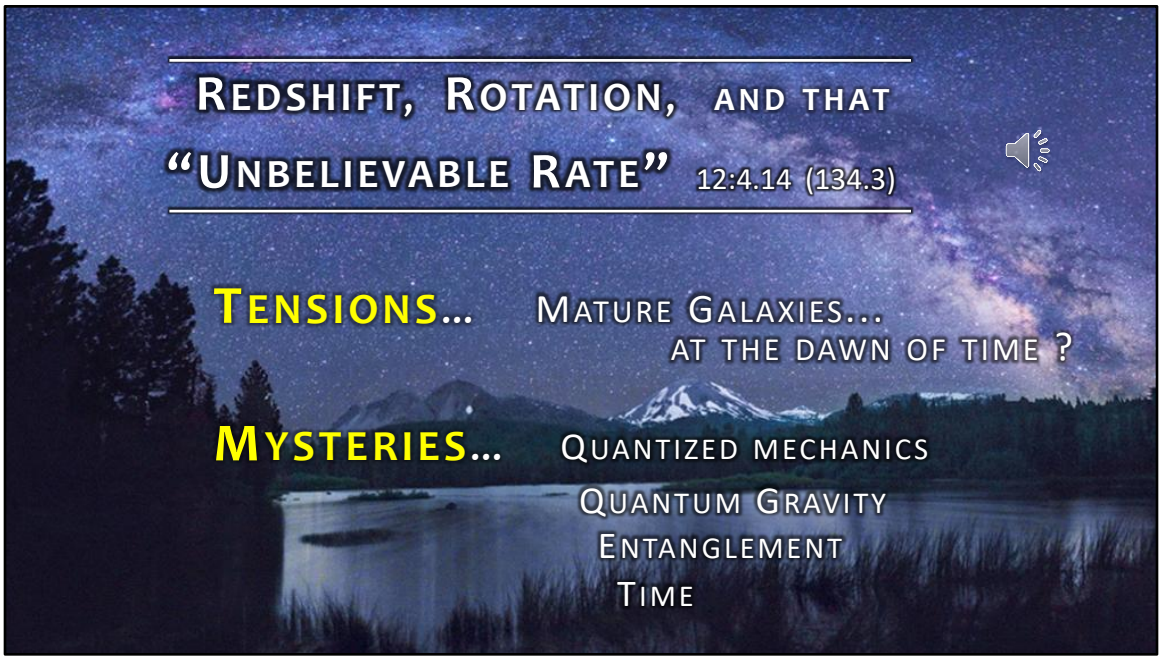
As we'll see, getting cosmological redshift from rotation is surprisingly simple. But before we get to that, we should keep in mind something a famous physicist, Richard Feynman, once famously said. To paraphrase:

"**If your beautiful theory or model does not fit the data, then it's wrong.**"

Since a "Urantia Book model" is so unorthodox, and vast, before we try to use this model to explain redshift, we should check how it lines up with some basic facts of science. To help set the stage, we'll begin by reviewing some fundamentals:

- First, those "**standard models**" of Physics and Cosmology.
- Next, we'll check what astronomy reveals about our region of space.
- Then we'll compare all this with those "**outer space levels**" the Urantia Book describes.
- Which will bring us to the redshifting of light, and the effect of relativistic rotation.
- Finally, we'll collect some final thoughts about what we find.

If time allows, I've added (as **Appendices**) a few highlights worth exploring more deeply. So, let's dive in.



REDSHIFT, ROTATION, AND THAT "UNBELIEVABLE RATE"

And so, let's begin.

A century of progress in both cosmology and particle physics has left us with certain **mysteries** and **tensions** in current standard models.

At the largest (cosmological) scale, astronomy reveals apparently mature galaxies existing at what was thought to be "**the dawn of time**".

At the smallest, "quantum" scale, **many** questions remain.

Safe to say, at the cutting edge, scientists might feel increasingly justified in questioning certain assumptions about what we thought we knew.

For students of the Urantia Book, this current curiosity about truly fundamental things raises the question: Can the Urantia Book help to solve these mysteries, and resolve these tensions?

Let's set the stage.

1. STANDARD MODELS

Between about 1910 and 1930, a few bright minds were formulating ideas about two deep mysteries confronting the science of the day. One of these mysteries involved the quantization and interaction of energy and mass. The other involved cosmology, the distribution and motion of energy, mass and matter throughout the universe.

By 1933, foundations for particle physics and cosmology were taking shape, and the almost inevitable trajectory of both had become predictable – particle physics would get lost in "quantum fields", while cosmologists would feel compelled to assume some sort of "Big Bang" origin for the universe.

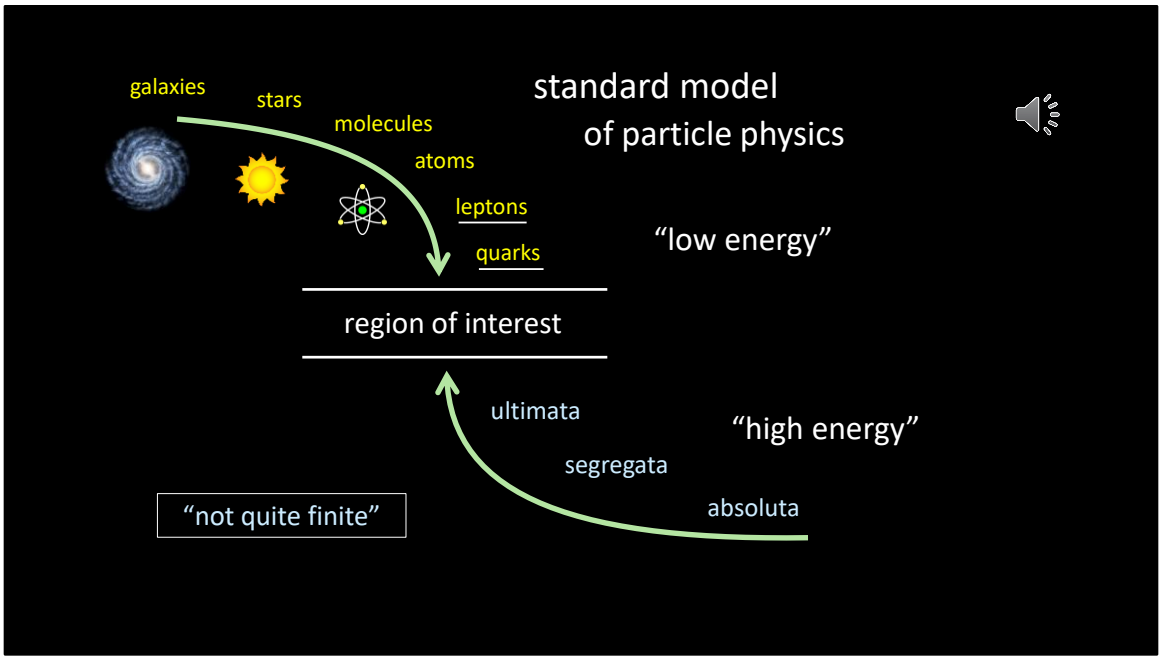
So in 1935, in the spirit of [quote] "**authoritative elimination of error**" (101:4.6), the authors of the Urantia Papers revealed very different foundations for both.

Their foundations for cosmology are what we'll explore today. But since these foundations depend on energy, mass and matter, that is to say, particle physics, we should spend a few minutes reviewing what these papers say that energy, mass and matter actually are.

Let's start with what we know:

- - - - - - - - -

(Quantization) Niels Bohr, Louis de Broglie, Wolfgang Pauli, Werner Heisenberg, Erwin Schrodinger.
(Cosmology) Vesto Slipher, Henrietta Leavitt, Willem de Sitter, Georges Lemaître, Edwin Hubble.



Native science has built up a compelling tale about how galaxies and stars are built up from clusters of atoms, and how atoms are built from clusters of leptons and quarks.

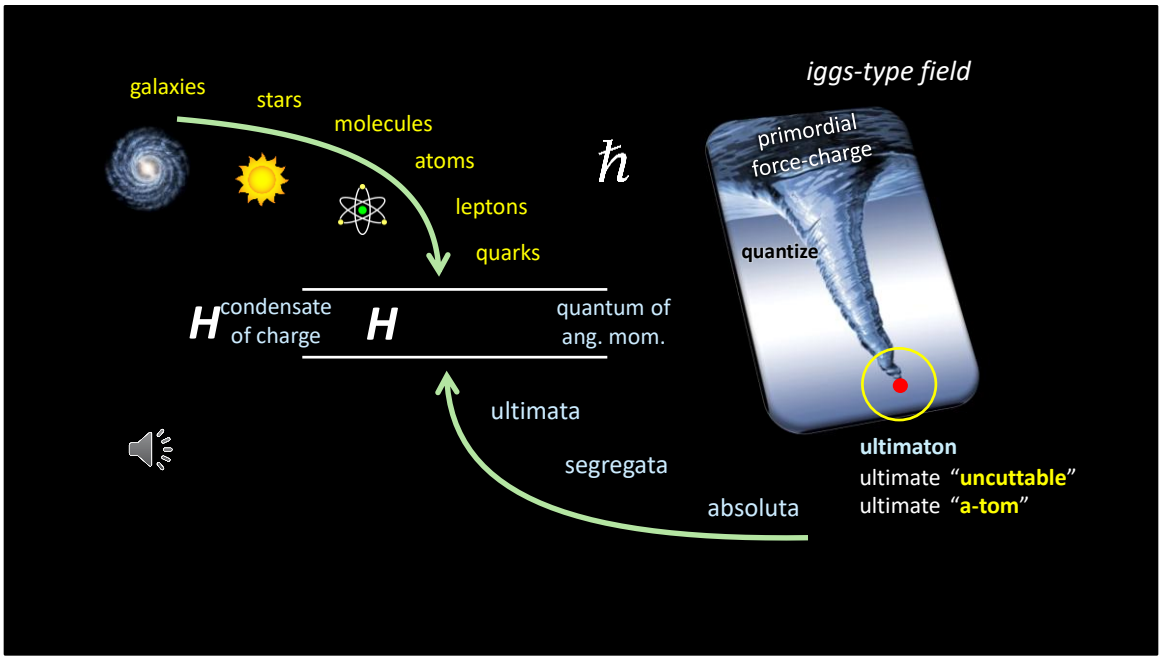
Currently, these leptons and quarks are thought to be **elementary**, that is to say, not made from smaller parts.

This scheme, based on the interaction of leptons and quarks, is called the "standard model of particle physics", and it describes most things we see really well. But in particle physics, this model is thought of as an effective, "**low energy**" approximation. Which implies another "**high energy**" domain…

Which is where the Urantia Book comes in. The Urantia Book approaches this standard model from the other – **high energy** – side, introducing these **ancestral** levels of **not quite finite** stuff.

In the middle here, between what we can measure and what's been revealed, we have "**a region of interest**". It's interesting to scientists – they want to know more about leptons and quarks.

It's interesting to students of the Urantia Book – for reasons we're about to see.



Regarding this standard model, two things are missing from this picture… First,

Planck's quantum of **angular momentum**,
and what we call a "**Higgs-type** field".

What if we put these two together…

this condensate of charge, and
this quantum of angular momentum?

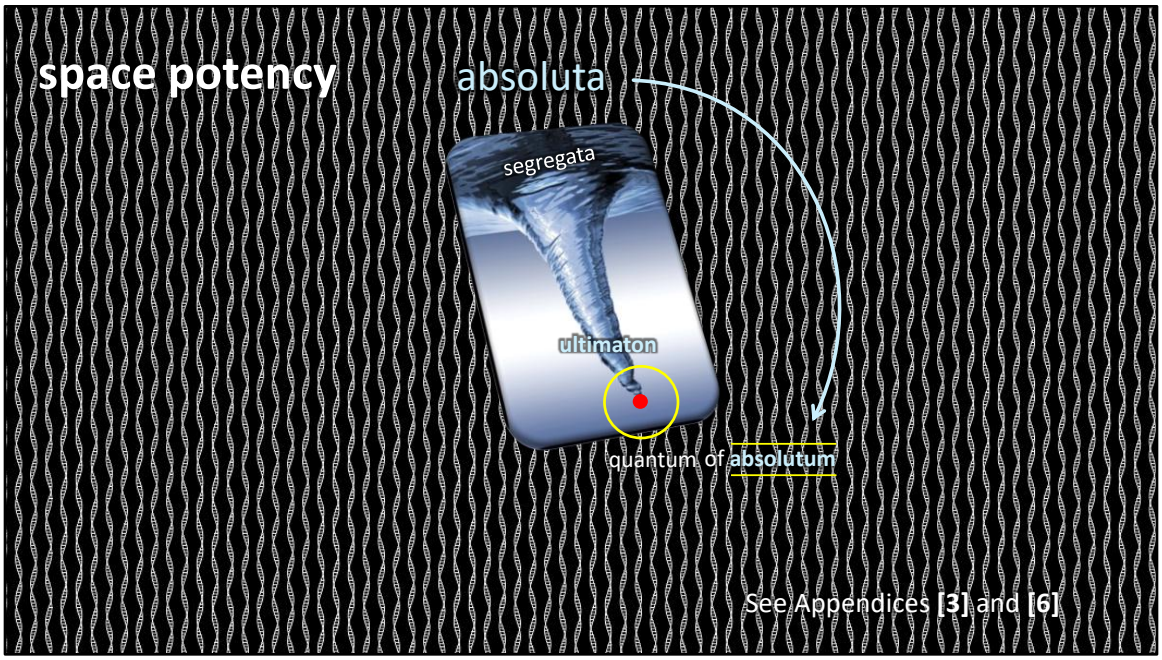
Well… given the way that angular momentum in a superfluid tends to quantize, a quantum of angular momentum acting in this (superfluid) condensate of charge implies a **vortex**, the very tip of which becomes a point-like thing: a spinning, irreducible quantum of **ultimate** energy density: the **<ultimaton>**.

And since this <**ultimaton**> is literally…

the ultimate **uncuttable** thing,
the ultimate "**a-tom**",

this name – **ultimaton** – is certainly appropriate!

Now, for the experts…

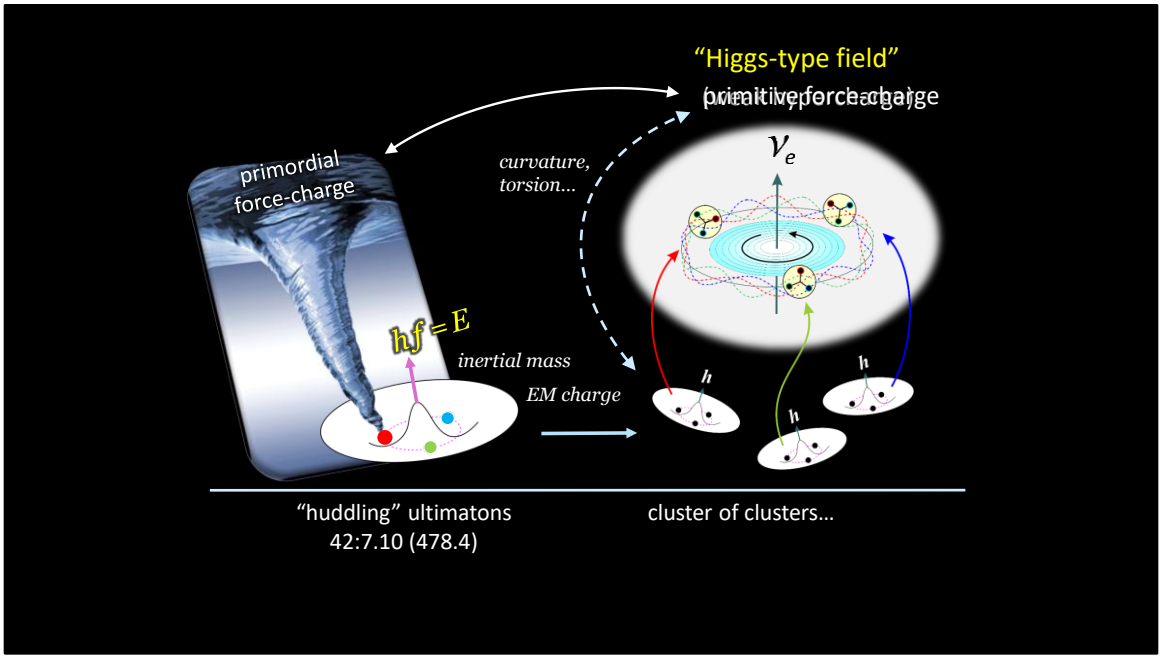


… notice a connection between "**space potency**" and **ultimatons**.

Since "space potency" is also called <**absoluta**>, we can make a case for this <**ultimaton**> being… a quantum of Paradise <**absolutum**>.

More on this in **Appendices [3]** and **[6]**.

Meanwhile, …



… that famous (but unexplained) "**huddling**" proclivity of ultimatons (42:7.10) allows tiny clusters naturally to form.

And from such clusters of huddling ultimatons, we get these **neutrino-like** things, tiny building blocks for standard model leptons and quarks.

All spinning in a background field of primitive **force-charge**,
that standard model "**Higgs-type field**".

Now, if we simply **identify** this standard model field, of

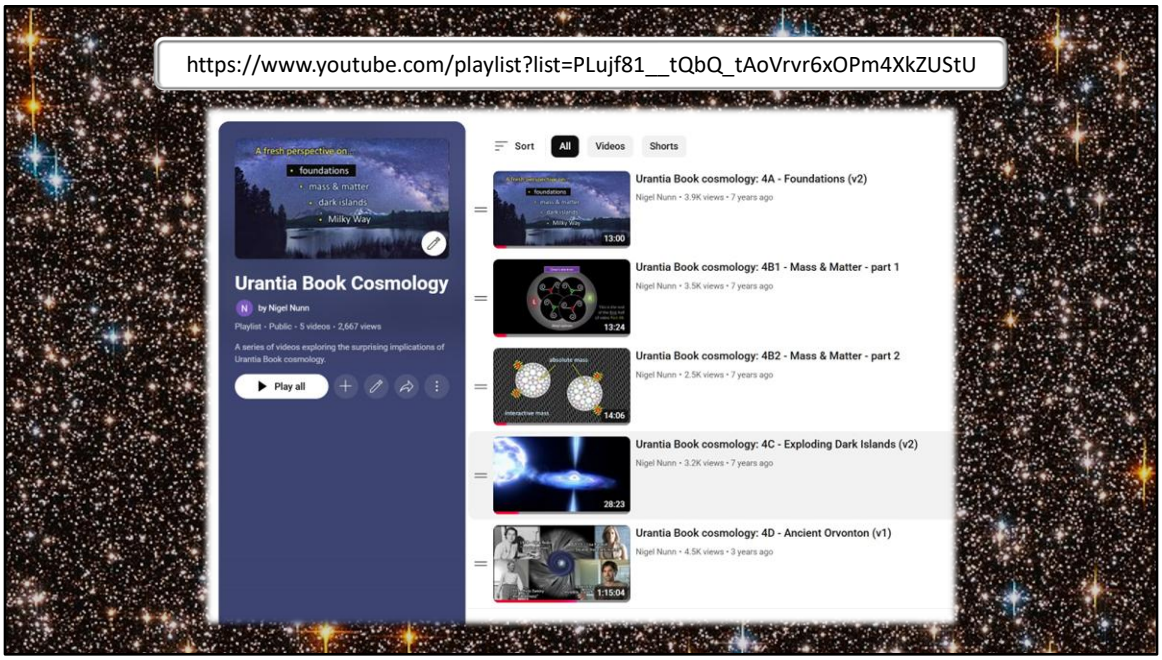
> **primitive, primordial** "**weak hypercharge**" with the Urantia Book's **primordial force-charge**,

we solve a few deep mysteries of particle physics…

In standard model terms, what we have here are structures of quantized weak hypercharge, acquiring inertial mass – and electromagnetic charge – by **interacting with** that "condensate of charge", the very stuff from which ultimatons are made.

That's a quick review of energy, mass and matter from a Planck scale view.

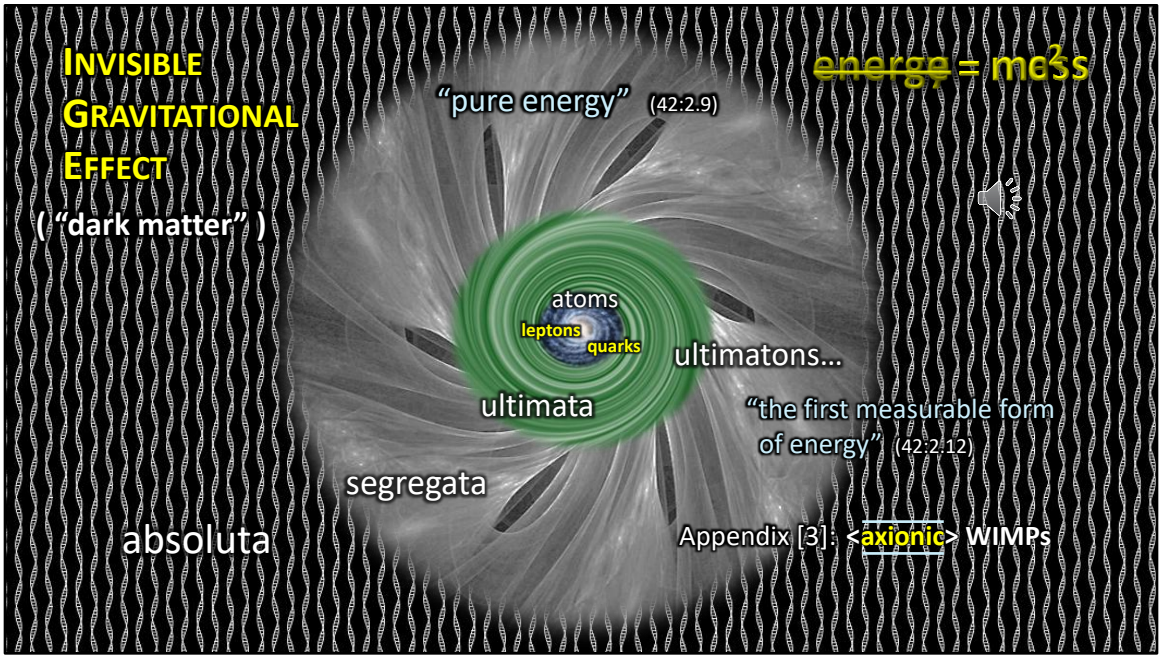
For those who'd like a closer look, …



… we go into more detail in these previous parts. See YouTube playlist,

https://www.youtube.com/playlist?list=PLujf81__tQbQ_tAoVrvr6xOPm4XkZUStU

Let's now shift to a more astronomic, or "**cosmological**" perspective.



In the Urantia Book, the pre-history of a spiral galaxy begins when a Primary Force Organizer interacts with <**absoluta**>, **condensing** a halo of <**segregata**>. An Associate Force Organizer then spins up this superfluid stuff, some of which begins to **quantize** as ultimatons.

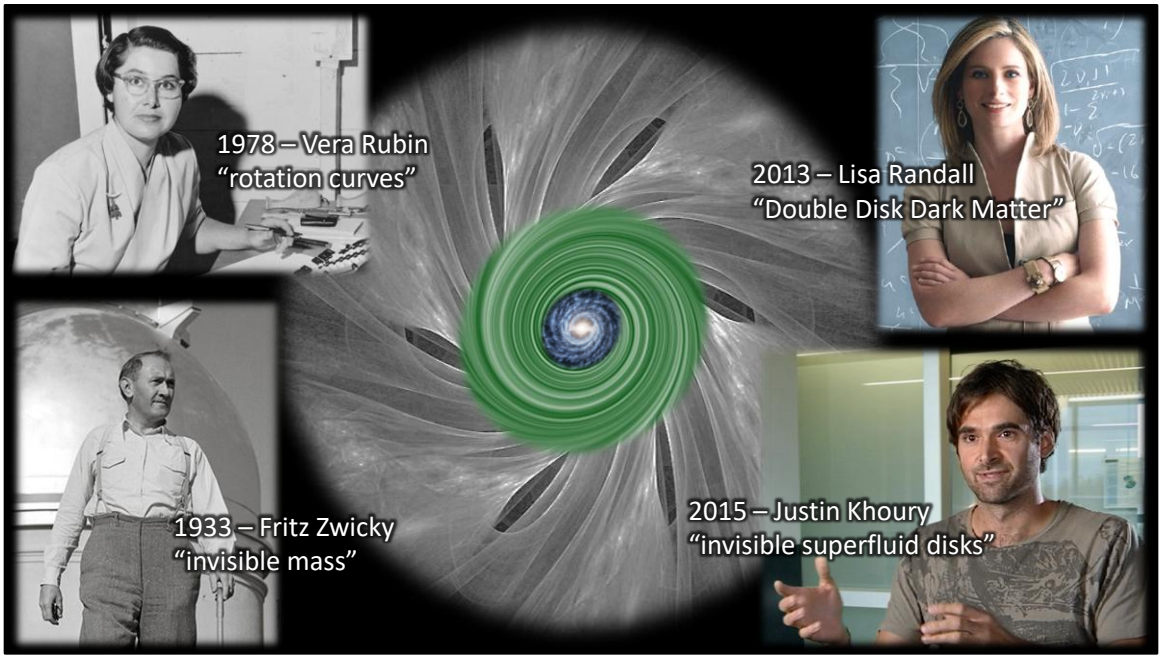
Some of those ultimatons then begin to cluster (as we just saw), becoming standard model atoms, built up from leptons and quarks. However, being pre-electronic, neither segregata nor ultimata interact with electromagnetic light. So, both this halo of segregata and this disk of ultimata are invisible, or "**dark**".

Notice what's just happened: by describing such foundations for galaxies, the Urantia Book has revealed two distinct sources of invisible gravitational effect, what astronomers currently call "**dark matter**":

Here, recall that in **42:2.9**, <**segregata**> is also called [quote] "**pure energy**". So, following Einstein, if we divide all that energy by the speed of light, squared, we get an awful lot of... **mass**. Or rather, a whole lot of invisible gravitational effect.

Meanwhile, three paragraphs later in **42:2.12**, <**ultimatons**> are described as [quote] "**the first measurable form of energy**". In **Appendix [3]** we say a little more about why ultimatons turn out to be the ultimate (so-called) **W.I.M.P.**, a second source of invisible gravitational effect.

What makes this interesting …



… is that by 1935, 2 years after Fritz Zwicky first noticed the need for invisible mass;

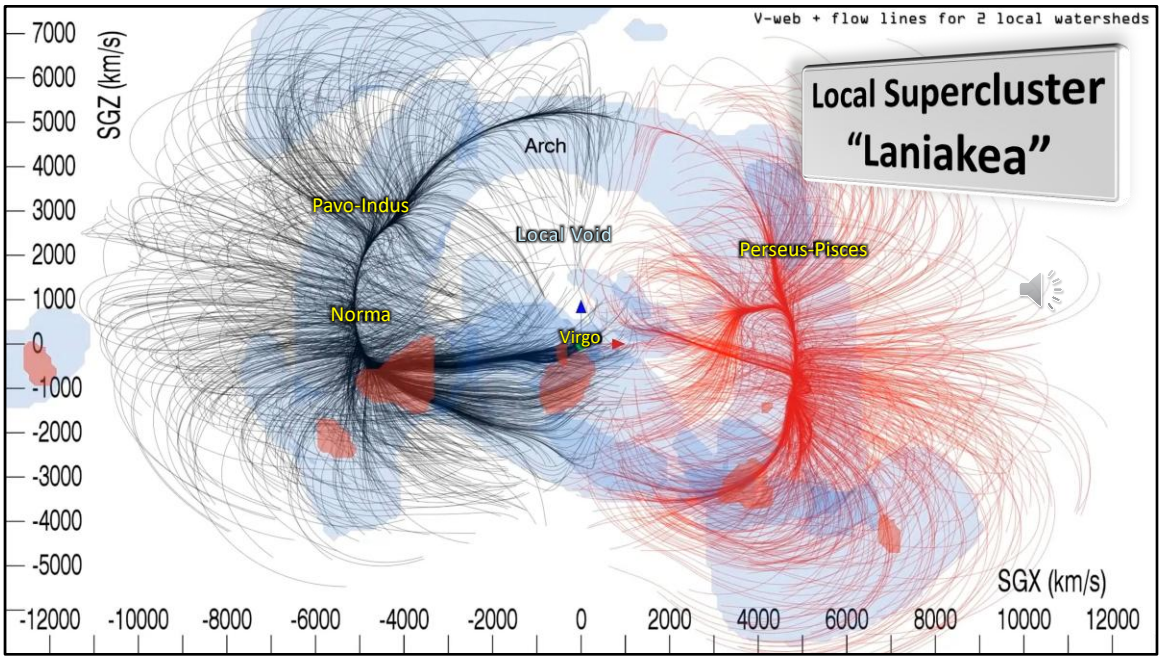
40 years before Vera Rubin measured those “flat rotation curves” of spiral galaxies;

the authors of the Urantia Book had presented – or predicted – exactly the sort of model that researchers have recently begun to explore.

A model that assumes – or predicted – the sort of Higgs-type field that both of our “Standard Models” require. In 1935.

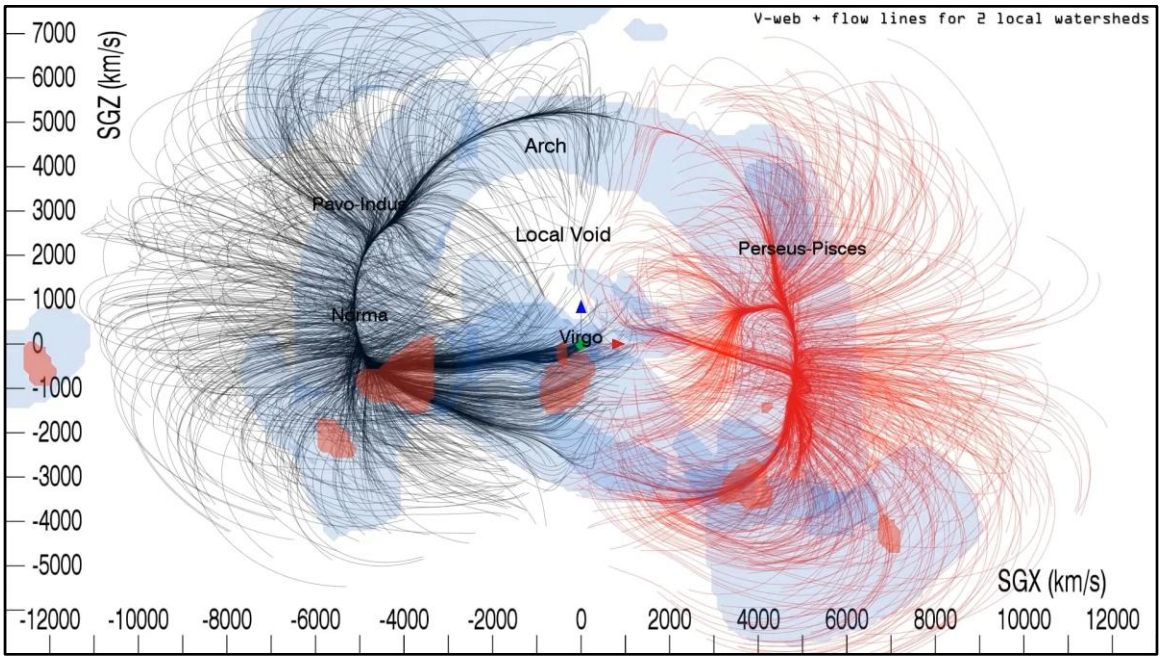
* * *

With this background in place, let’s now consider the distribution and motion of energy, mass and matter throughout the universe.



2. Local Supercluster

In 2014, astronomer Brent Tully and his group presented a study of our local supercluster, so-called Laniakea.

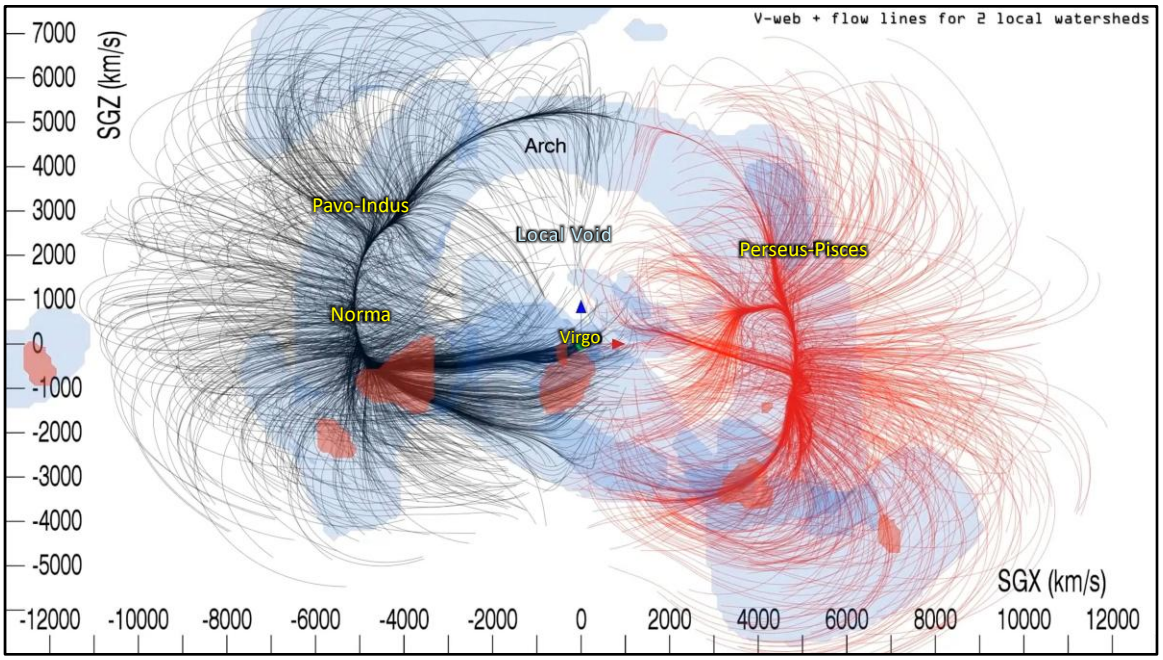


[**MOVIE**]

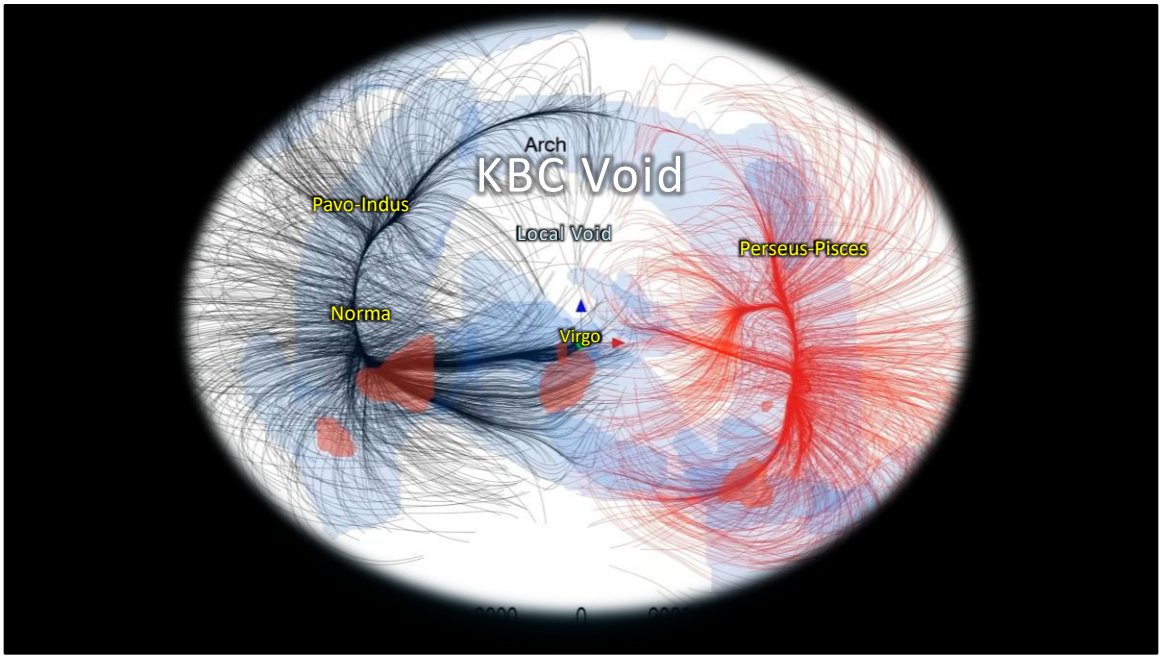
The novelty here is that… this was not simply a plot of **visible** galaxies.

This was their attempt to map the distribution and motion of all the energy, mass and matter – **visible** and **invisible** – within this local region of space.

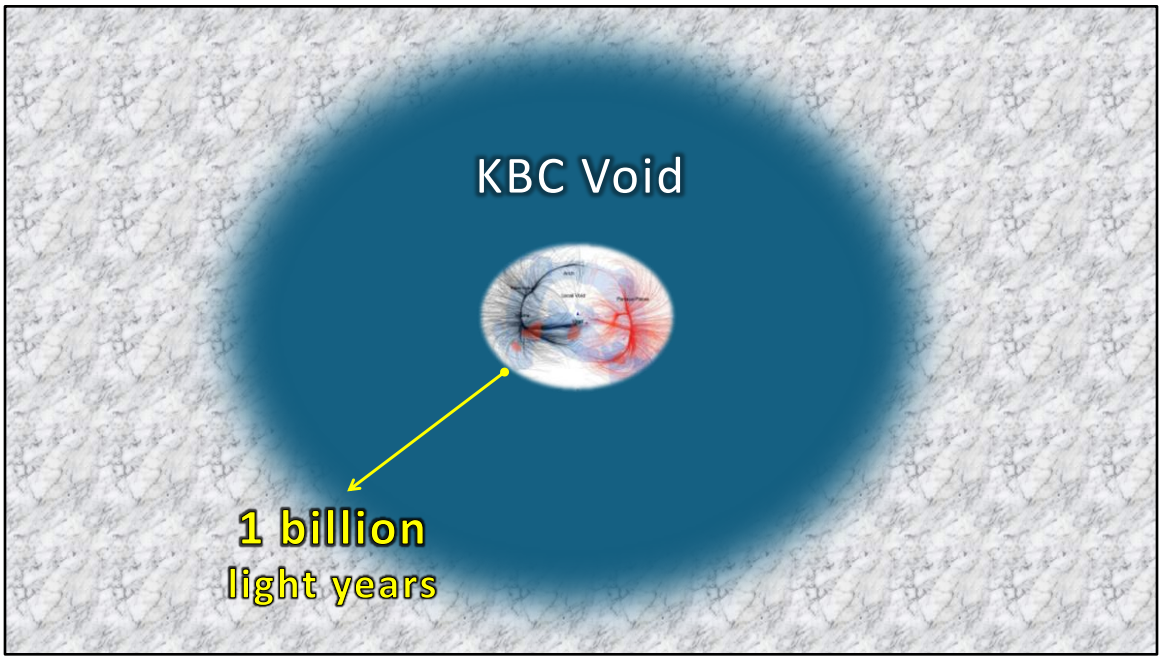
For students of the Urantia Book, the remarkable thing here is that, …



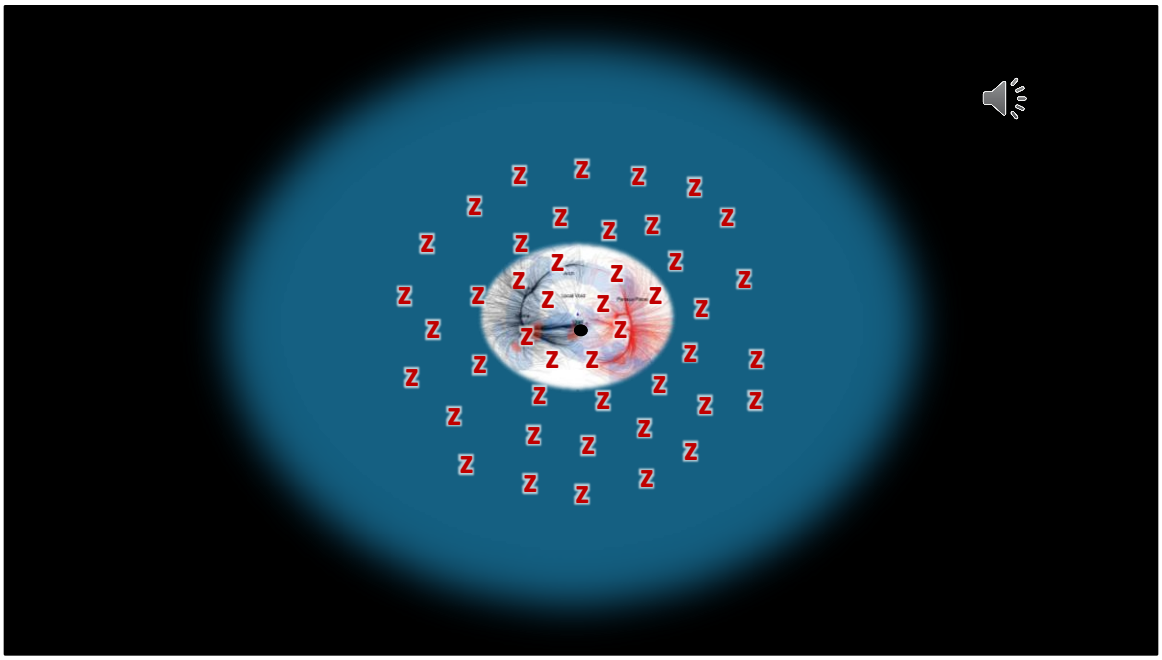
… within this local region of space, the story revealed by astronomy is – at first glance, as we'll see – a surprisingly good match to the story the Urantia Book described… in 1935.



However, those stories begin to diverge as we expand our view,
out beyond the so-called **KBC Void**,



The deeper we probe into space, out beyond, say, a billion light years, the more our **estimates of distance** depend not on actual **measurements of distance**, but on assumptions about **redshift**.

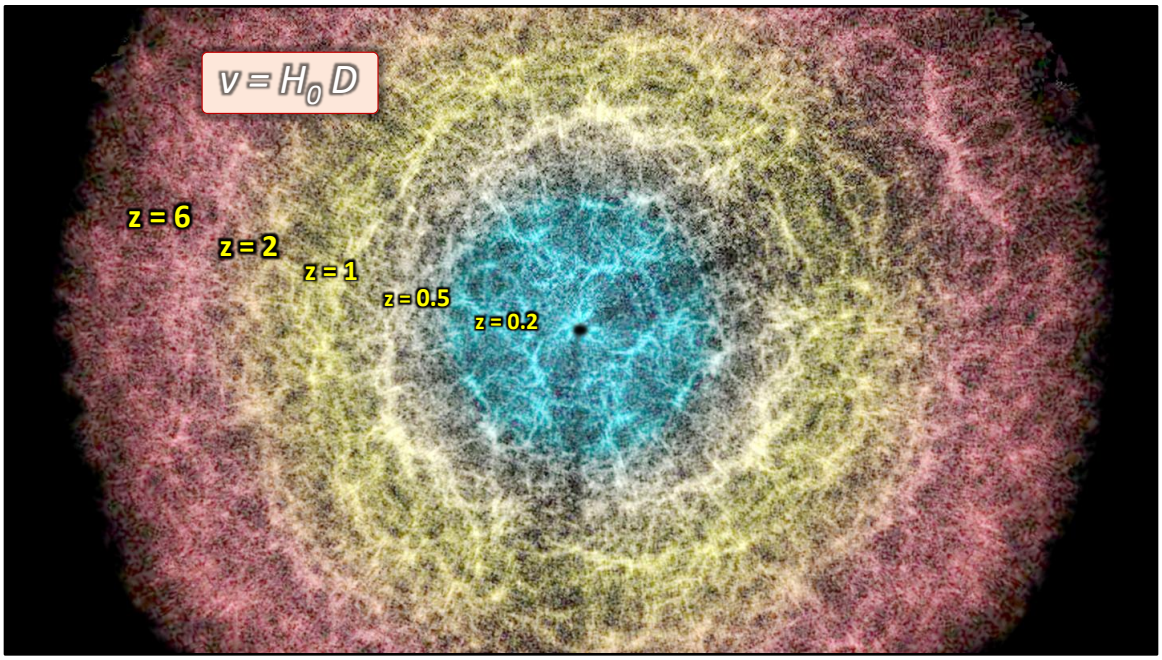


Now, redshift is something that astronomers can measure most precisely.

And thanks to ever-improving telescopes and techniques, we now have catalogs of redshifts for literally millions of galaxies. And as I'm sure we all know, some of these redshifts… are **alarmingly big**.

Which brings us to a **CENTRAL** question for cosmology: how to map these increasingly large redshifts into actual, physical, 3-dimensional space?

One currently popular way…

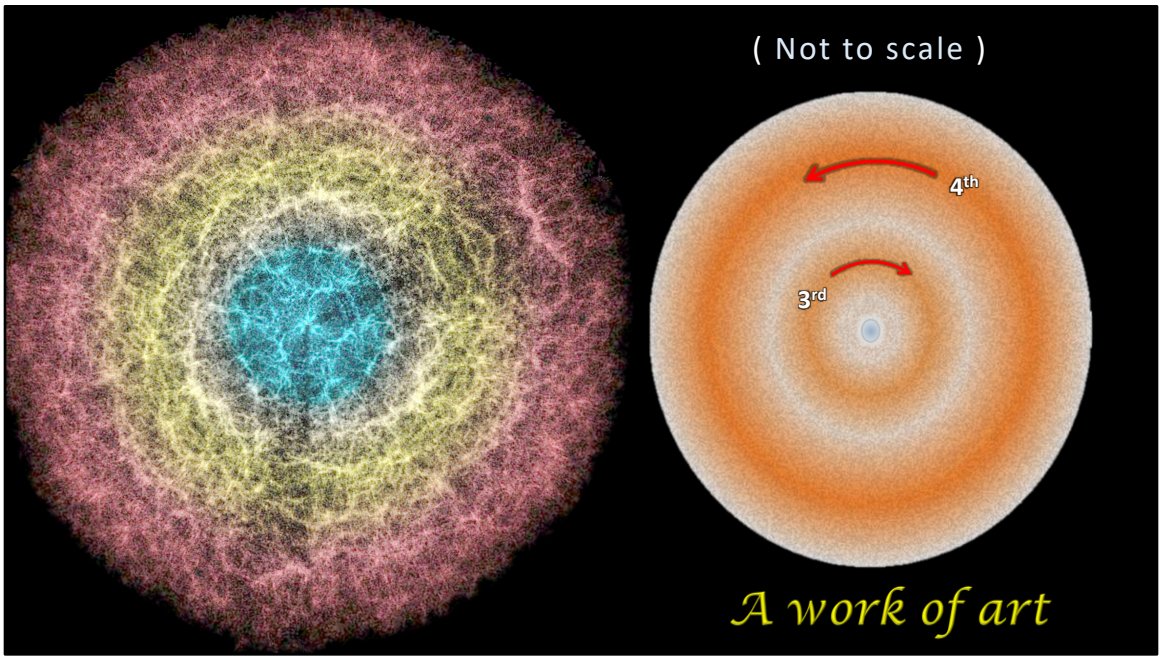


… is to assume a simple expansion of all space, in which these increasingly large redshifts imply increasingly large "**rates of separation**".

By **assuming** this rate of separation (or expansion) is directly proportional to distance, that is to say, by **assuming** a Hubble-type law [see equation], astronomers **assume** that they've solved their **central problem** — how to find the **distance** to a distant galaxy:

"**Well, just read its redshift**."

So we find that nowadays, most astronomers map the distribution of galaxies something like this… [see slide].



On the other hand, the Urantia Book implies a mapping… more like this [see slide], a set of nested, concentric, counter-rotating space levels of [quote] "lessened resistance to motion" (11:7.8, 12:1.2).

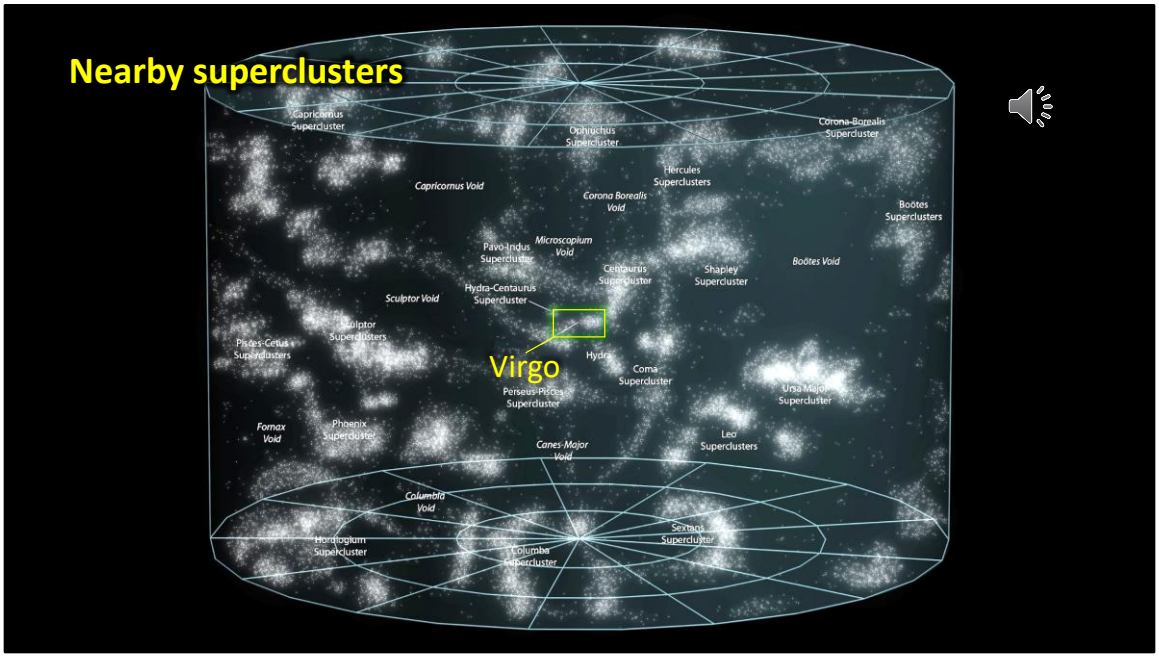
Now of course no self-respecting, sensible and sober cosmologist would ever dare even to suggest anything like this, a model so obviously contrived and **artificial**…

But recall, **artificial** literally means "**made by an artist**", which just happens to be the essence of Urantia Book cosmology: that the universe **IS** a work of art.

* * *

A few slides back I mentioned that within **Laniakea** – that is to say, within a few hundred million light years – both the Urantia Book and hard data from astronomy appear at first glance to reveal remarkably similar stories regarding the distribution and motion of galaxies.

Let's now take a closer look at this claim.

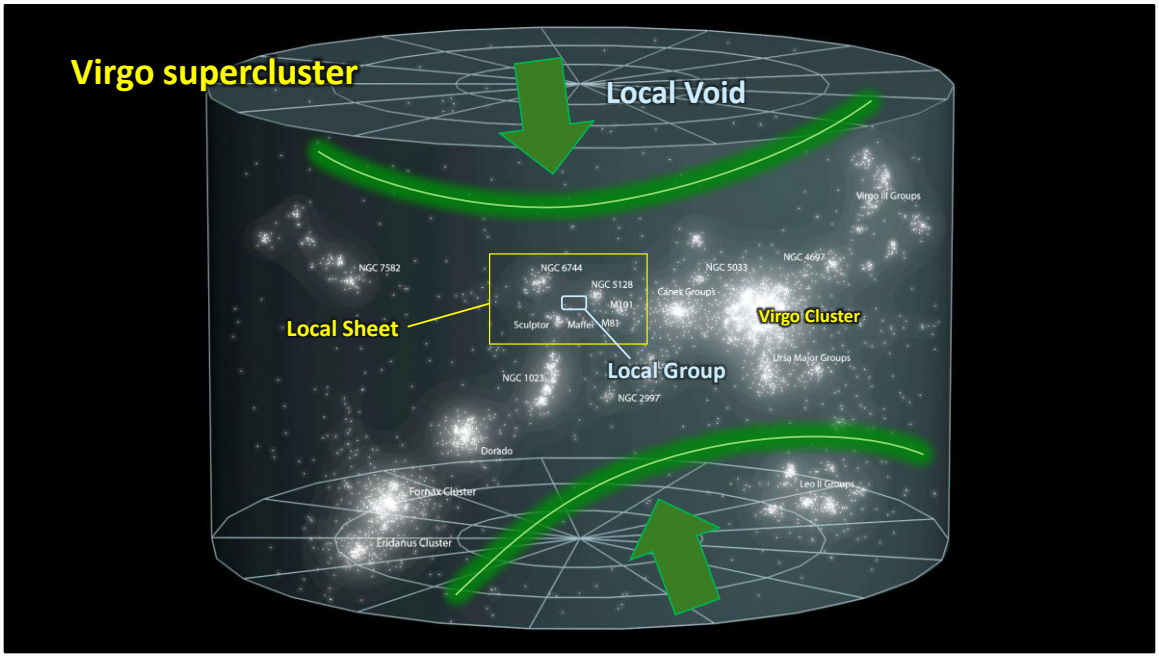


3. Local Astronomy

Here's a rough plot of the region within which Tully's group mapped Laniakea.

Our local Virgo cluster of galaxies is near the center.

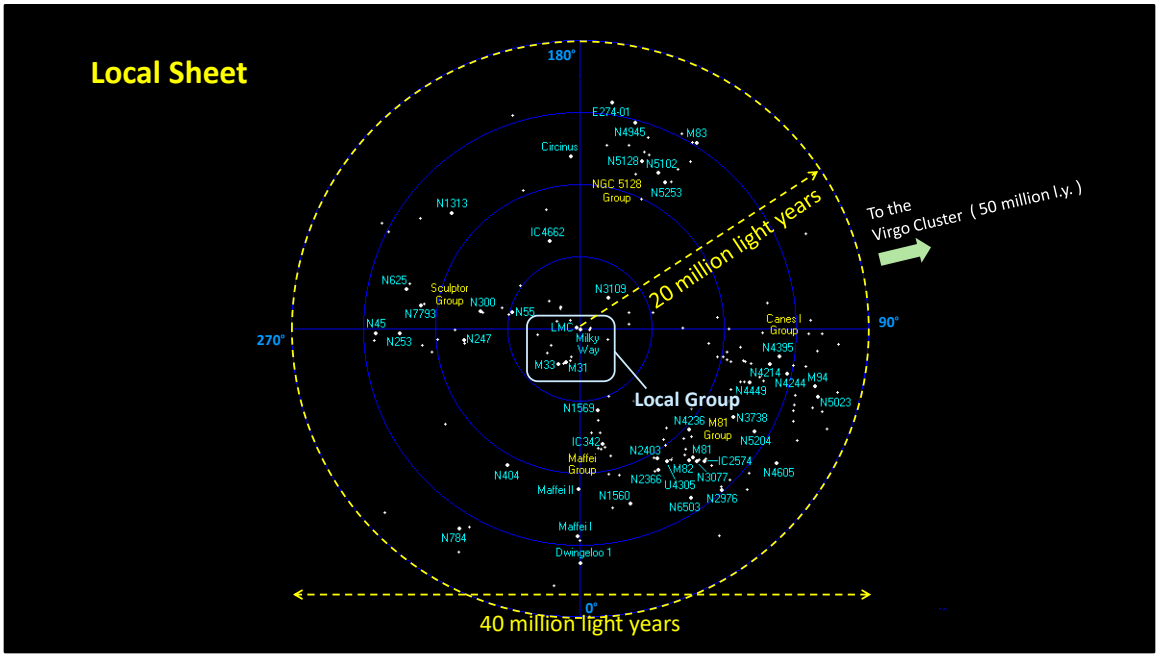
Zooming in, …



… we find a thin sheet of galaxies, the **Local Sheet**, sandwiched above and below by so-called "**voids**", huge bubbles of (relatively) empty space.

We're here in the middle of this sheet, within the so-called **Local Group**.

Zooming in a little more, …

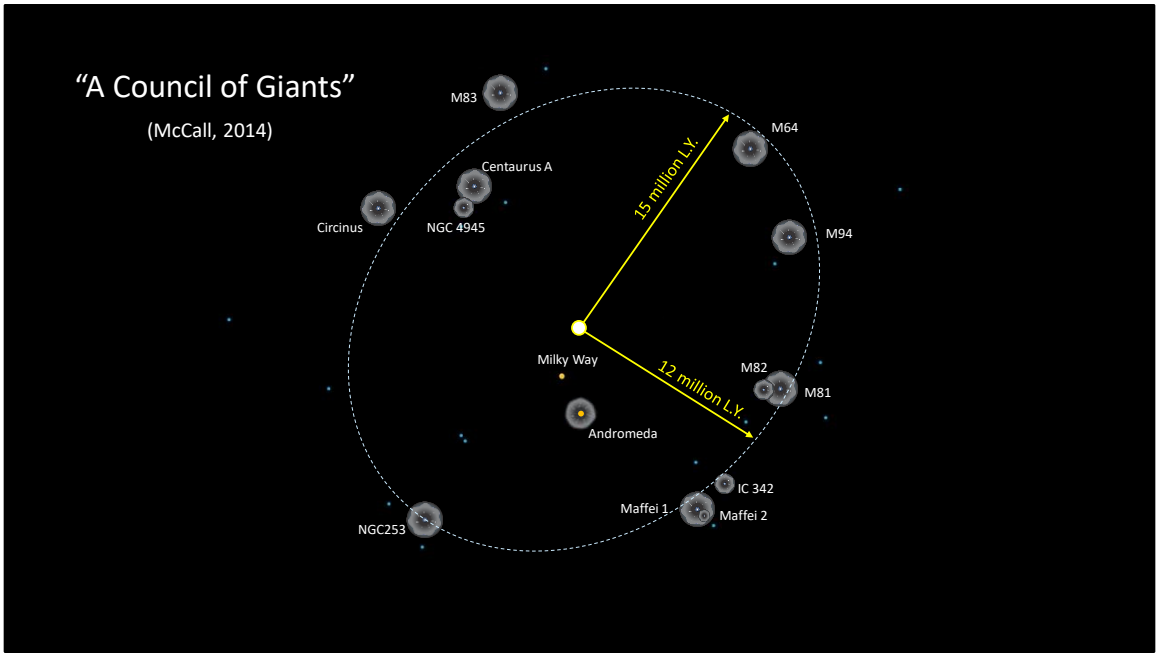


..., here's a map of this **Local Sheet**, about 40 million light years across.

The so-called **Local Group**, with our Milky Way, is here in the center.

In 2014, astronomer Marshall McCall presented a study of this region, carefully remapping all bright galaxies within 20 million light years of the Milky Way.

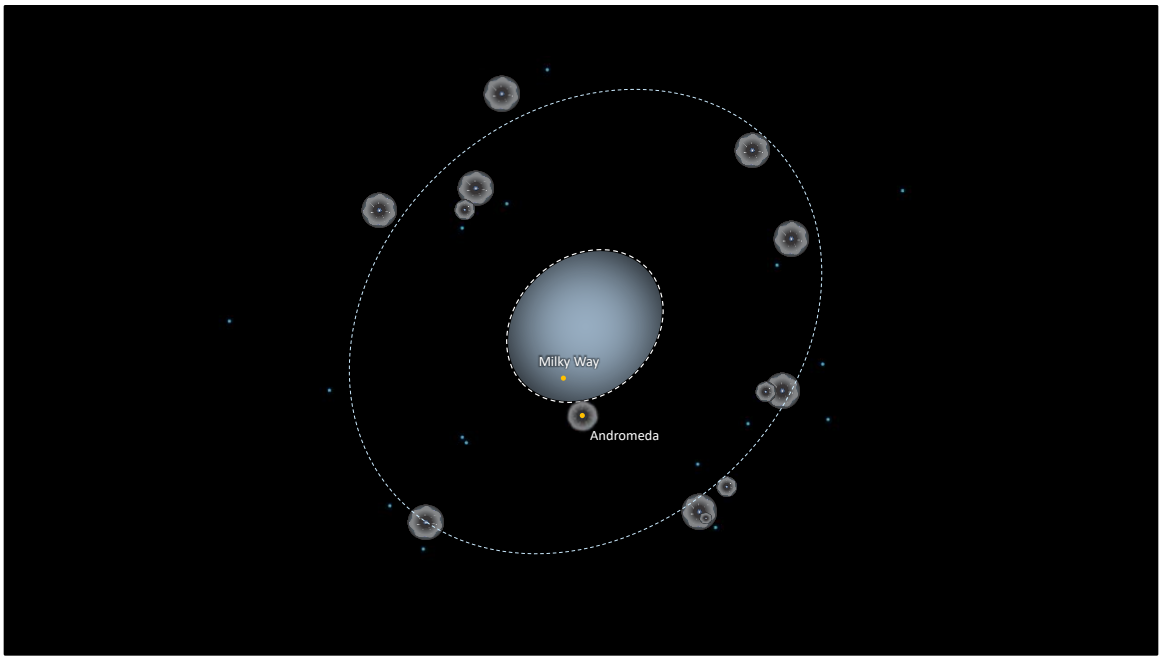
Map: https://en.wikipedia.org/wiki/Virgo_Supercluster



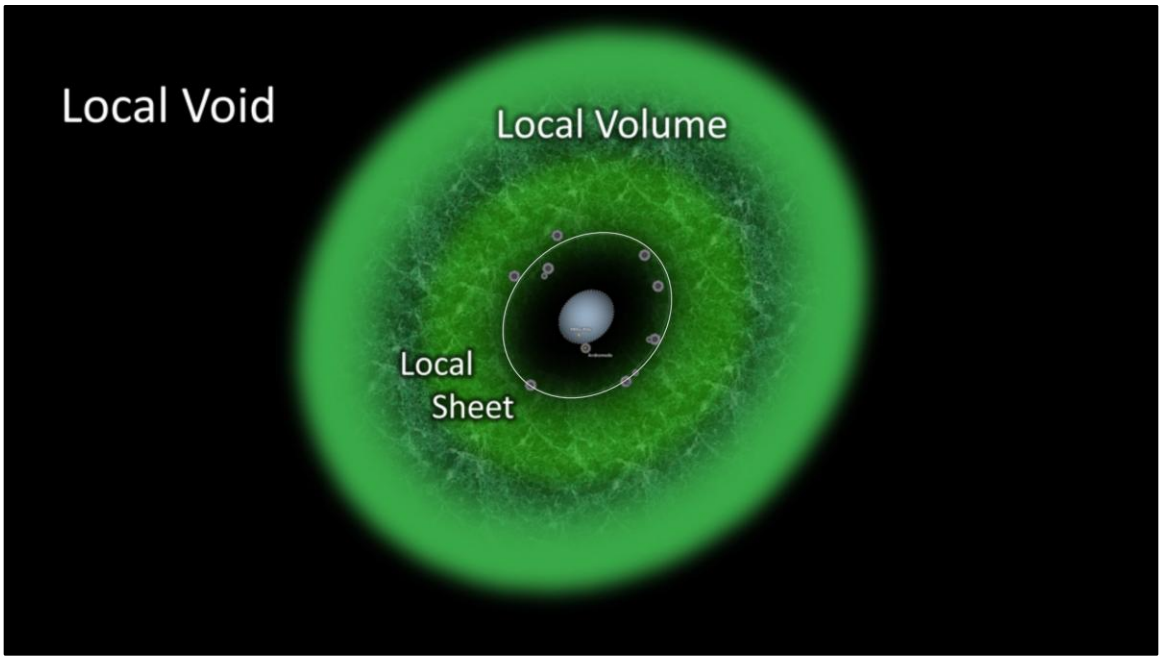
And this… is what he found: that our local group of galaxies appears to sit just off center in a relatively quiescent zone, surrounded by this ring of 12 large galaxies.

To which he gave the catchy name, "**A Council of Giants**".

For completeness, we should add in those halos and disks of invisible mass (segregata and ultimata) that most astronomers now assume must surround each galaxy.



Also, we should indicate that local disk-shaped region – hidden from view by that [quote] "… dense diameter of the Milky Way." 32:2.11 (359.8)

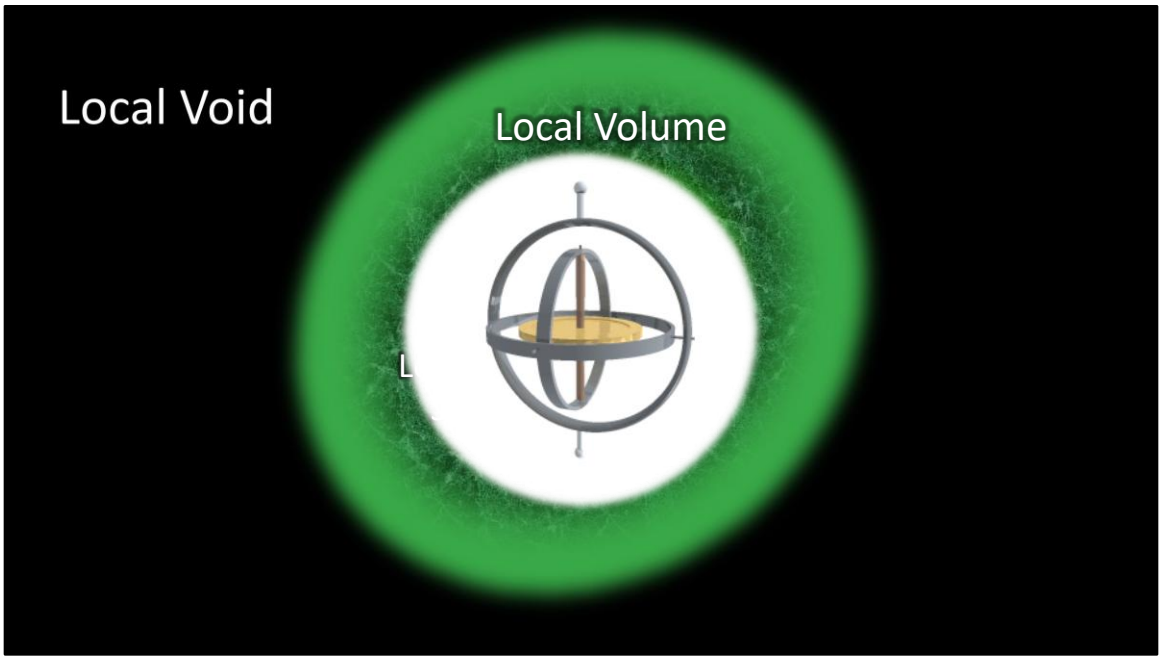


Astronomers have since found that this “Council of Giants” forms the inner fringe of that **Local Sheet** of galaxies, which lies within a so-called **Local Volume** extending outwards for about 30 million light years.

This Local Volume appears to be centered within a second relatively quiescent zone, the **Local Void**.

A complication here is that, if we assume the Milky Way lies in the same plane as that grand universe “**wheel**” described in paper 15:0.1, then the plane of that central grand universe… is not aligned with this **Local Sheet**.

For students of these papers who might wonder about this, as a place-holder idea…

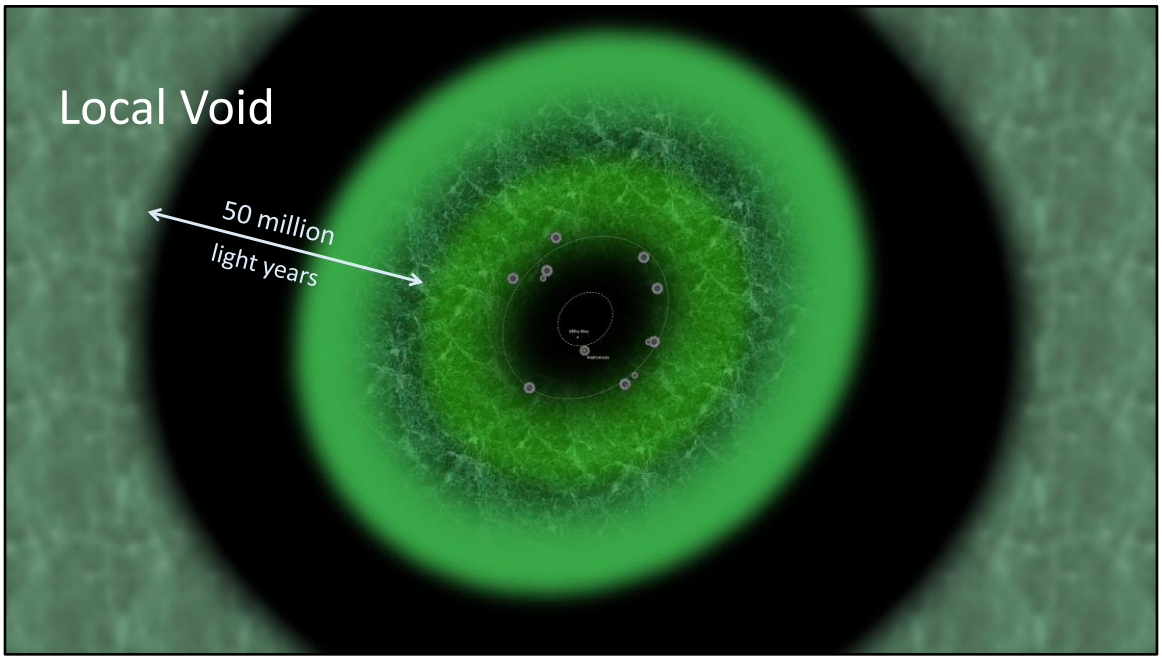


… imagine a multi-gimbal gyroscope:

[**play: multi_gimbal_gyro.gif**]

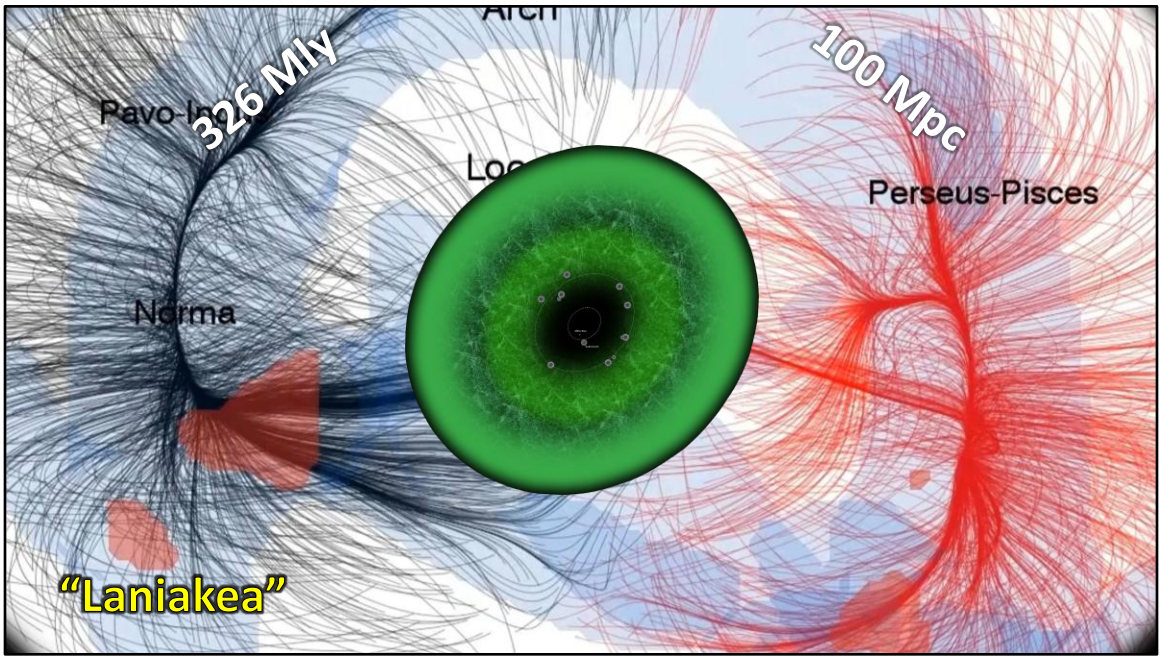
For stability, I like to think of the outer space levels not only rotating around the grand universe, but also precessing OVER – reinforcing the idea of the grand universe as a stable central kernel for the future master universe.

But of course there's no scientific (or even Urantia Book) justification for such speculation, so I'll just mention this issue, and move on.



Moving out beyond this **Local Void**, beginning from about 50 million light years beyond the outer edge of that **Local Sheet**, we find [quote]

"early evidence of force manifestations" (12:1.15) …



… the start of that distribution of mass-energy mapped by Brent Tully's group, that [quote] "mass-movemented, might-tensioned" (42:2.11) flow they called **Laniakea**.

Ok, the story so far:

Astronomy reveals that our local group of galaxies sits near the center of a **Local Sheet** of galaxies, within a **Local Volume** extending outwards for about 30 MLY.

This Local Volume is surrounded by a relatively quiescent zone, the **Local Void**.

This Local Void is surrounded by an expanding shell of galaxies, our **Local Supercluster**, so-called **Laniakea**.

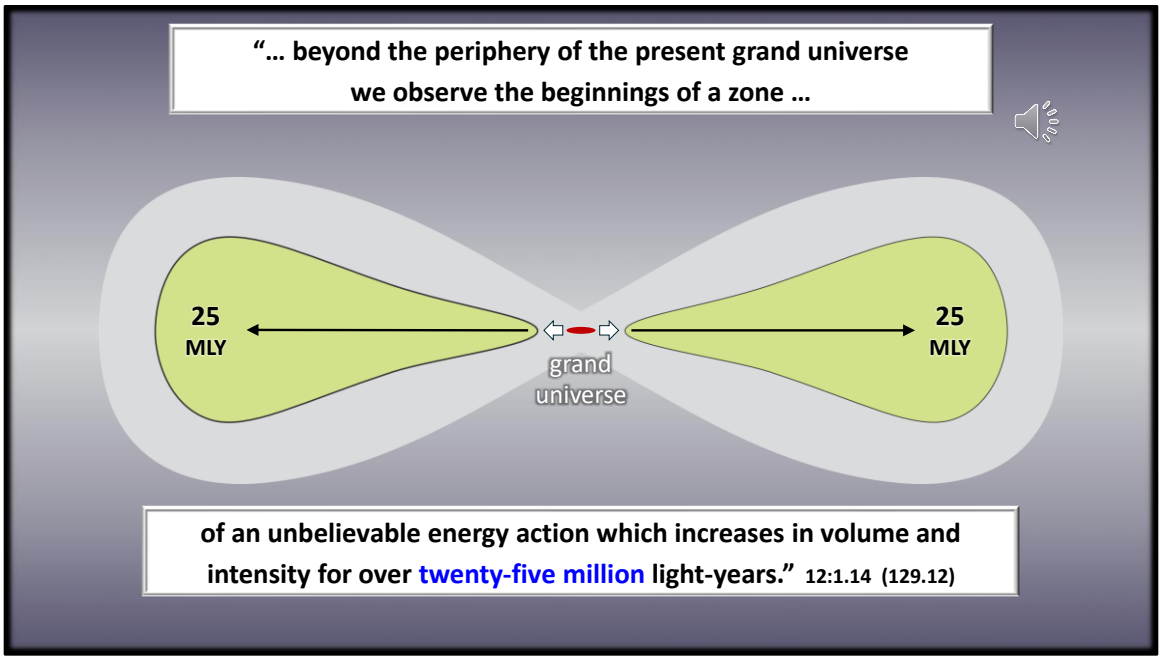
And beyond this expanding shell of galaxies, there's a vast, under-dense zone – the **KBC Void**, or **Local Hole** – extending out to about a **billion** LY.

And beyond this vast quiescent zone, astronomers are confronted by an apparent "**Cosmic Web**"… of millions upon *millions* of redshifts.

For students of astronomy, this is simply the story the data reveals.

But for students of the Urantia Book, this story becomes something more. As we'll see, within our **Local Supercluster**, this astronomic landscape turns out to be almost exactly what the Urantia Book described… in 1935.

Let's take a look.



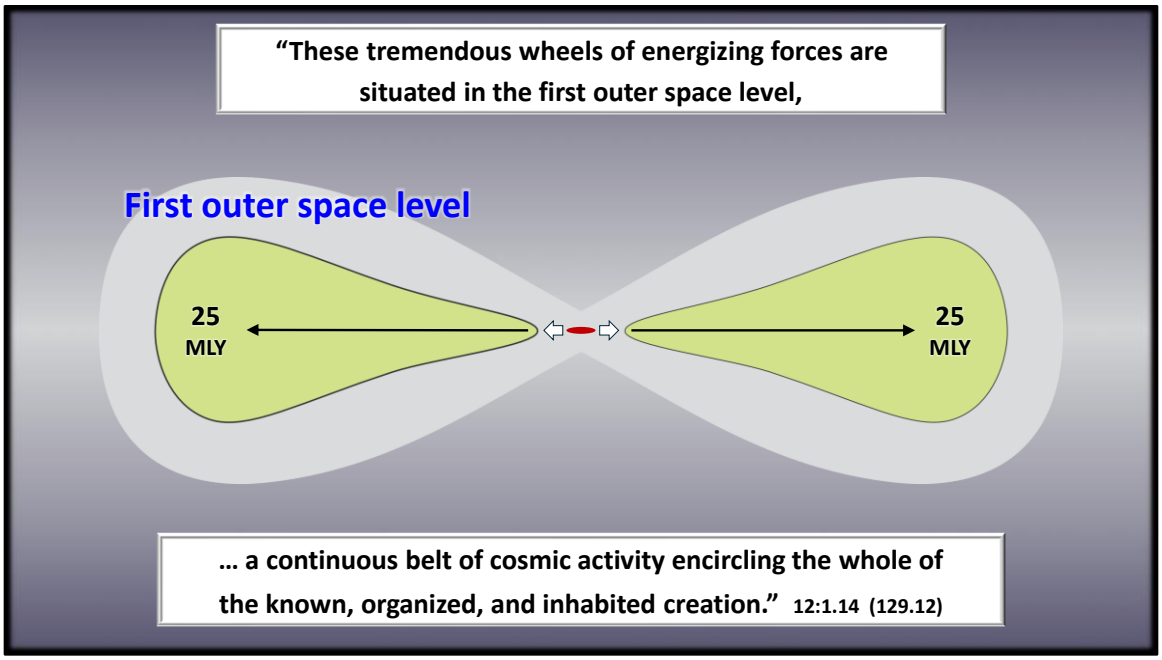
4. Outer Space Levels

The Urantia Book describes an ancient "grand universe", seen here from the side, at the center of an elliptical sheet of galaxies (again, seen here from the side) extending outwards for [quote] "over twenty-five million light-years".

From Paper 12:1.14 [quote],

> "… beyond the periphery of the present grand universe we observe the beginnings of a zone of an unbelievable energy action which **increases in volume and intensity** for over twenty-five million light-years." 12:1.14 (129.12)

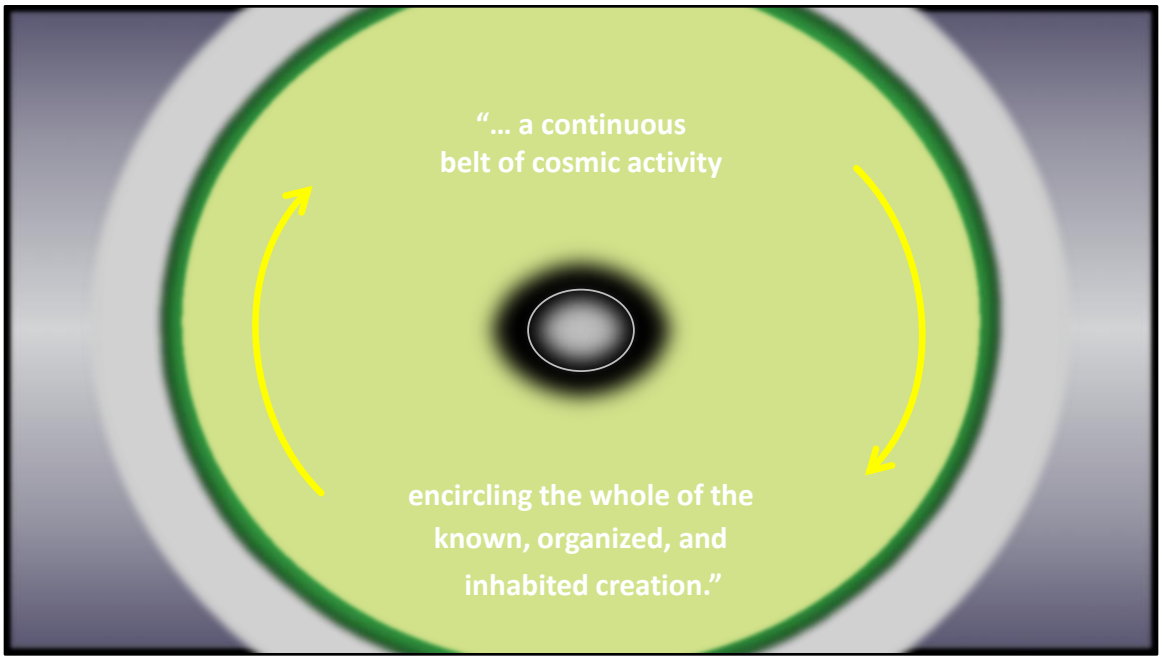
Increasing in volume and intensity for over twenty-five million light-years.



"These tremendous wheels of energizing forces are situated in the **first outer space level**, a continuous belt of cosmic activity **encircling** the whole of the known, organized, and inhabited creation." 12:1.14 (129.12)

End quote.

Seen from above, that paragraph in Paper 12…



… appears to be describing something like this: [see slide]

"a continuous belt of cosmic activity, encircling the whole of the known, organized, and inhabited creation." 12:1.14 (129.12)

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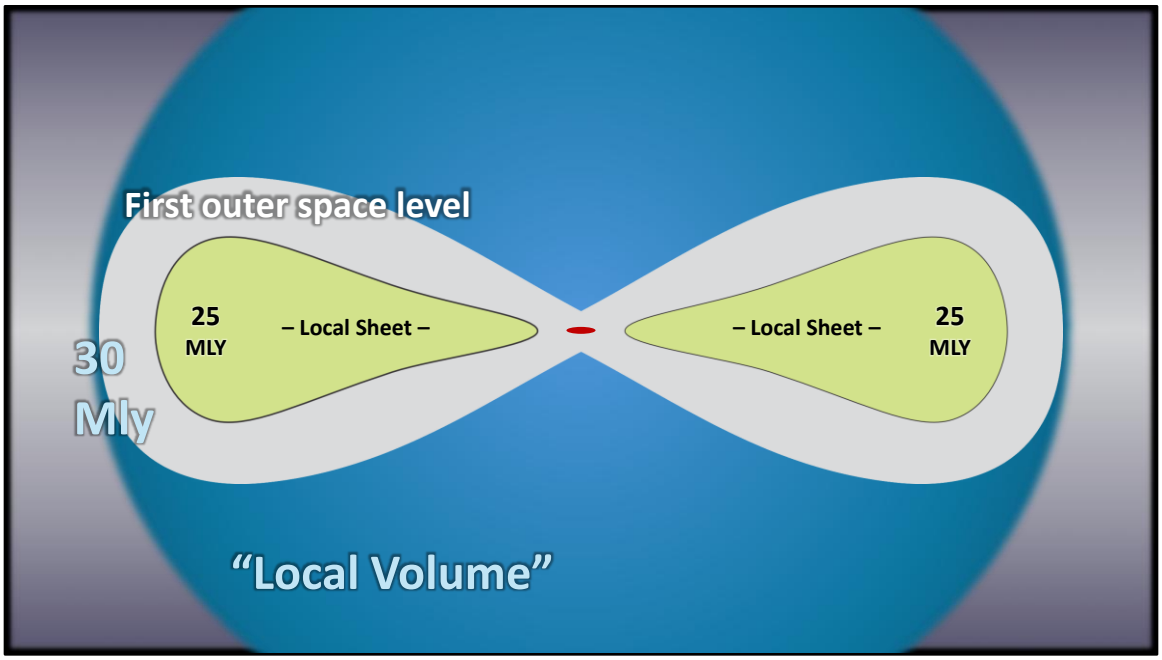
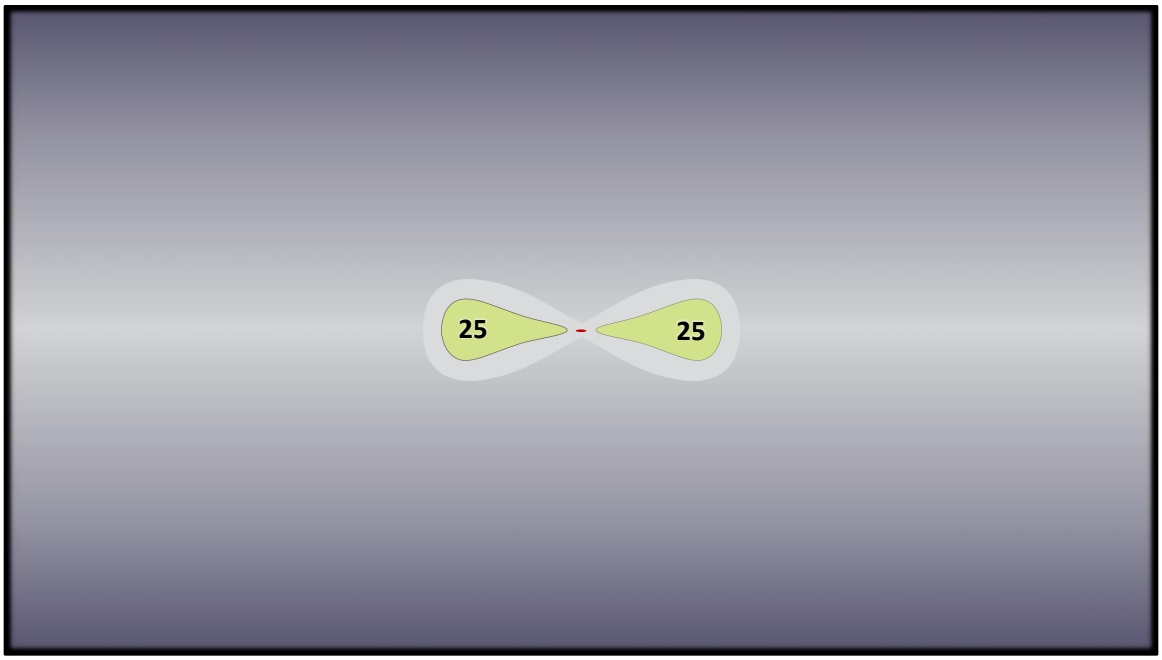


Ok, this seems straight forward: a first outer space level surrounding our place in space, radius roughly **25 MLY**.

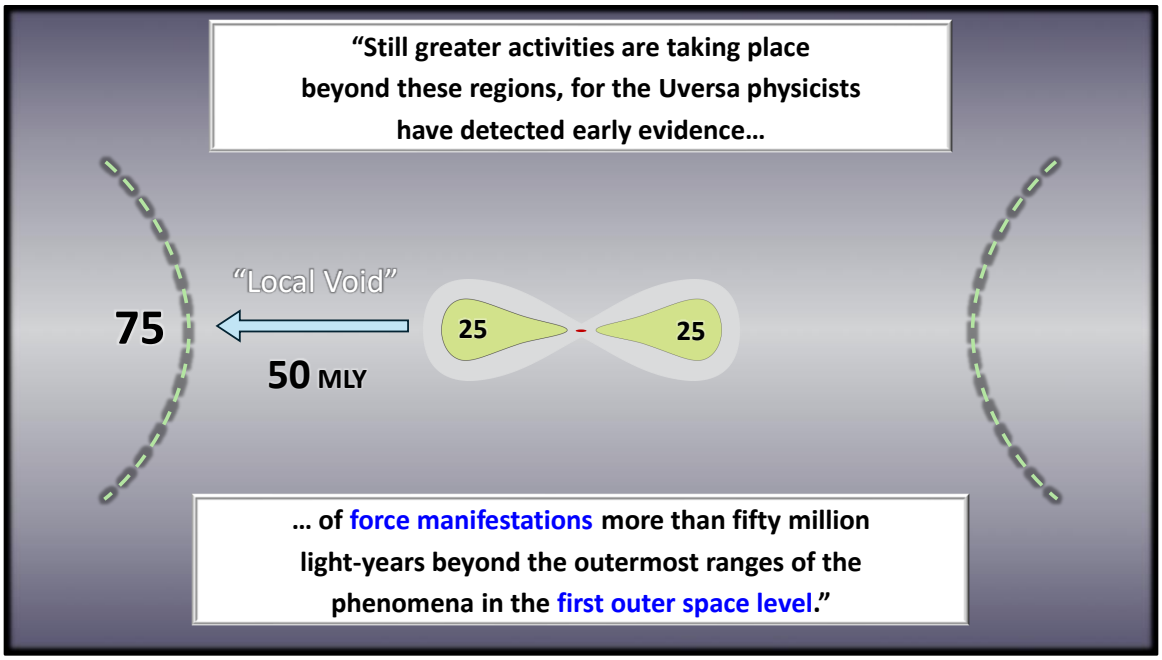
On the other hand, any student of astronomy would immediately be struck by the fact that the size of this structure is more-or-less a perfect match for that **Local Sheet** astronomers have in fact found. As of 2025, this **Local Sheet** is thought to span the midplane of a **Local Volume**, extending outwards for about **30 MLY**.

But wait, there’s more.



Let’s zoom out a bit. From Paper 12:1.15,

[quote] …



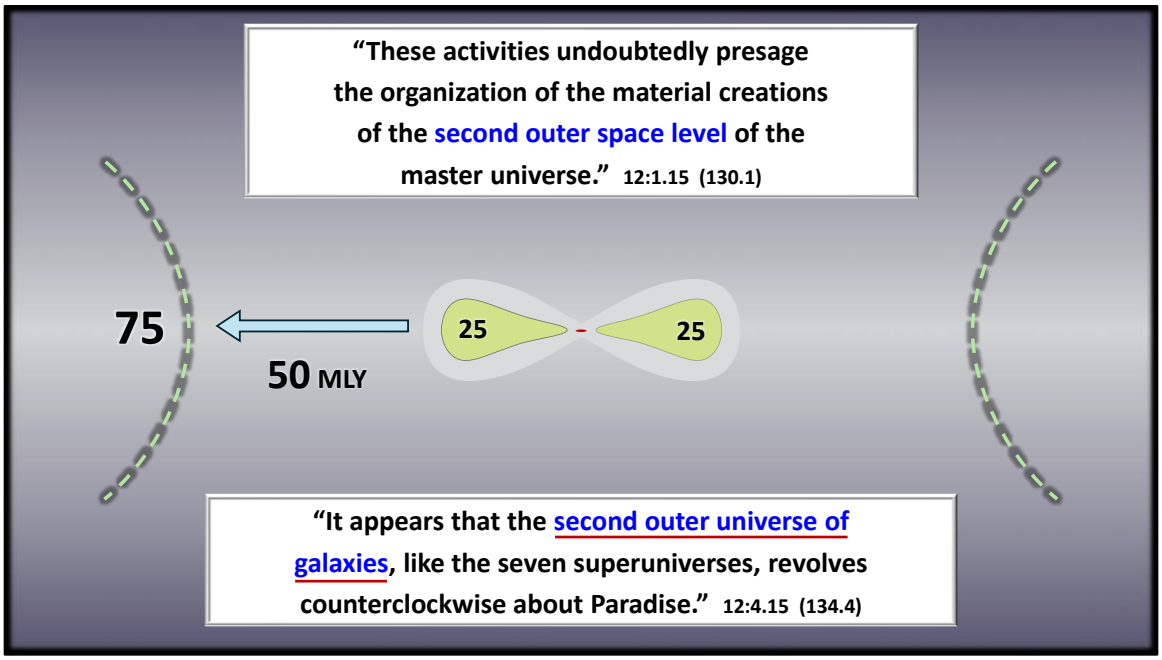
… ,

> "Still greater activities are taking place beyond these regions, for the Uversa physicists have detected early evidence of force manifestations more than fifty million light-years beyond the outermost ranges of the phenomena in the first outer space level." 12:1.15 (130.1)

End quote.

Students of astronomy would also note that this quiescent zone, 50 MLY wide, matches that **Local Void** astronomers have also found.

Also, note that reference to "early evidence of force manifestations" beginning about **75 MLY** away.



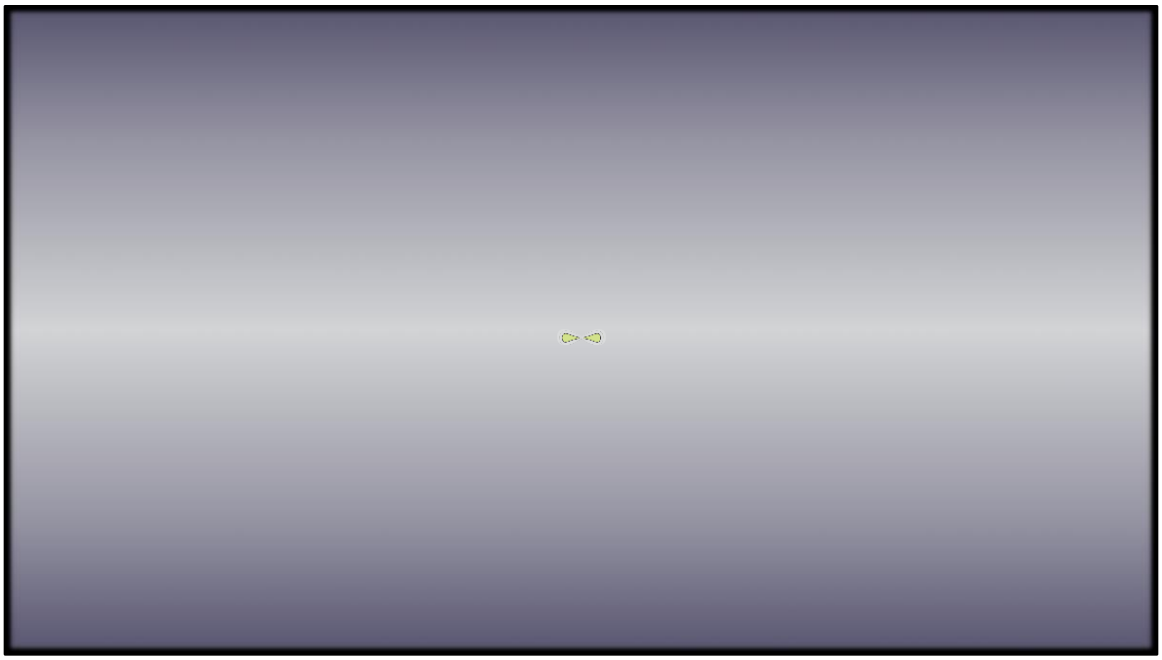
Again, from Paper 12:1.15,

> "These activities undoubtedly presage the organization of the material creations of the **second outer space level** of the master universe." 12:1.15 (130.1)

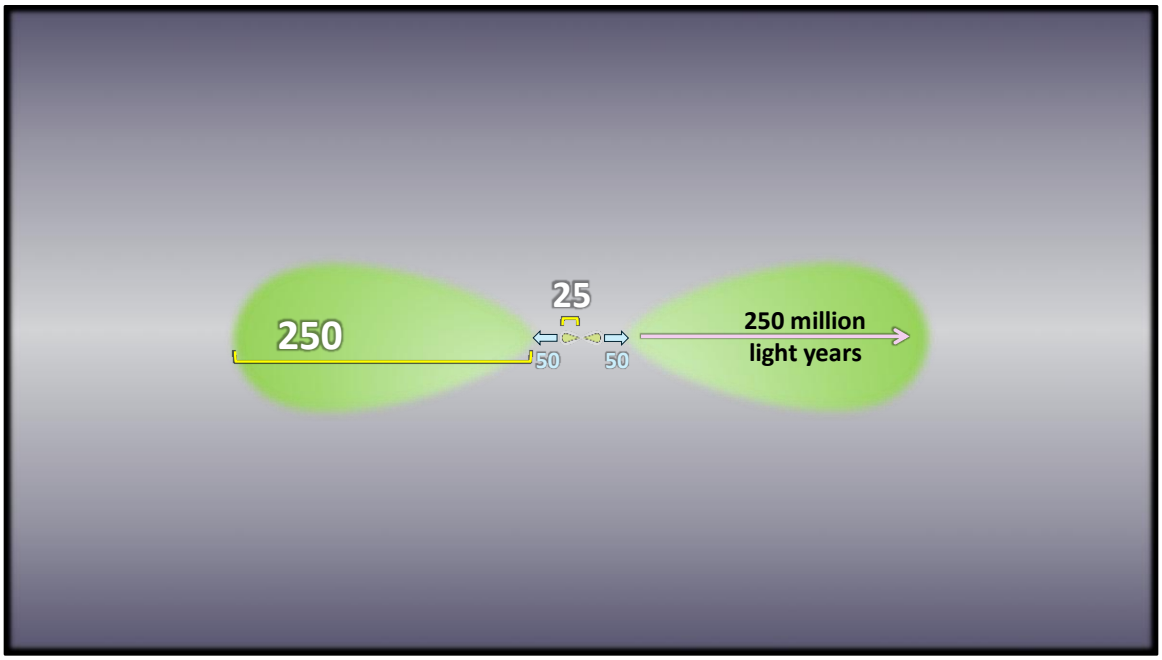
But then three section later, in Paper 12:4.15, we find this [quote]:

> "It appears that the **second outer universe** of galaxies, like the seven superuniverses, revolves counterclockwise about Paradise." 12:4.15 (134.4)

"**second outer universe of galaxies**" ?



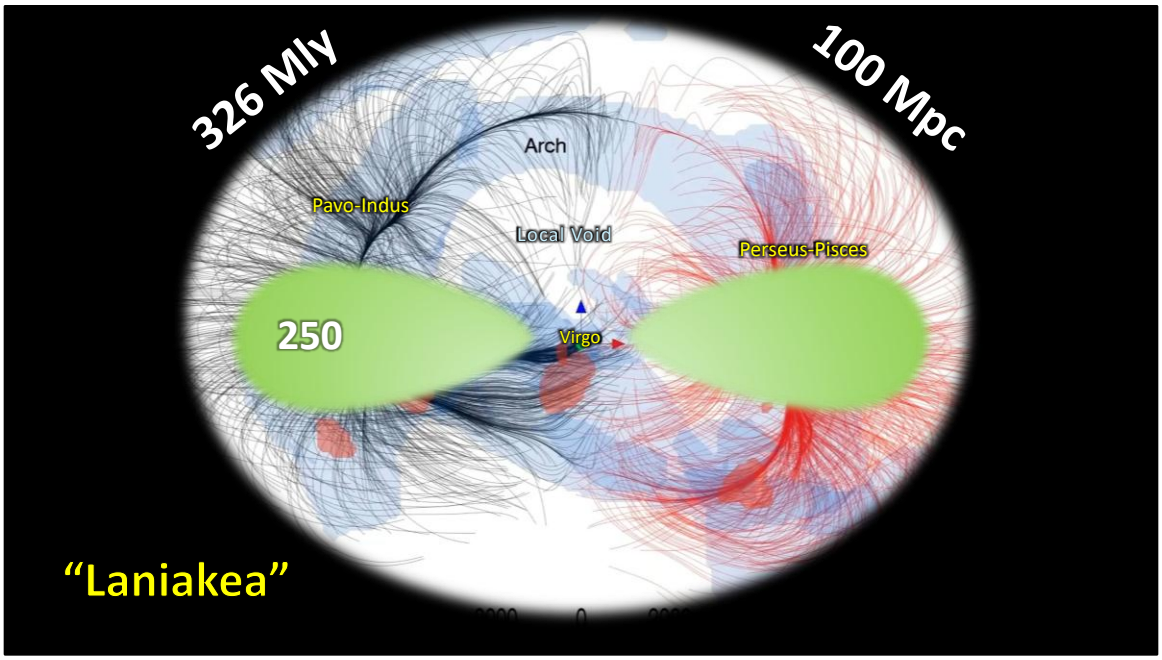
If we assume… that this…



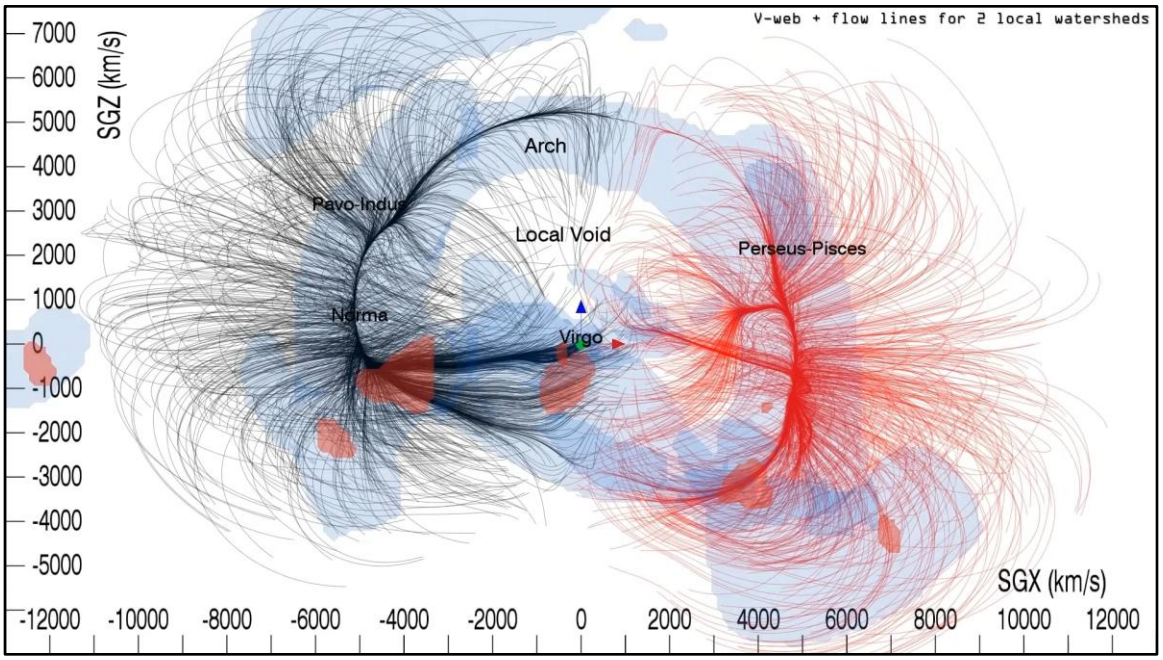
… “second outer universe of galaxies” is say, ten times bigger than that first outer space level, so about **250 MLY** wide, then something remarkable happens.

Imagine that in cross section, a “second outer universe of galaxies” looks something like this, a [quote] “zone of an **unbelievable energy action**”, a distribution of mass-energy “**increasing in volume and intensity**” for, say, **250 MLY**.

Well, then this “second outer universe of galaxies” becomes – once again – a well-nigh perfect …



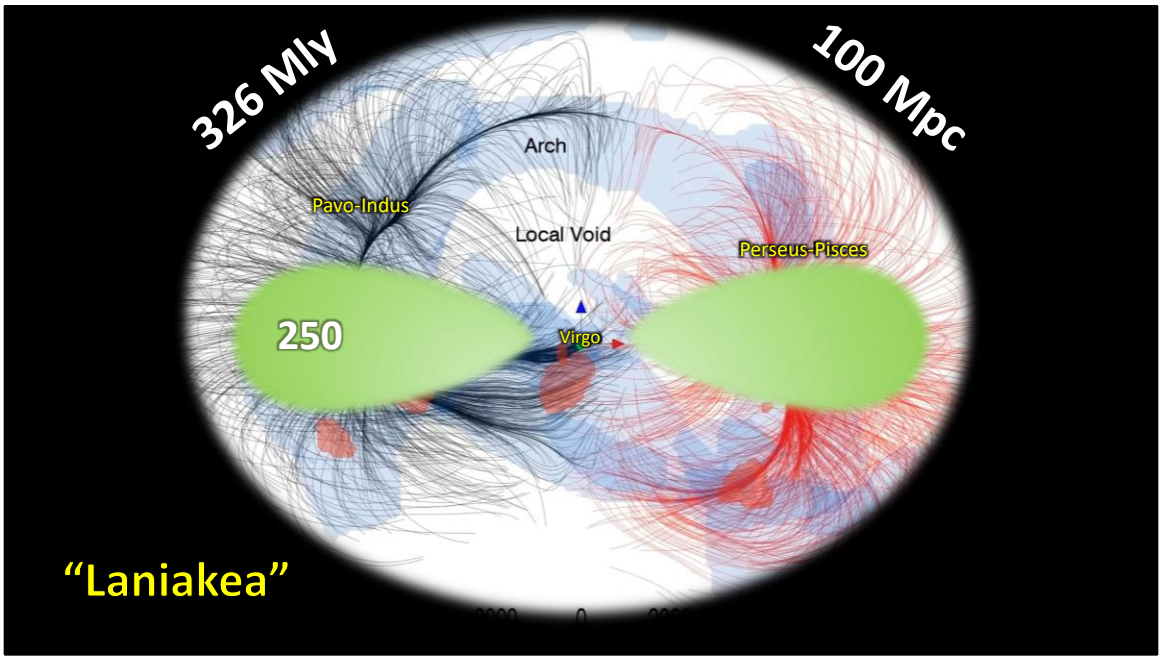
… match for what astronomers have actually discovered: **Laniakea**, that expanding shell of galaxies surrounding the Local Sheet.



[**MOVIE**]

Once again, here's that animated map made by Brent Tully's group back in 2014.

Remember, this animation shows **not** the distribution of visible galaxies, but a prediction of the **cosmic flow**, the distribution and motion of all the energy, mass and matter within our local, expanding, bubble of space.

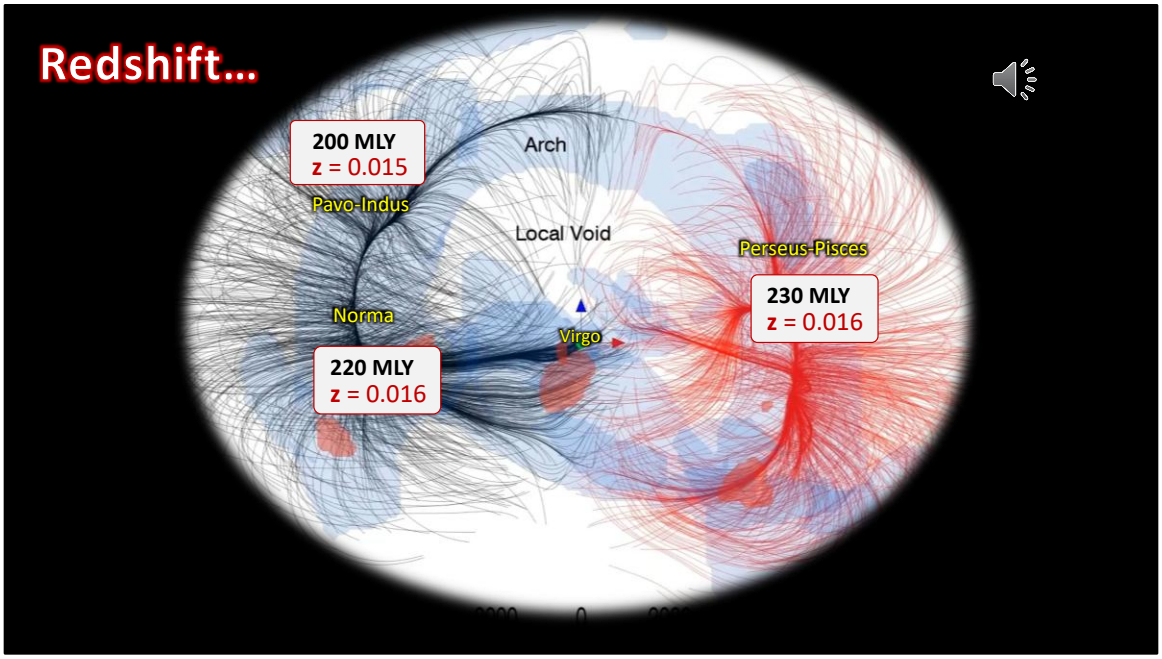


Clearly, there's nothing **scientific** about identifying Laniakea, this elliptical donut shaped cosmic flow, with the Urantia Book's "second outer universe of galaxies".

For students of *The Urantia Book*, this is simply an **intriguing** correlation.

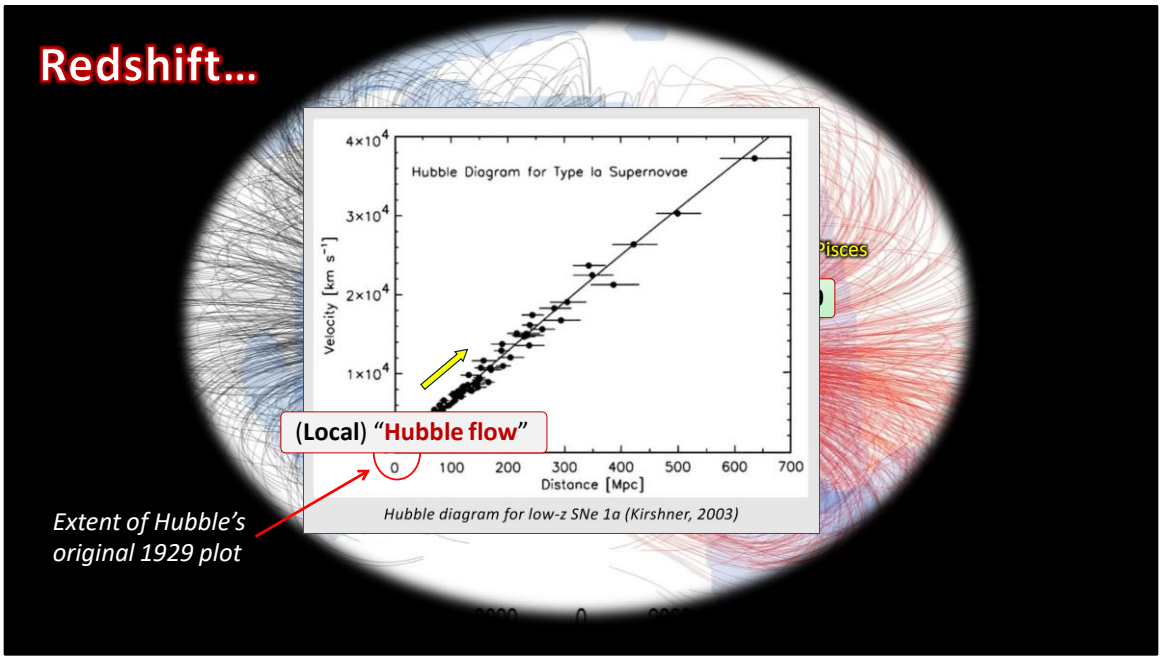
But as a student of astronomy, this **remarkable** correlation makes me take seriously what these papers go on to say… about redshift, and about the global motions of space.

So, let's briefly review what we know about redshift, and what these papers say.



As mentioned earlier, **redshift** is something that astronomers can measure **most precisely**. And the redshifts of galaxies in Laniakea reveal a very clear pattern.

For example, galaxies in clusters near the outer edge all share similar redshifts, about **z = 0.016**. For small redshifts like this, astronomers often refer to **radial velocity** rather than redshift…



…, so we find that galaxies near the outer edge of this donut-shaped volume of space are all receding at about 4,500 km/s.

Now – as also mentioned earlier – within this local region of space, astronomers have a number of techniques for estimating distance. They use these to calibrate so-called "**distance ladders**", which they then use for mapping distances to galaxies.

When these distances are plotted against velocities, that famous relationship between distance and velocity becomes clear…

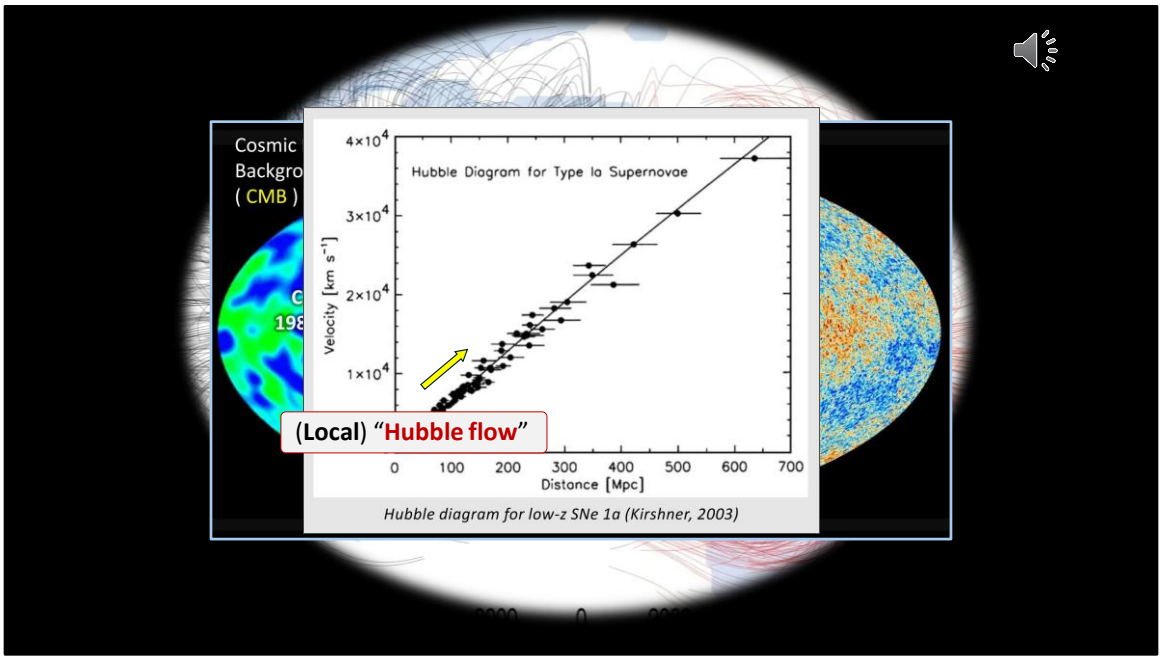
What we have here is compelling confirmation of a so-called "Hubble flow".

But notice, what this data **actually** confirms is a **LOCAL** Hubble flow.

Hold that thought.

- - - - - - - - - -

Worth noting here is the extent of Edwin Hubble's original 1929 plot. This red circle indicates the distances and velocities of those 24 galaxies that – in 1931 – motivated Georges Lemaitre to kick start the whole idea of "Cosmic Egg" / "Big Bang" cosmology.



Meanwhile, cosmologists discovered a background of microwave radiation, their "**smoking gun**" confirmation of some "**Big Bang**". Against this background, students of cosmology are now more-or-less compelled to conclude…

> *"What **more** proof do we need? Galaxies racing away, a microwave background, a model that (mostly) works… Why waste time inventing and **exploring alternatives**?*

Well, pause to consider: in 1935, in Paper **11:6.4**, the Urantia Book revealed that for almost 500 million years, space has in fact been expanding. In other words (according to *The Urantia Book*), any galaxy within 300 MLY, that is to say, **every** galaxy in this second outer universe of galaxies, HAS in fact been receding for over 300 million years. Exactly what astronomers have found: a **local**, "Hubble-like" outwards flow.

However, while cosmologists then extrapolate a **GLOBAL** Hubble flow (and runaway expansion), *The Urantia Book* describes the very opposite: a gentle, two-billion year cycle of expansion and contraction, and a universe FAR older than 14 billion years.

Thus students of the Urantia Book are **VERY** keen to… "**explore alternatives**".

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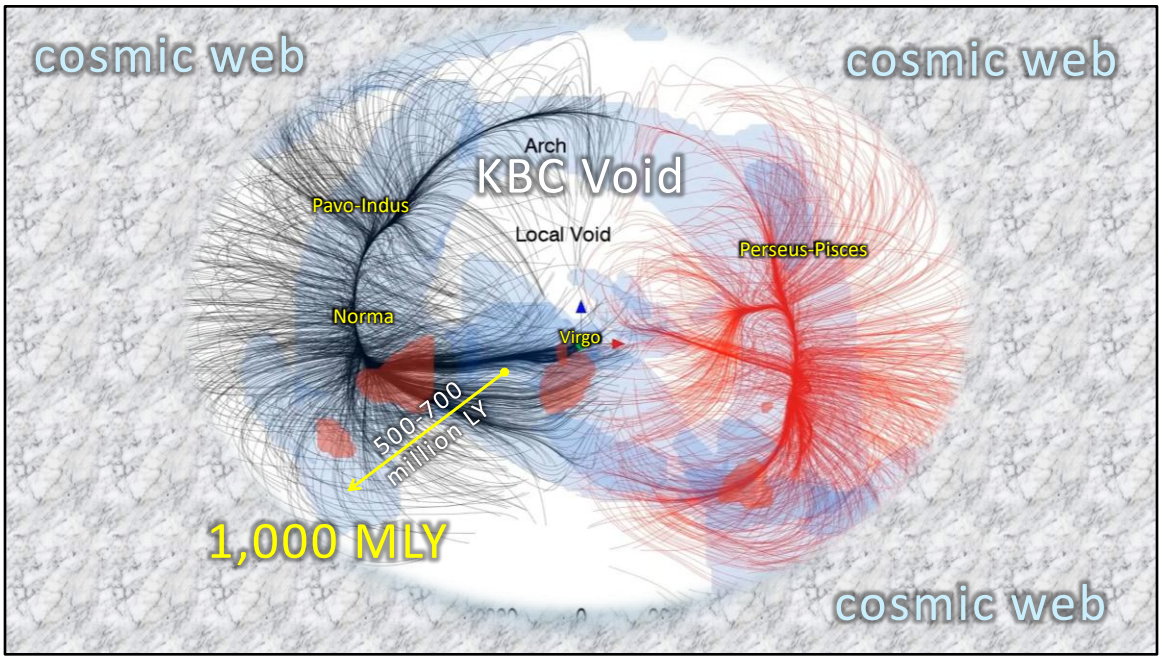
1920-1940 CMB Temperature predictions: https://www.youtube.com/watch?v=bboKmG0uUuU

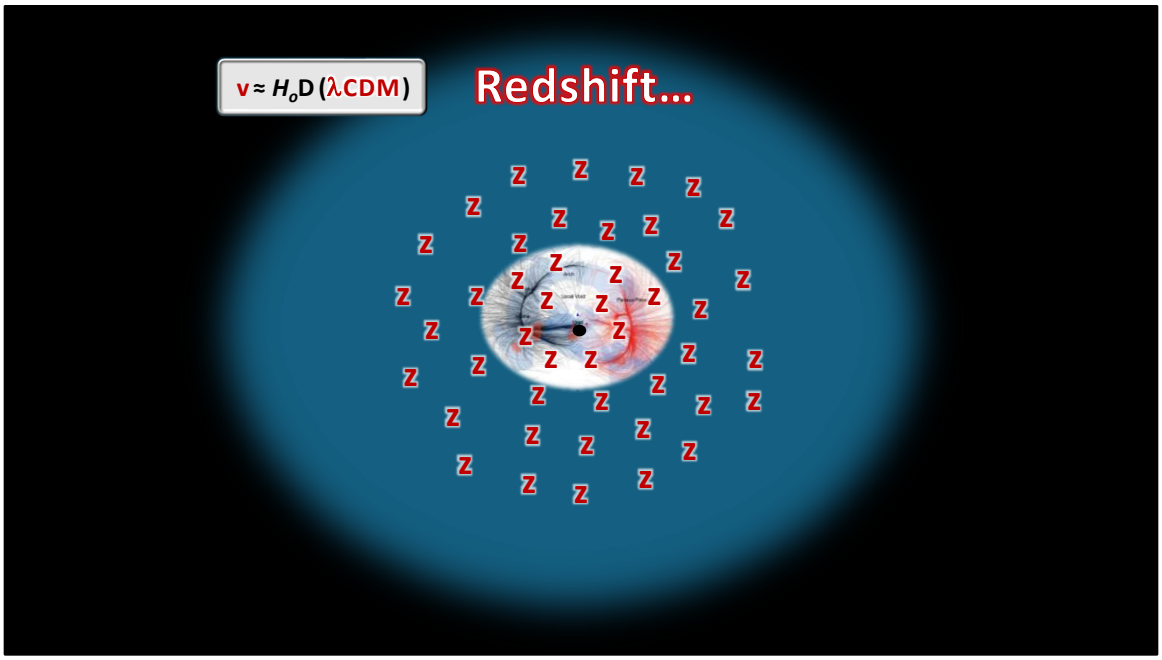


So we find that, at least within this local bubble of space, redshift and standard candles work well to confirm a **local** Hubble flow. But as we move out into deep space, things become less clear.

As we saw earlier, this second outer universe of galaxies is surrounded by another quiescent zone, the so-called "**KBC Void**", or "**Local Hole**". This region appears to extend about 500 to 700 million light years beyond Laniakea, so out to about a billion light years.

Once again, this zone is not empty of galaxies, it's just a region where the density of galaxies is noticeably reduced.

And beyond this **Void**? Well, beyond 1 billion light years, native science is confronted by that (apparent) "**cosmic web**".

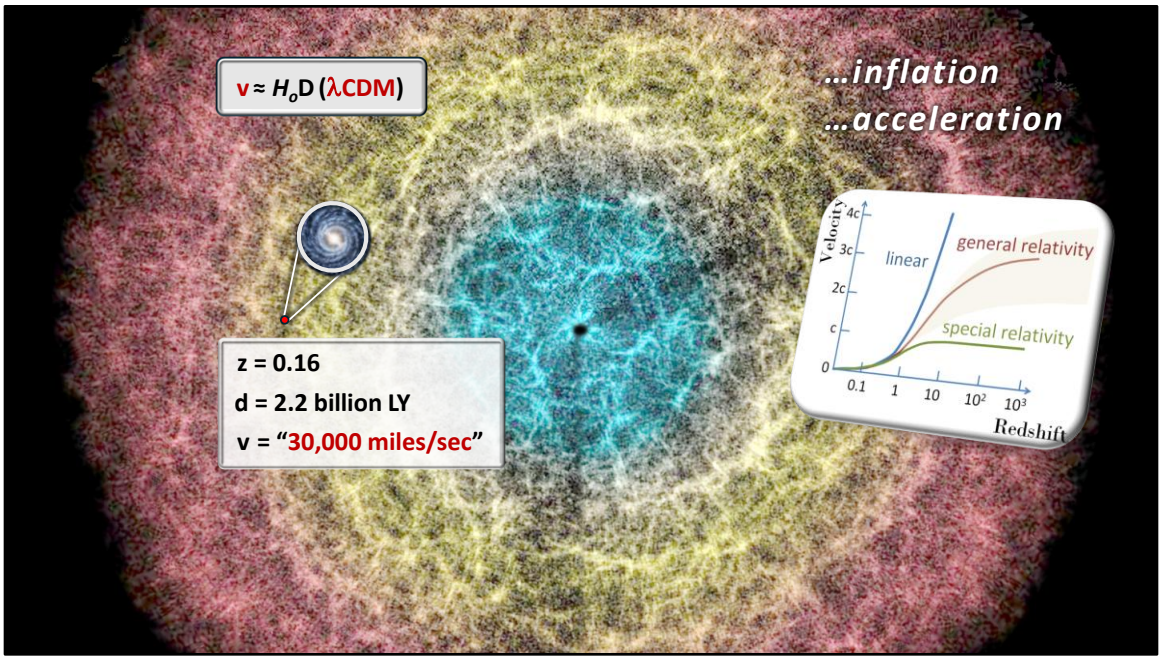


Which brings us back to that crucial point: the further astronomers probe beyond this [third] quiescent zone, the more their estimates of distance depend not on actual **measurements** of distance, but on **assumptions** about **redshift**.

Here, let's recall that central problem of cosmology: how to map ever-increasing redshifts into physical, 3-dimensional space?

A lot of time and money – and many careers – have been spent on this **question**, and for a number of decades, so-called "**lambda-CDM**" has been considered an excellent **answer**, given what the scientific method has been able to reveal.

In this model, for redshifts from beyond the KBC Void, a "Hubble-Lemaitre" type law is thought to apply, …



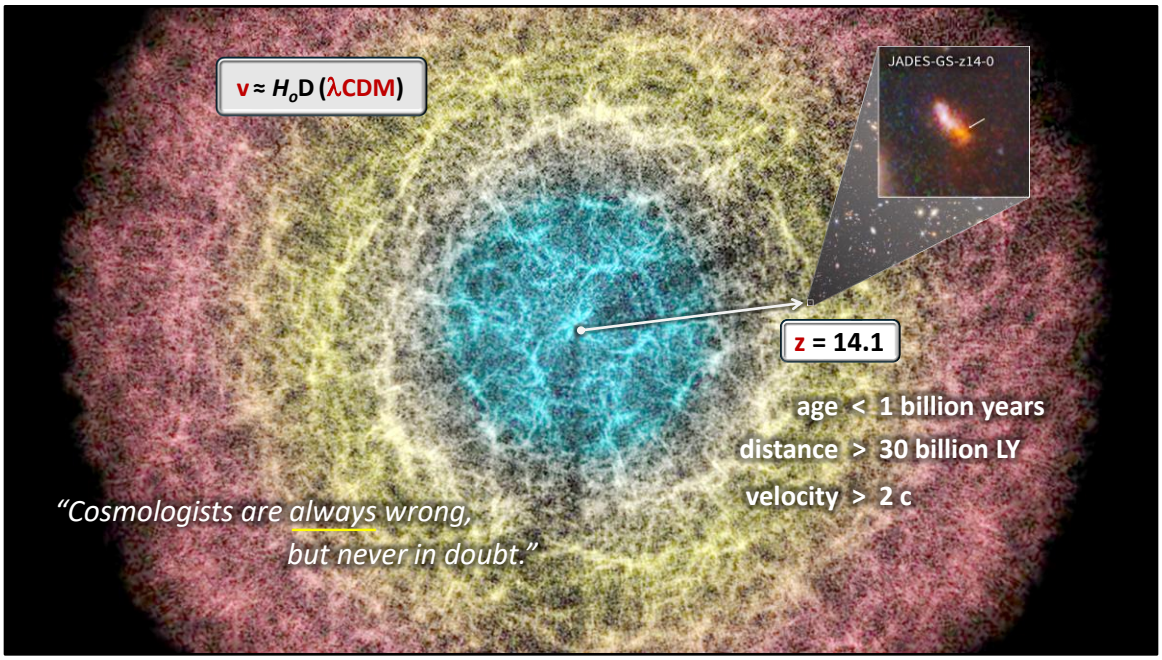
…, so cosmologists map redshifts in the simplest possible way:

Essentially, **inflation** followed by an accelerated **expansion**, everything unfolding in less than **14 billion years**.

Using this idea – of an expanding "Big-Banged" universe – **cosmologists** found they could explain most things that **astronomers** have found.

For example, imagine a galaxy with redshift **z= 0.16**.

Using this standard model, a redshift of **0.16** implies that this galaxy must be about 2.2 billion light years away, and be receding at about "**30,000 miles a second**".



And until recently, everything was good.

But then astronomers began to find things like this: [diagram]

Apparently mature galaxies with redshifts of 14.

Now in current consensus models, a galaxy with a redshift of 14 must be less than a billion years old, be over 30 billion light years away, and be receding at more than twice the speed of light.

Of course, by adjusting some assumptions about galaxy formation, cosmologists can make such data fit. But their models are being stretched, and certain tensions have appeared. Which reminds one of the old saying,

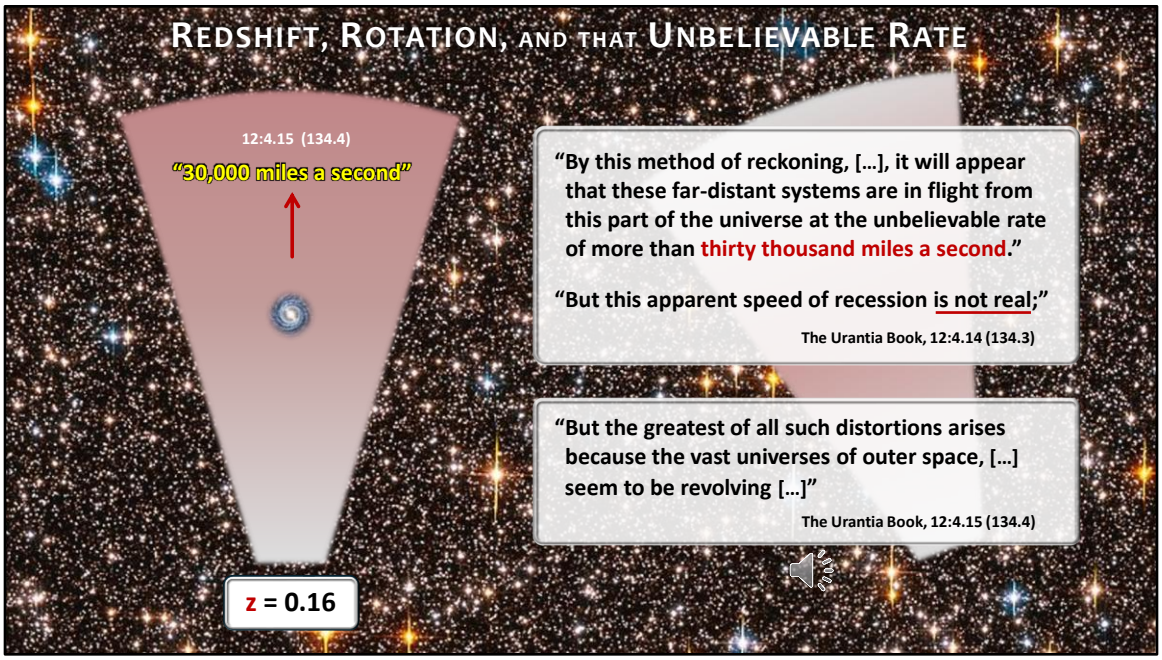
"Cosmologists are always wrong, but never in doubt."

So what does the Urantia Book say about redshifts, this shifting of spectral lines?

Well, for small displacements, the papers simply confirm our current ideas.

But with regard to the large redshifts of galaxies in deep space, these papers say something… truly unexpected.

Let's take a look



5. Redshift and Rotation

Imagine that galaxy with redshift **0.16**, receding at [quote] "**30,000 miles a second**".

Referring to our use of a Hubble-type law to estimate distance and velocity, *The Urantia Book* throws a spanner in the works. From paragraph 12:4.14 [quote]:

> "By this method of reckoning, […], it will appear that these far-distant systems are in flight from this part of the universe at the unbelievable rate of more than **thirty thousand miles a second**. But this apparent speed of recession **is not real**;"

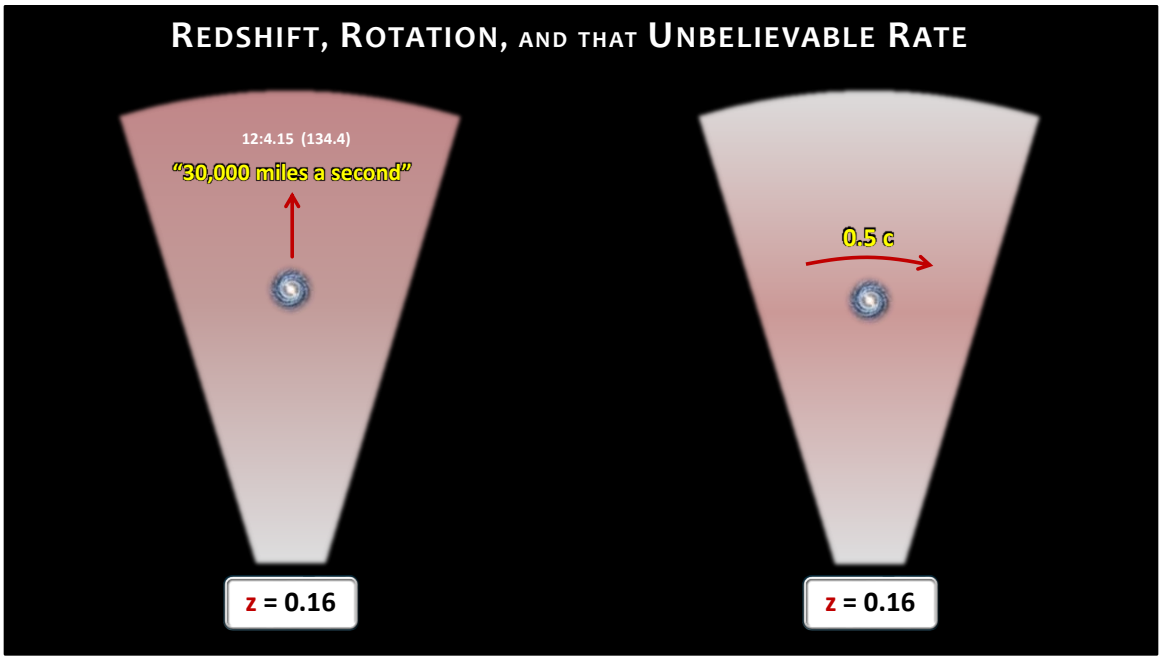
End quote.

Not real? Well, one has to ask: if this apparent speed of recession **is not real**, what's causing this enormous redshifting – or **distortion** – of spectral lines?

Which brings us to paragraph 12:4.15, and that unexpected idea [quote]:

> "But the **greatest** of all such distortions arises because the vast universes of outer space, […], seem to be revolving […]" 12:4.15 (134.4)

Here, the authors **appear** to be saying that the greatest cause of the enormous redshifts of galaxies…



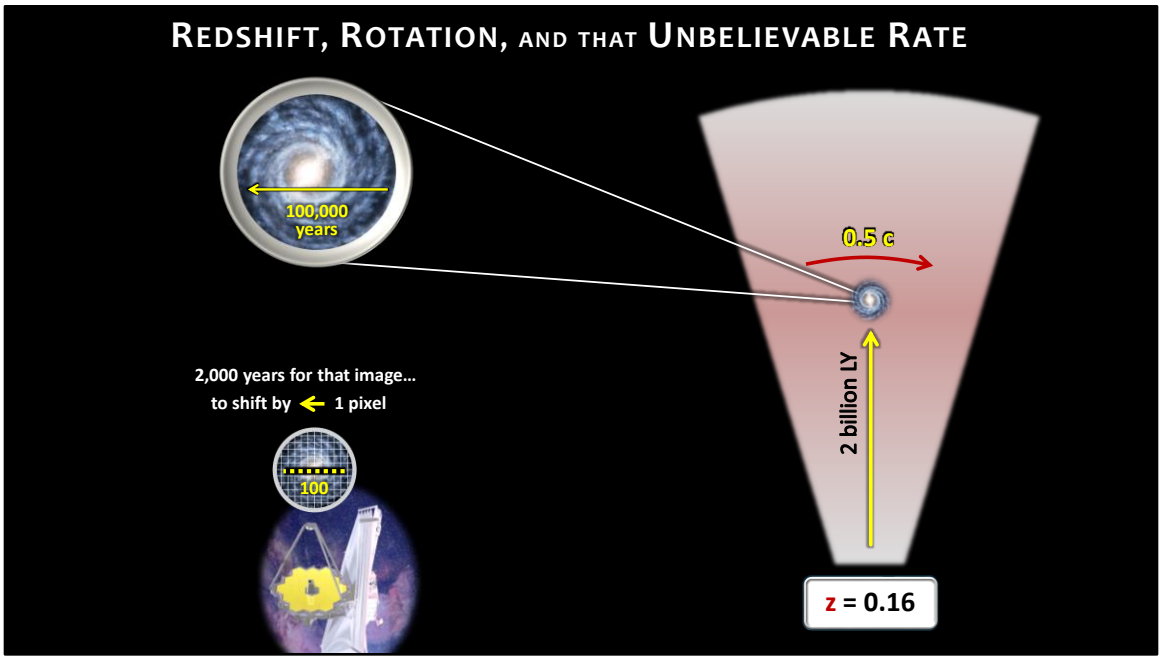
… in deep space is due to **sideways** (not **radial**) velocities.

So, what if a galaxy 2 billion light years away, were moving sideways, directly across our line of sight, at say, half the speed of light?

Well, as we'll see, once again we'd measure a redshift of… **z = 0.16**.

Ok… first question: If a galaxy were moving sideways, across our line of sight, at half the speed of light, surely astronomers would have noticed… ?!

Well, let's pause to consider.



Say that galaxy, 2 billion light years away, is about the size of our Milky Way, so about 100,000 light years across. This means it would take light – travelling at the speed of light – 100,000 years to cross that galaxy.

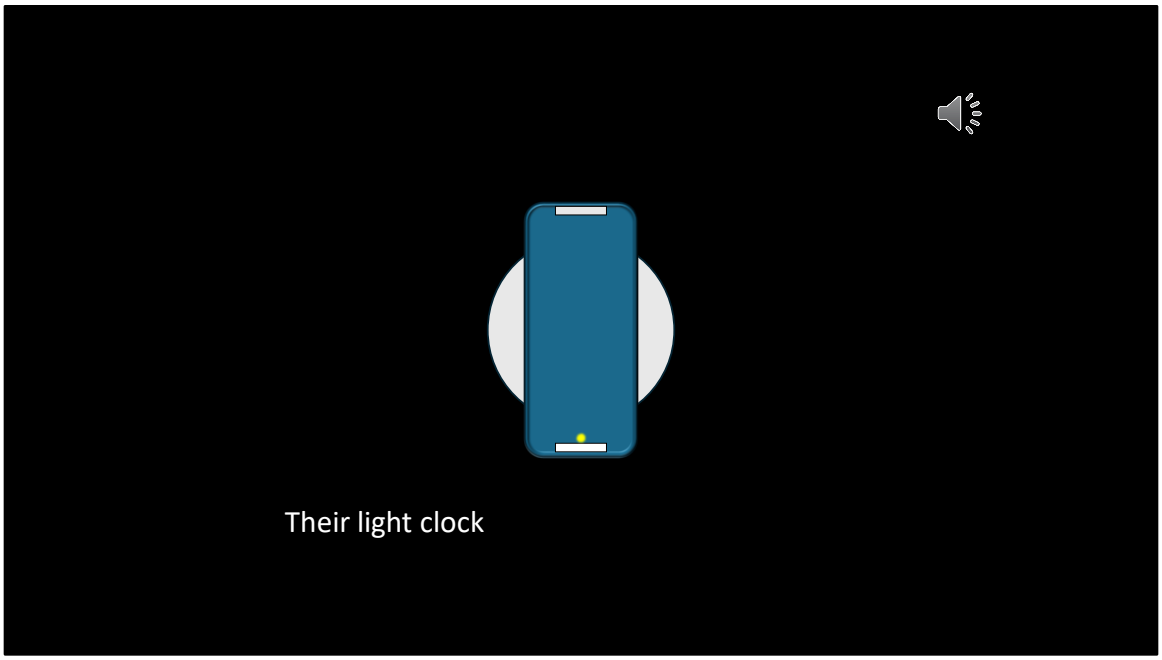
Now imagine that in some telescope the image of that galaxy is about **100** pixels wide. Then if that galaxy were moving sideways, directly across our line of sight, at half the speed of light, it would take… **2,000** years (!) for the image in that telescope to shift by **one** pixel.

The point being that, for the foreseeable future, this kind of direct measurement of **transverse** velocity will remain a challenge. However, as I'll explain in a moment, a pair of upcoming survey missions may just solve this problem, and help to prove relativistic sideways motion in outer space.

Next question: But how can **sideways motion**… cause redshift?

To see how this can work, we need to review that strange idea…
about **light** and **time**.

[https://esahubble.org/about/general/instruments/wfc3/]



6. Transverse Velocity

Imagine a spaceship, with a light-clock ticking away.

Each cycle of a photon, up and down, measures one (local) tick of this clock.

The astronauts on that space-ship use this light clock to measure the passing of time.

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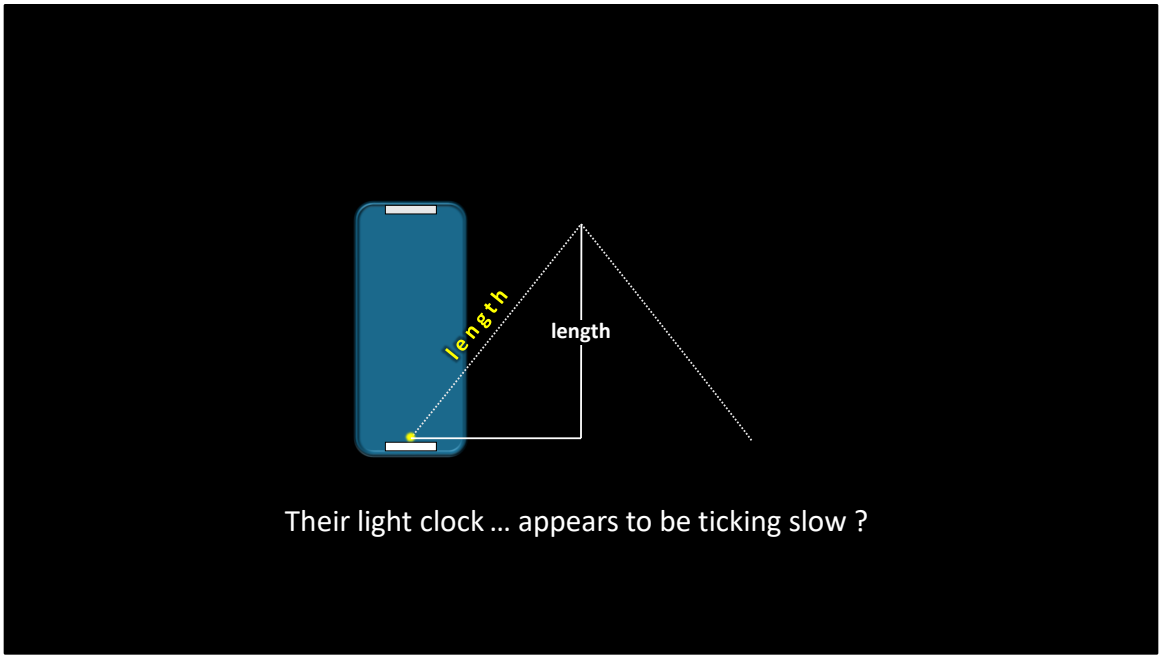
https://www.emc2-explained.info/Dilation-Calc/



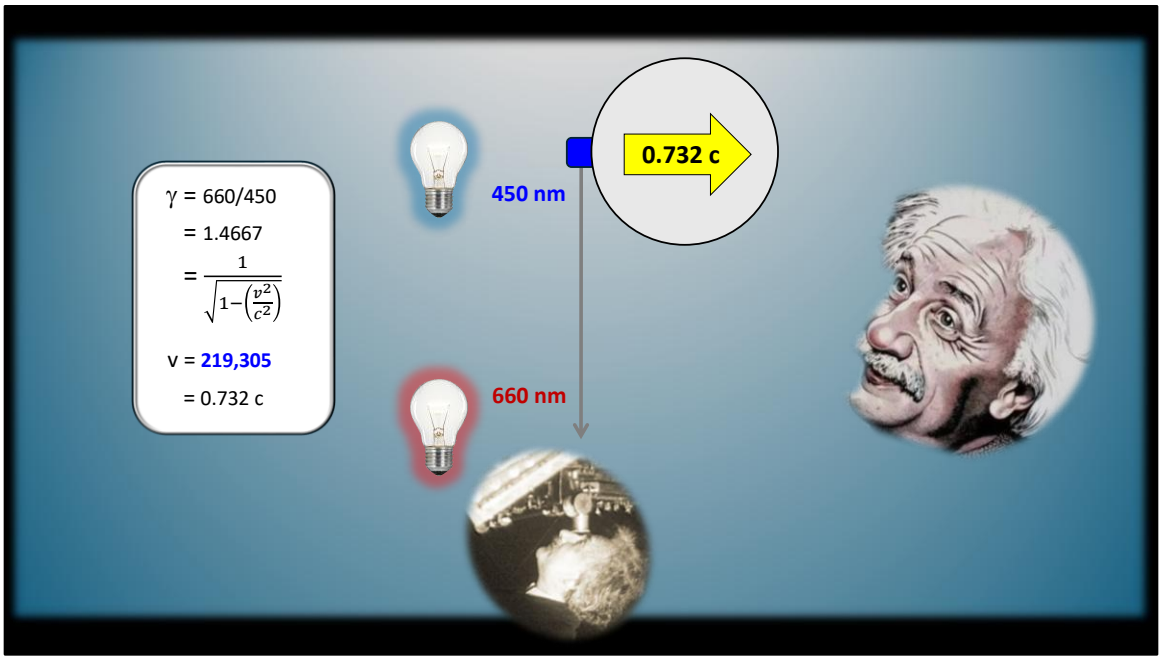
Now imagine this spaceship zooming by, directly across our line of sight.

From our point of view, we measure the length of that photon's path to be longer than the path – measured locally – by those on the spaceship.

So if the speed of light is the same for all observers, as Einstein proposed, then we'd measure the light-clock on that spaceship to be ticking slow.

A hundred years of study apparently confirms that this effect is **real**.

If we assume that it is… let's think what this means.



Imagine that spaceship, zooming directly **across** our line of sight. As it turns out, this particular type of spaceship has a tail-light that flashes blue light with a wavelength of **450** nm.

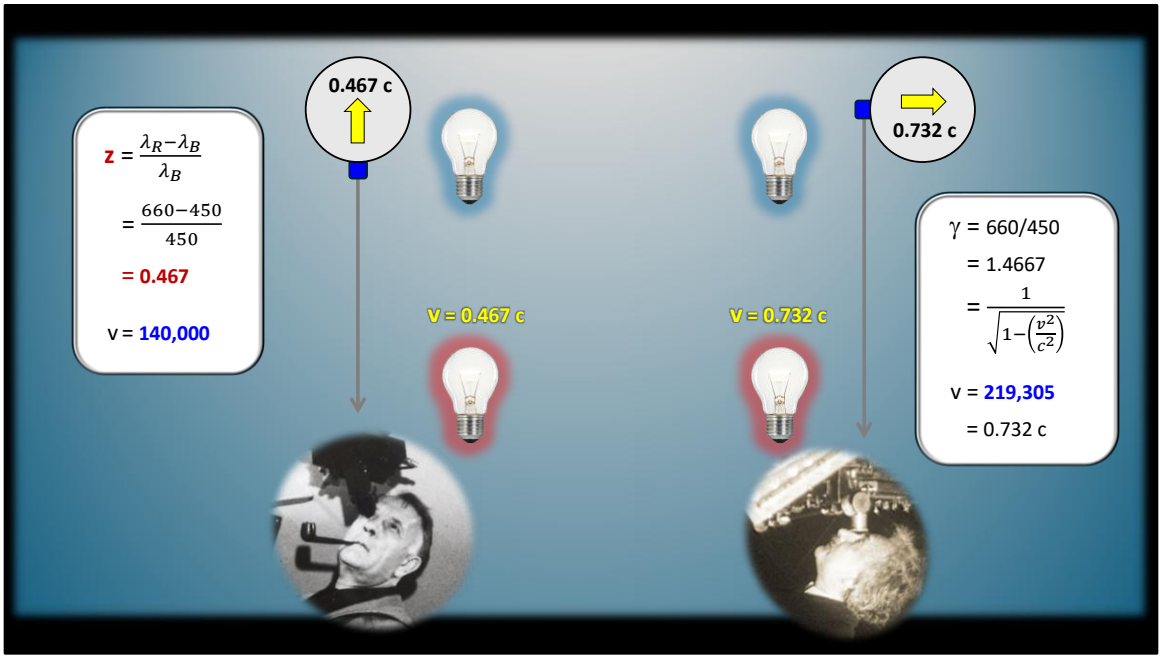
Now, **some scientist** with a telescope is asked to estimate the spaceship's speed. He observes the tail-light flash, and measures a wavelength… of **660** nm.

In other words, he sees this **blue** tail-light… flashing **red**.

This scientist happens to know a thing or two about relative motion, and running the numbers, he finds a Lorentz factor, gamma, of 1.47.

After a little algebra, he reports that this spaceship is zooming by at 73 percent the speed of light.

Ok, that's the situation for a spaceship zooming **sideways**,
directly **across** our line of sight.

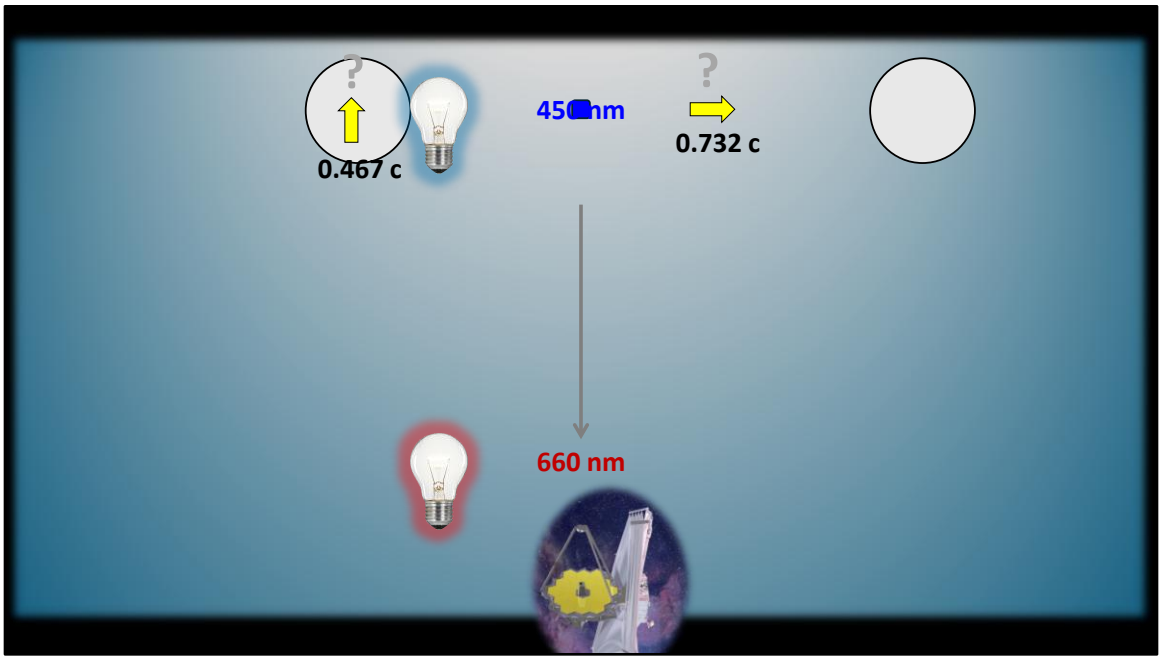


Now imagine a second spaceship, with the same type of flashing blue light. But this ship is zooming away, directly **along** our line of sight.

Once again, a scientist with a telescope is asked to work out how fast this ship is moving away. When he observes that blue tail-light, he also sees it… flashing **red**.

As it turns out, **this** scientist happens knows a thing or two about the Doppler shifting of light. Running the numbers, he finds a redshift of 0.467, and reports that this spaceship is **receding** at just over 46 percent the speed of light.

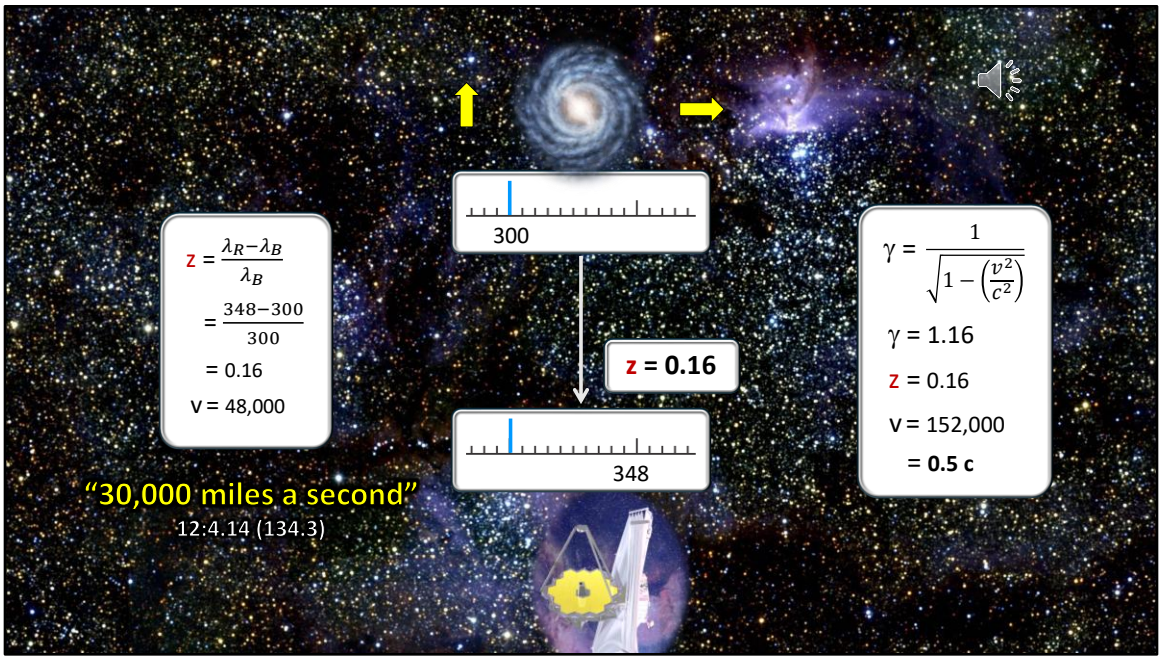
Which brings us to a curious issue.



If a spaceship with one of those flashing blue tail-lights is cruising deep in outer space, and we take a snapshot with our best telescope, and measure that blue light to be flashing red… is this redshift due to **radial** or **transverse** motion?

In other words, is that ship receding **ALONG** our line of sight at 46% the speed of light? Or is it zooming **ACROSS** our line of sight at 73% light speed?

This issue becomes more interesting…



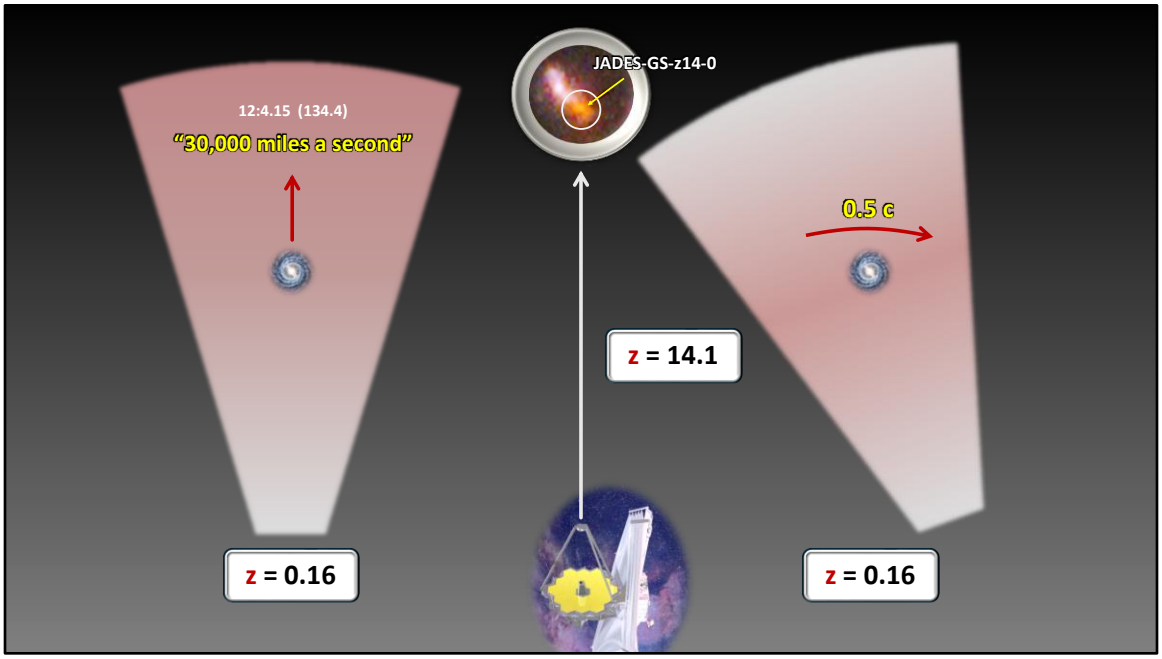
… if we replace that spaceship with a galaxy.

Let's say we know, from astrophysics, that if this galaxy were not moving relative to us, then a certain spectral line will be found at a wavelength of 300 nm.

But when we observe that galaxy (with our best telescope), we measure that spectral line at 348 nm. In other words, we observe a redshift of **z = 0.16**

As we've just seen, this redshifting of spectral lines can certainly be caused by **radial** motion, directly **ALONG** our line of sight.

But it can also be caused by **transverse** motion, directly **ACROSS** our line of sight.



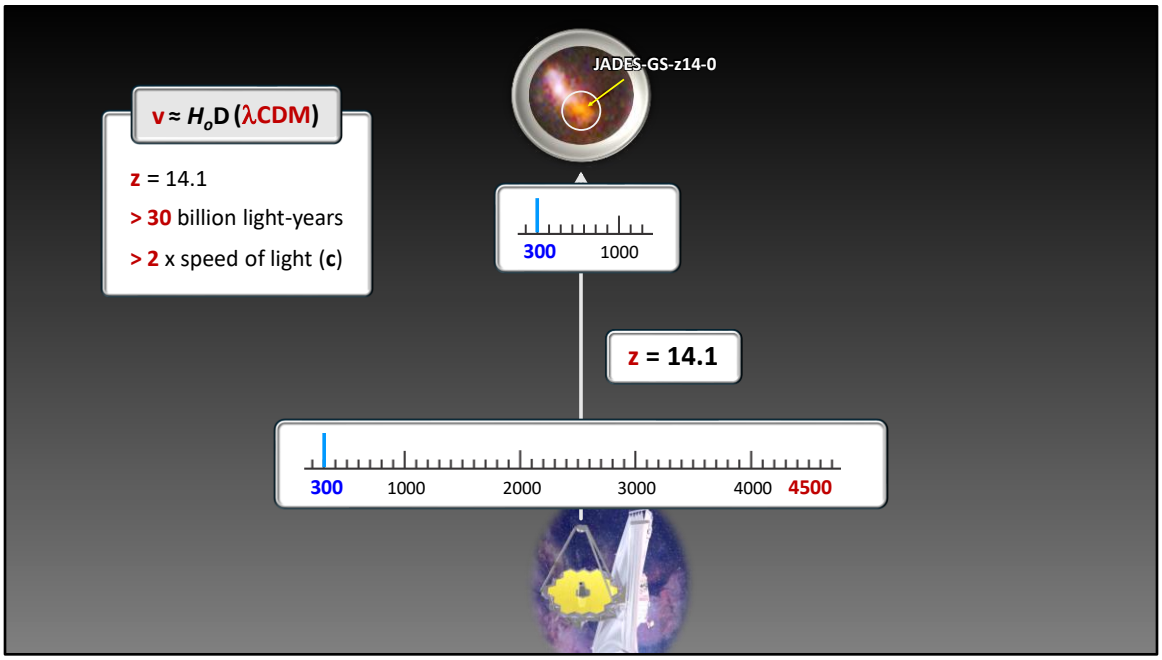
So which is it?

Is that galaxy receding at that [quote]

> "**unbelievable rate of more than 30,000 miles a second**" (12:4.14)?

Or is it zooming sideways, at half the speed of light?

But the plot, she thickens…

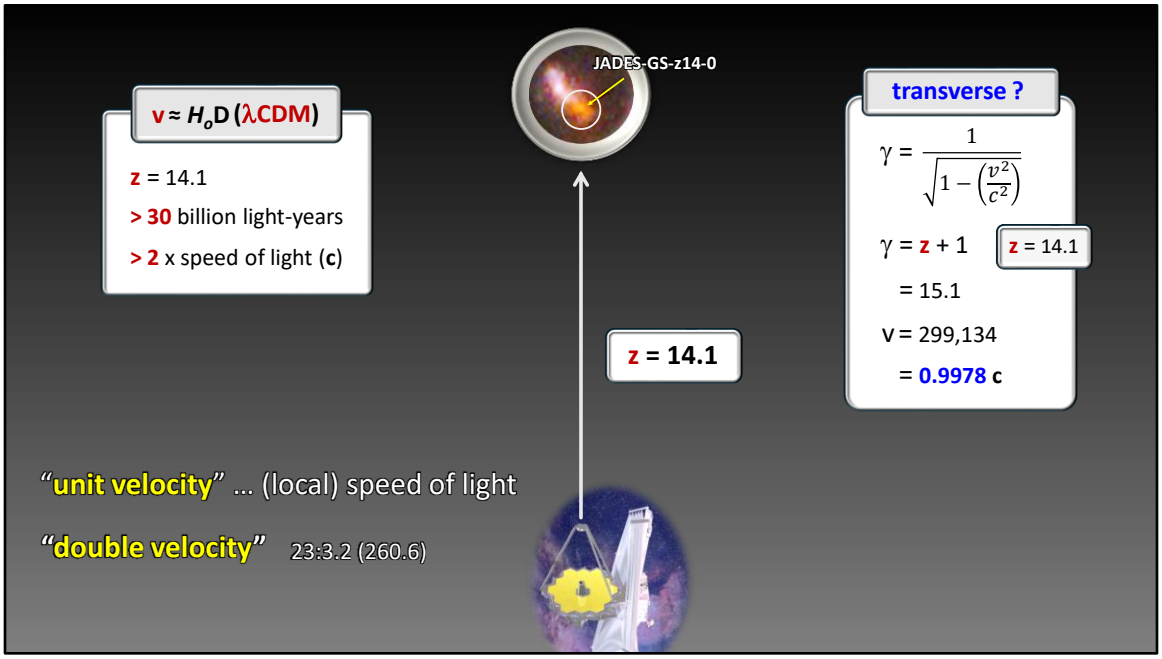


In October 2023 and January 2024, the James Web Space Telescope observed a galaxy with redshift **z = 14.1** (JADES-GS-z14-0).

This means that a spectral line emitted or absorbed by that galaxy at **300** nm would be measured by the telescope at… **4500** nm, or **4.5 microns**.

Now, using **lambda-CMD**, a cosmologist would conclude that this galaxy must be over 30 billion light years away, and be receding at more than twice the speed of light.

On the other hand,



…, if that galaxy were moving directly **ACROSS** our line of sight, at **just under** the speed of light, we would also observe a redshift of **z = 14.1**.

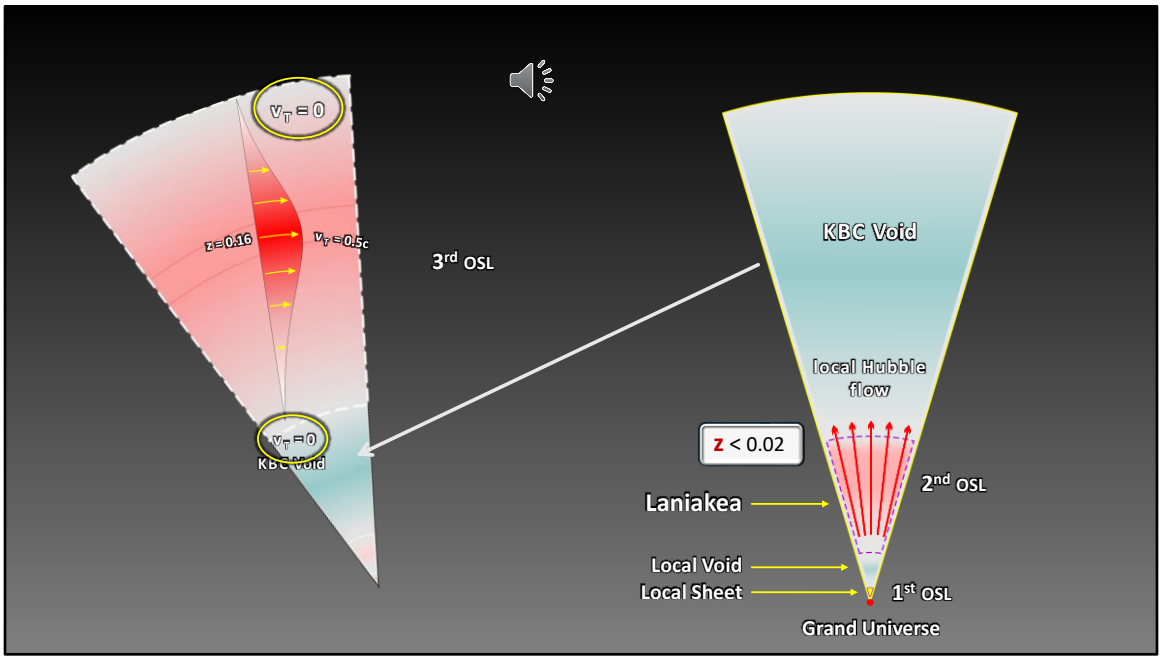
So once again, which is it?

Is this galaxy receding at over twice the speed of light?

Or is it cruising sideways, at just under "**unit velocity**" – the (**local**) speed of light?

Regarding **unit velocity**, recall that midwayers can move twice this fast (23:3.2), while seraphim can reach three times this speed. Point being that, on a cosmic scale, the (**local**) speed of light becomes literally **painfully** slow.

Let's now try to see what all this means for motion in the outer space levels, those [quote] "curved space paths of lessened resistance to motion".



Regarding the first outer space level, the relatively tiny velocities and redshifts are due both to the current expansion phase of space respiration, and local gravitational interactions.

Likewise in Laniakea, the second outer space level. Since all these galaxies lie within **300** MLY, the most recent **500** million years of expansion imposes that characteristic (local) "Hubble flow".

But moving out beyond that KBC Void, things become more interesting.
From 11:7.8 [quote],

> "A space level thus functions as an elliptical region of motion surrounded on all sides by relative motionlessness." 11:7.8 (125.2)

End quote.

This **appears** to imply that, at its inner and outer margins, a space level is "**relatively motionless**". So in this third outer space level, we'd expect little or no sideways motion at the edges, rising to some maximum sideways flow midstream.

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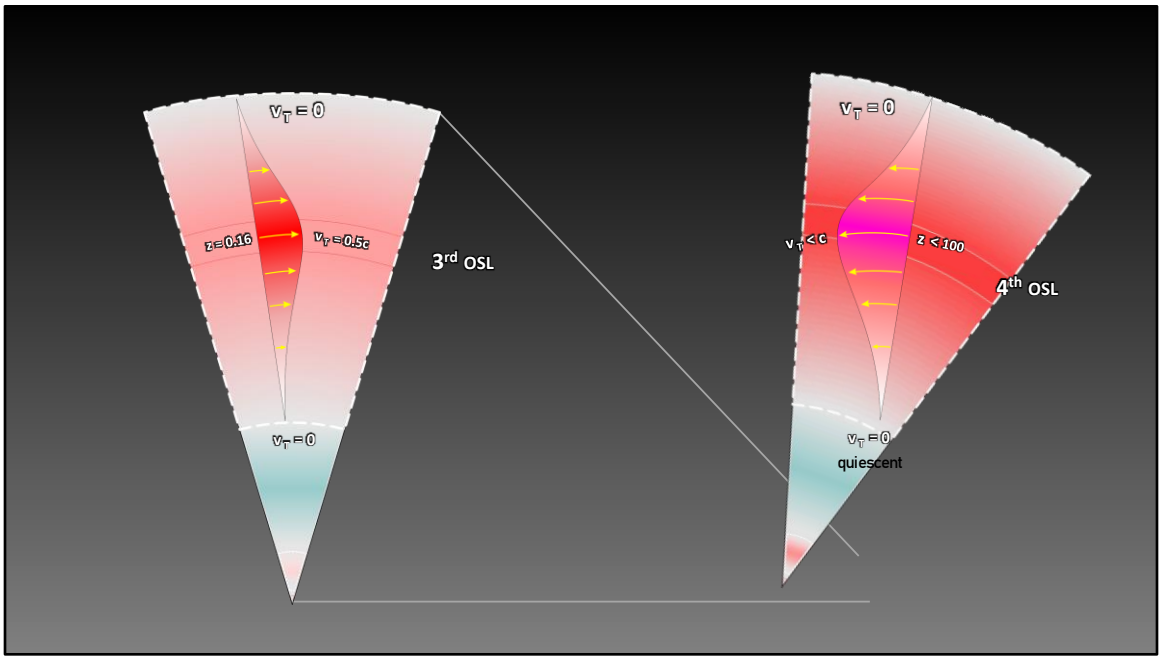
[**Note**]: this midstream/sideways flow is along a **geodesic**, hence always (effectively) **perpendicular** to

observers in the grand universe.

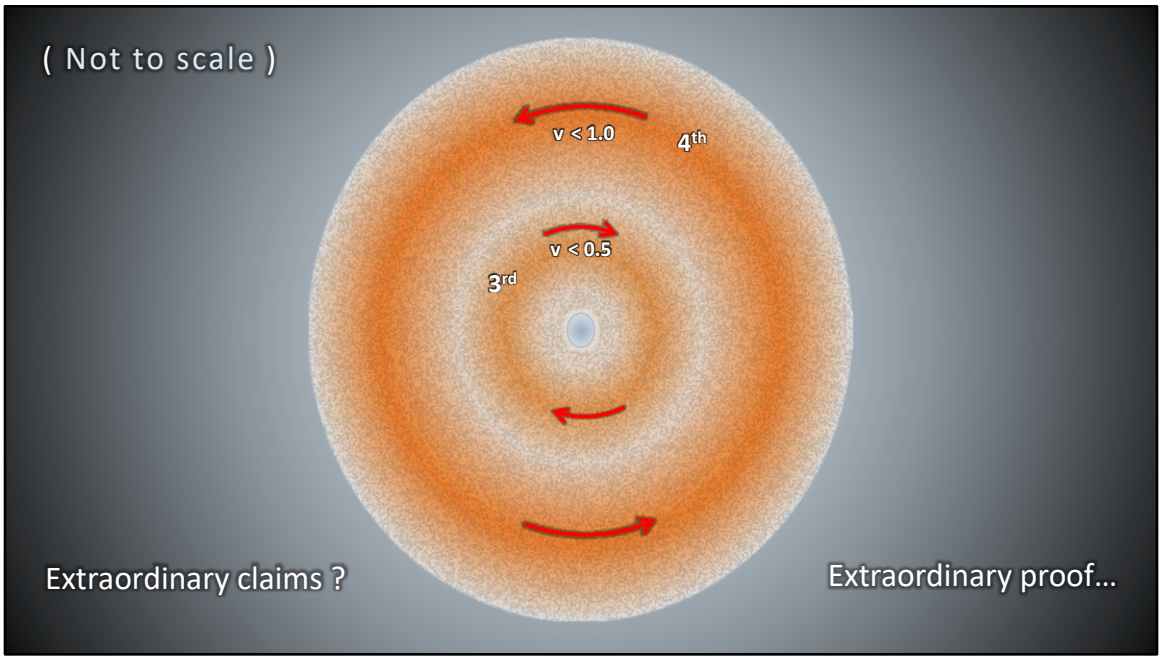


Likewise in the 4th outer space level.

Once again, we'd expect little or no sideways motion at the inner and outer edges, with the rate of flow rising to some maximum speed midstream.

In this case, if we assume the rate of this midstream flow approaches the local speed of light ("**unit velocity**"), then this model easily accommodates redshifts well beyond 14, all the while bounding the actual velocity of galaxies below the speed of light.

So with these details in place, when we put all this together, …



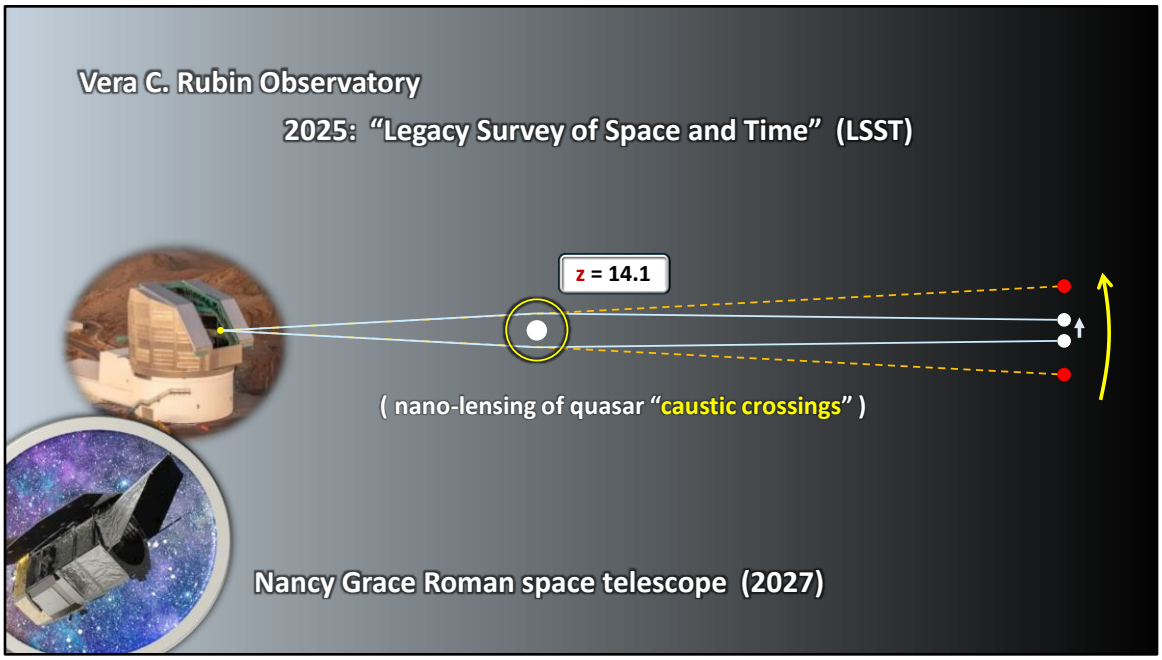
We get the Urantia Book's model…

- of the absolute motion of space itself, so-called "space respiration",
- and those counter-rotating levels of outer space.

Now, if we simply allow the midstream flows of the 3rd and 4th outer space levels to be relativistic, then as we've seen, this model can accommodate any redshift any astronomer might ever observe.

So now let's ask the question: Is there any possible way to **prove** this unorthodox idea, that the **primary** cause of cosmological redshift is **relativistic sideways flow**, and not some runaway expansion?

As it turns out, there may just be:



The Rubin Observatory is about to begin its 10-year "**Survey of Space and Time**".

One of its 4 main goals is to identify things that unexpectedly change.

And one thing that would certainly cause an unexpected change is if a massive galaxy in the 3rd outer space level happens to gravitationally lens a quasar in the 4th outer space level, moving sideways at near the speed of light.

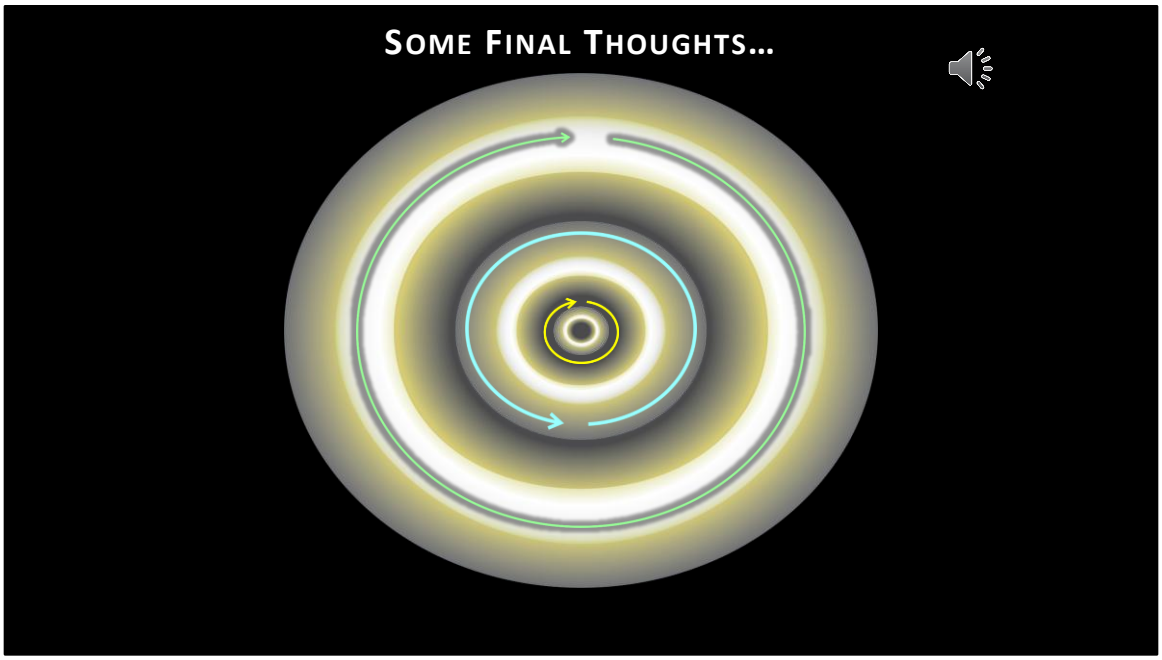
But even better: in 2027, the Roman space telescope will begin a more focused and fine-tuned survey of ***things that change***.

For a quasar moving sideways, "**nano-lensed**" by a foreground massive galaxy, this "next-gen" space telescope will be able to snap frames of a movie that, within a year, could prove the transverse (or "sideways") motion of the most distant objects in space. While not confirming a Urantia Book cosmology, it would certainly compel cosmologists to "pause to consider…"

So, what if astronomers DID see something like this – hard evidence of a quasar or "**Little Red Dot**" moving sideways?

Well, for the next ten years scientists would propose **events** and "**epicycles**"

… to explain such things away.

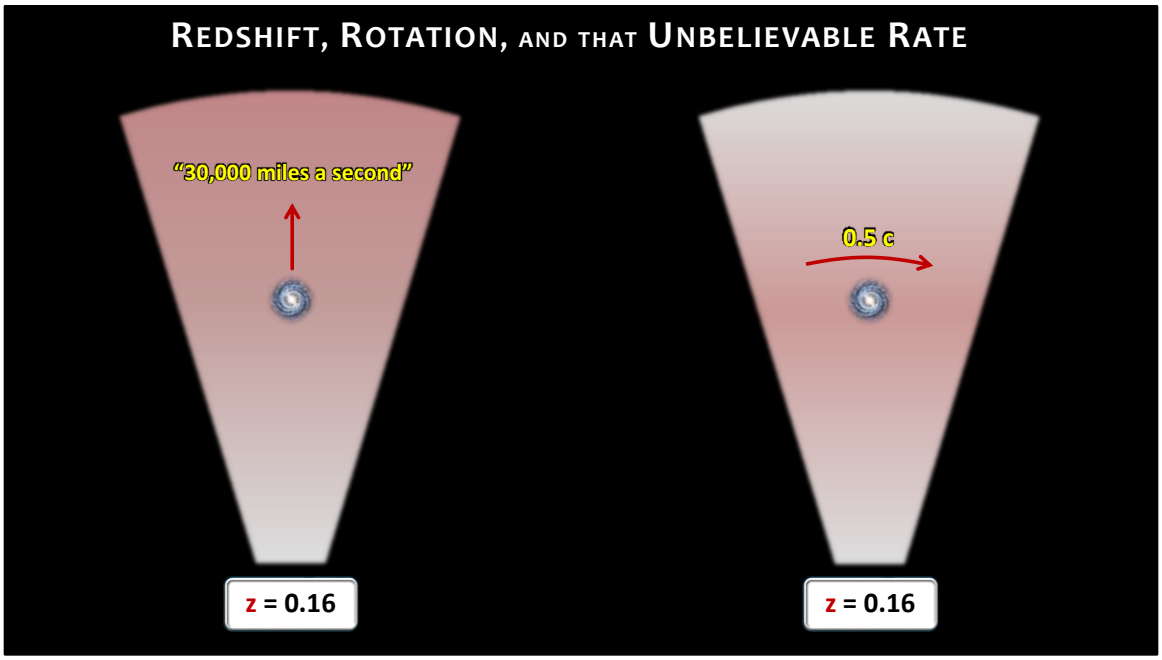


7. FINAL THOUGHTS

Let’s wrap up by collecting a few final thoughts.

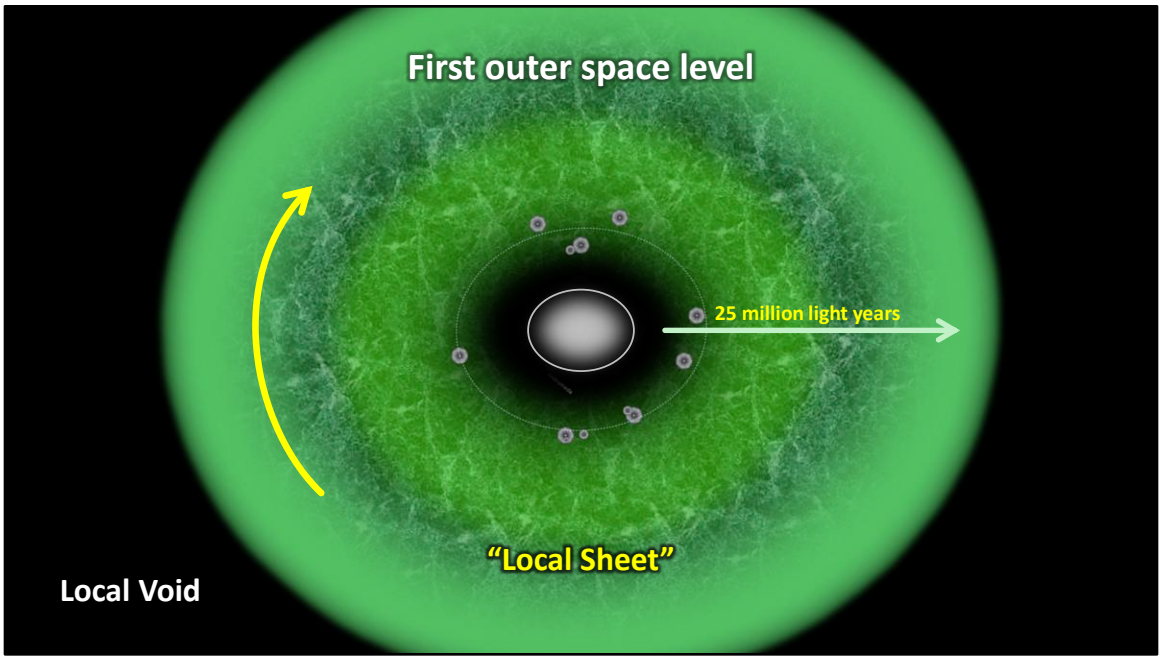
As I’m sure we’d all agree, it’s a long way from detecting a quasar moving sideways… to discovering a cosmos of nested, counter rotating levels of outer space, and cycles of space respiration.

So where do things stand?

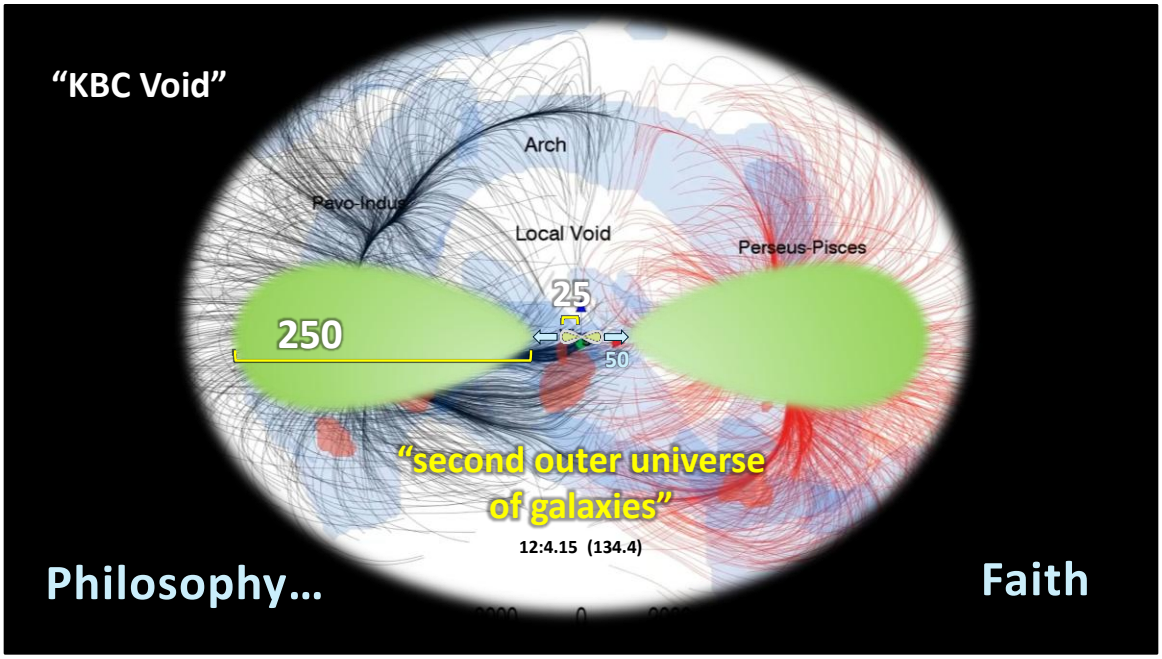


Clearly, the enormous redshifts of galaxies in deep space can be explained by an accelerating, runaway expansion, as proposed in current Big Bang models.

But as we've seen, such redshifts can also be explained by relativistic rotation.



We've also seen that the first outer space level, as described in the Urantia Book, is a remarkably good match to the so-called "Local Sheet" astronomers have found.



And we've seen that the Urantia Book's [quote] "second outer universe of galaxies" can easily be identified with Laniakea, our local supercluster, surrounded by that enormous KBC Void.

So here's the challenge: the Urantia Book reveals a cosmology that's far beyond the reach of either **scientific** discovery or **religious** experience. Thus exploring this model will require an approach that involves **philosophy**, and **faith**.

At the same time, we must keep in mind that astronomy and cosmology – the study of "**how the heavens go**" – is a matter of science, not faith. So we need to approach this study not as **evangelists**, but as **students** exploring an idea.

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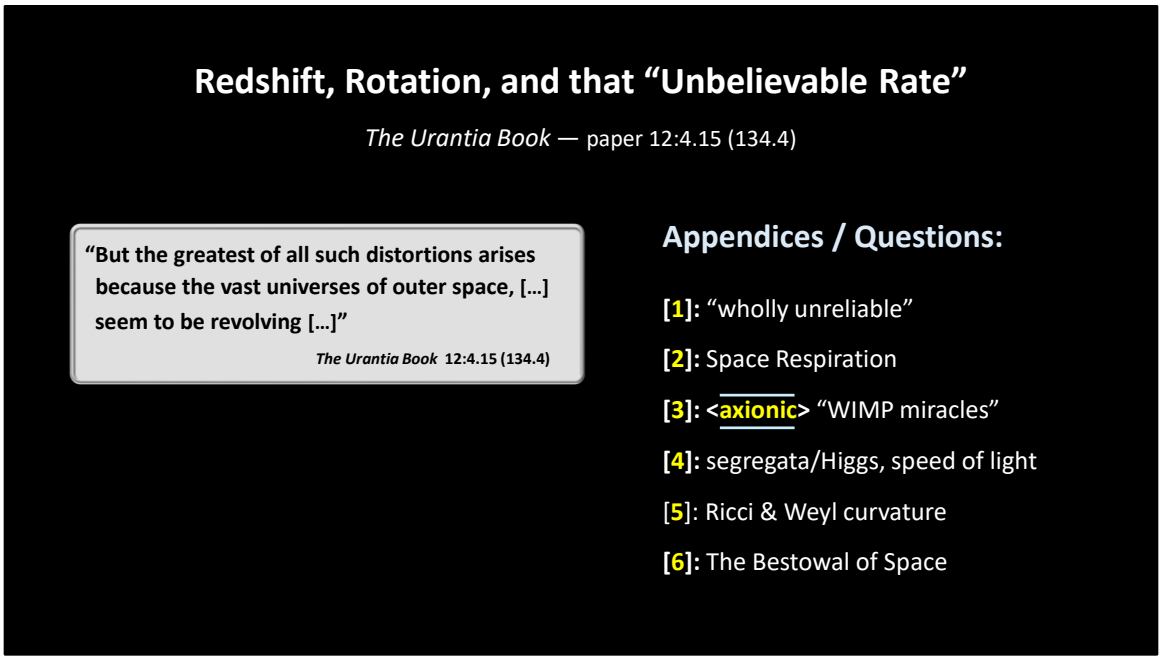


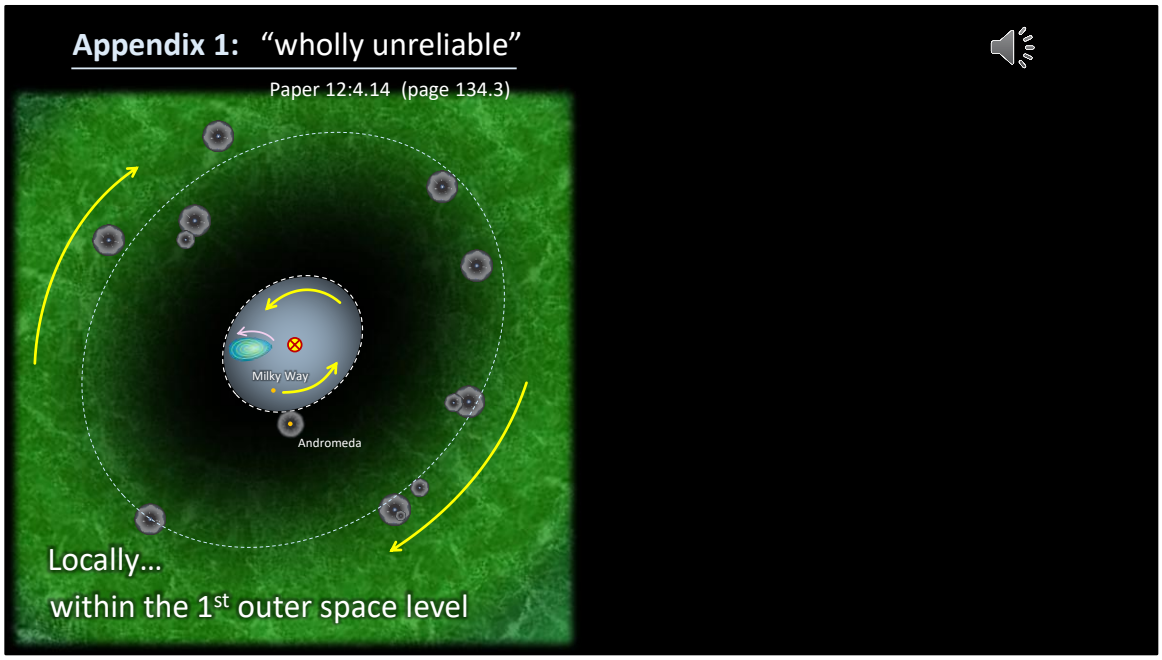
[**Appendices**]:

That's my attempt to explore that unexpected line in paragraph 12:4.15, that hint about a connection between redshift and rotation, [quote]

> **"But the greatest of all such distortions arises because the vast universes of outer space, […] seem to be revolving […]"**

But before concluding, if time allows, I've added (as **Appendices**) a few highlights I'd like to explore.

These might be a good way to kick-start some Q&A.



[Appendix 1]: "wholly unreliable" 12:4.14 (134.3)

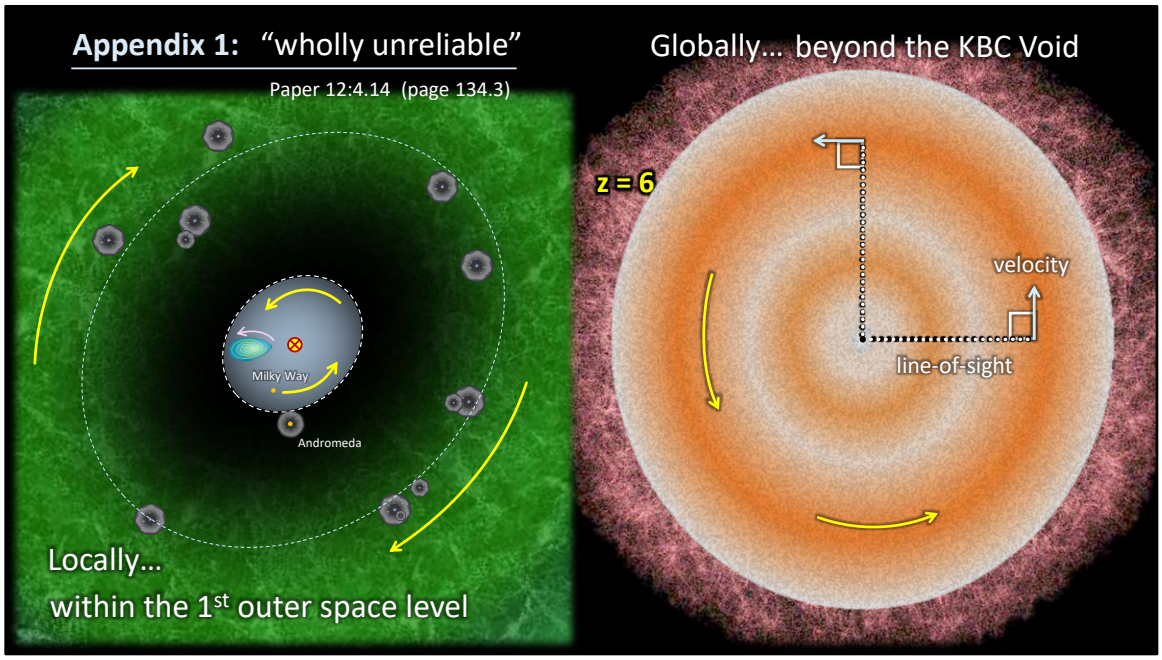
In Paper 12 section 4, the authors imply two very different cases where using redshift to determine velocity becomes [quote] "**wholly unreliable**".

The first case applies locally, within the first outer space level. Think of all those relative motions, all those rotating "**wheels within wheels**":

- *minor sectors rotating within major sectors,*
- *major sectors orbiting Uversa,*
- *superuniverses orbiting Havona,*
- *the first outer space level rotating around the grand universe wheel*.

The relative Doppler shifts due to all these local, relative motions conspire to make any estimate of absolute velocity impossible. Also, note that within Laniakea, within our local bubble of expanding space, all these relative velocities and Doppler shifts are (relatively speaking) tiny.

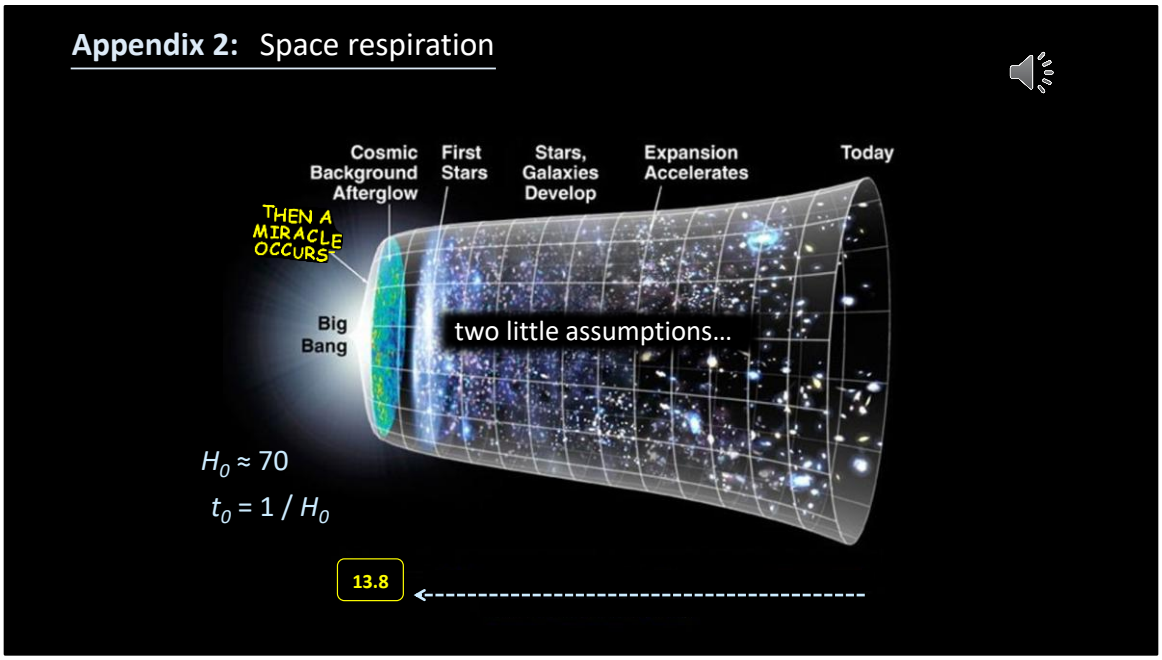
The second case (where using redshift to determine velocity becomes "wholly unreliable") involves the enormous redshifts …



… of galaxies beyond the **KBC Void**.

By assuming that a "Hubble-type law" still applies to these truly distant galaxies, astronomers are led to **assume** that they can estimate their distance and velocity simply by reading their redshift. However, the author of Paper 12:4.15 claims this use of redshift is "**wholly unreliable**" because most of the redshift is caused **not** by radial velocity (due to a runaway expansion), but to a number of factors, the greatest of which is their **transverse** motion along the geodesics of curved space paths.

Here, it's important to note that any light we observe from such distant galaxies was emitted **perpendicular** to the velocity of that galaxy. Hence its redshift is **not** affected by **ANY** Doppler shift, being due entirely to the **time dilation** of special relativity.



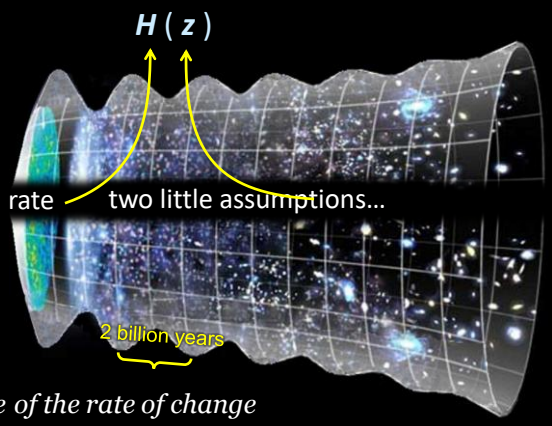
[Appendix 2]: "space respiration" 11:6.0 (123.3)

Regarding current assumptions about space, I'm sure we all know this story that cosmologists currently like to tell… which goes something like this:

> *Given one miracle – one miraculous moment of "cosmic inflation" – and two little assumptions, we can predict that the universe began to expand about 13.8 billion years ago.*

Appendix 2: Space respiration

Ringermacher & Mead (2015)
(arxiv.org/abs/1502.06140)



rate of change of the rate of change

… has been changing ?

Nowadays, these two little assumptions, about [**redshift**] and [**rate of expansion**], seem so obviously true, that some cosmologists no longer see them as "assumptions", but rather, as **hard facts** which their models must obey.

It's no exaggeration to say that this story, this proposed expansion history of the universe, sits on these two assumptions. So in 2015, two physicists (not cosmologists) Harry **Ringermacher** [1] and Lawrence **Mead**, took a close look at these assumptions, and this story, and the best data of the day.

And they noticed… something subtle in the supernova data: that "the rate of change of the rate of change" (of the expansion) has been changing… **every 2 billion years or so**.

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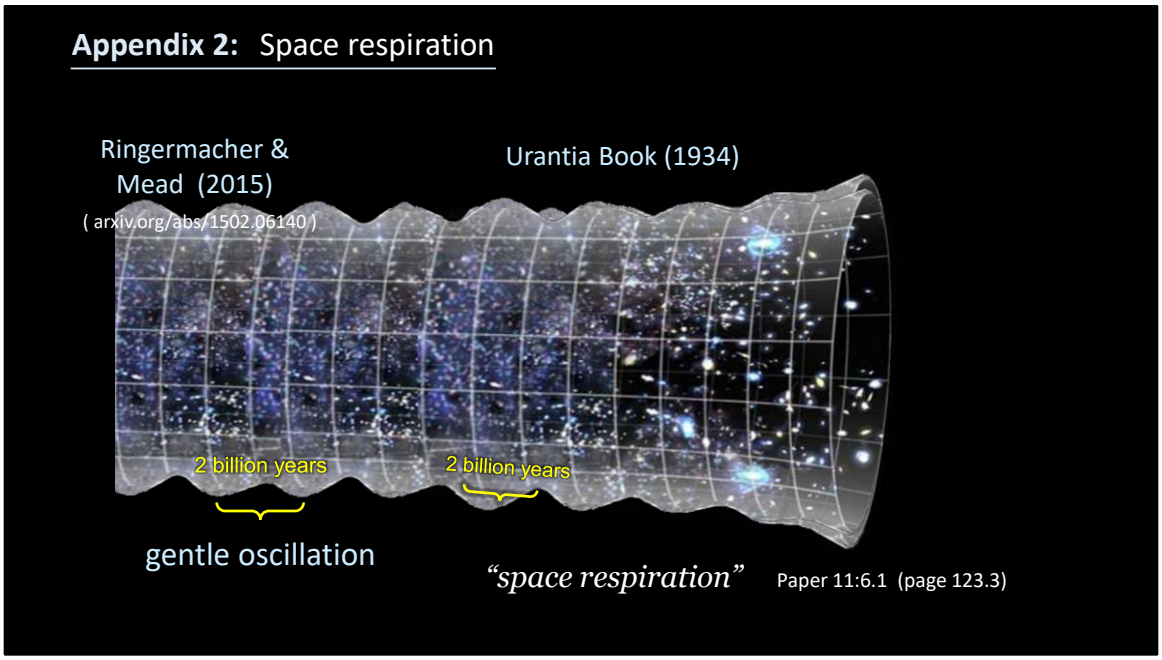
[1] University of Southern Mississippi.
https://astronomynow.com/2015/07/01/is-the-universe-ringing-like-a-crystal-glass/

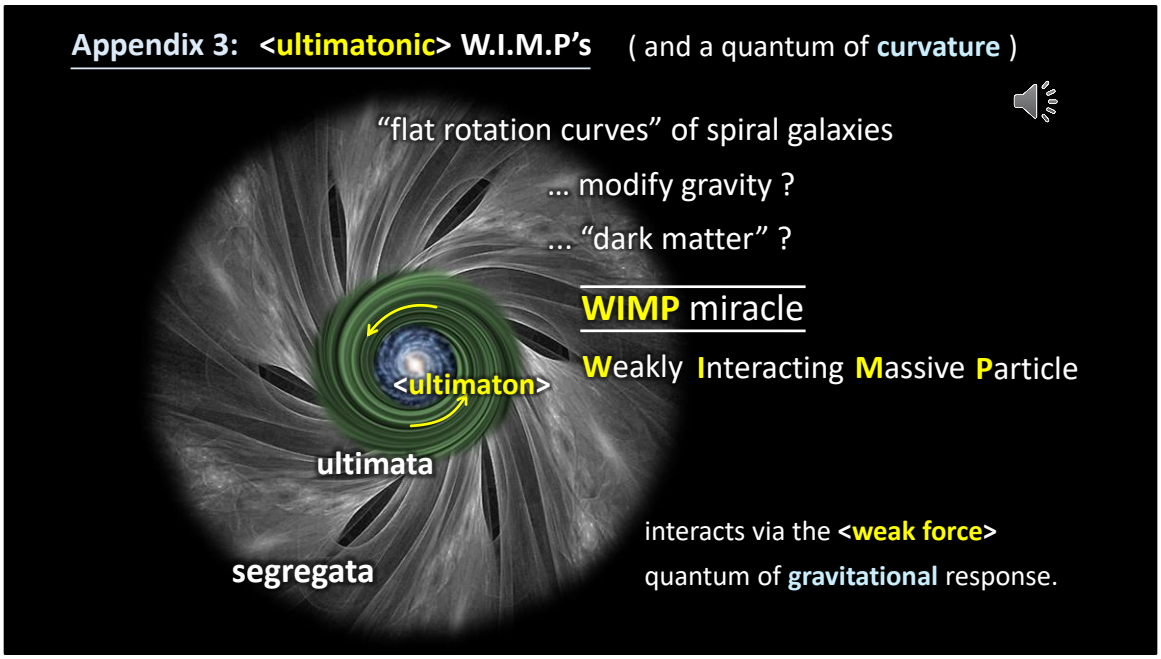
Appendix 2: Space respiration



They proposed that a simple, "**big-banged**" universe was in some sense "**ringing**" or oscillating as it expanded; that over the last 13 or 14 billion years, the rate of expansion of the universe has **sped up** and **slowed down** 6 or 7 times.

The Urantia Book takes this unorthodox idea one more step: it proposes **cycles**, two billion years long, of gentle oscillation; of so-called "**space respiration**".

Paper 11 section 6 discusses the idea.



[**Appendix 3**]: ultimatonic **WIMP** miracles (and a **quantum of curvature**)

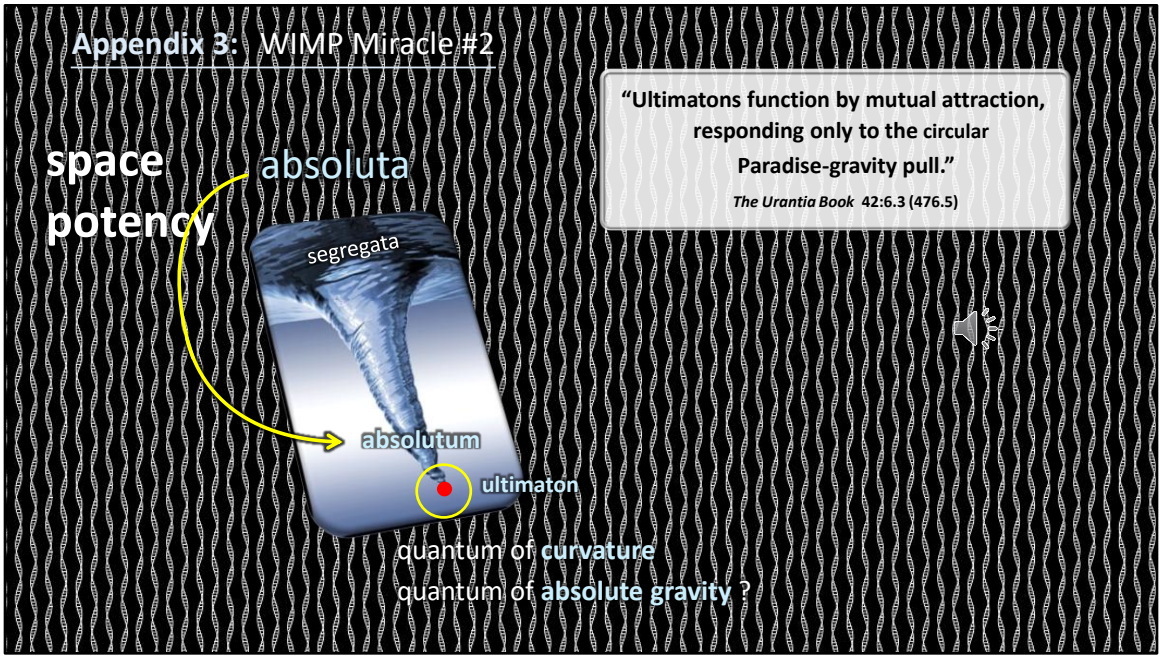
In the late 1970's, [*] when Vera Rubin first noticed those famous "flat rotation curves" of spiral galaxies, scientists were faced with a problem: either our ideas about gravity would need to be modified, or most of the mass of the universe must be [*] invisible, or "dark".

In the 1980's scientists began to discuss a so-called [*] "**WIMP miracle**". The idea was that if spiral galaxies were [*] embedded in some vast halo of invisible, **W**eakly **I**nteracting **M**assive **P**articles (or **WIMP**'s), this would help to explain why spiral galaxies rotate the way they do.

In 1935, *The Urantia Book* predicted something similar. A Primary Force Organizer [*] condenses a halo of <**segregata**>, within which an Associate Force Organizer [*] spins up a disk of <**ultimata**>. Then within such vast, dark disks, [*] atoms and stars begin to form, and eventually… spirals of stars.

In this scenario, the <**ultimaton**> becomes quite literally the [*] ultimate **WIMP**. It's "weakly interacting" because it [*] interacts only via the weak force, and it's massive not in the sense of "lots of mass", but as the fundamental [*] unit, or quantum, of gravitational response.

Which brings us to a second, *very different*… "**WIMP Miracle**".



In paper 42 section 6, an **absolute** relationship between ultimatons and Paradise is described. From (42:6.3) [quote],

> " Ultimatons function by mutual attraction, responding only to the circular Paradise-gravity pull. "

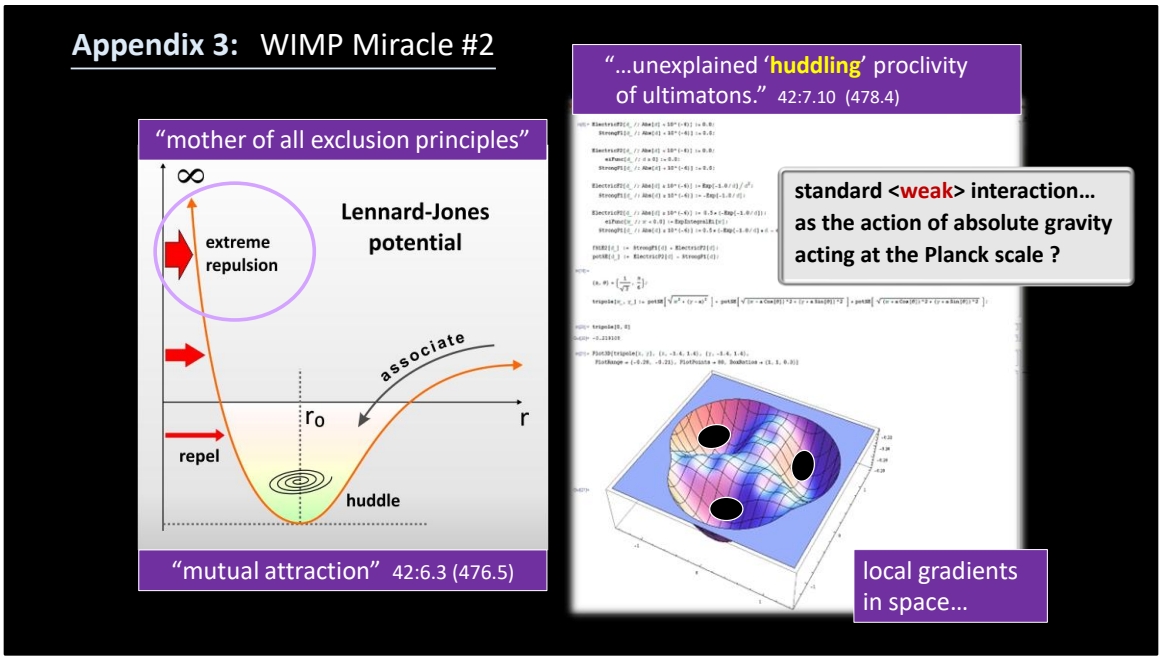
Given this direct, "**absolute**" relationship, we can make a case for ultimatons being some quantity of space potency (or **absoluta**) with all the space squeezed out.

If so, then the *density* of an ultimaton would make it a quantum of "**curvature**", the sort of curvature "**faintly glimpsed**" by Einstein (195:7.5).

In other words, a quantum of classical gravity.

Now, if we think of so-called "**absolute**" or "**Paradise**" gravity as the **curvature** imposed by Paradise acting on space, then the ultimaton, the quantum of that curvature, becomes a quantum of **absolute gravity**, the quantum of material response to Paradise.

Which leads to an interesting idea…



Imagine the density of ultimatons causing local gradients in space, such that neighboring, co-moving ultimatons might tend to fall together (that "**mutual attraction**" mentioned in 42:6.3).

Mathematically, we'd have a balance of forces: that "**mutual attraction**" drawing a few ultimatons together, while some **extreme repulsion** – from their quantum of ultimatonic spin (Planck's **quantum of action**) – keeps them apart.

This sort of balance – between mutual attraction and extreme repulsion – might help to explain that [quote] "**unexplained**" proclivity of ultimatons to huddle (42:7.10).

Given all this, we might even model the so-called <**weak**> or short-range interaction of standard model physics as the action of absolute gravity acting – at the smallest (so-called Planck) scale – on those ultimatonic **WIMPS**.

Which brings us to a third "**WIMP Miracle**".

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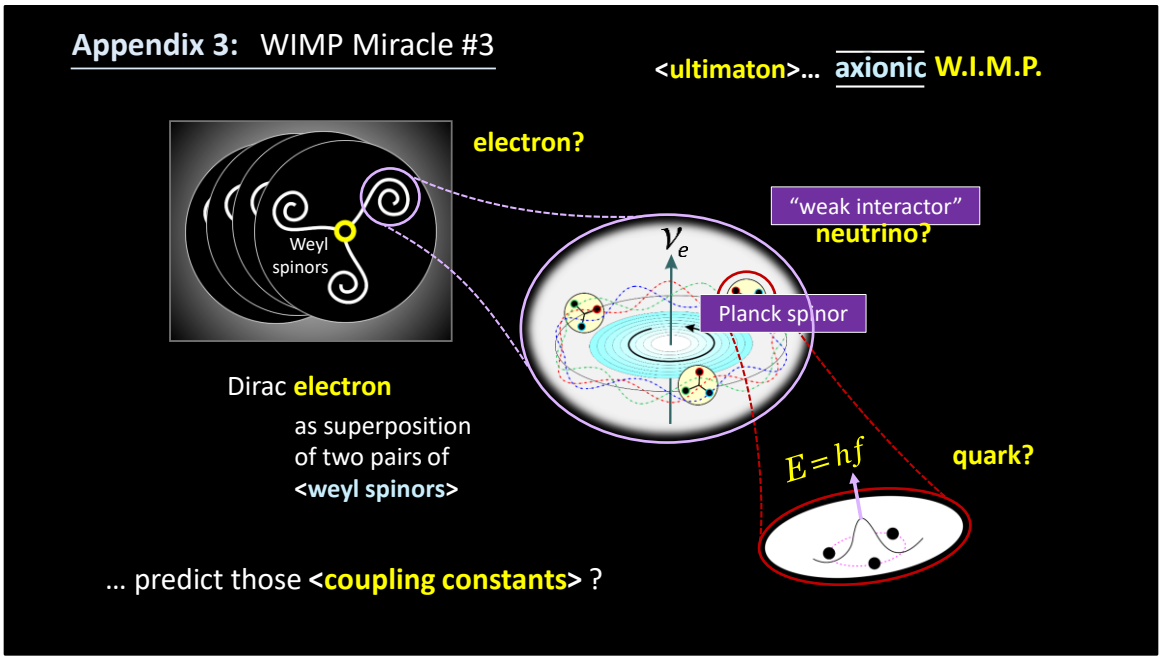
If clusters of such quantized density do in fact drag their associated space, as described in paper 118:3.6 (1297.7), this would both confirm and explain Einstein's speculation about the "**frame-dragging**" of space by mass.



Given such tiny clusters of huddling ultimatonic WIMPs, we can make contact with standard model physics in the following way:

1. Build up the Dirac electron from a superposition of pairs of Weyl spinors.

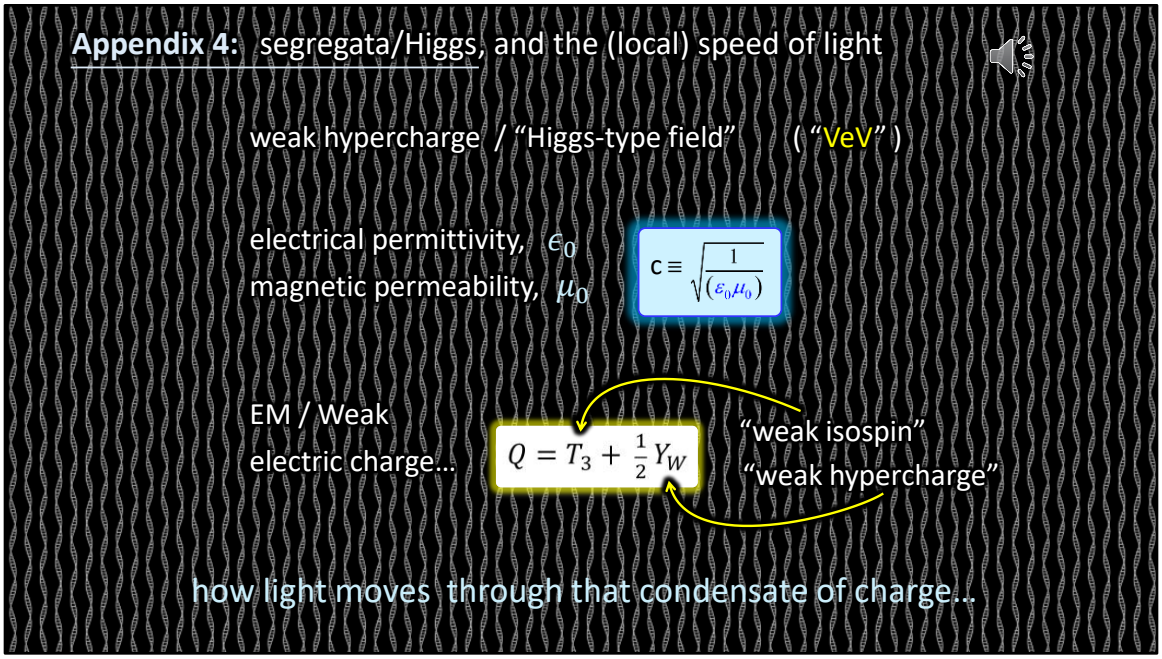
2. Build these spinors from smaller parts; parts designed and tuned… to interact with that condensate of weak hypercharge we call a Higgs-type field.

3. Build these interactive parts from Planck-scale things, our huddling ultimatons.

We can use the same sort of scheme for all leptons and quarks.

And as one might expect, accounting for all these internal, spinning parts might even allow us to predict those so-called coupling constants for all standard model particles… something that **all** physicists are very keen to do.

Oh, and one more thing. Given that Frank Wilczek’s <**axion**> was invented to help clean up a problem in the “Standard Model” for particles, it’s tempting to describe the ultimaton as… an **axionic WIMP**.



[Appendix 4]: segregata/Higgs (and the local the speed of light)

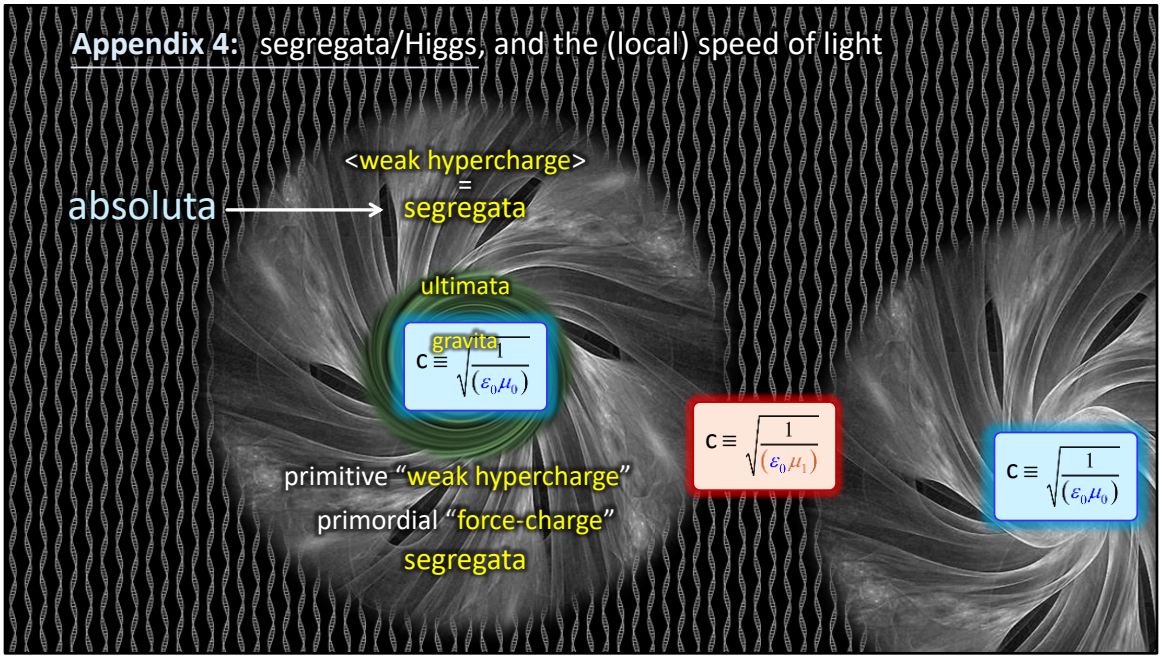
Two current assumptions in cosmology are (1) that space is pervaded by a field of primitive **weak hypercharge**, that so-called "**Higgs type field**", and (2) that this field has a vacuum expectation value (or **VeV**) that's everywhere the same.

Another assumption is that empty space has a certain **electrical permittivity** and **magnetic permeability** that, once again, are everywhere the same.

Using these (locally measured) values, scientists then define a speed of light in empty space like so… [**eqn**].

By 1970, a connection between electromagnetic and weak interactions had been proposed, such that electric charge can be defined in terms of **weak isospin** and **weak hypercharge**: [**eqn**]

This deep connection between that short-range "ultimatonic" force (see **Appendix 3**) and standard quantum electrodynamics (or QED) implies something interesting about the way electromagnetic light moves through that field (or "condensate") of primitive **weak hypercharge**.



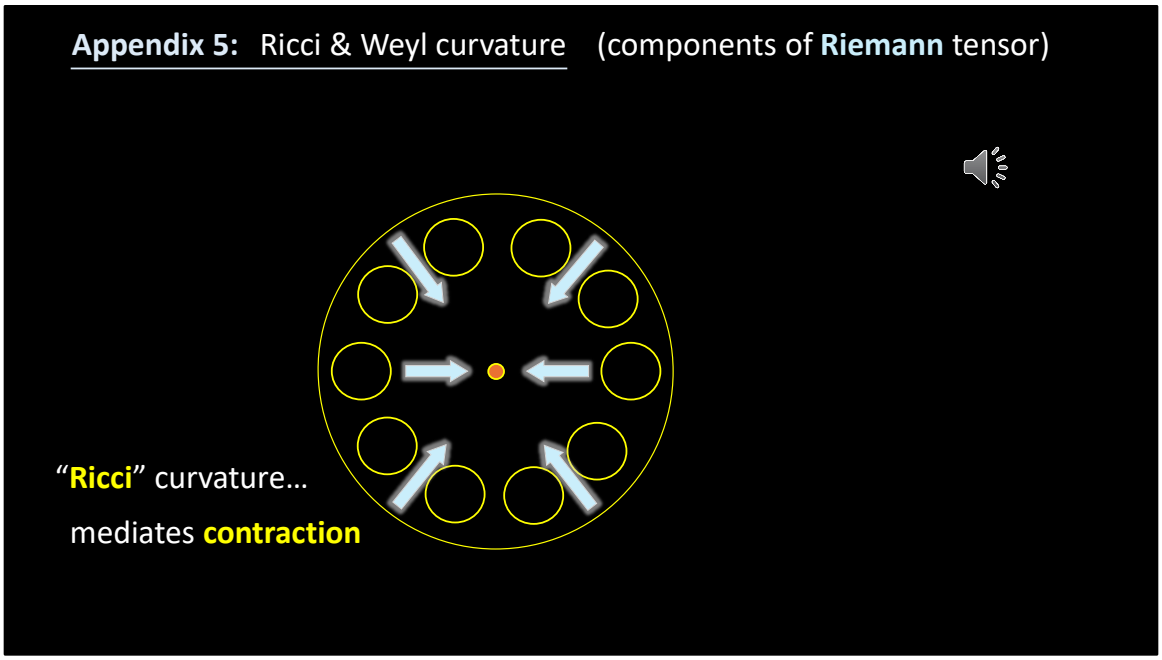
In 1935, *The Urantia Book* also predicted a condensate of primitive charge: so-called "**primordial force-charge**", or <**segregata**>. But this was different to our standard model Higgs-type field. In particular, its distribution or "vacuum expectation value" was NOT everywhere the same.

This *Urantia Book* version of a Higgs-type field was "locally localized", appearing only where some "Organizer of Force" acted to condense so-called space potency, or <**absoluta**>

Which raises the question: if the "vacuum expectation value" of a Higgs-type field affects, in some way, the permittivity and permeability of space, and if we identify the standard model's condensate of <**weak hypercharge**> with *The Urantia Book's* <**segregata**>, then any variation in the distribution of **segregata** would imply variation in the (local) **permittivity** and **permeability** of space.

Hence variation in the local speed of light.

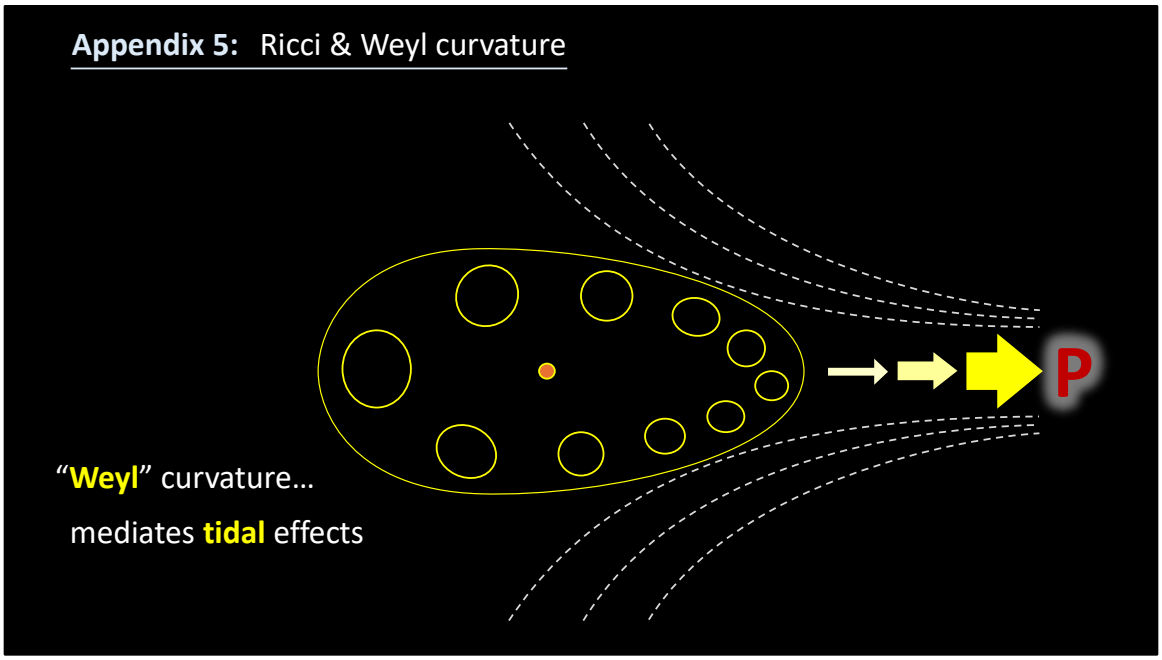
In particular, the (**local**) speed of light **within** a galaxy would be different to the speed of light **between** galaxies.



[Appendix 5]: **Ricci** & **Weyl** curvature

The components in the Riemann tensor of Einstein's equations mediate two very different effects.

One effect is so-called "**Ricci** curvature", which mediates the **contraction** of a spherical or circular distribution of mass-energy.



The other is so-called "**Weyl** curvature", which mediates **torsion** and **tidal** effects.

Of interest here is that if a spherical or circular distribution is orbiting some gravitating center – like a superuniverse orbiting Paradise-Havona – then the effect of **Weyl** curvature is to preserve the volume, while extruding that distribution into a flattened, almond shape.

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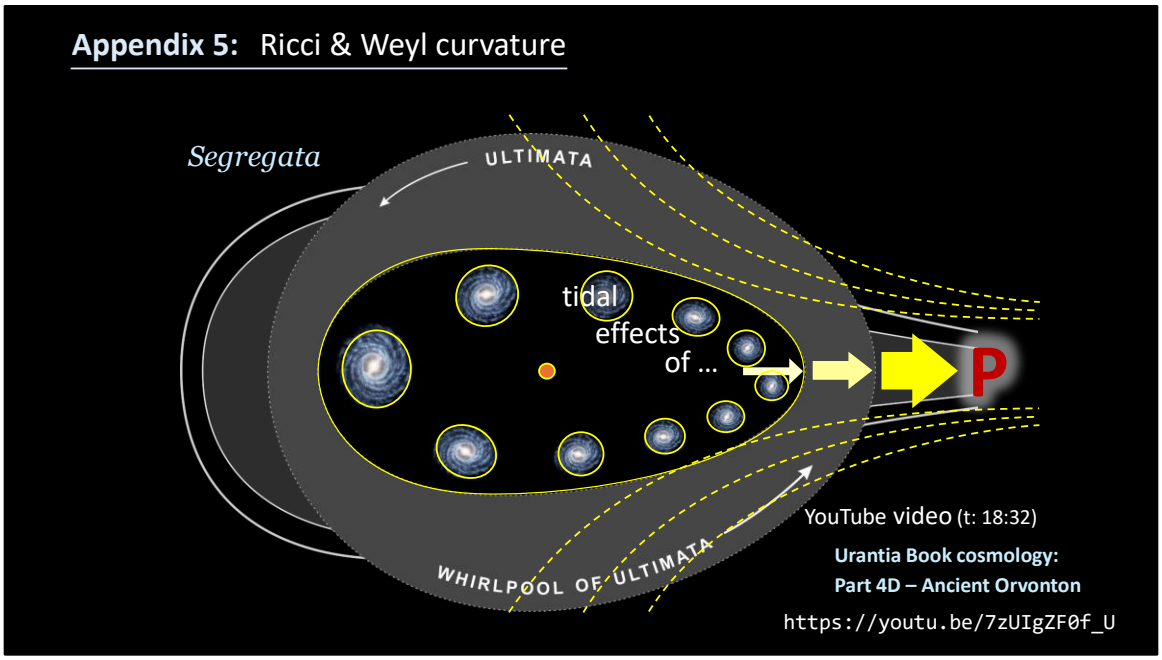
The Weyl curvature tensor is the traceless component of the Riemann tensor, which is a measure of the curvature of a manifold. It is invariant under conformal transformations and is crucial in the study of general relativity and gravitational physics.

The Weyl curvature is the only part of the curvature that exists in free space and governs the propagation of gravitational waves through regions of space devoid of matter. It is also the conformally-invariant part of the Riemann curvature tensor, which determines the shape of the field of light cones.

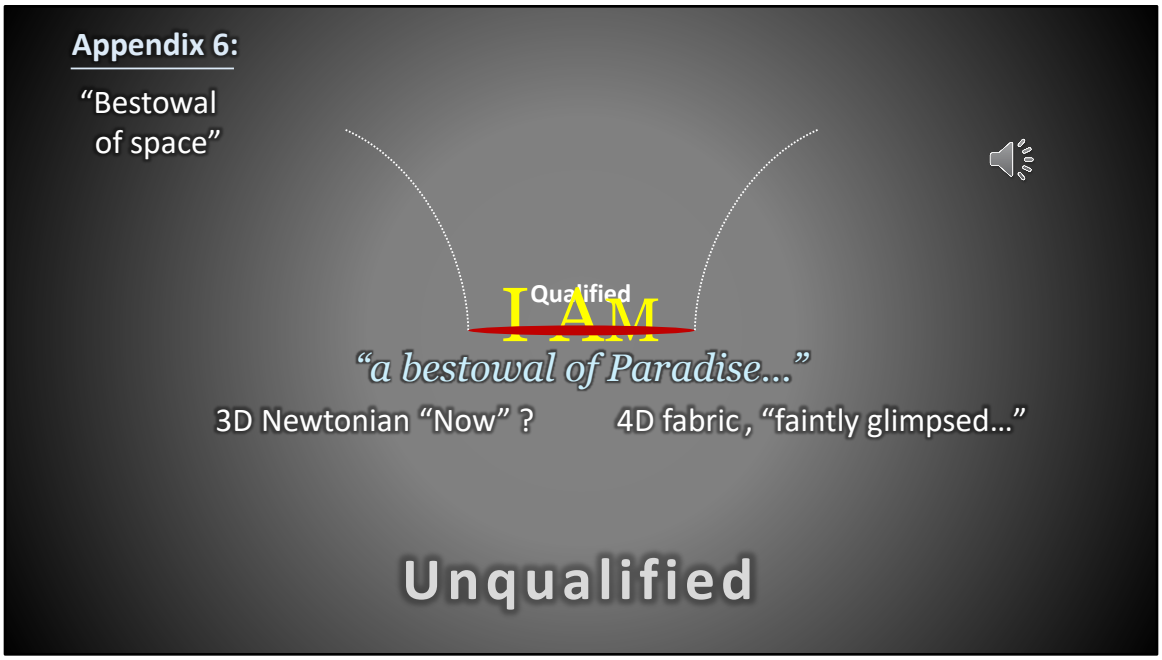


Some implications of this feature (of Einstein's [quote] "**faintly glimpsed findings**") can be seen from time 18:32 in the previous YouTube Video, Part 4D.

[Link to Part 4D (time 18:32) "Weyl curvature"]
[https://www.youtube.com/watch?v=7zUIgZF0f_U&t=1112s]

https://youtu.be/7zUIgZF0f_U?si=VYuJvjppj7A7LzFS&t=1112

[*] the faintly glimpsed findings of "relativity" 195:7.5, page 2078.8



[Appendix 6]: "**The Bestowal of Space**"

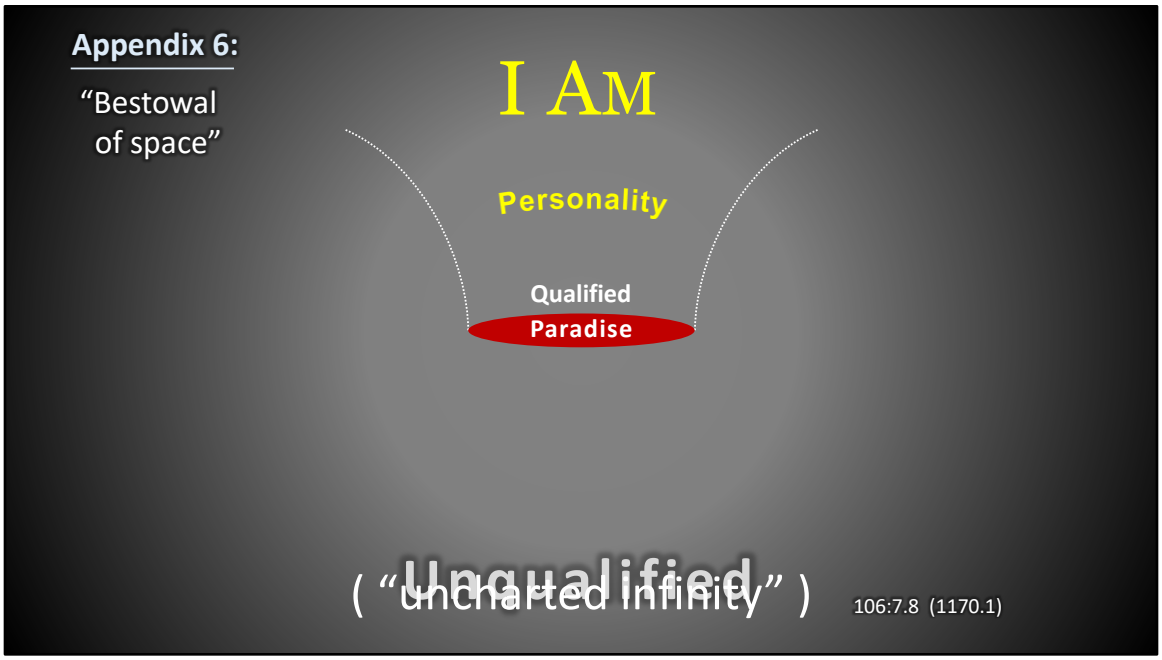
Space, as presented in *The Urantia Book*, is very different to the old idea of a 3D Newtonian "now", or the simple 4D fabric "**faintly glimpsed**" by Einstein (195:7.5).

In *The Urantia Book*, space is [quote] "**a bestowal of Paradise**" (11:7.4).

Which raises the question: "Where, exactly, did Paradise bestow that space?"

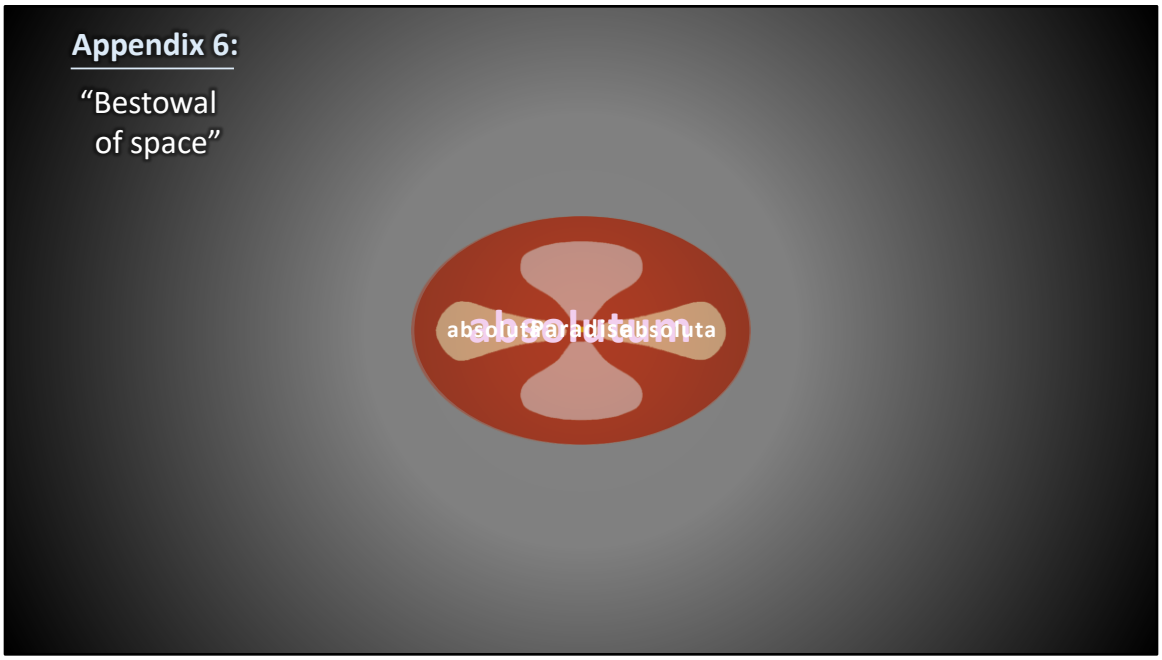
Let's take a look:

In some "**nontime sequence of events**" (11:2.11), the **I AM** Qualifies a center.



This center (Paradise) becomes a base of operations… for Personality.

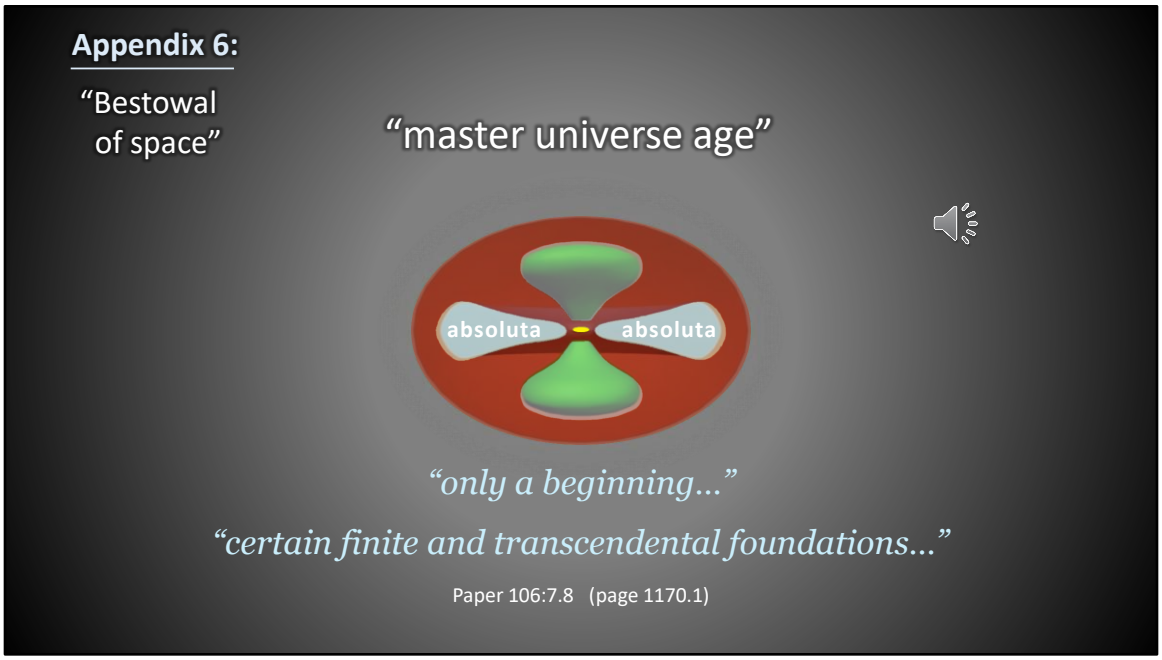
Note: at this stage, "**space**" does not exist.



In paper (11:2.9), this center – Paradise – is said to be made of made of a homogeneous organization of <**space potency**>, so-called <**absolutum**>.

Then, in that "nontime sequence of events", a differential, locally localized <**melting**> and <**inflation**> of this **absolutum** allows spaces of **absoluta** (or space potency) to appear;

like chambers in a heart.



These chambers – these ***spatial excavations*** – counter-balance, and start to move; this cosmic heart begins to beat; and the master universe age begins.

So what happens next?

In Paper 106:7.8, the authors explain that **after** this master universe age, when this entire master universe is perfected and complete, its entire history will appear to be [quote]

> "only a beginning"…
>
> "simply the creation of **certain finite and transcendental foundations** for even greater and more enthralling metamorphoses in uncharted infinity."

At such a future eternity moment, not only will the master universe still seem young, but the purpose and seven-dimensional destiny of Finaliters will become clear.

* * *

The Urantia Book presents a cosmology that stirs the soul:

a central perfect universe, fringed by spacetime shallows in which Finaliters are born.

Finaliters, destined to launch from this cosmic continental shelf into oceanic depths,

seeding the light and life of personality throughout nested levels of outer space.

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