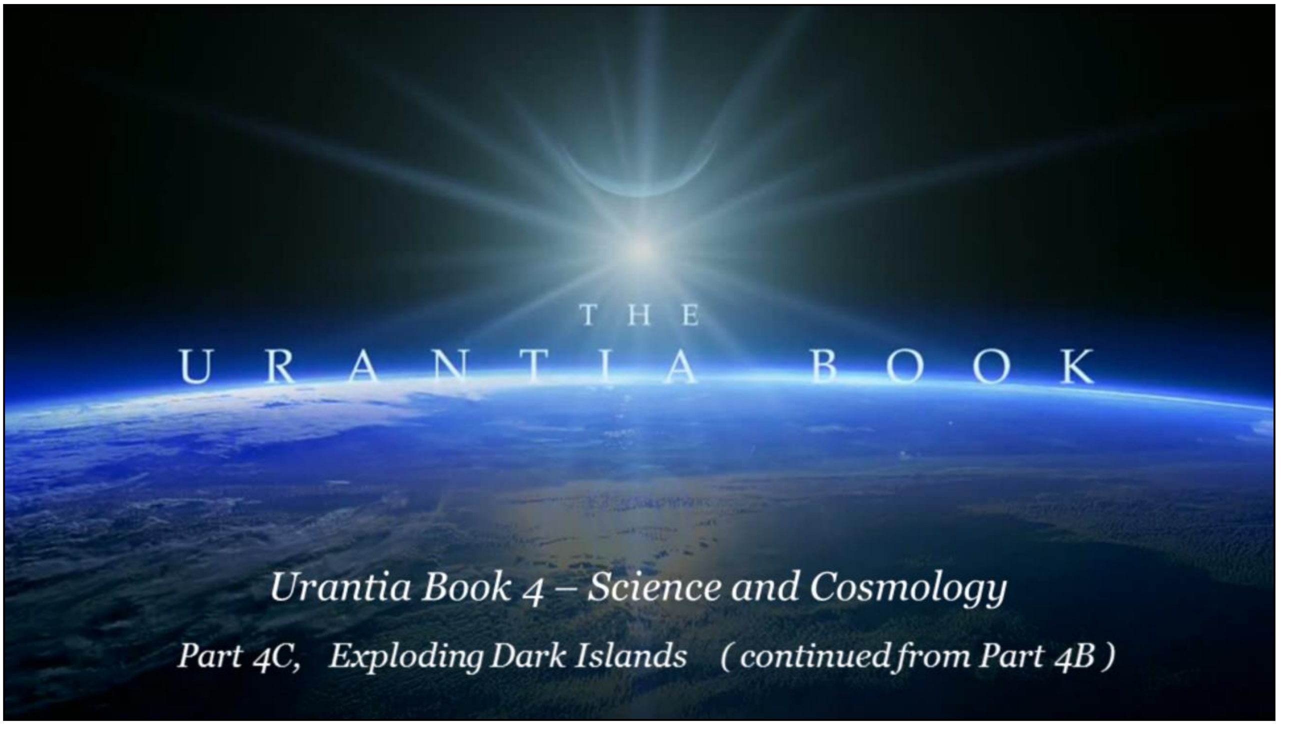
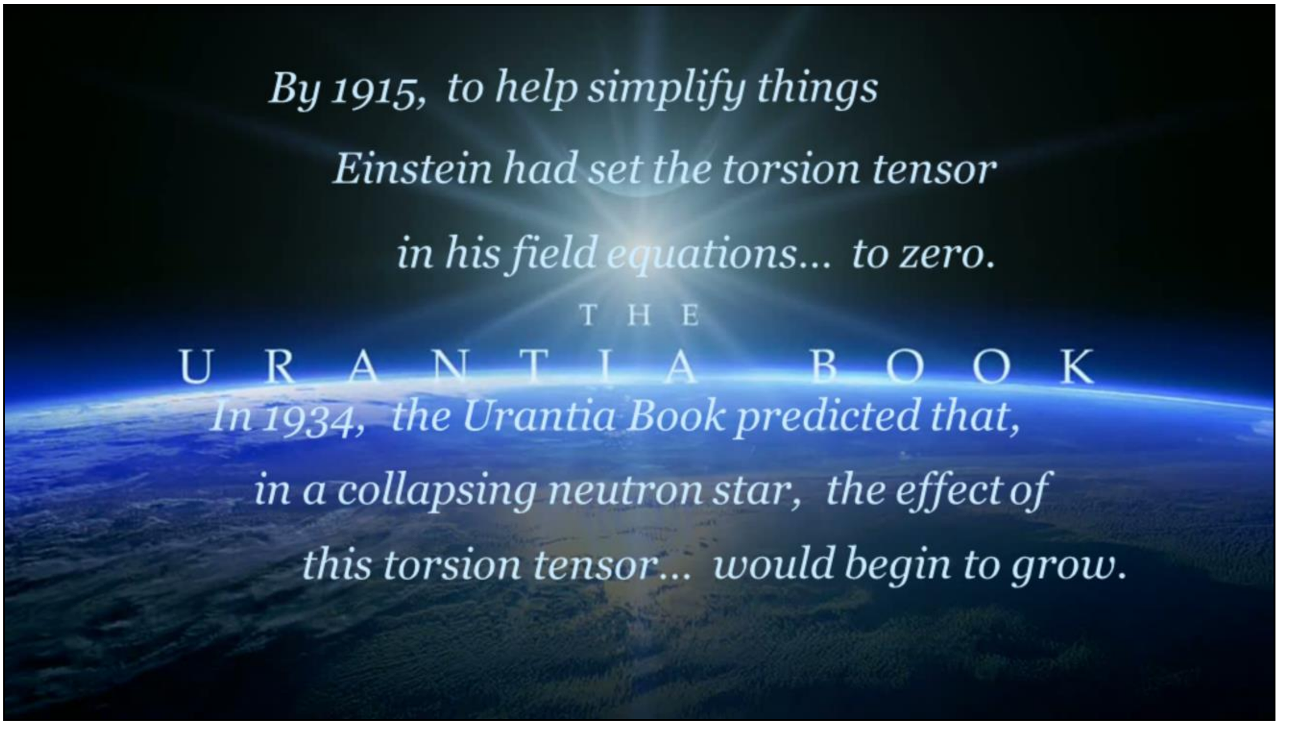


The Urantia Book

Introducing a bigger frame in which to think



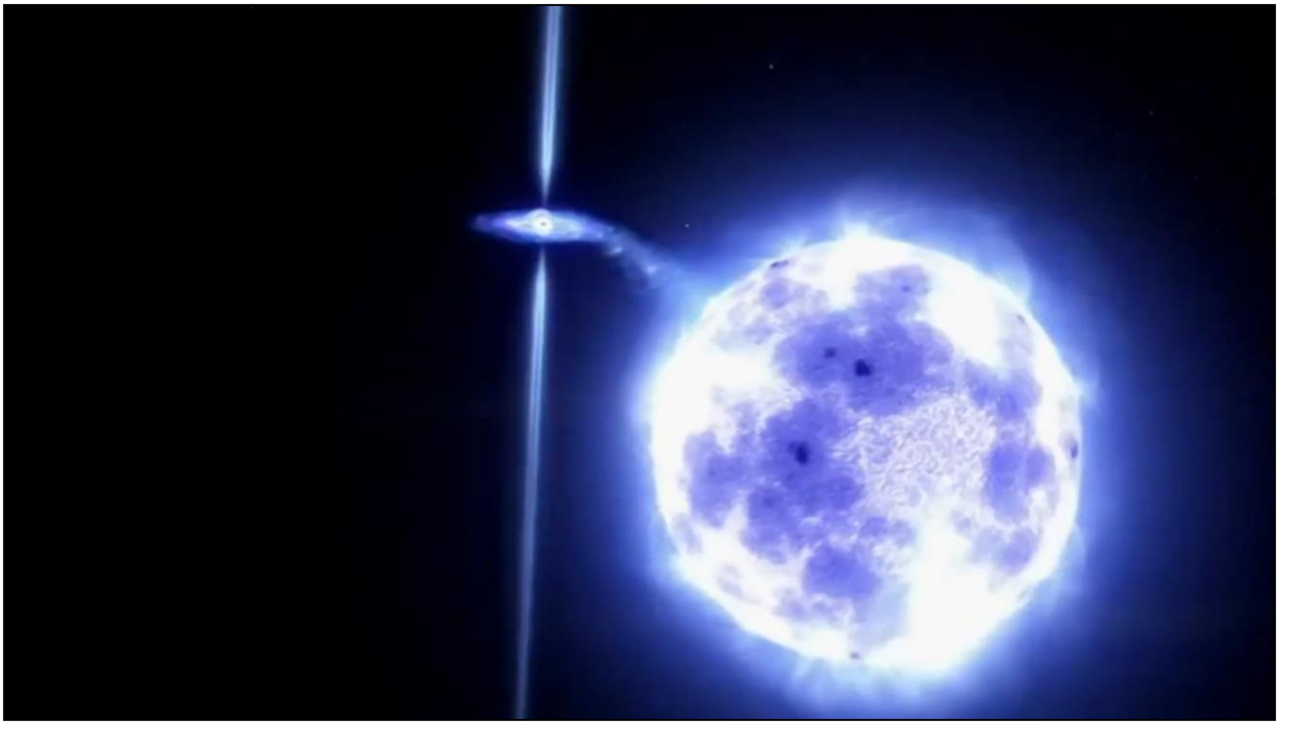
By 1915, to help simplify things,
Einstein had set the torsion tensor
in his field equations to zero.

In 1934, the Urantia Book predicted that,
in a collapsing neutron star, the effect of
this torsion tensor… would begin to grow.

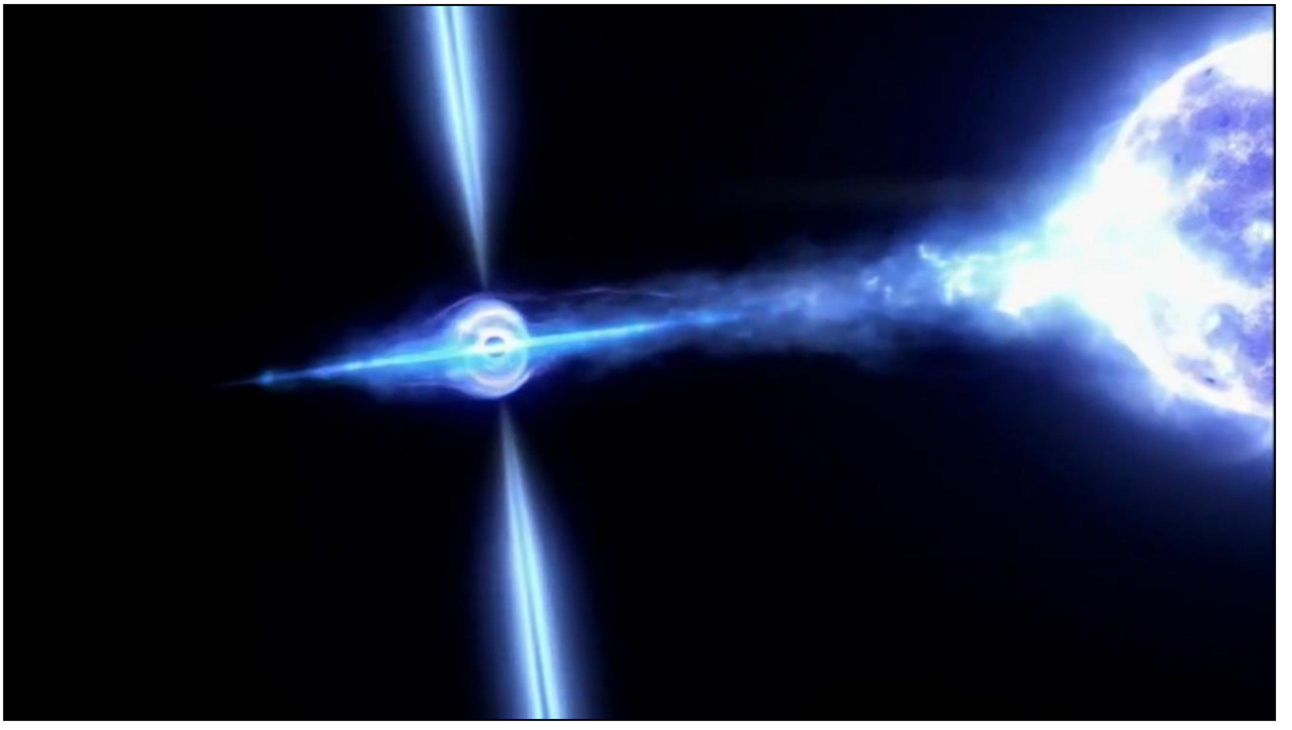
Given this new model for mass and matter,
let's now think what all this means for **dark islands**,
those so-called "black holes in space",

and for the Milky Way.

First, dark islands.



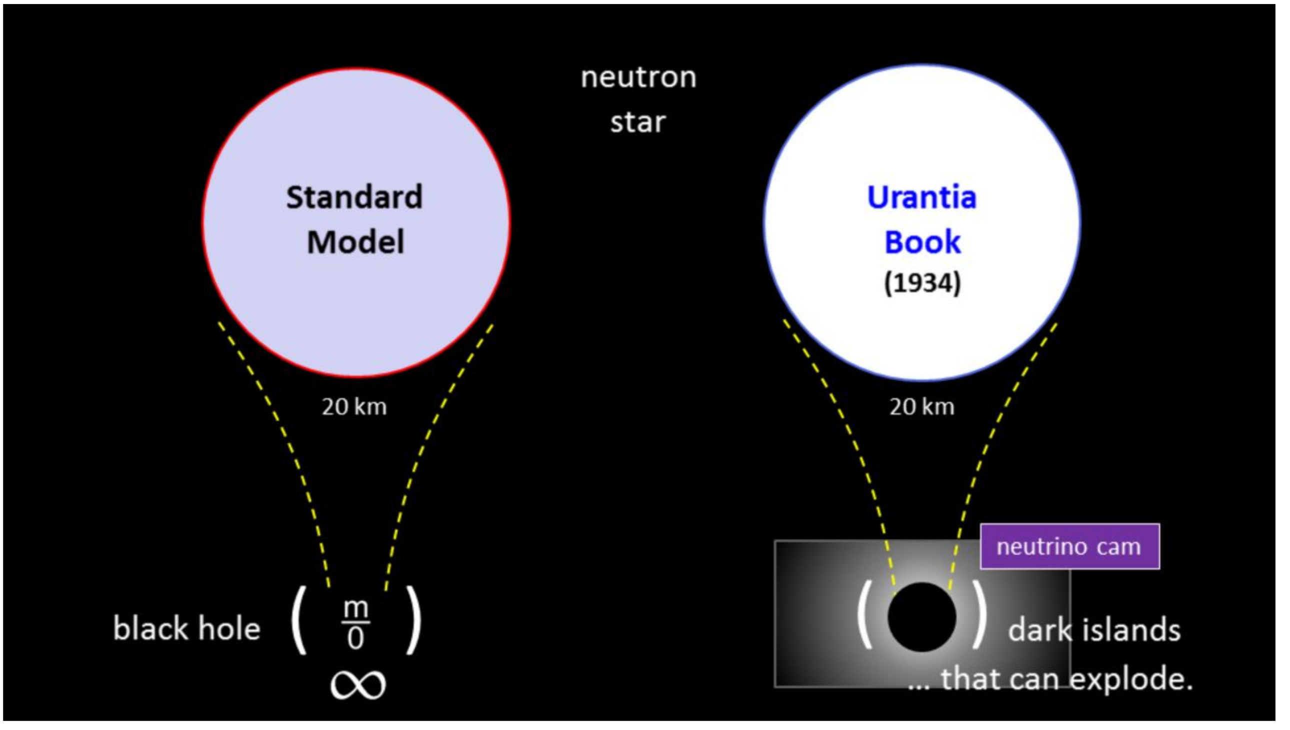
One of the really interesting things that astrophysicists explore is what happens when a neutron star…



[**Neutron star / accretion disk video**]

… in a binary system, with an accretion disk,

pulls in just a little bit too much mass… and starts to collapse.



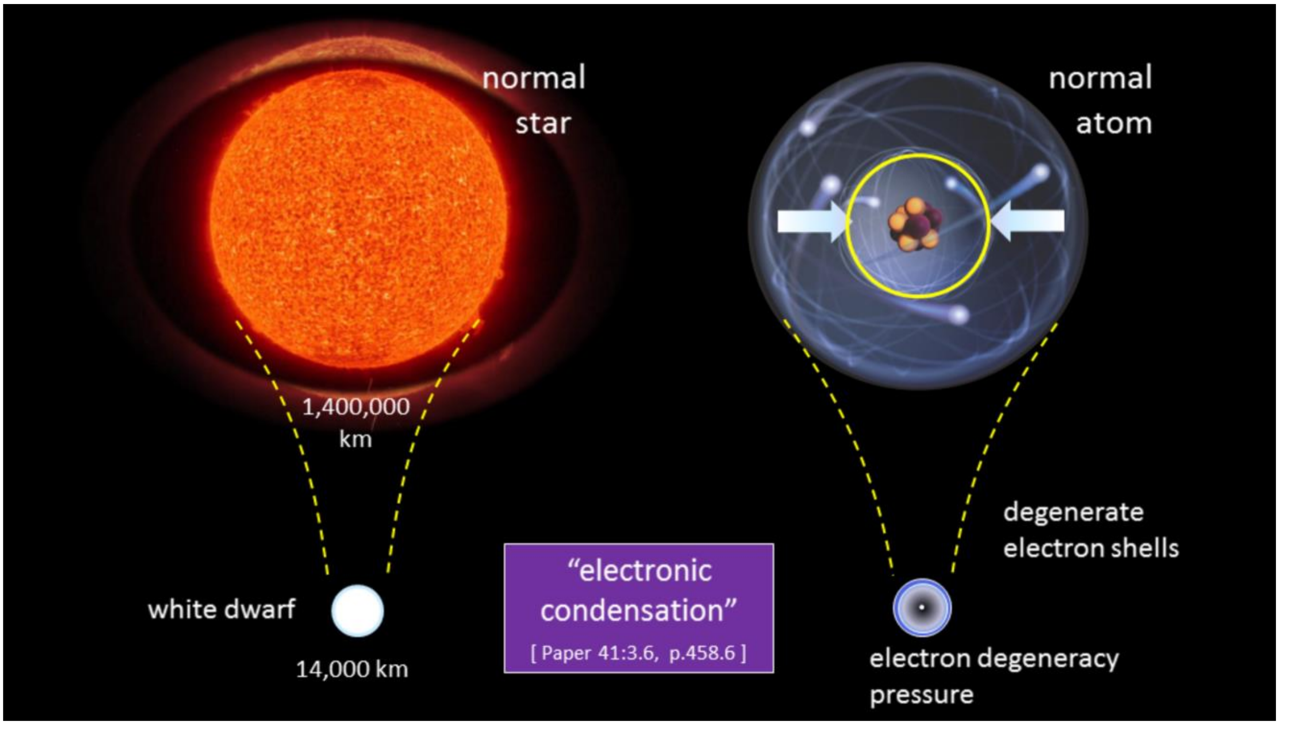
Our quantum field theories don't predict any way to stop this collapse,
so we're stuck with the old idea, that *"all timelike geodesics must converge"*, and a "**black hole**" forms.

A problem with this story is this division by zero, this **infinite** density of energy implied by dividing all that mass by zero volume.

Einstein actually said "**No**".
Along with others, he refused to **believe** that nature would allow such a thing.

In 1934, the authors of the Urantia Book took Einstein's side. In a few short paragraphs, they sketched out nature's scheme for stopping the collapse; leading to the prediction not only of so-called "dark islands", but also… of nature's most **efficient** bomb.

To explore this, let's begin with what we know about the cooling and contraction of stars, and quantum **exclusion principles**.



After small to medium stars (like our Sun) burn through their fuel, they tend to puff off their outer layer, then start to cool. This cooling allows gravity to pull the atoms closer together, and the star begins to shrink.

As it cools some more, gravity forces the electrons closer and closer to their nucleus, and both the star and its atoms shrink down to some minimum stable size, where a quantum **exclusion principle** – an "electron degeneracy pressure" – kicks in, and stops the collapse.

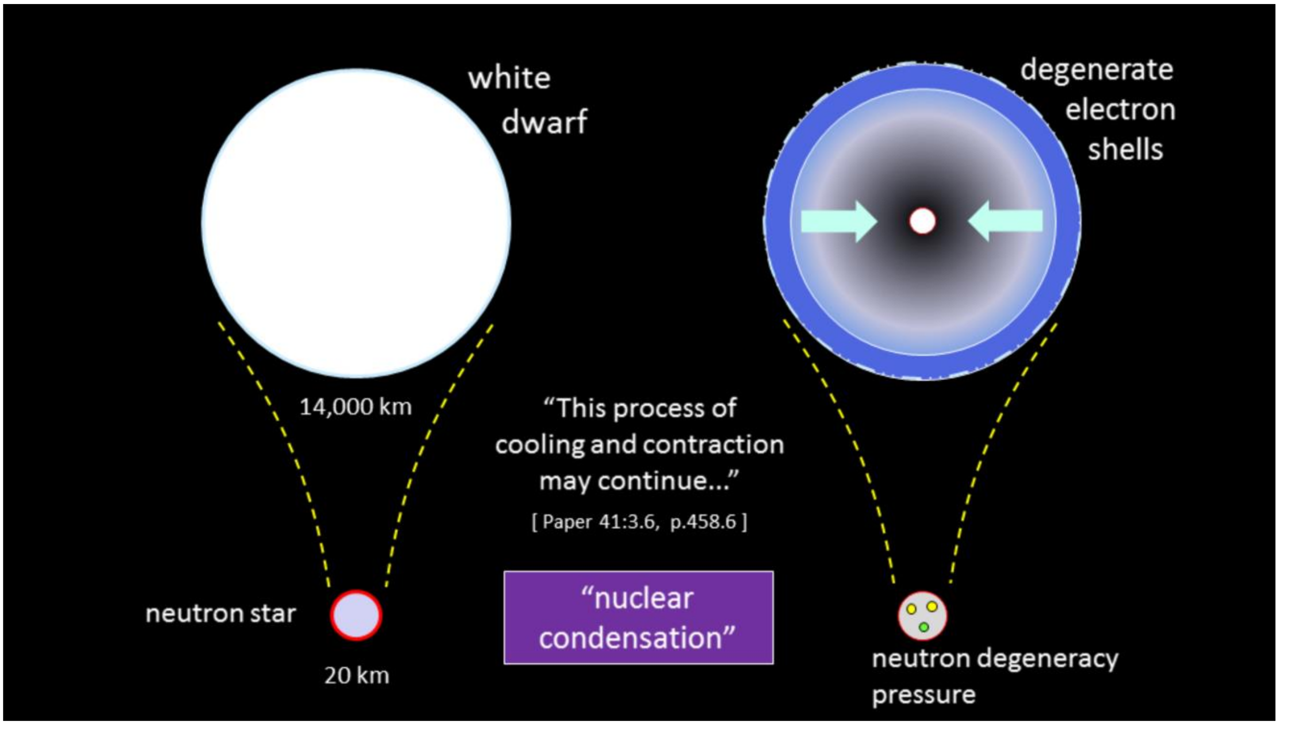
This first level of collapse – this first stage in the cooling and contraction of stars – is what Paper 41 refers to as "**electronic condensation**" [**Paper 41:3.6, page 458.6**]

The idea is that "basic material units" are being brought "closer and closer together".

Worth pausing to consider what's just happened: something the size of our **Sun** has collapsed down… to something the size of the **earth**,

a "**white dwarf**".

Ok. Now what if we add **a little more mass** to this cooling and contracting star?



If we add a little **more** mass, then from Paper 41 section 3: [quote]

"this process of cooling and contraction may continue…" [**41:3.6, 458.6**]

If one of these white dwarfs pulls in extra mass, say from a binary partner, and reaches about 1.4 times the mass of our Sun, then… gravity wins.

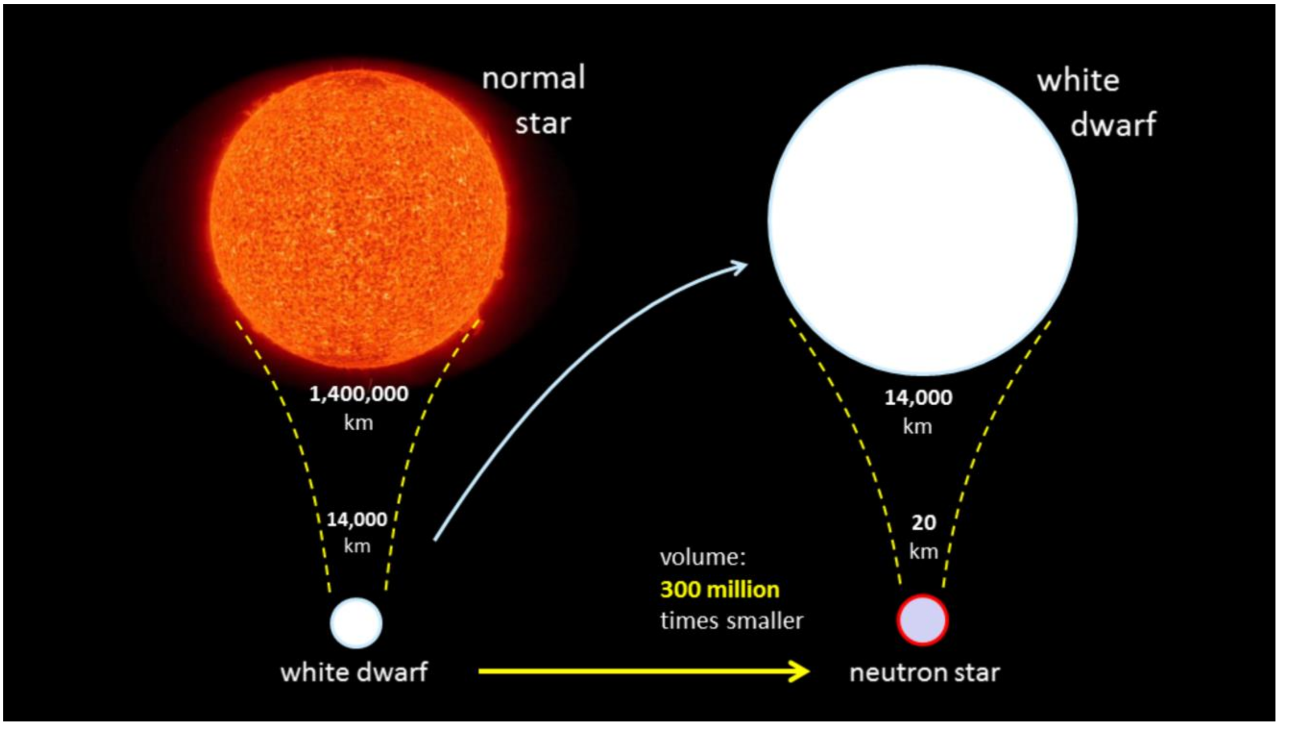
Gravity forces the electron shells right into their nucleus, and a **star's worth of atoms** collapses… to a **ball of neutrons**, about 20 kilometres wide.

A **neutron star**.

Once again, "**basic material units**" are being brought "***closer and closer together***".

Once again, the collapse is stopped… by **another** quantum **exclusion principle**.
This time, a so-called "neutron degeneracy pressure".

This second level – of **nuclear** condensation – forms a second stage in the cooling and contraction of stars.

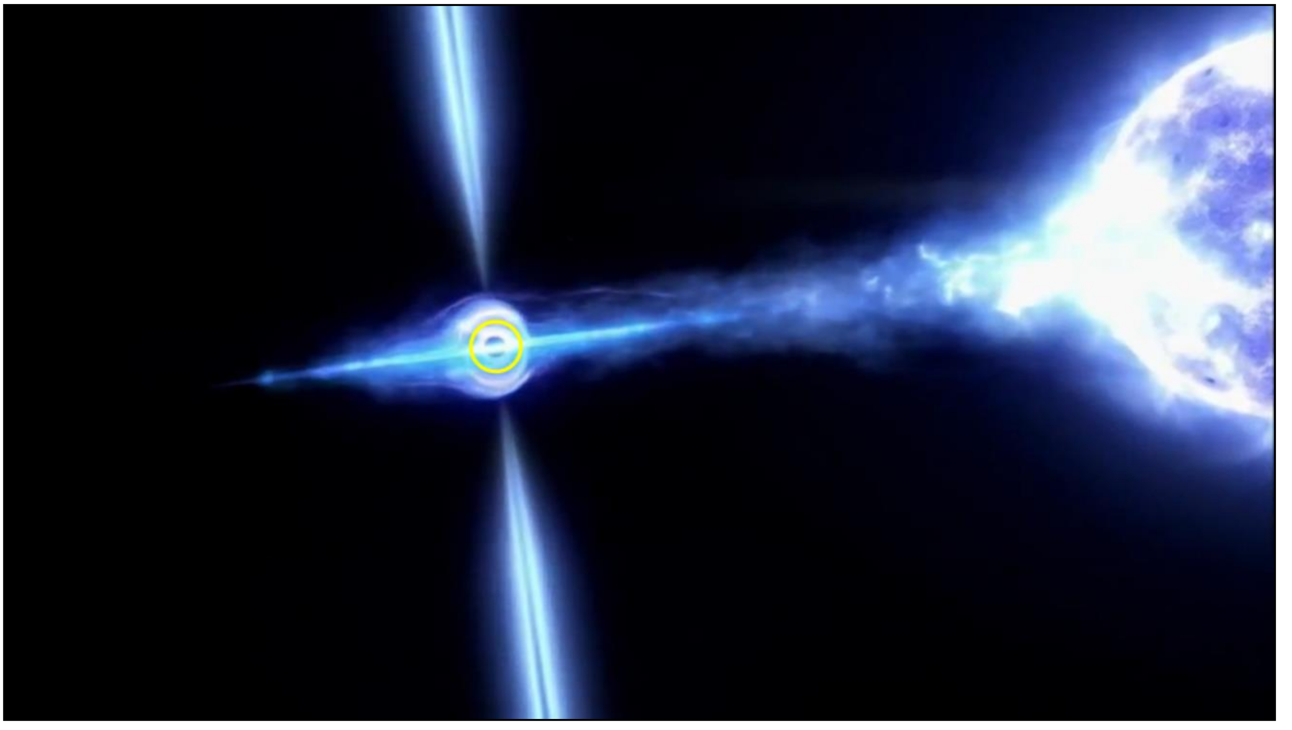


Ok, the story so far:

- A **white dwarf** is what you get when the mass of a small to medium star gets squashed into a volume the size of the Earth.
- A **neutron star** is what you get when **even more mass** is squashed **even smaller** , into a volume **300 million** (!) times smaller than this tiny white dwarf.

Which brings us to the cutting edge of physics.

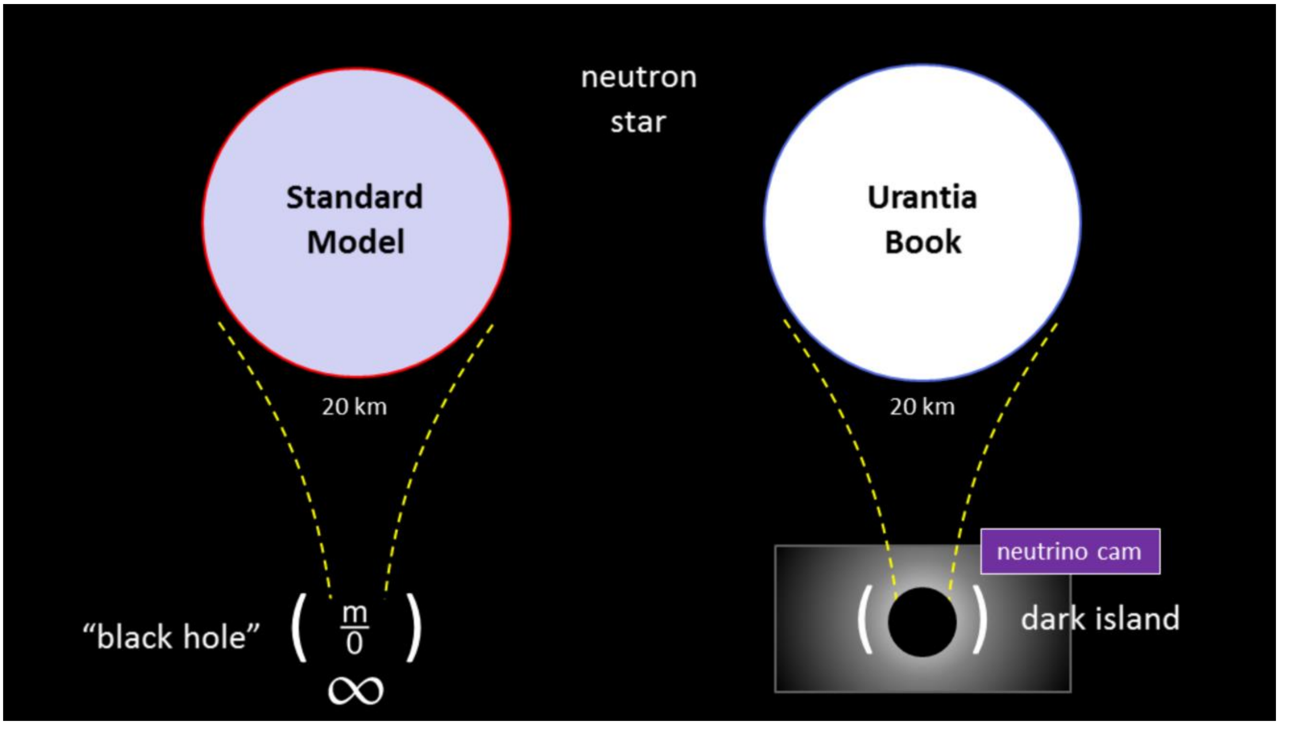
Our "standard models" can handle neutron stars. After all, they're just a bunch of neutrons, packed very, very tight.



[**Neutron star / accretion disk video**]

But if a neutron star starts to steal extra mass, say from that binary partner through an accretion disc, then once again, gravity (eventually) wins.

Temperatures in this ball of neutrons jump beyond a **trillion degrees**,
and the neutrons – literally – start to **melt**.



Here's where both our standard models start to fall short:

Quantum field theory has no way to stop the collapse, so it **PREDICTS** infinite density.

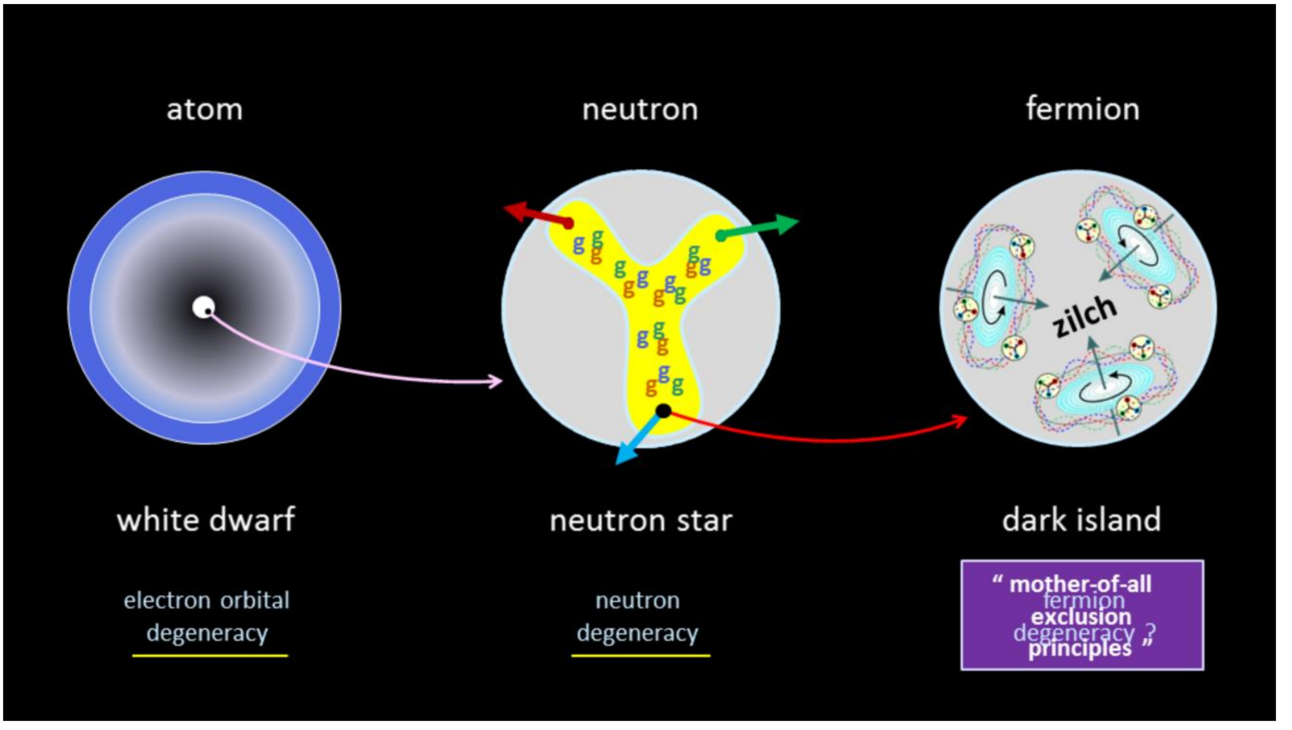
And the way cosmology (**currently**) measures space no longer works.

So we find ourselves… led to believe… that a "**black hole**" forms.

The Urantia Book story is different.

These papers **PREDICT** that the collapse of a collapsing neutron star can only go so far, and then stops; causing a so-called "**dark island**" to form.

What this means is that the Urantia Book's model for mass and matter…



… **predicts** further levels of structure and support.

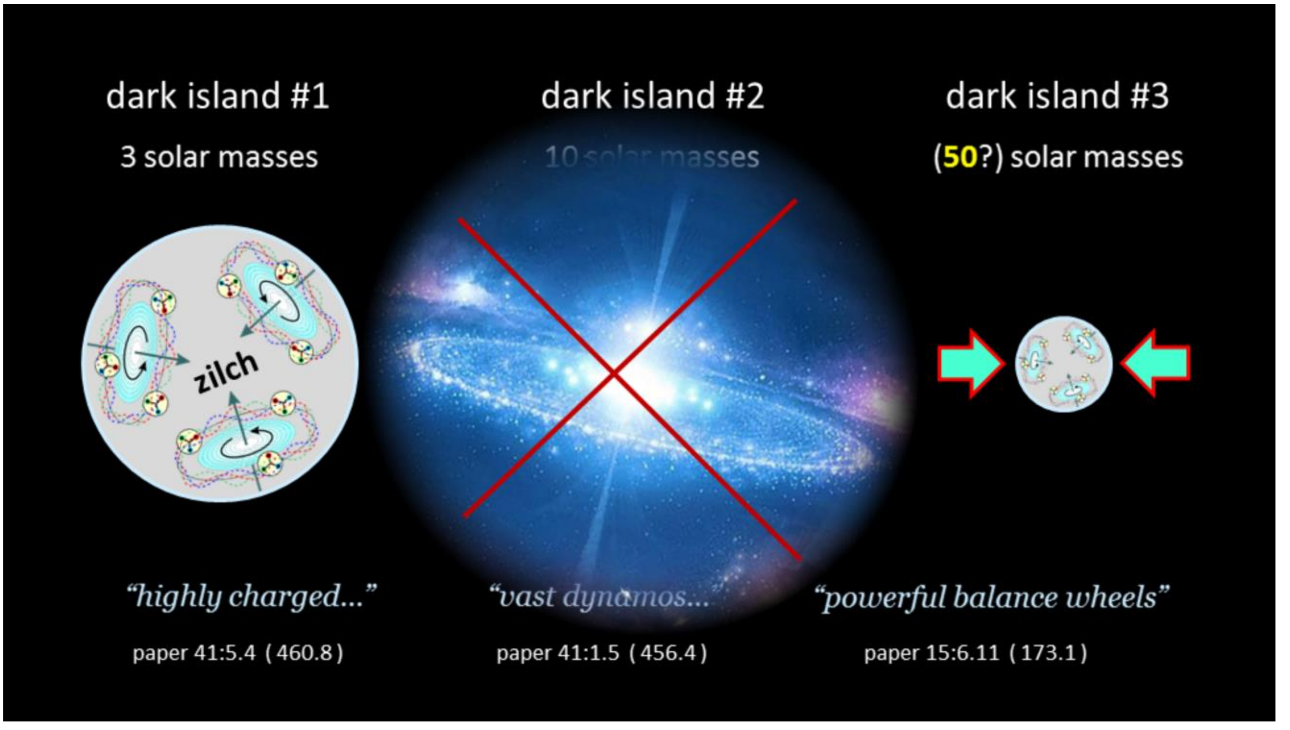
Now, we know that electron orbital exclusion can support the mass of a white dwarf.
And that some neutron exclusion effect (involving quarks) can support a neutron star.

But as we saw [in Part 4B], the Urantia Book explains that such quarks are **not** mere “fluctuations in a field”.

In the Urantia Book scheme, there’s an awful lot of action – ***Planck scale*** action – **inside** these curious quarks.

So what the Urantia Book ***predicts*** is that, tangled up with this action, are at least two more undiscovered (or **undiscoverable**) levels of structure, that can delay the collapse of matter: the first, connected to some kind of ***fermion*** degeneracy pressure;
and a **final** one – which we might call “the **mother** of **ALL** exclusion principles”.

In this model, it’s these extra levels of support, these extra modes of structural exclusion, that stop dark islands from collapsing as “black holes”.



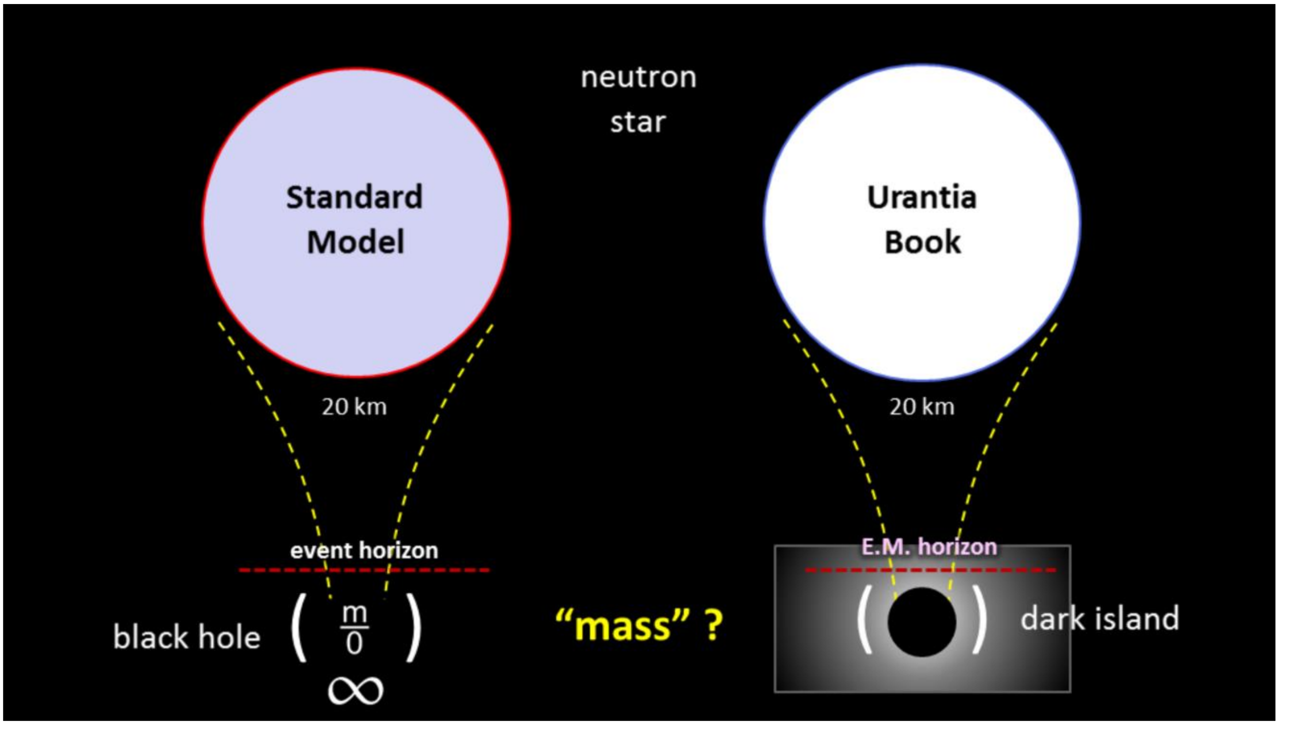
Of course, these extra levels of support imply a range of sizes for these dark islands, from say 3 solar masses all the way up, to some… unspecified limit.

… the point being that, in this model, there **is** some upper limit to their mass.

In other words, these evolutionary, "solar mass" dark islands **do not** continue to merge and grow, to become those "**supermassive**" things that seem to anchor galaxies in space.

Nevertheless, these **ultra-compact** objects are said to have some…

very useful properties.



So once again, from paper 41 section 3: [quote]

"this process of cooling and contraction may continue…" (41:3.6, 458.6)

But instead of going **all** the way – to infinites and spacetime holes – nature simply **rearranges** the enormous energies bound into the structures of matter.

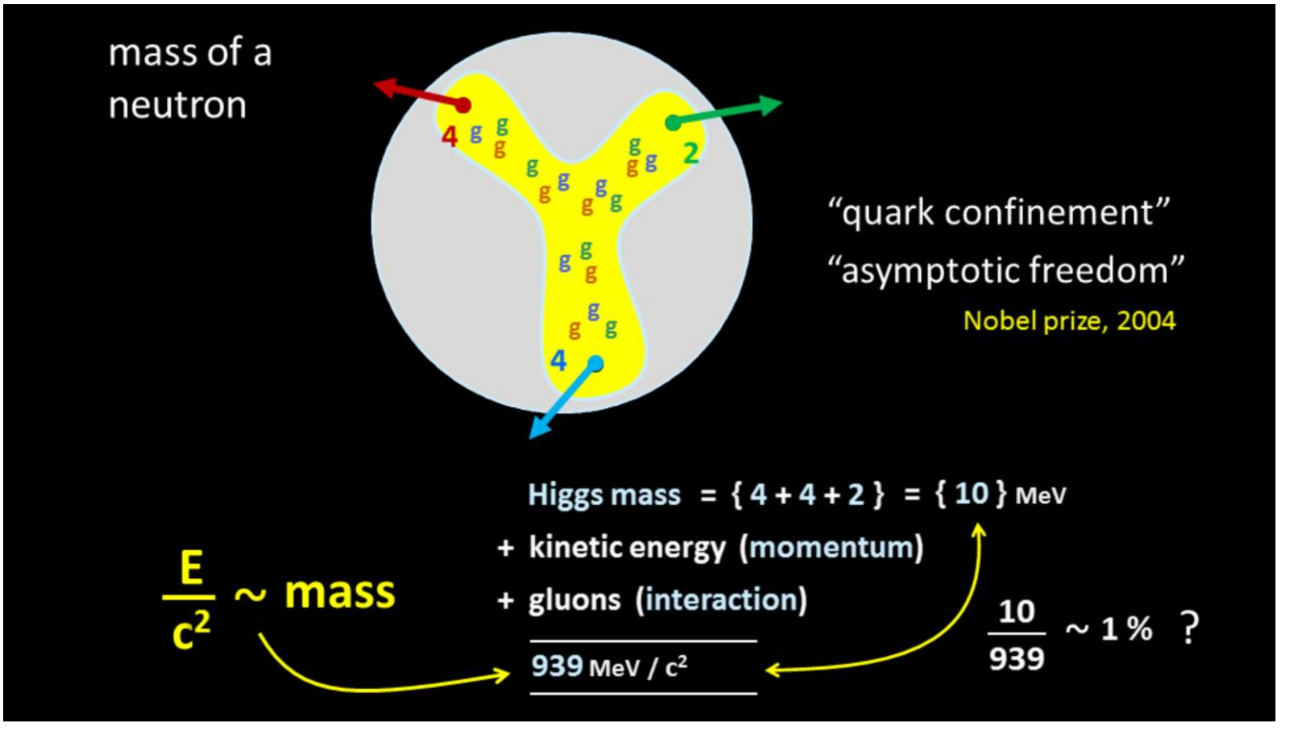
So, why are these islands called "**dark**"? Well, while this Urantia Book scheme avoids the old, original kind of **event** horizon, it does imply… an *electromagnetic* one; once a cooling and contracting star shrinks below a certain size, it can neither emit nor reflect light.

And so these islands are "**dark**".

But what about their mass? As a neutron star collapses, something… ***weird*** seems to happen to [what we call] its "**mass**". The more this object shrinks, the more its "**interactive**" mass (which was causing the collapse) appears to… disappear ?!

To make sense of this, let's think about what happens to one of those tiny **neutrons** *inside* a collapsing neutron star, at the moment it starts to melt.

In particular, what happens to its "**mass**".



Currently, we think of neutrons as robust little bags containing quarks. We measure the "**mass**" of these tiny bags to be about… **939** units (of "standard model mass").

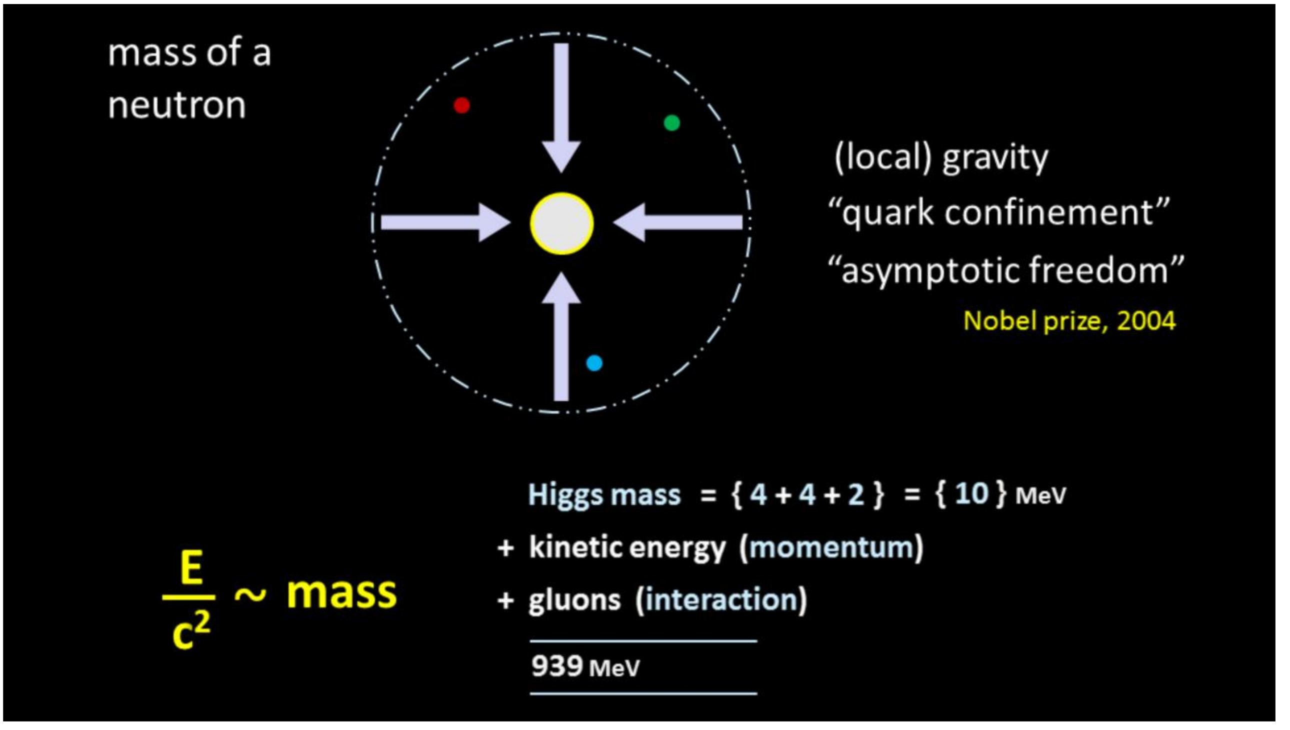
But as we saw in Part 4B, the mass this system (is thought to) get from a Higgs-type mechanism is tiny; only about **1 per cent** of its total measured mass.

Where does all the extra mass – that other 99% – come from?

It's thought to come from (1) the **momentum** of the moving quarks, and (2) the weird glue that keeps the quarks together.

When we add up all the **energy** involved, all that **mc^2**, we get those 939 units of "**mass**/**energy**".

But the standard model includes a surprise: **asymptotic freedom**.



When a neutron’s quarks are close together, there’s no need for all that glue, so that cloud of virtual gluons… **disappears**.

So in a collapsing neutron star, as those neutrons start to melt, if gravity itself can hold the quarks in place, there’d be no need for gluons to **confine** the quarks.

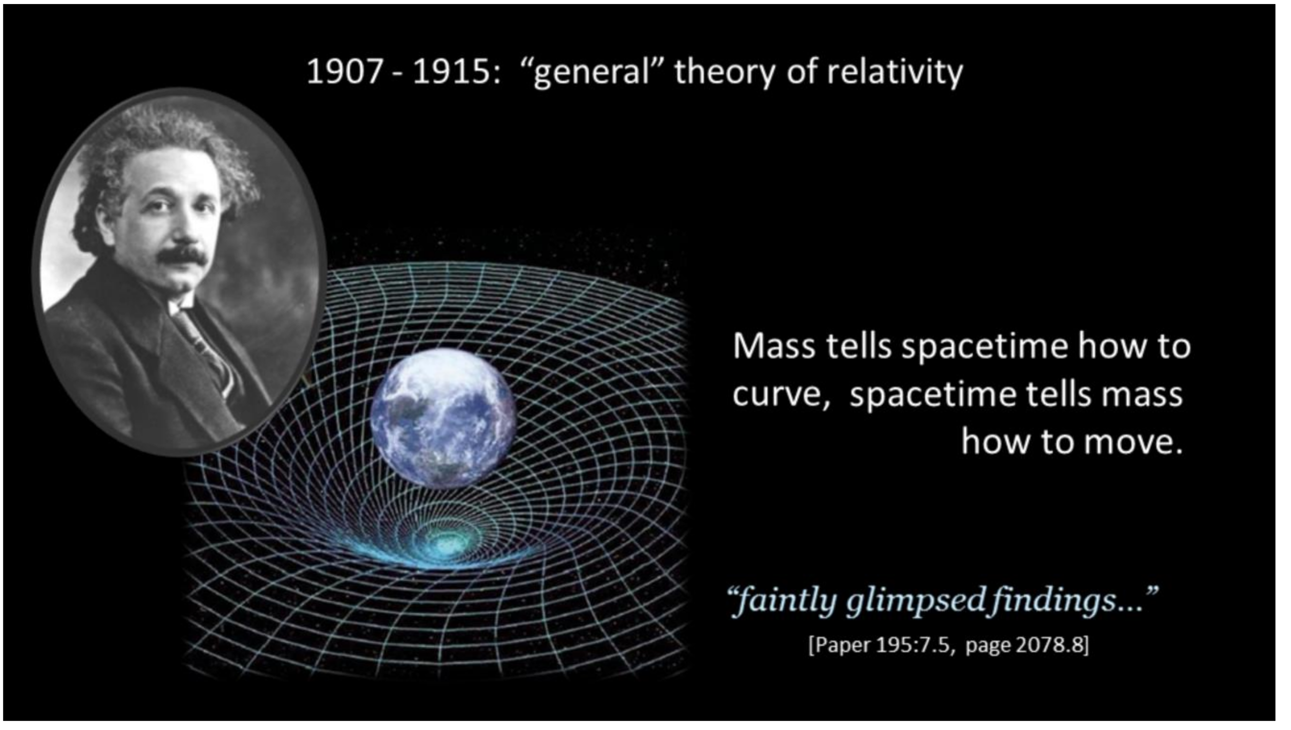
But with the need for gluons gone, all that **interactive** **mass** (from that cloud of virtual gluons) … **disappears**.

And as the range for the quarks to move becomes constrained, so too their momentum… **disappears**.

So here’s the question: as the momentum and gluons disappear, **what happens to the mass** of this tiny, compacting ball? Remember, the mass of the quarks themselves was only ever **1%** of the mass of the original neutron. So as the momentum and gluons fade away, up to **99%** of the mass in this tiny collapsing system… **appears to**… **disappear** !

We’ll get back to this, but first let’s bring in Einstein and his ***“faint glimpse”*** of how things work.

[**Paper 195:7.5, page 2078.8**]



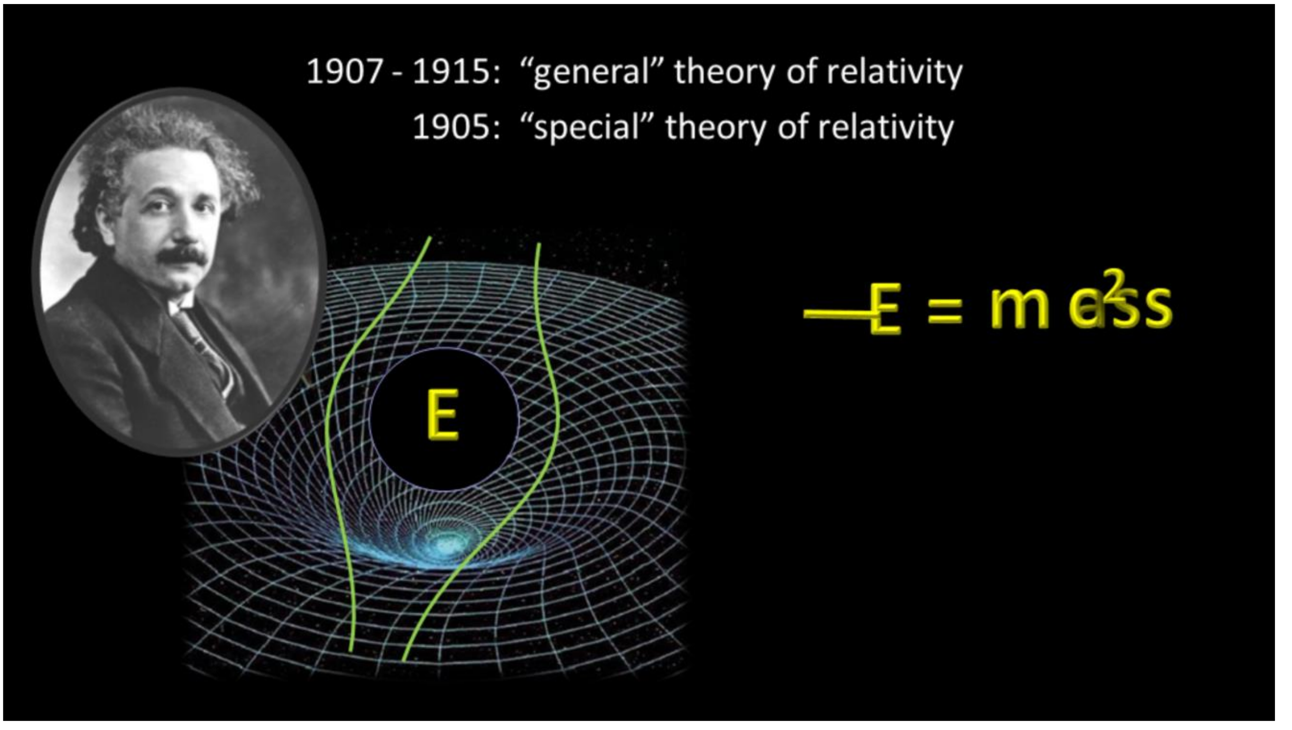
Between 1907 and 1915, Einstein sketched out a surprising connection:

between **SPACE** and **time** and **mass**,

the idea that mass causes little dimples in some "flexible fabric" we now call space-time.

This so-called *"faint glimpse"* became part of his theory of **General** relativity.

[**Paper 195:7.5, page 2078.8**]



Earlier, in his limited or **Special** theory, he described another relationship:

between **ENERGY** and **mass**.

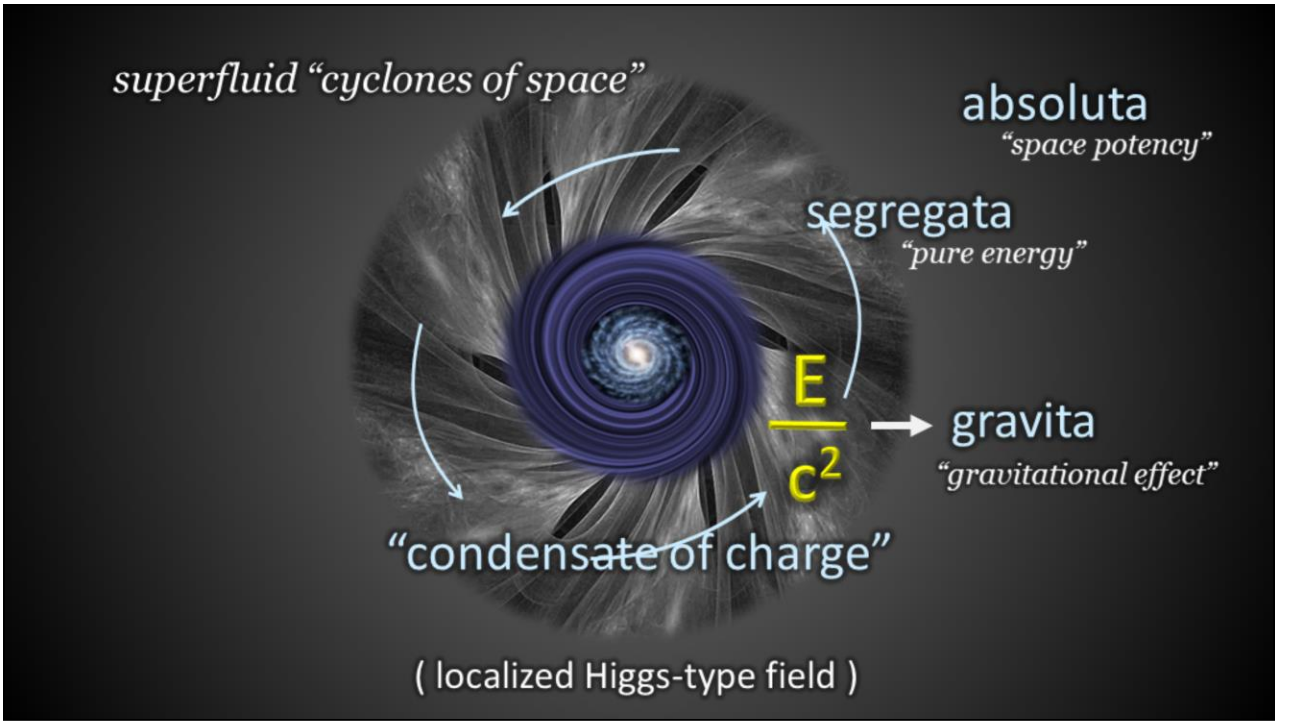
Putting these two ideas together, we find that if you’ve got a great big ball of energy – say some condensate of charge, somehow localized in space – and then divide by the speed of light, squared, then you’ve got the equivalent of… an awful lot of **mass** !

In other words, an awful lot of **gravitational effect**, which is something astronomers would notice; even if that “mass”, or in this case **primordial charge**, is invisible, or “**dark**”.

So here’s the thing: if we had some island of energy, some rotating condensate of primordial charge, then even before we have a single particle of matter, we’d have an awful lot of **gravitational action** – or apparently dark “**mass**” – for astronomers to explain!

[**see paper 57 section 2**]: *… [gravitational anomalies] … “but that was all.”* (57:2.2, 652:5)

But as we saw earlier (in Part 4A), …



… this is exactly how the Urantia Book kick-starts the story of galaxies – and of **mass** itself: as a local segregation of pure energy, condensed from a global potential.

A condensate of primordial charge.

In other words, a locally localized Higgs type field.

Ok. Now, following Einstein's lead – dividing all that **Energy** by the speed of light, squared – we find that such an isolated, island of **charge** serves nicely as a halo of **<u>invisible</u>**, **gravitational** effect.

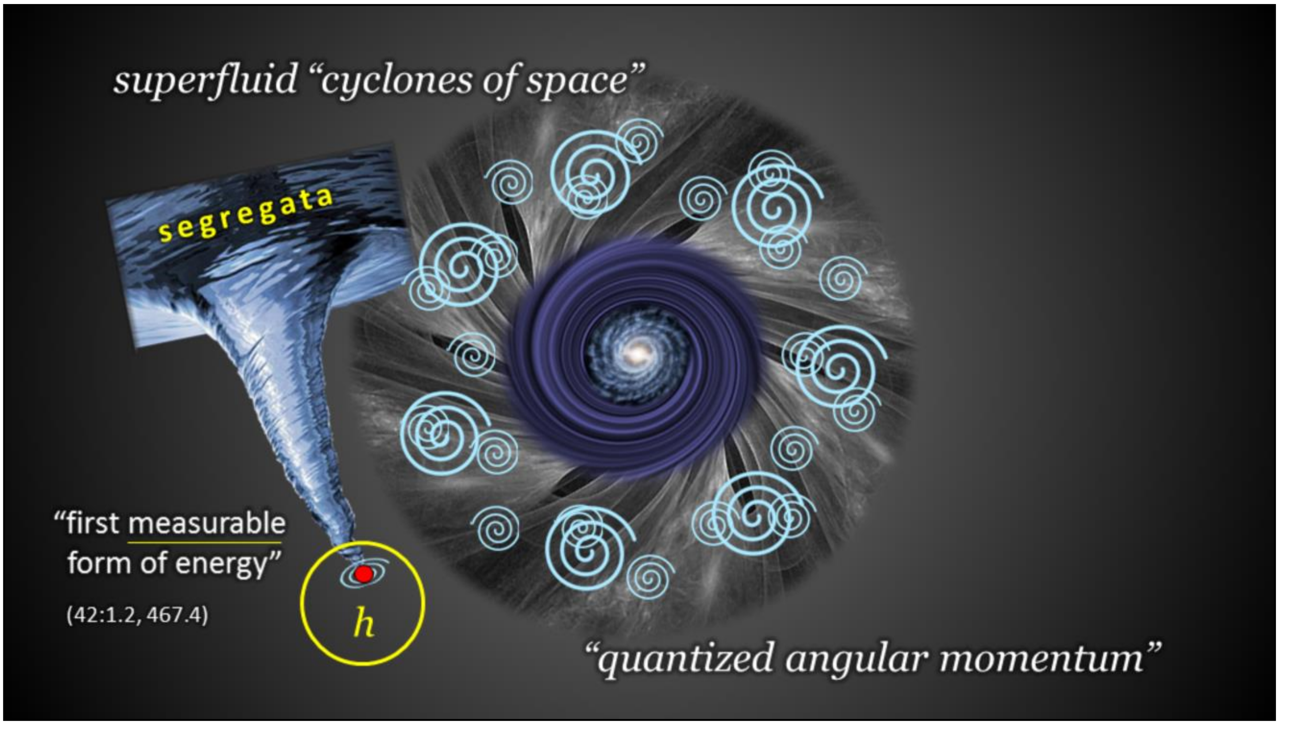
We also saw how angular momentum gets injected, causing these islands of energy to spin up, becoming vast, superfluid, ancestral cyclones…

within which spiral galaxies evolve.

So we have spiral galaxies evolving in **<u>ROTATING</u>** halos of invisible, gravitational effect…

which, by the way, solves very neatly the mystery… *of why these spirals rotate the way they do.*

But we're thinking of these vast cyclones as "superfluid"…



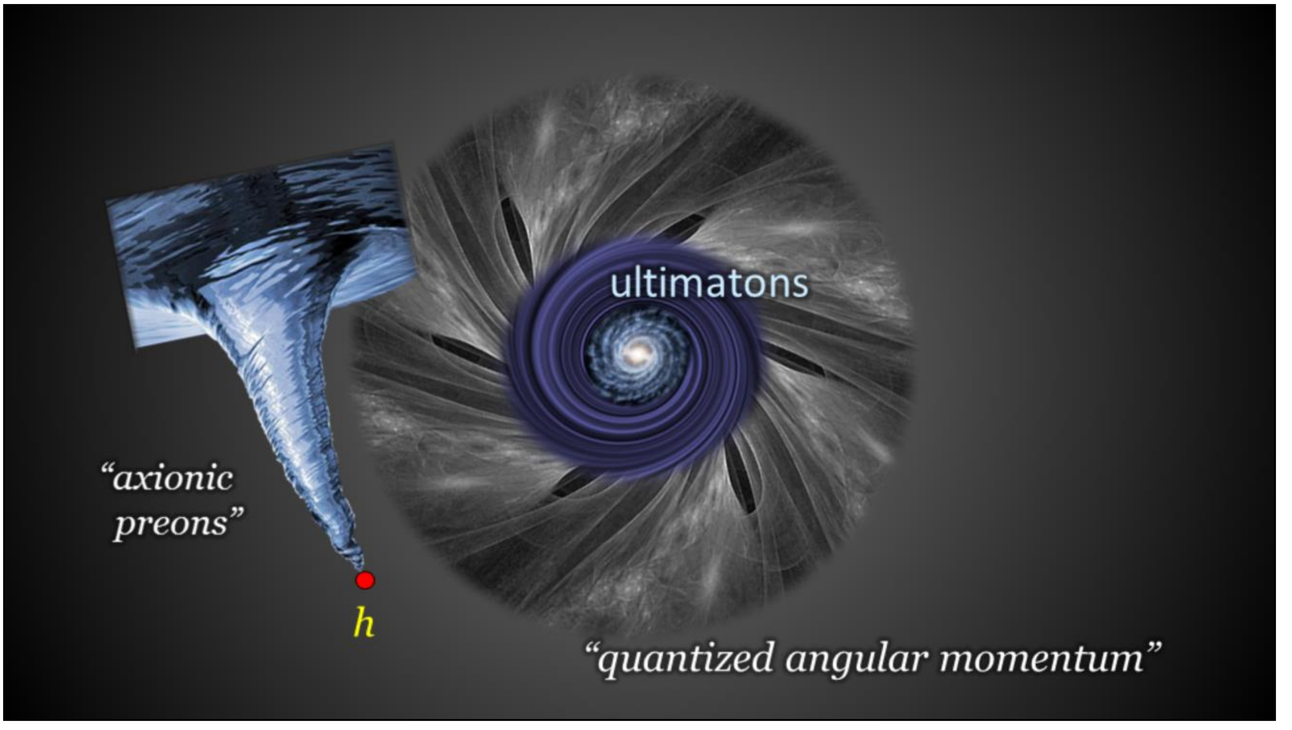
… and as we know, angular momentum in a superfluid tends to "quantize", to break up and disperse as smaller and smaller vortices.

Which makes you wonder: at what point does this "quantization" stop?

What's to stop this quantization of angular momentum (in this superfluid segregata) from going all the way – all the way to the actual **unit** of angular momentum, that *first, measurable, quantum* of **action** (or spin) we call Planck's constant?

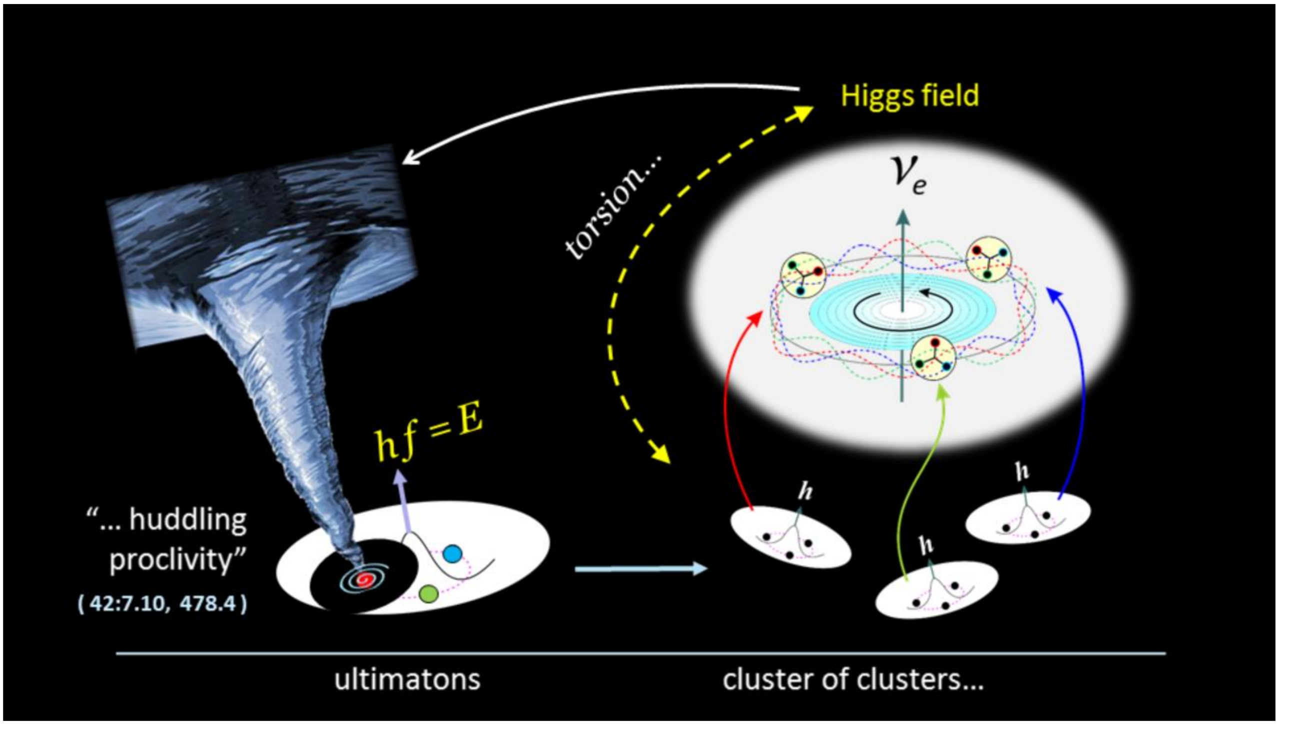
Which suggests a connection: in paper 42 section 1 (**42:1.2, 467.4**), the Urantia Book describes its ultimaton as "**the first measurable form of energy**".

So if Planck's constant, the **standard model's** … *first measurable bit of action*, approximates in some way the presence – or finite effect – of the ultimaton, then in a single stroke, we've put **ultimatonic foundations** underneath Dirac's very famous, and very useful (and very mysterious!) model for the electron.



So the idea is that this quantizing angular momentum in our superfluid disk becomes a condensate of these "**axionic preons**" – or **ultimatons** – which …

[see Part 4A, slide 17]



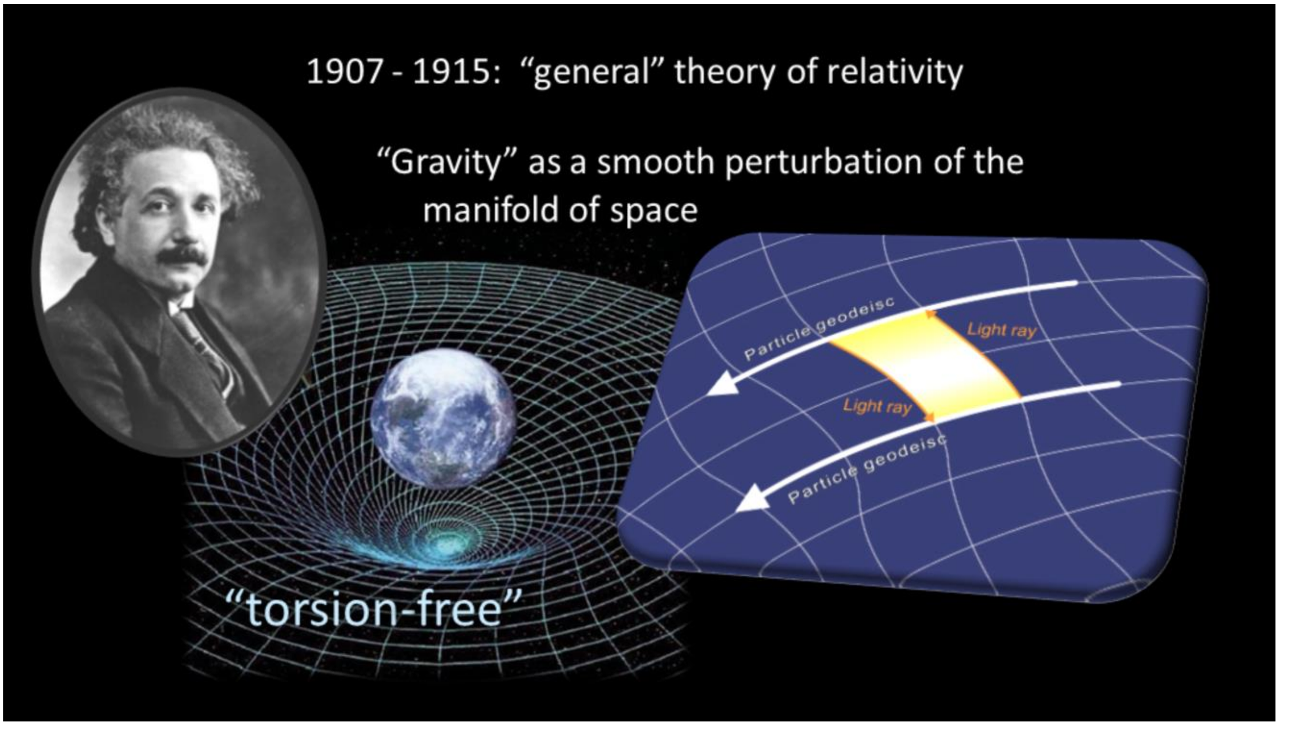
… as we discover in paper 42, have

a proclivity to "**huddle**" [**42:7.10, 478.4**].

Which leads to a surprising idea. As we saw in Part 4B, the Urantia Book builds up standard model matter from **clusters** of **clusters** of these "huddling ultimatons".

But in this scheme, the ultimaton is literally a vortex in the standard model's Higgs-type field. So all these quantized vortices – bound and clustered and interacting – imply an internal frenzy of rotational stress, acting (locally) upon space.

In other words, there's a powerful **torsion** locked away within this tiny cluster of huddling ultimatons.

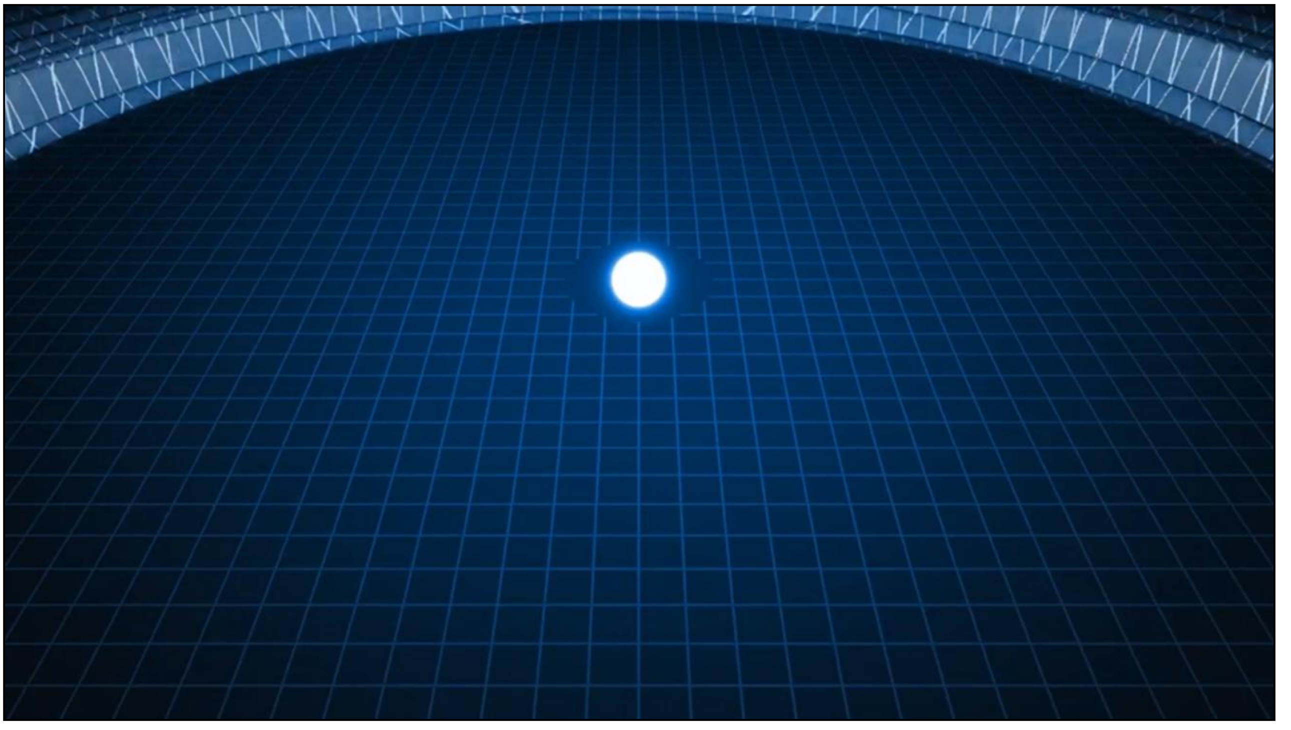


Which brings us back to Einstein. To make it possible to explore his new theory, Einstein had to simplify a few things.

In particular, he set the **torsion tensor** in his field equations to ZERO…

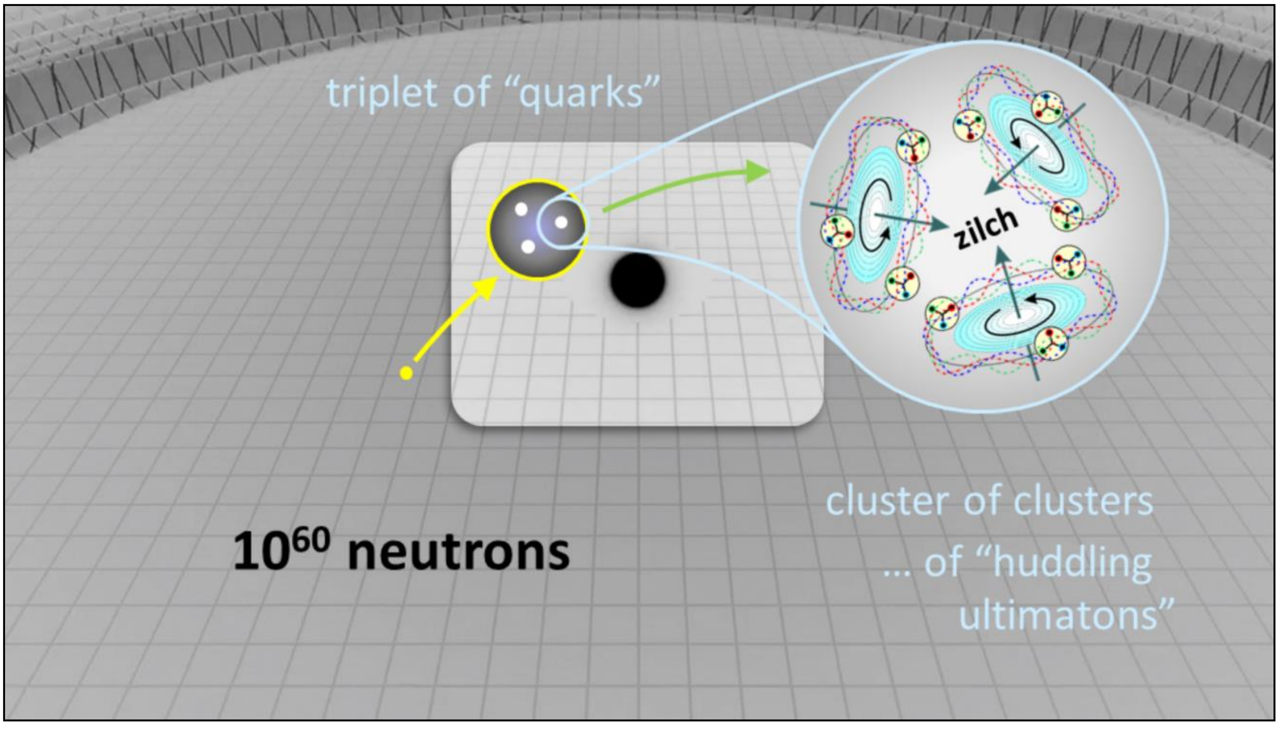
… which, in a smooth, **<u>cosmological</u>** context, was the obvious thing to do.

The gentle gravitational play between planets and their star, or between stars in a galaxy, is effectively torsion-free.



But when we shift scales, and consider, say, the merging or collapse of neutron stars, then, as we'll see, torsion appears center stage.

Now, to a **cosmologist**, this sort of compact remnant is just a gravitating mass, either a bigger neutron star,

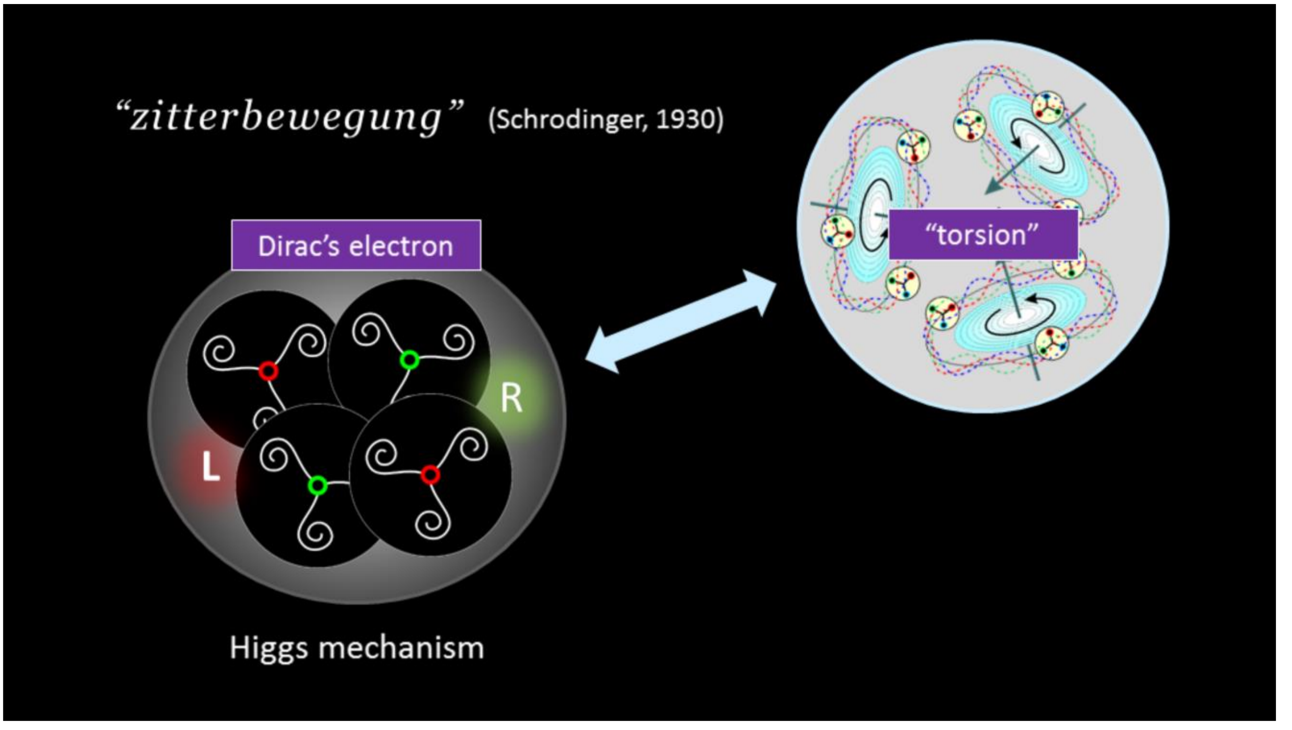


… or black hole, depending simply on the mass.

But a ***particle*** physicist has to wonder, “What about all those neutrons?”

Given that neutrons are some kind of system of quarks, then a Urantia Book scheme requires that each of these tiny quarks is actually a **cluster of clusters** of huddling ultimatons, axion-like preons, twisting and tangled up with local scalar fields.

So both quantum field theory and the Urantia Book raise the same question:
what *really* happens as those neutrons start to melt? What happens when
all those flickering fermions are forced to bump elbows?

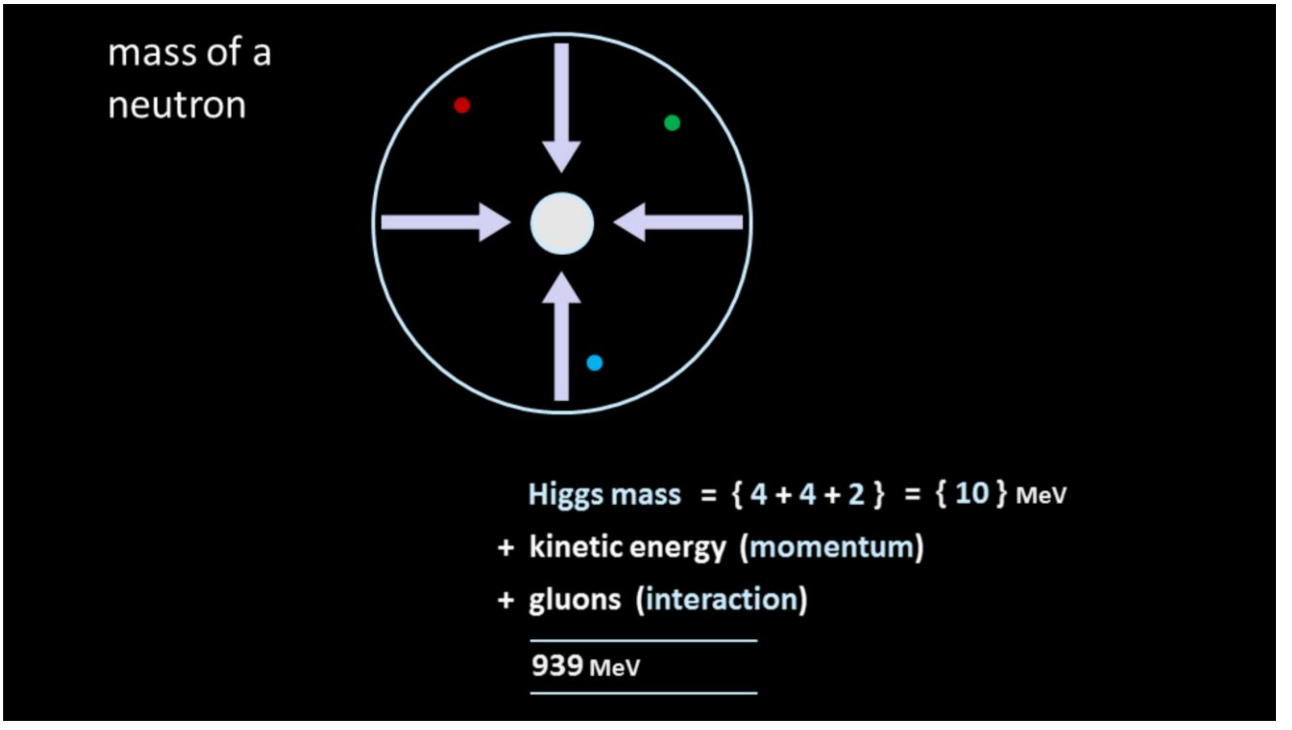


In Part 4B, we saw why Dirac's famous model for fermions (built up from chiral spinors) works so well; its relativistic oscillations – those ***zittering*** flips between left & right hand states, tangled up with some Higgs-type field – capture some of the frenzy of all this Planck-scale, **axionic**, ultimatonic action.

So what happens when such a structure gets compressed?

Remember, in our collapsing neutron star, …

[**cube rotate to "asymptotic freedom"**]

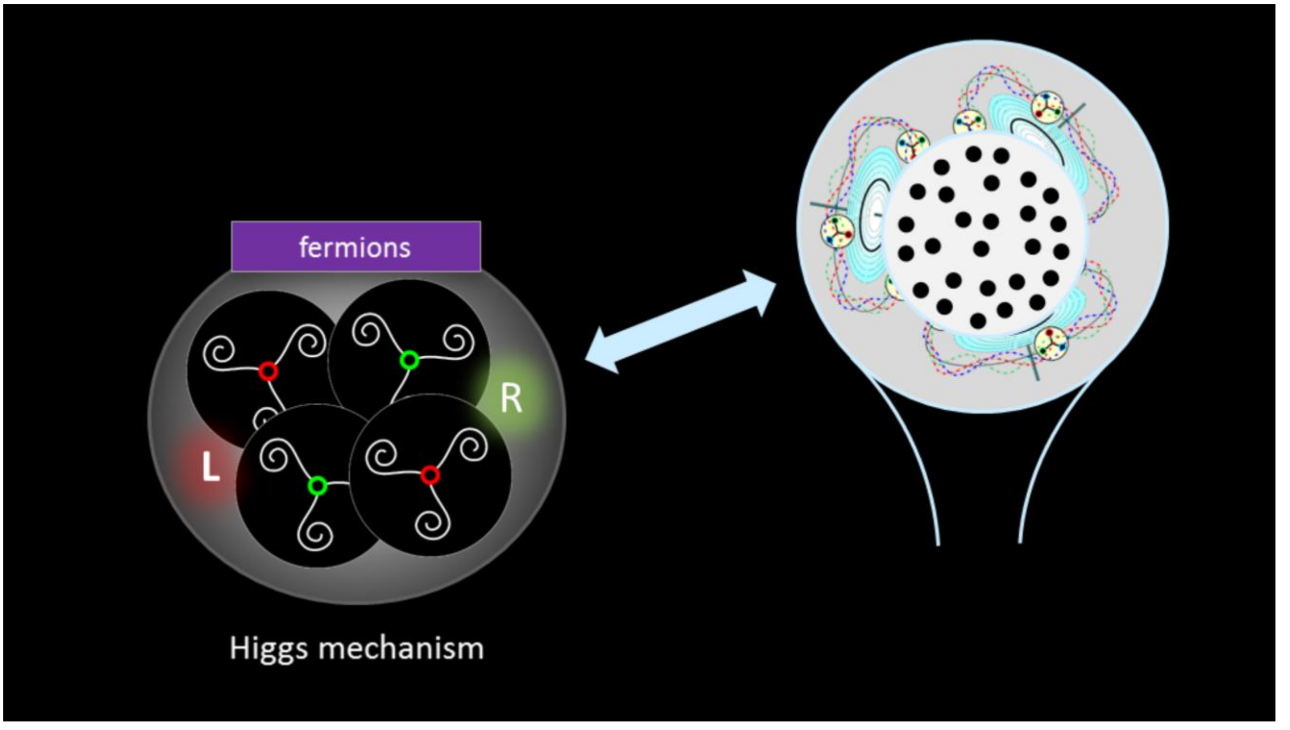


… we found that inside each shrinking neutron,

– both the **quark momentum**,
– and the **gluons**

disappear.

[**cube rotate back… to "zilch-torsion"**]



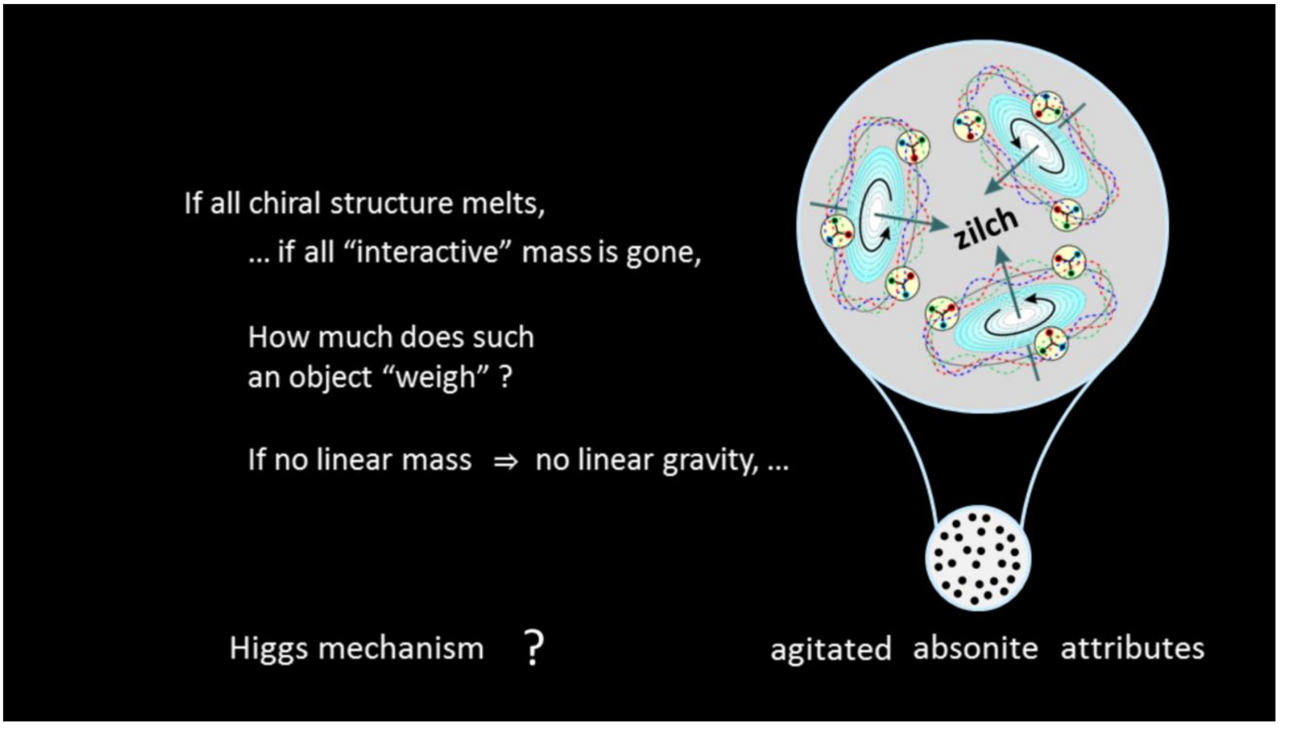
Meaning all that's left is that **FERMIONIC FRENZY** of ultimatonic clusters, flipping frantically in their (ancestral) Higgs-type field.

But remember, for a Higgs-type mechanism to work, there needs to be some non-symmetric **structure** for that mechanism to rotate, or "flip".

So what if this last level – of ***ultimatonic*** structure – were to melt?

What if these clusters of huddling ultimatons were to dissolve…

into a fluid of ultimatons?



Well, then there'd be nothing left for a Higgs-type mechanism to flip.

In Urantia Book terms, **all** that interactive "gravitational response" – all that interactive (or "**linear**") type of "mass" – is gone!

So we have to ask: when all the neutrons in a collapsing neutron star are reduced to their component ultimatons, if all that chiral structure melts, if **all** the so-called interactive mass is gone, how much does such an object weigh?

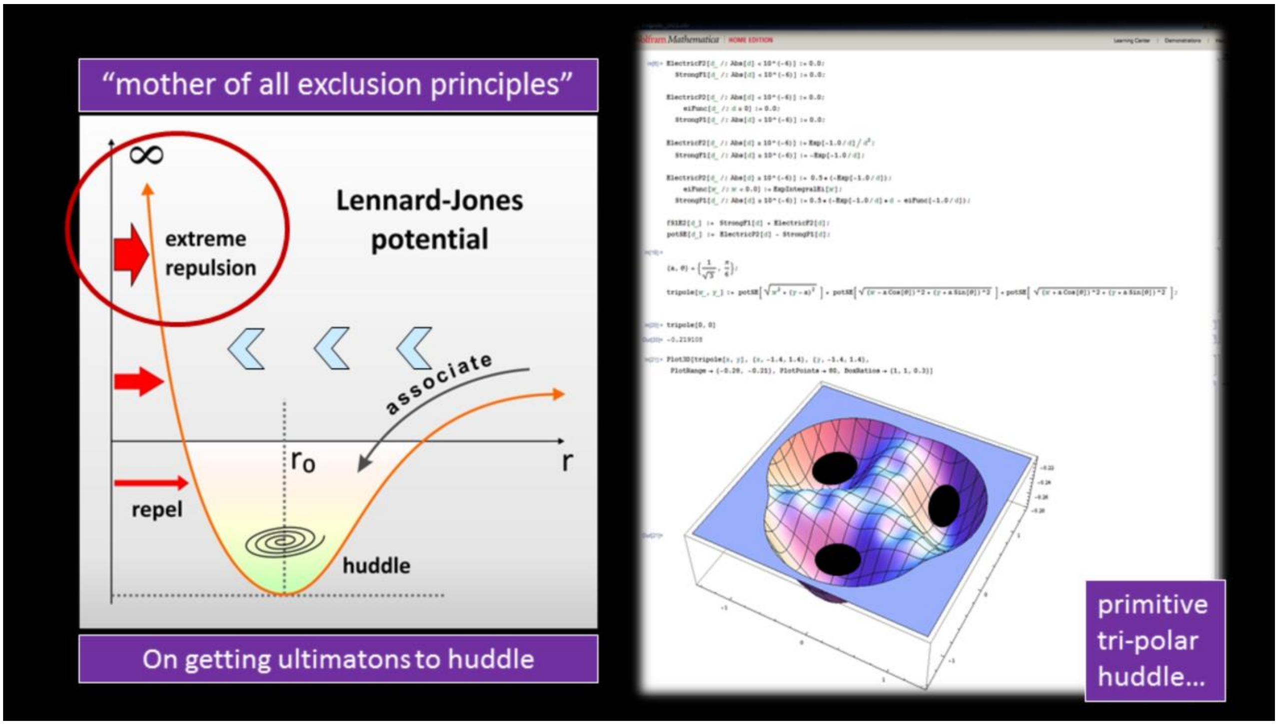
And if "**no linear mass**" means "**no linear gravity**", then what local force is left to confine the **agitated** - **absonite** - **attributes** of all those ultimatons?

Remember, in a Urantia Book scheme, ultimatons are not mere *"fluctuations in a field"*.

They are the place where nature stores angular momentum, the place where nature locks **absonite energies** onto our finite manifold. They are a condensate of a condensate of space potency.

So what does this mean for a collapsing neutron star? It means that certain standard model assumptions, about particles, and space, and singularities,

"ain't necessarily so".



Here, let's recall that ultimatonic, "**mother-of-all-exclusion-principles**"
– which I've mentioned a few times.

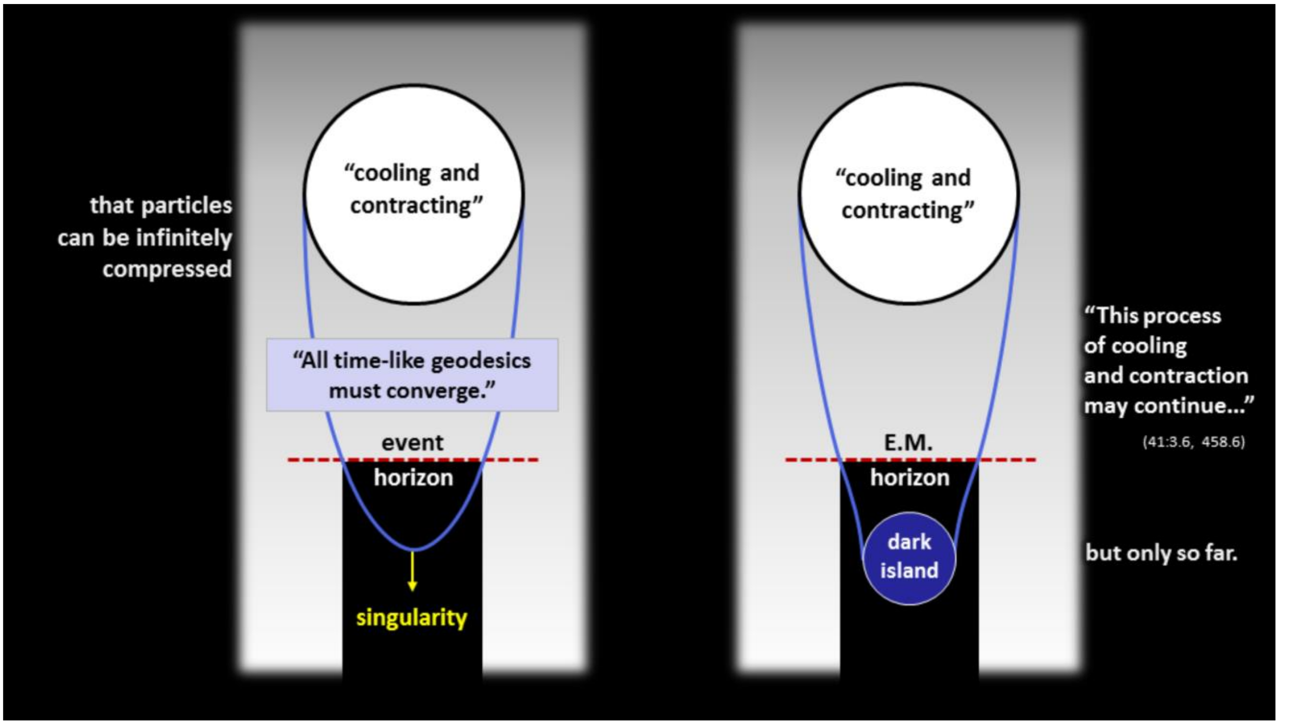
The idea is that if ever the **absonite attributes** of these huddling ultimatons start to overlap – or interfere – this extreme repulsion, this "**ultimatonic**" exclusion principle kicks in.

Notice, at this smallest scale, in this ultimatonic scheme, we find not the chaos of quantum uncertainty, but a frenzy of ***vorticity***, …

of **torsion** tangled up with local scalar fields.

So, will all this ultimatonic **torsion** – locked up WITHIN leptons and quarks – simply disappear into the long good night of some black hole?

Let's review the alternatives:



On one hand, we can just extrapolate a couple of textbook ideas:

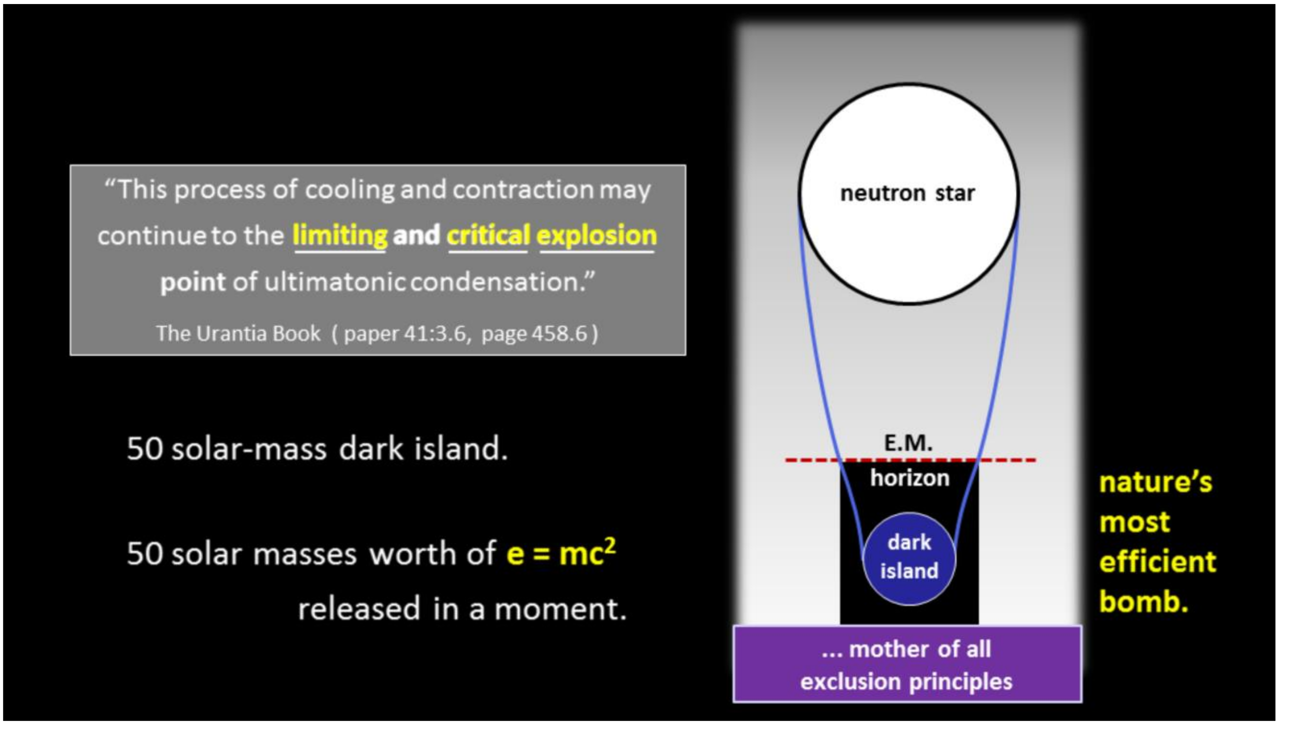
1. that particles are nothing but fluctuations in a field,
   and thus can be **infinitely** compressed.

2. that since the manifold of space itself is being curved, then…
   "all timelike geodesics must converge".

On the other hand, we have… a very different story. First, with regard to what happens when matter collapses, and second, with regard to what's **really** being "**curved**".

As they say in paper 41 section 3, this "**process of cooling and contraction may continue…**", but only so far.

Once again, at a certain radius, an **electromagnetic** horizon can still form; once an object shrinks below this size, it can neither emit nor reflect light. Thus such islands are "**dark**".



But in the Urantia Book's model of collapsing neutron stars, this process of "cooling & contraction" may continue, but **only** until this ultimatonic, mother-of-**all**-exclusion-principles, stops the collapse. But that's not the end of the story;

there's a punch line. From paper 41, section 3 [quote]:

> "This process of cooling and contraction may continue to the **limiting** and **critical explosion** point of ultimatonic condensation." [end quote, (41:3.6, 458.6)]

The **limiting** and **critical** **explosion** point.

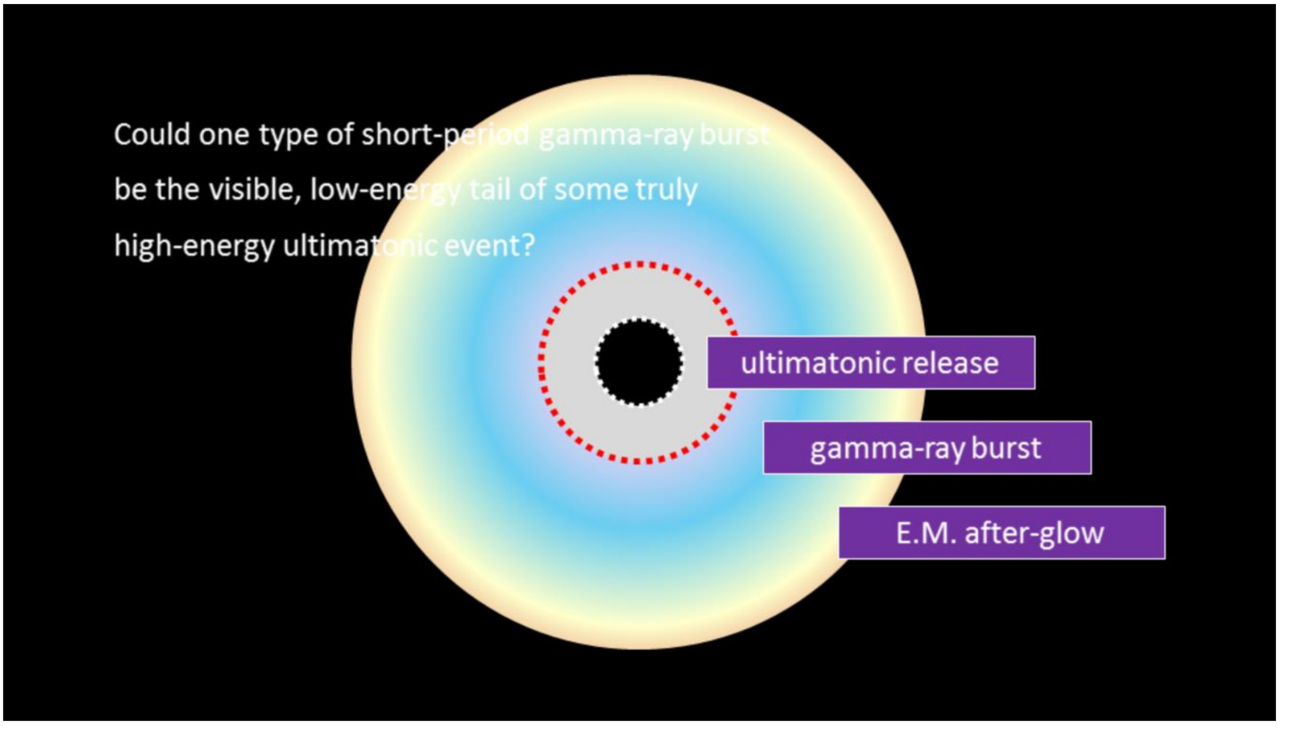
How many ways can we read "**limiting**", "**critical**" and "**explosion**"?

The Urantia Book **predicts** that such an object – this invisible ball of mass – **explodes**.

- Imagine a 50 solar-mass dark island:
- 50 solar masses worth of **e = mc^2**
- released in a moment.

As I read this paragraph, as this "**limiting and critical explosion point**" is reached, dark islands become… nature's most efficient bomb.

What sort of bomb?



Well, if this "ultimatonic explosion" begins simply as a release of unbound ultimatons, then initially, there'd be no **electrons**, so no electromagnetic light.

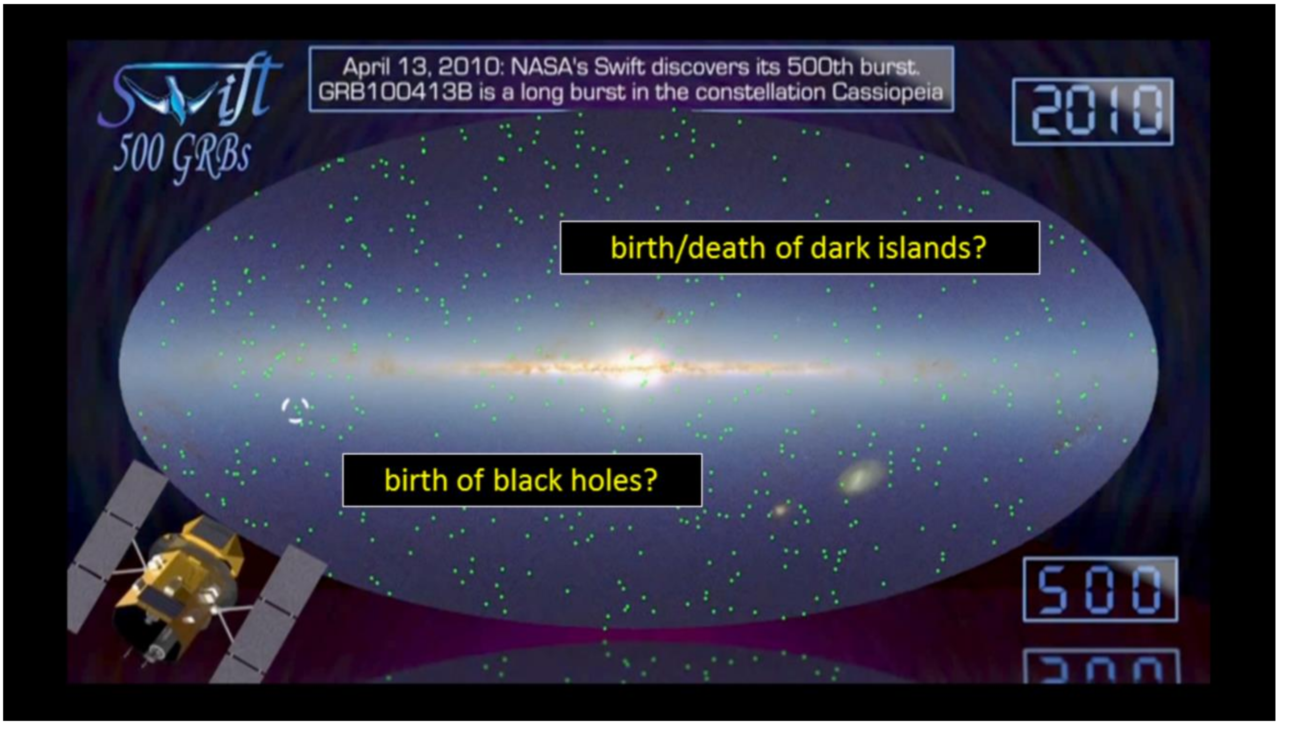
In other words, the actual, initial explosion may be invisible, or **"dark"**.

Of course, as the initial **ultimatonic** commotion settles down,
there'd be… **electromagnetic** repercussions,

- Like a short-period gamma ray burst,
- And some brief, characteristic after-glow.

Which raises the question:

> *Could one type of short-period gamma ray burst*
> *be merely the visible, **low energy tail** of some truly*
> *high energy, **ultimatonic** event?*



We've seen these gamma ray bursts – these mysterious bombs – going off ever since we got gamma ray detectors in space. This snapshot (from 2010) shows the first 500.

In the **current** map, the entire sky is filled with such dots.

One explanation – for the **short** period type of gamma ray burst – is the **birth** of a black hole.

But do they really mark… the **birth** and **death** of dark islands ?

If so, what a neat technique for recycling dead stars.

As we've seen, the Urantia Book tells quite a tale about mass and matter, and dark islands that go "**boom**".

Central to this story are new foundations – for the vast reservoirs of **energy** and **mass** – that science currently can measure, but can't explain.

In the next and final part, we explore what these new foundations might mean for our home sector in an ancient superuniverse – the so-called "Milky Way".

(continued in Part 4D: Cosmology – The Milky Way)