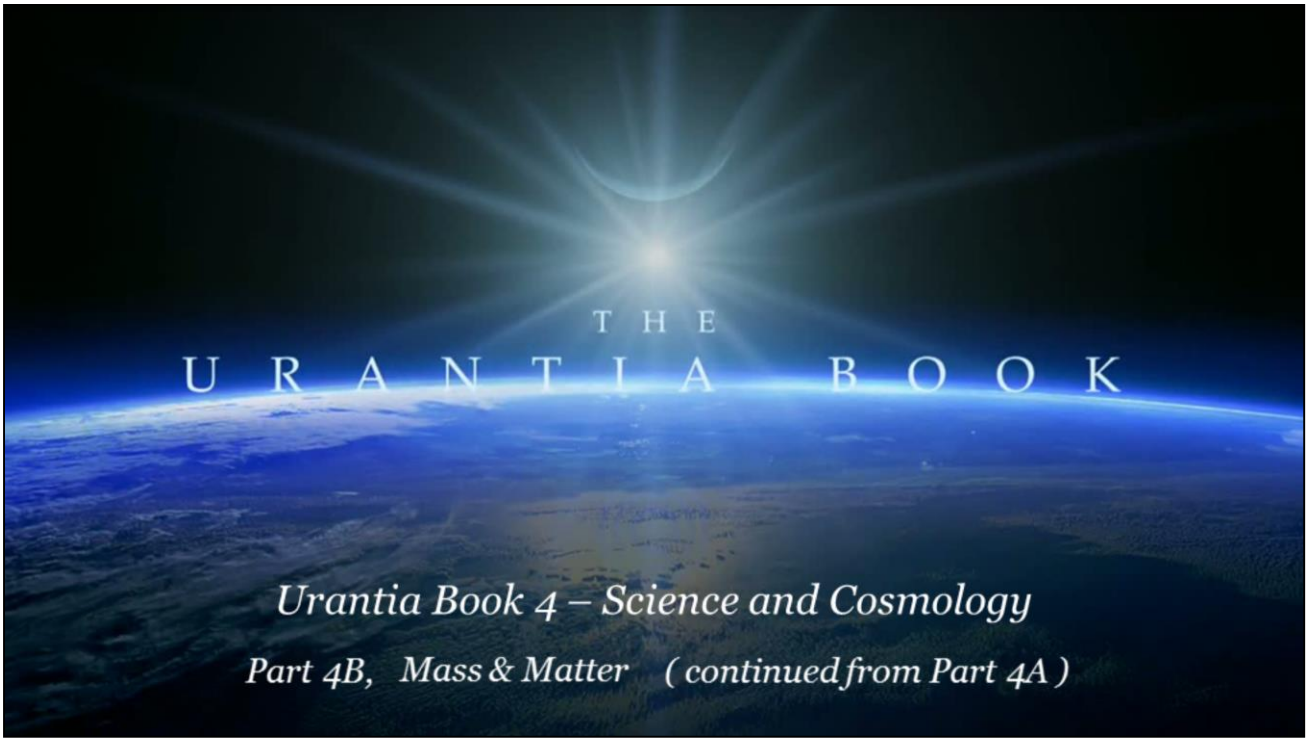


The Urantia Book

Introducing a bigger frame in which to think

Part 1: Universe Frames

Part 2: the Personal Universe

Part 3: a Family Affair

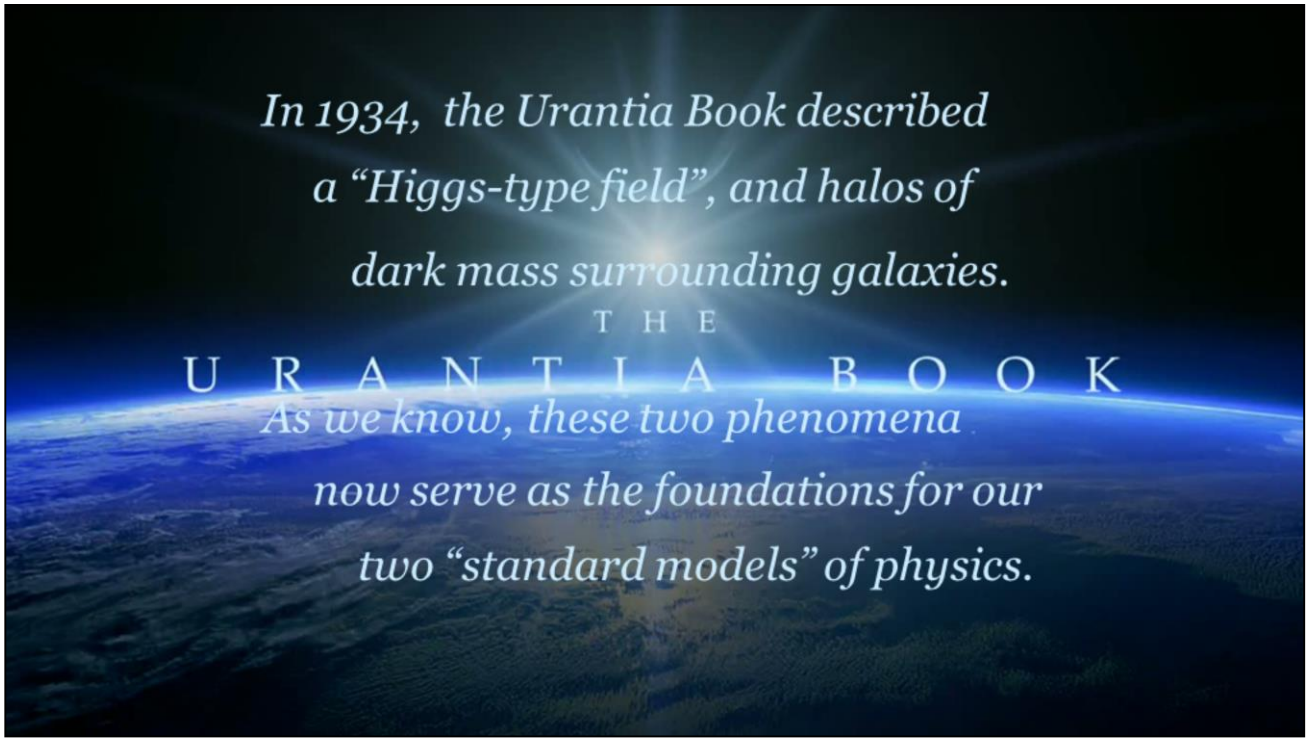
Part 4: Cosmology

A – Foundations

B – Mass & Matter

C – Exploding Dark Islands

D – the Milky Way

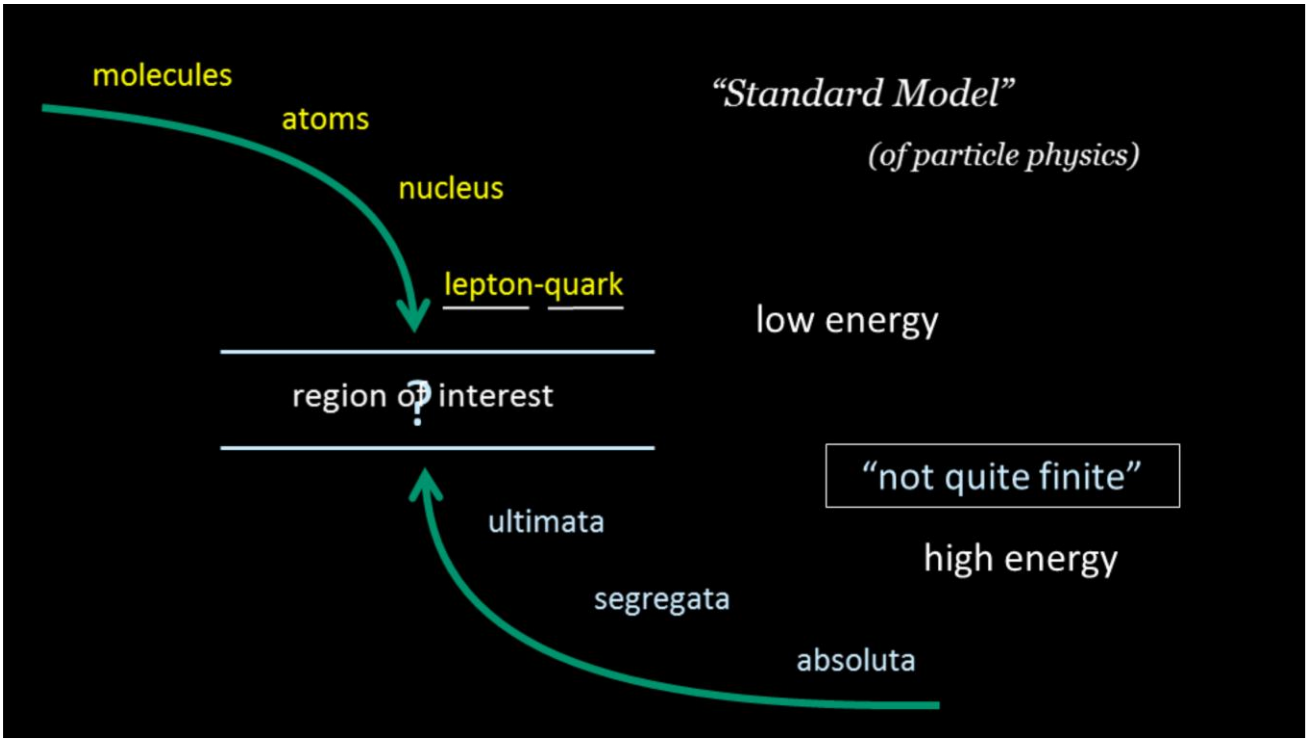


In 1934, the Urantia Book described a "**Higgs-type field**", and **halos of dark mass** surrounding galaxies.

As we know, these two phenomena now serve as the foundations for our two standard models of physics.

Ok, that's a quick look at the unique foundations on which the Urantia Book's scientific story sits.

Let's now see what these foundations mean for **mass** and **matter**.



As we know, everyday stuff is made from molecules, molecules are built from atoms, and atoms are complex things built from tiny parts. These tiny parts are called leptons and quarks, which are thought to be **elementary**, that is to say, not made from smaller parts.

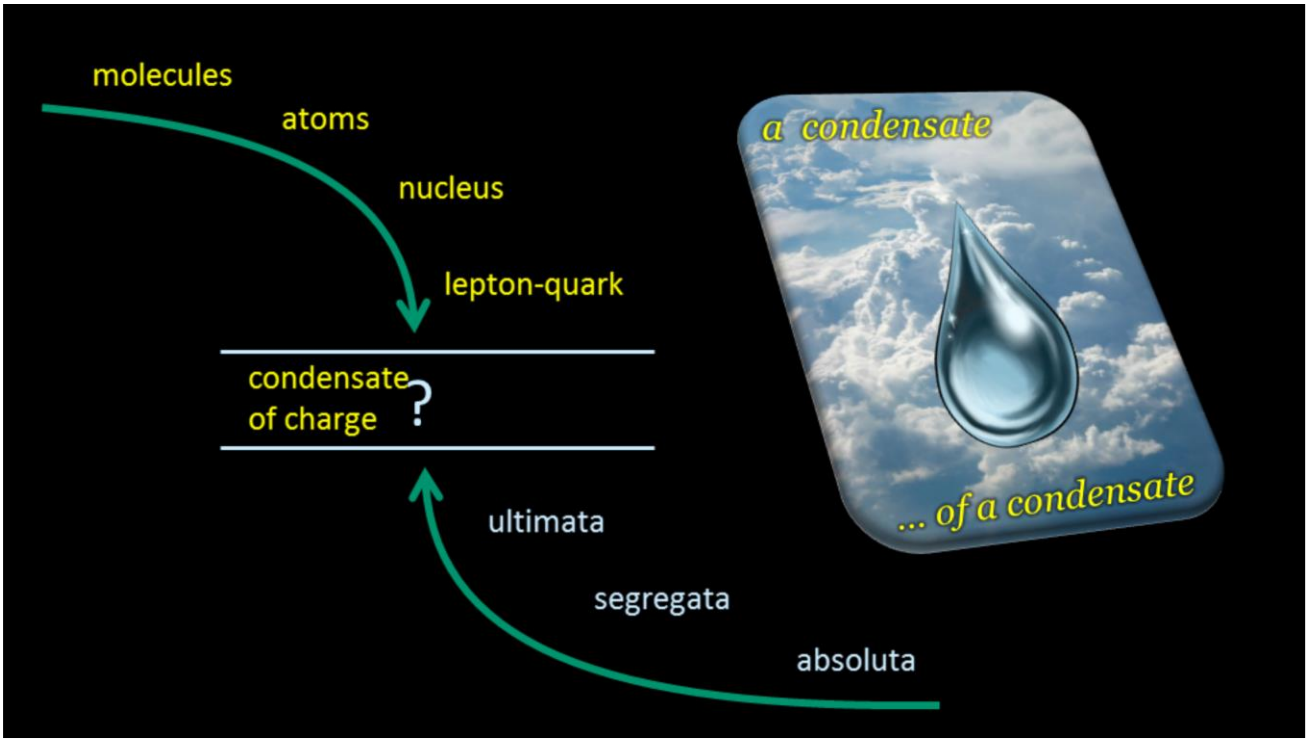
This scheme, based on leptons and quarks, is called the "Standard Model of particle physics", and it describes most things we see really well. But in particle physics, all this is thought of as "**low energy**" stuff. Which implies another "**high energy**" domain…

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 [which we just explored].

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 Urantia Book readers – **they** want to know how **ultimatons** fit in.

Ok, so what do we know.



Well, we know that for the standard model to work, this "**region of interest**" needs to be filled with something called

"**a condensate of charge**".

What's a condensate, and what kind of charge? We'll get to that. But first, let's introduce the **ultimaton**.

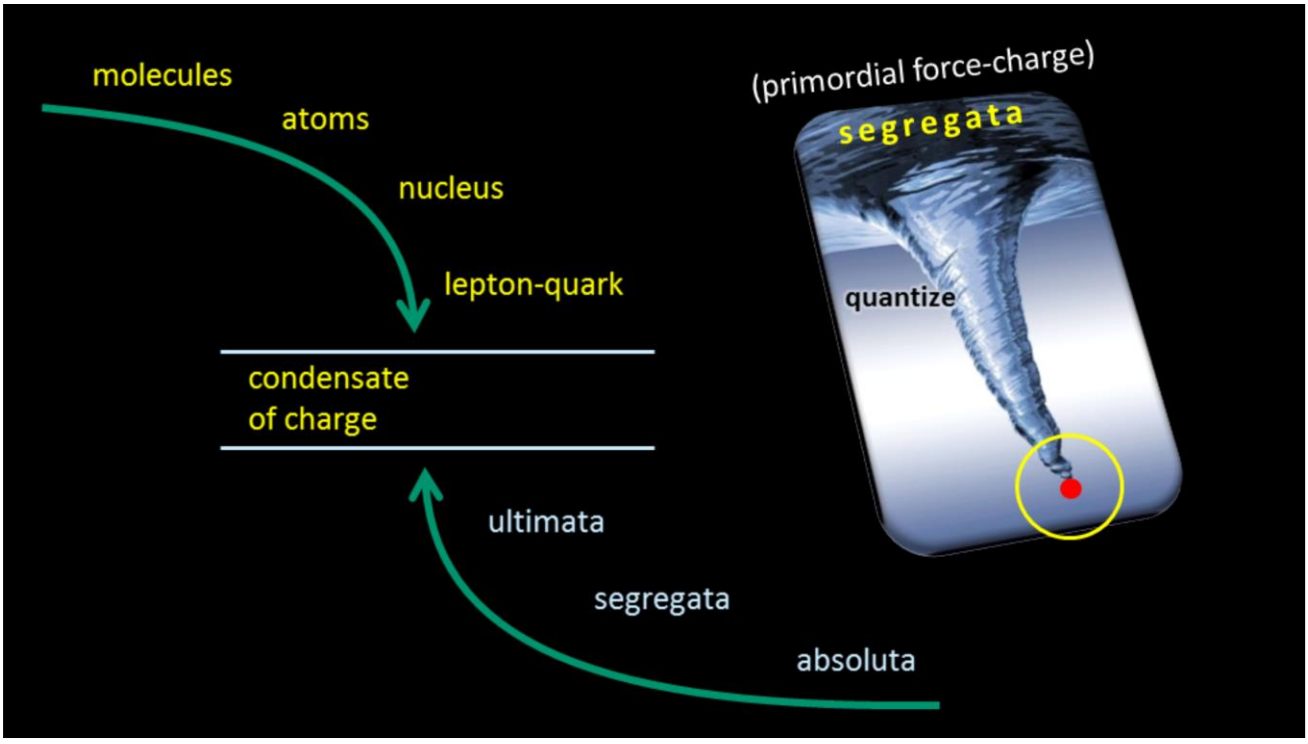
Imagine a rain cloud, **condensing** out of thin air, and a drop of rain, **condensing** inside that cloud.

If we think of the cloud as **segregata**, then this tiny drop would be the **ultimaton**.

Notice how this drop of rain - this *ultimaton* - becomes…

" a condensate of a condensate ".

To put this in more mathematical terms, …

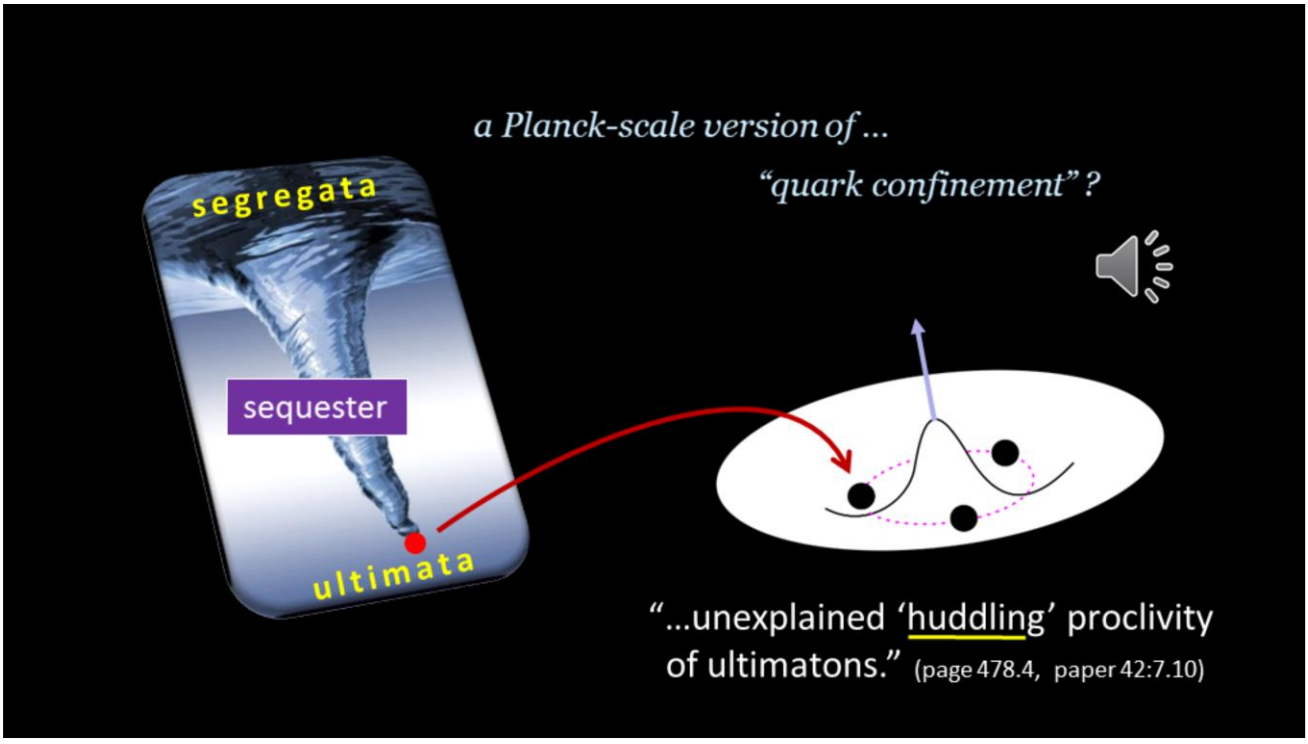


… think of a tiny vortex in this… condensate, this "**not-quite-finite**" stuff.

Then think of this **tip** as something discrete …

a **quantum** of **superfluid spin** …

an **ultimaton**.



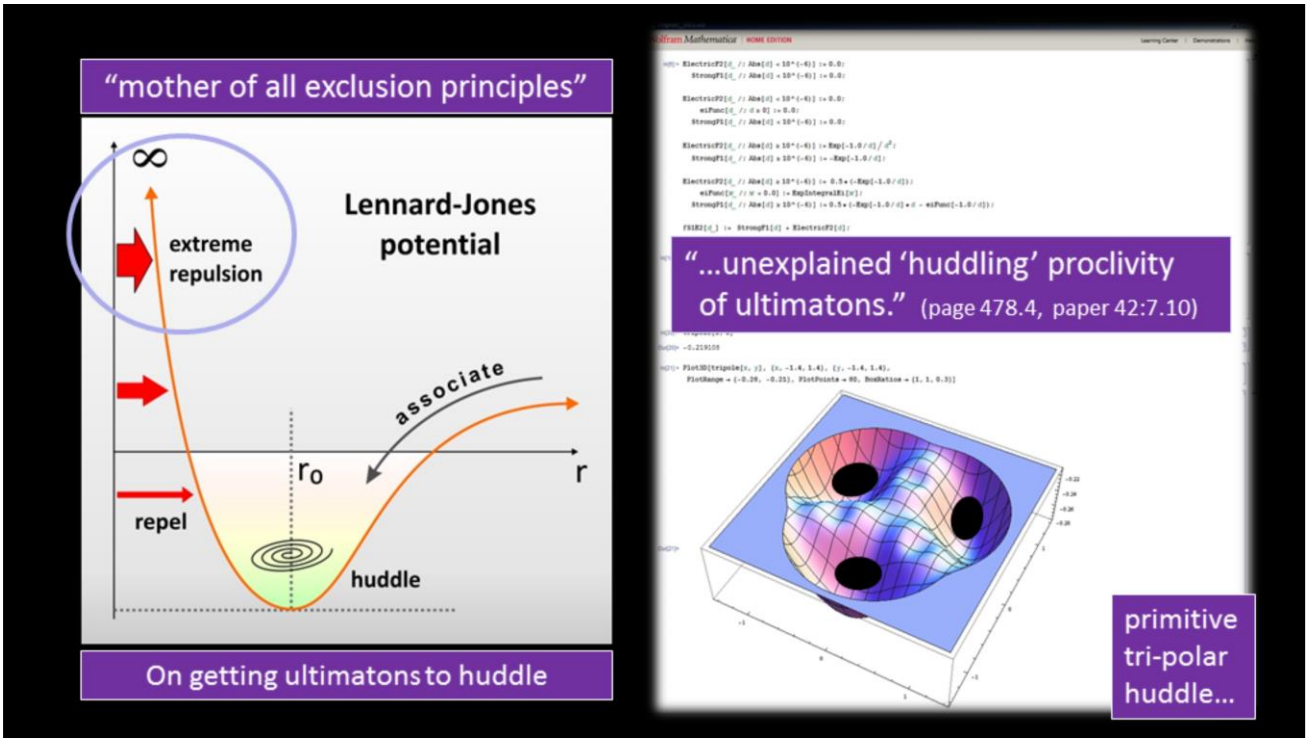
The idea is that segregata can be **cooled**, and **condensed** into ultimatons.

Or as physicist Lisa Randall might say: "**sequestered** onto our measureable manifold".

But before these ultimatons can be put to work, first, they need to "**huddle**".

Now by "huddling", I imagine something like this: **two** or **three** ultimatons, locked very, very tight,

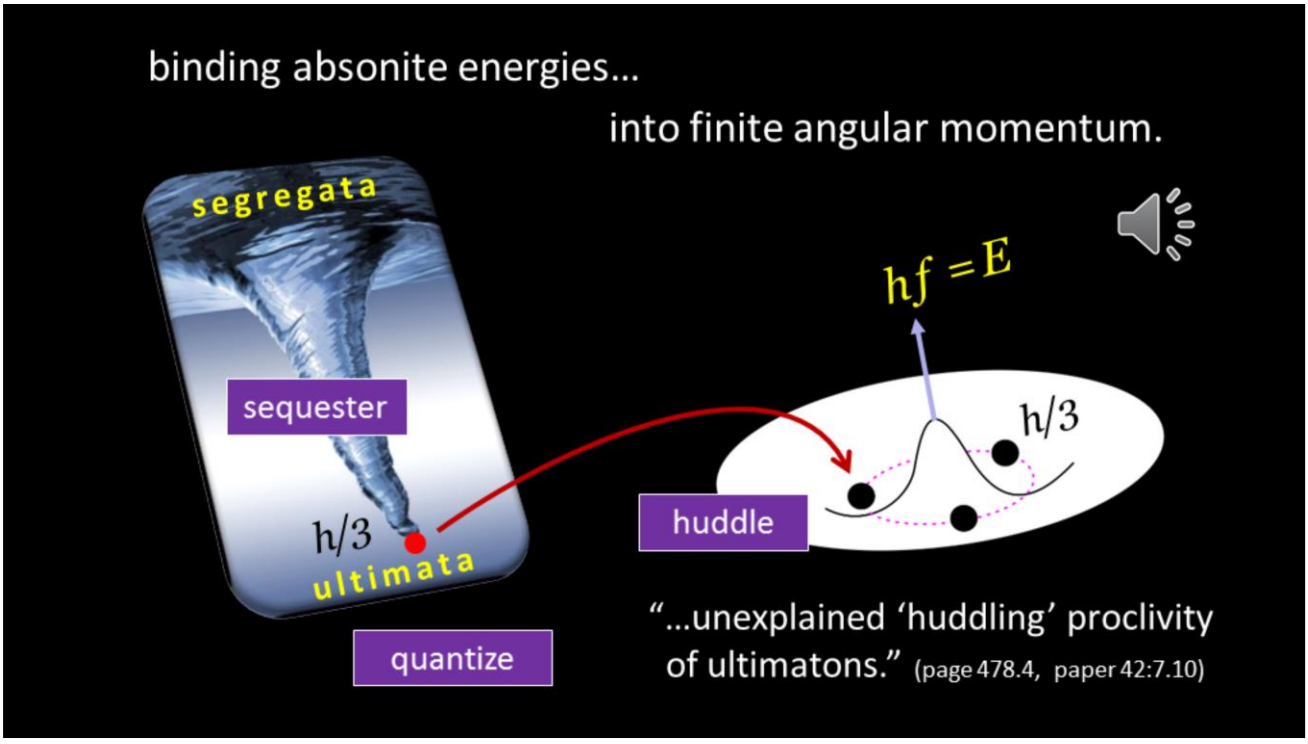
… a bit like the way quarks are "**confined**" inside protons.



Mathematically, we'd have… a balance of forces,

- "**mutual attraction**" drawing a few ultimatons together,
- while some **extreme repulsion** [say, from an antisymmetric spin] keeps them apart.

It's this sort of balance – between mutual attraction and extreme repulsion – that explains that [**quote**] … "**proclivity to huddle**" mentioned in paper 42 section 7.

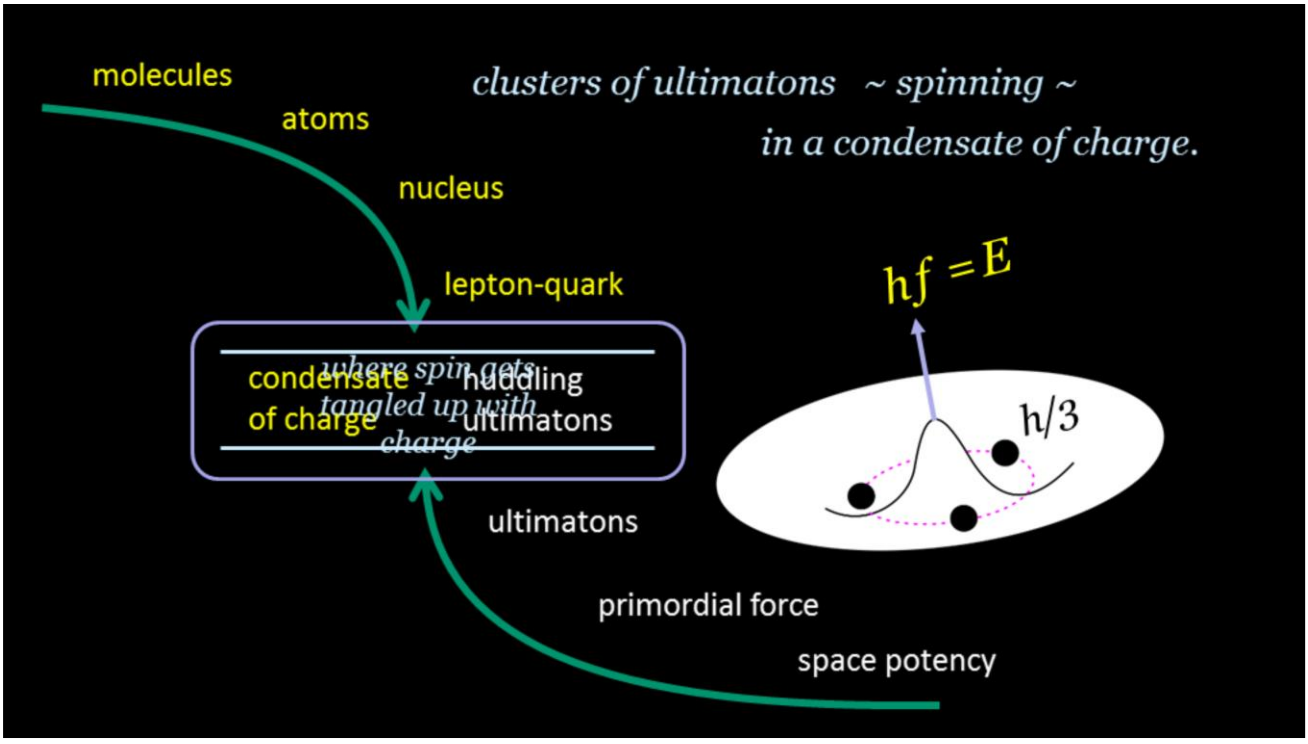


It's these two characteristics of ultimatons – their quantized, superfluid spin, and their proclivity to **huddle** – that allow us to make contact with standard model physics…

What we have here is the binding of **near-absonite** energies into **finite** angular momentum.

And **angular momentum** is something that science can **measure**.

So this "**region-of-interest**"…



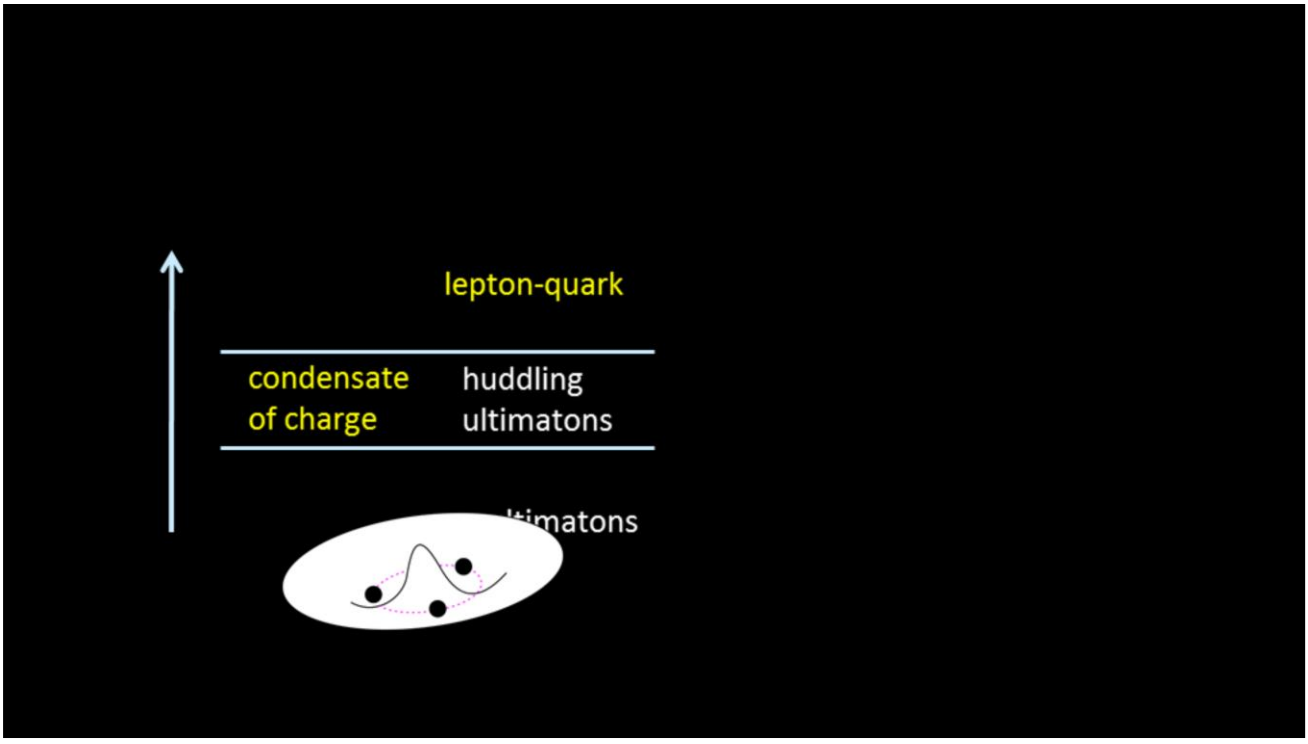
… will contain not isolated ultimatons,
but **clusters** of them, huddling.

Now, notice what we have:
clusters of ultimatons … **spinning** … in a condensate of **charge**.

As we'll see [**24**], this **extraordinary** place, where **spin** gets tangled up with **charge** ,

*** where **spin** gets tangled up with **charge** , ***

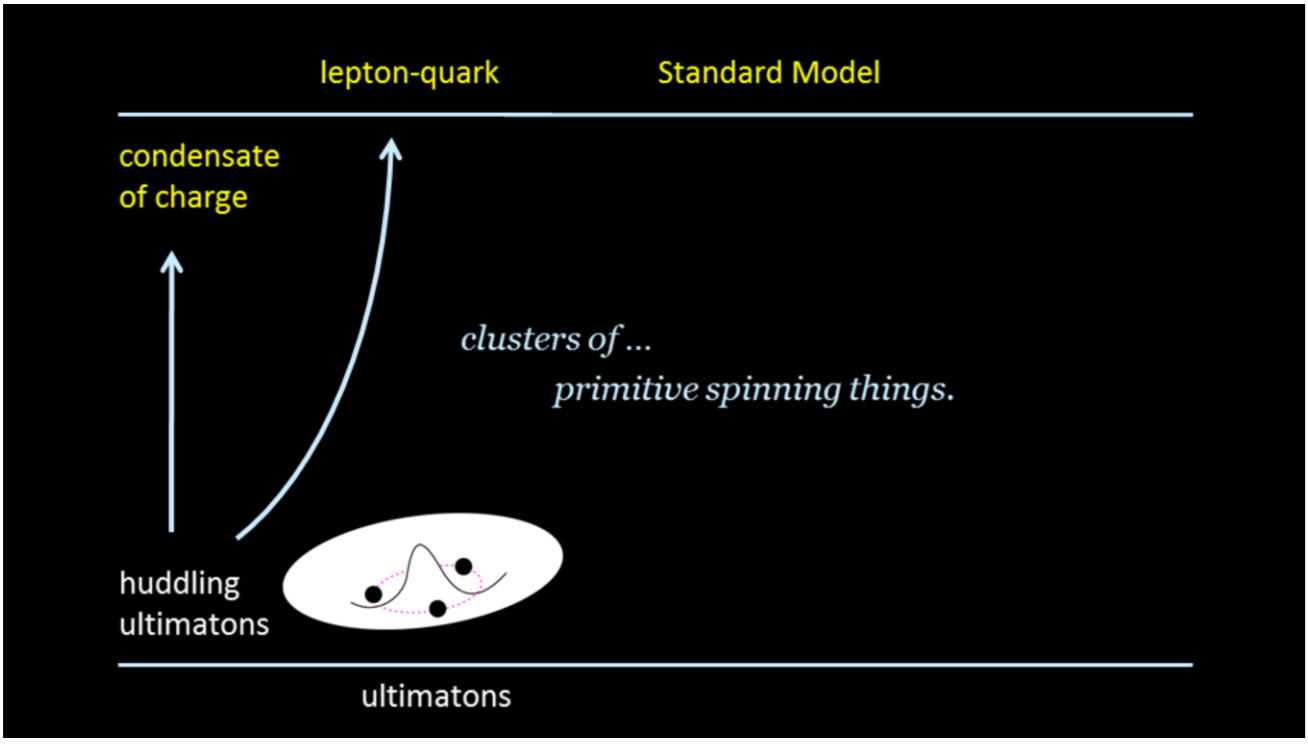
becomes the perfect place for revelation to make "first contact" with native science.



Let's take a closer look.

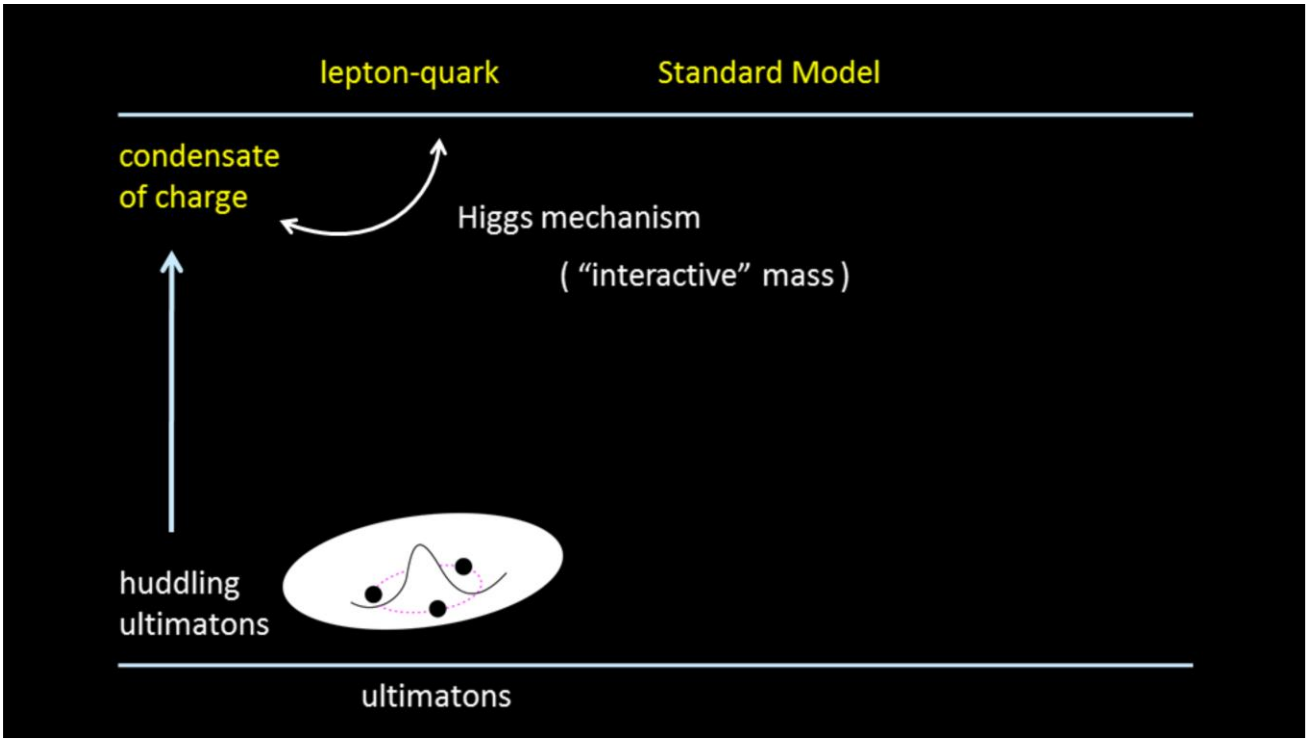
What we need to do is to work out how this **primitive** **spinning** thing,
this tiny, polarized huddle of ultimatons,

might **interact with** this condensate of charge,



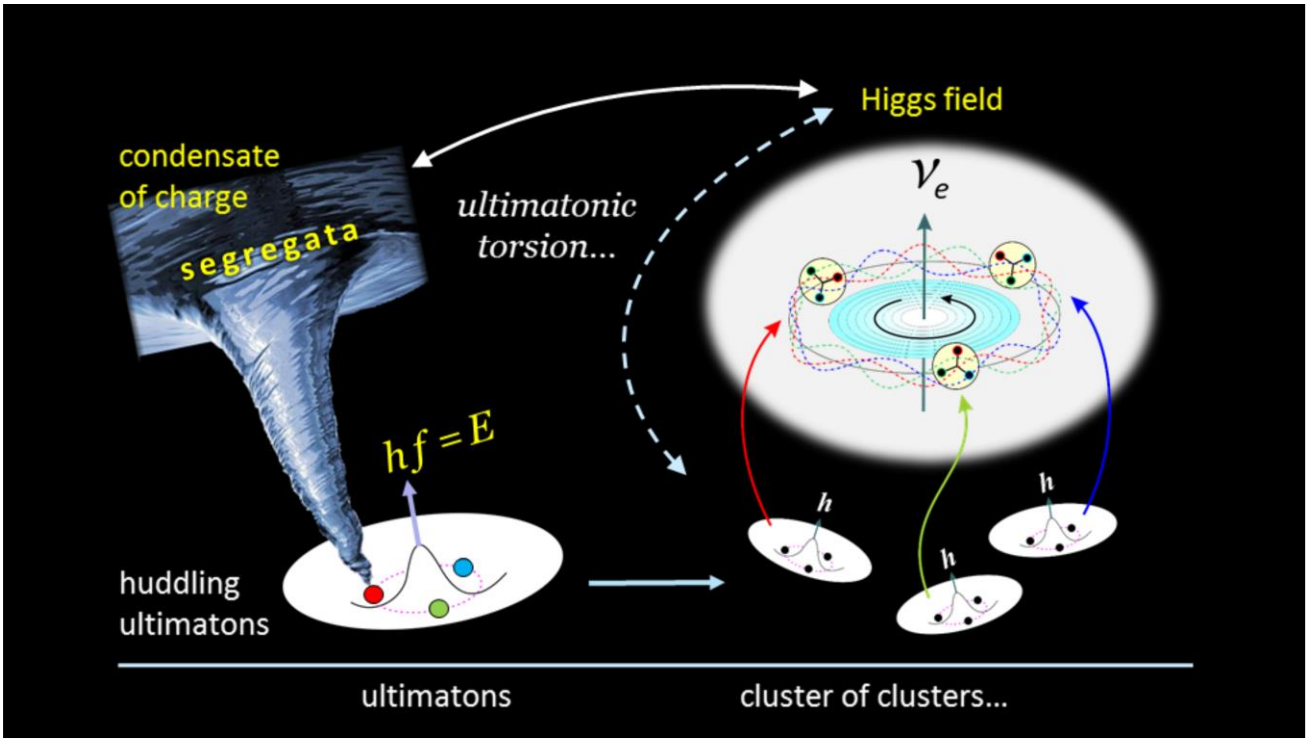
and then to show how leptons and quarks can be built up from **clusters** of these… primitive, spinning things.

Here I should point out that our standard model…



… already depends, *fundamentally*, on **a mysterious interaction** between these (leptons & quarks), and this (condensate of charge).

This is the famous **Higgs mechanism**, by which particles are thought to get… an "**interactive**", **inertial** kind of **mass**.



But notice that if standard model particles really **are** built up from clusters of huddling ultimatons,

then what we're… **predicting** …

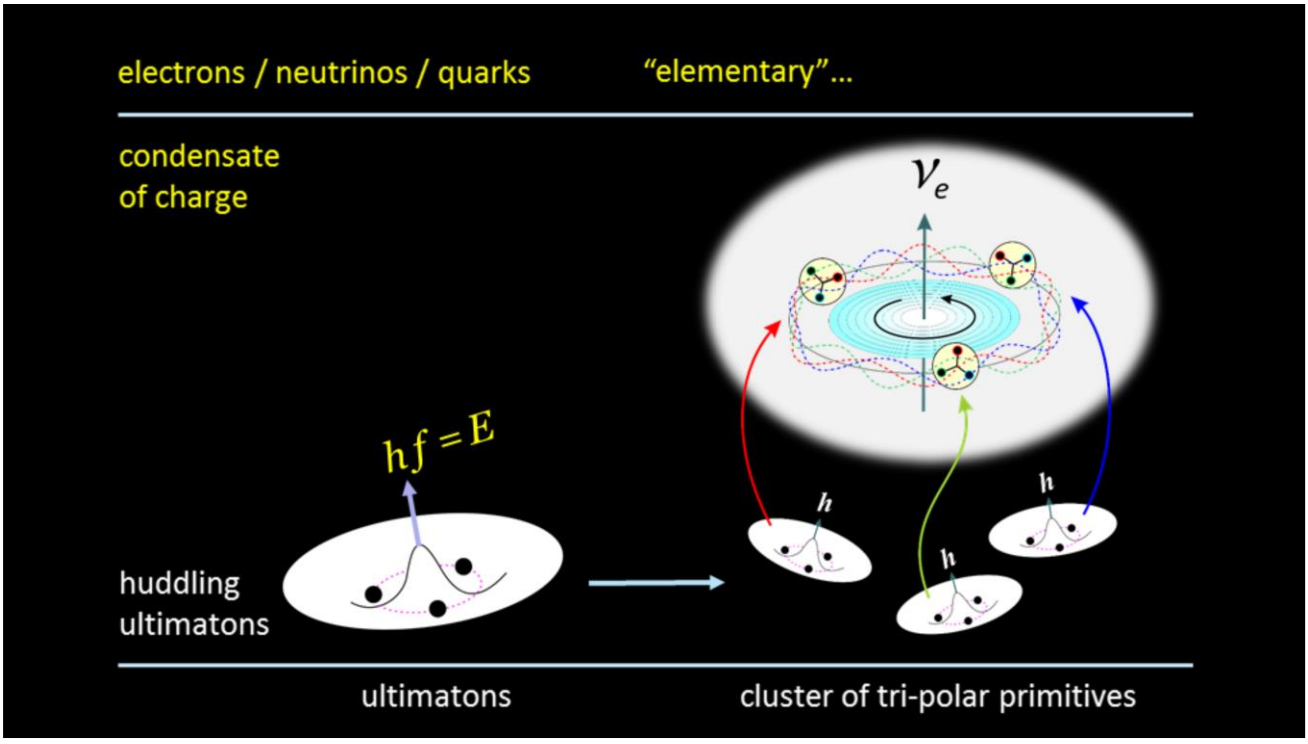
what we're *predicting*, is that this Higgs mechanism

is actually **caused by** the behaviour of ultimatons,

some kind of ultimatonic **torsion** … *interacting with* this… **condensate of charge**.

And as we'll see, this **condensate of charge**, this Higgs-type field, turns out to be a lot like **segregata** – the very stuff from which ultimatons are made.

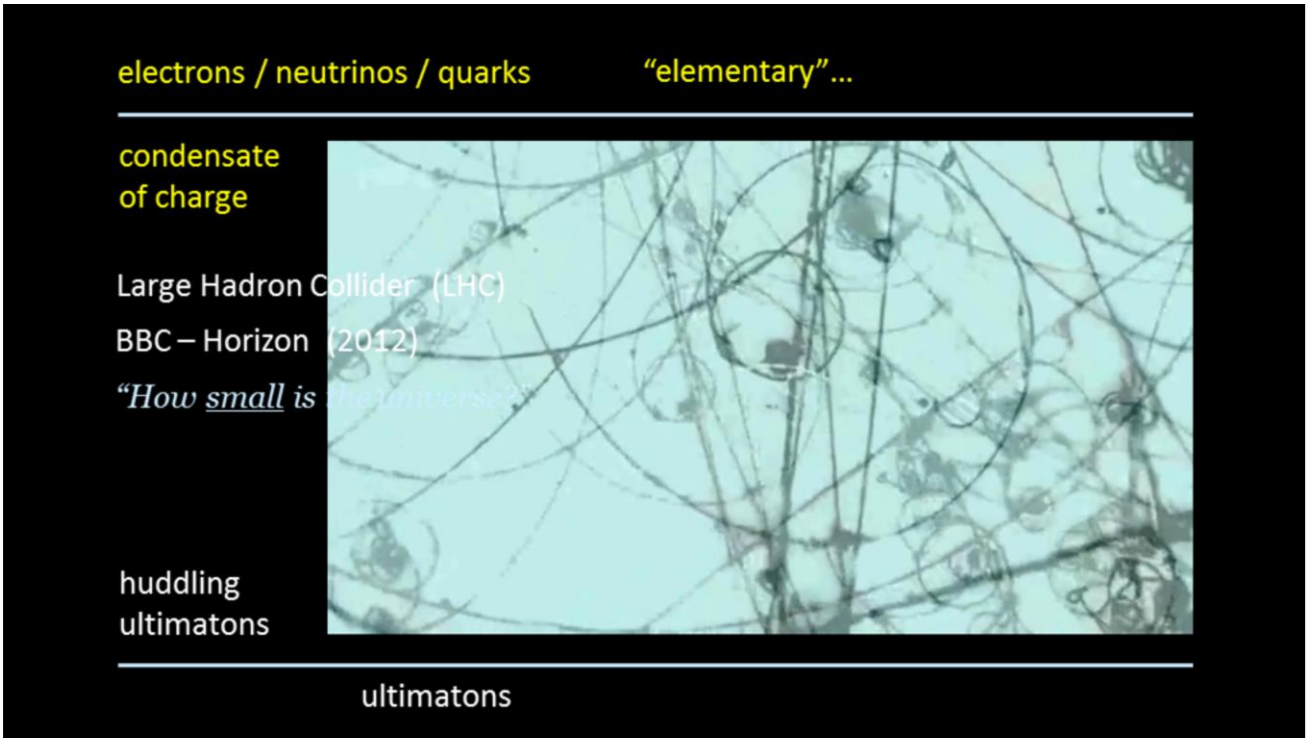
Of course, …



… if standard model particles, like electrons and neutrinos and quarks,
are built up from clusters of huddling ultimatons, then once again,
our ideas about what's "**elementary**" will need to change.

As it turns out, scientists have been wondering about this for some time – how elementary are "elementary" particles?

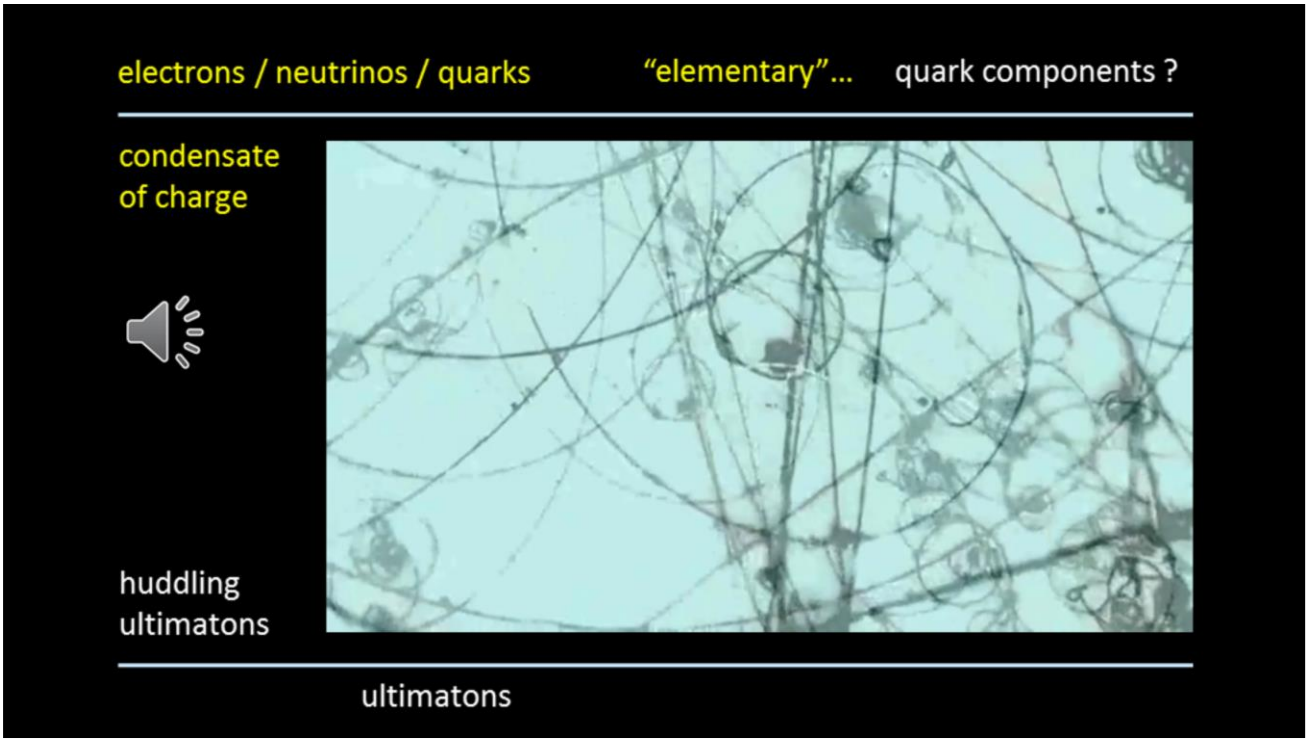
To find out, they built a really big machine…



… the Large Hadron Collider (or LHC).

In 2012 the **BBC** made a documentary about what scientists hope to achieve with this machine. Here's a 60 second clip:

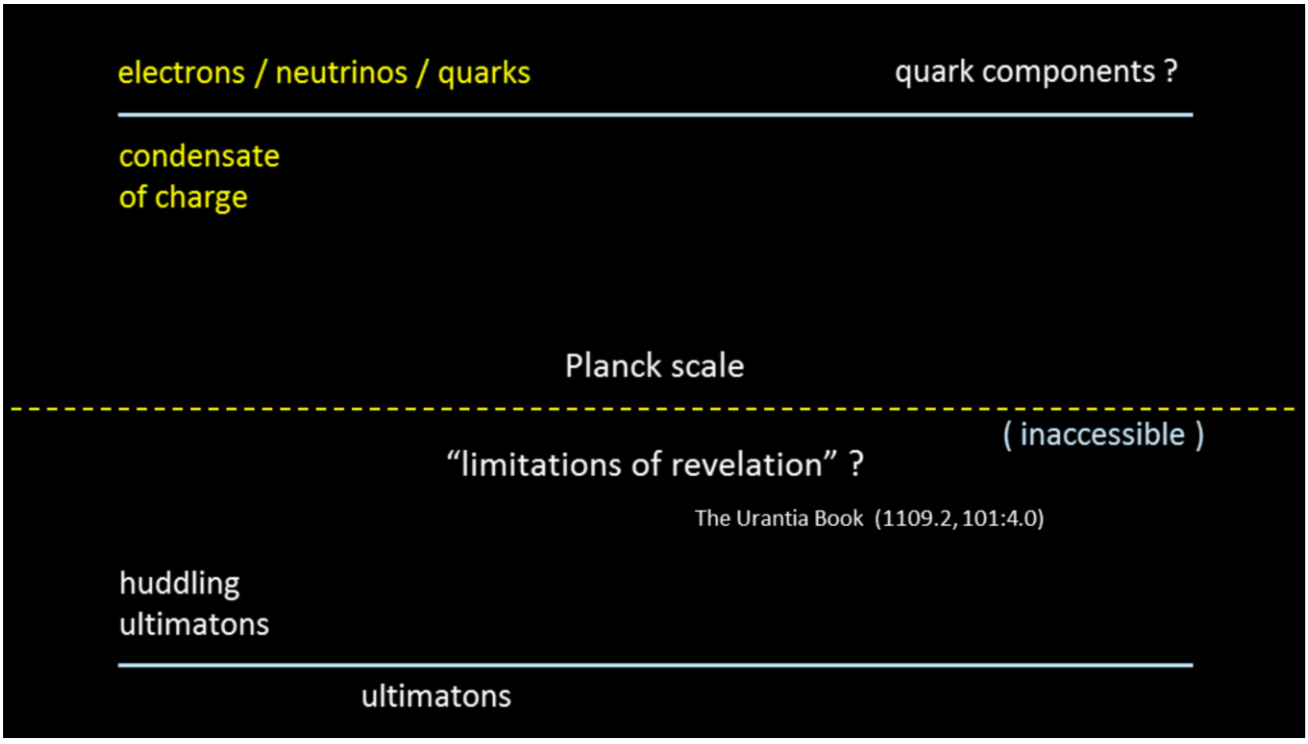
[Movie: elementary particles?] 0:56 seconds



[Movie: elementary particles?] 0:56 seconds

As you can see, scientists really **do wonder** about the internal structure of quarks.

But there's a problem.



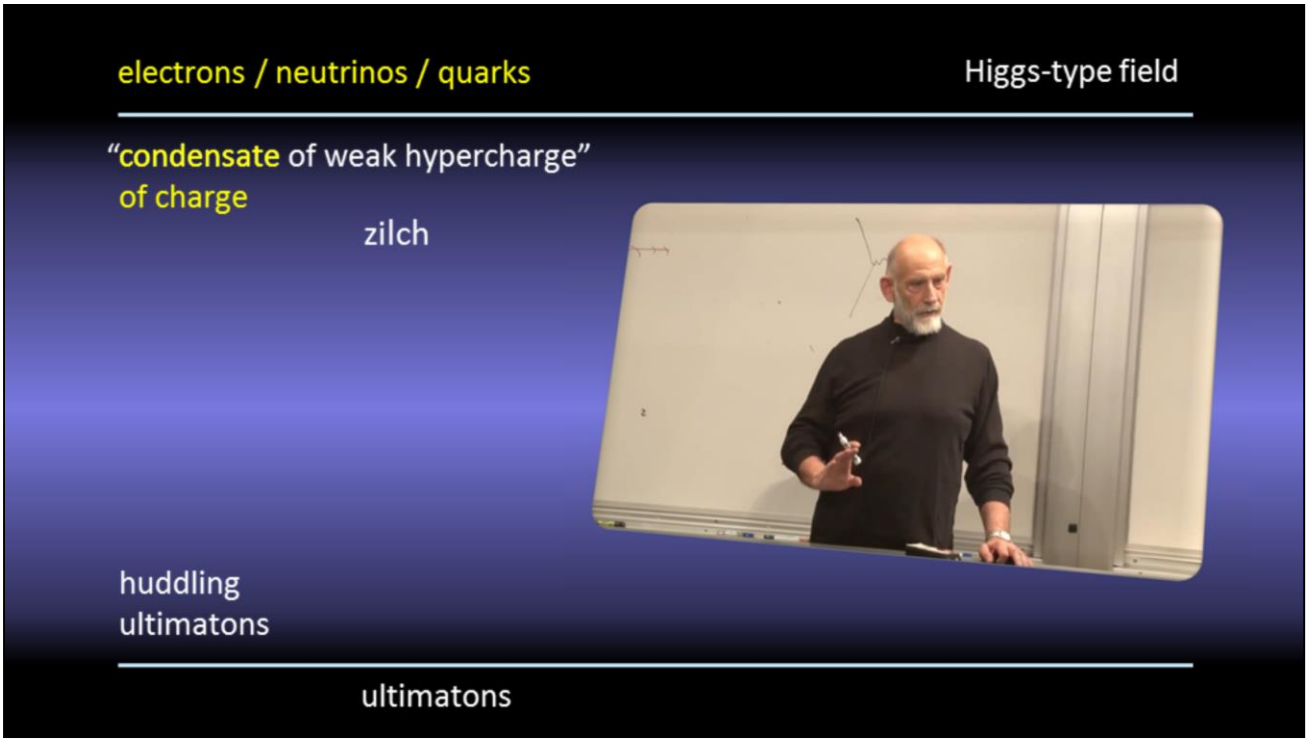
If leptons and quarks are made from smaller parts, then the next **natural** level down is the so-called **Planck scale**, which implies **inaccessible** energies and lengths.

So any such internal "**sub**-structure" would seem to be – forever – beyond human capacity to prove.

But if something is "beyond human capacity to prove", do those [quote] "**limitations of revelation**" (from paper 101) still apply?

* * *

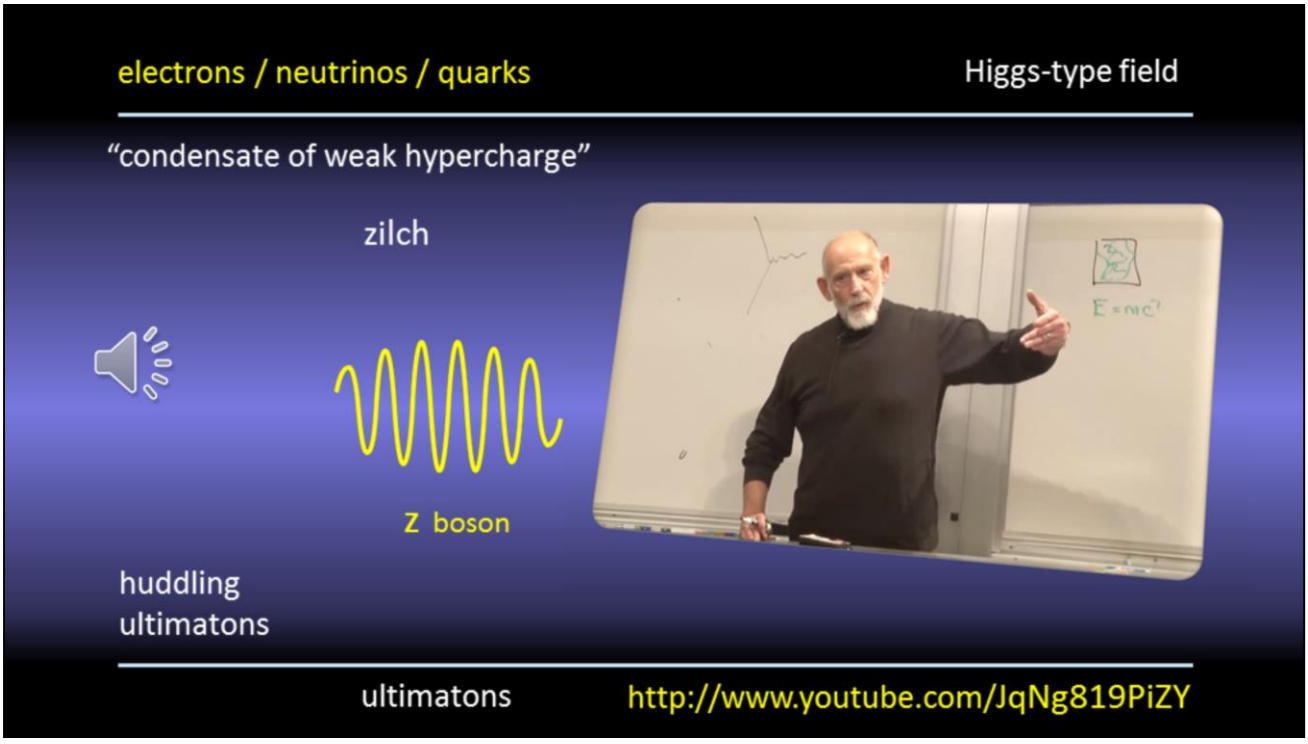
Now, about this "**condensate of charge**"…



This charge is called **weak hypercharge**, and this *condensate* is thought to fill all space. This is the famous "**Higgs-type** field".

Since the 1970's, our standard model (for particle physics) has **assumed** that this kind of condensate exists. In 2012, scientists claimed to have **proven** that it does.

But "**condensate of weak hypercharge**" is a mouthful, so professor Leonard Susskind likes to call this stuff "**zilch**". Zilch. I'll let the professor explain…

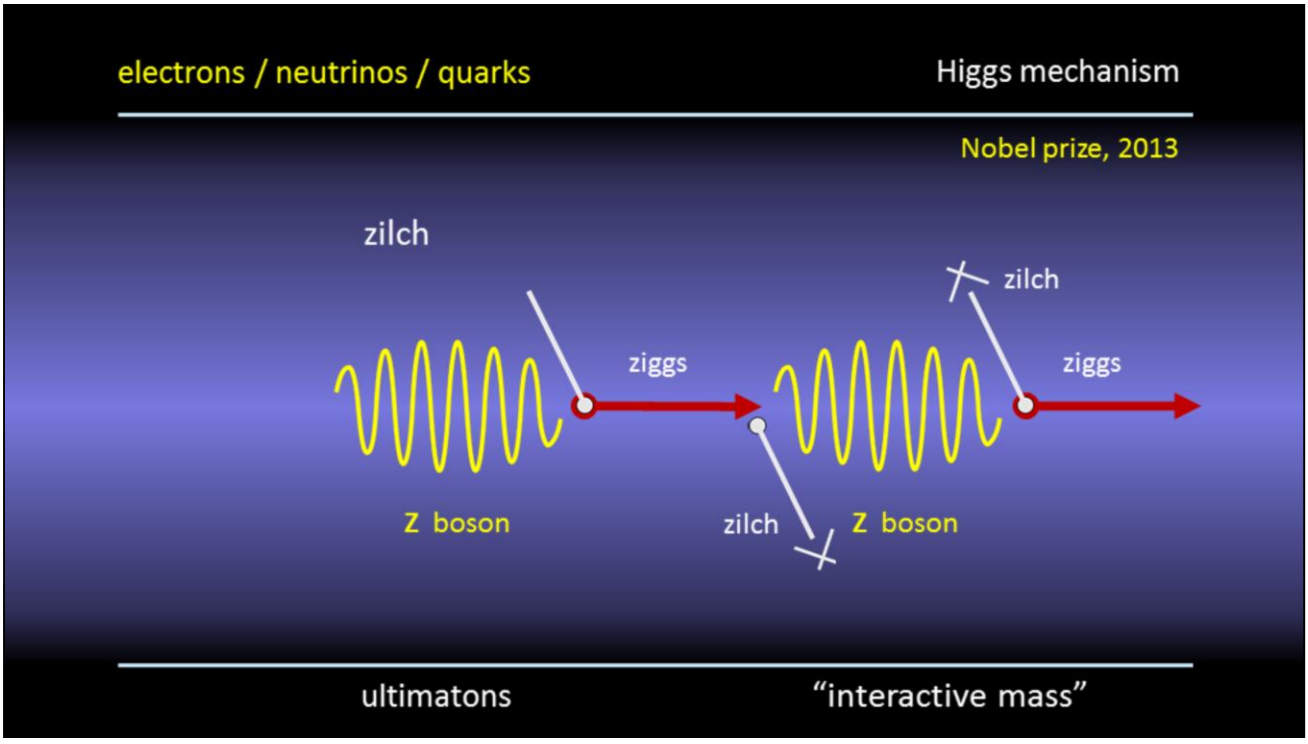


[Movie: Zilch_1.avi] 0:20 seconds

So why does this matter?

Think of a standard model particle, say a **Z-boson** (which the professor goes on to explain (see video : **http://www.youtube.com/JqNg819PiZY**).

It's the **interaction** of this sort of standard model **particle** with standard model **zilch** that's thought to generate an **interactive**, or standard model type of mass.



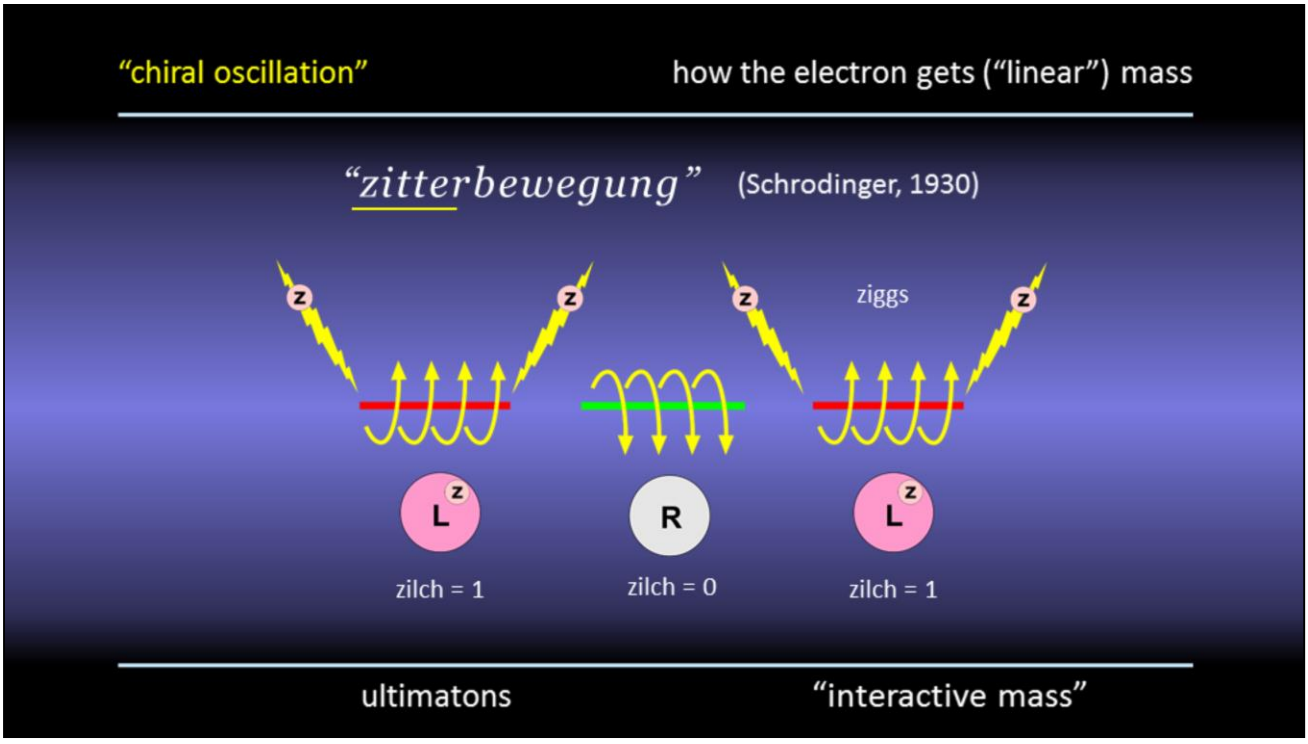
Now by "**interaction**" scientists mean something like this: a Z-boson hooks onto a bit of zilch, then lets it go.

This **is** the Higgs mechanism. This is what got the 2013 Nobel prize for physics: Z-bosons hooking into this condensate of zilch.

We don't have a name for this mixture of **Z-boson + zilch**, but since it's so central to the **Higgs** mechanism, Susskind likes to call this <quantum state> a "**ziggs**".
Yep, a **ziggs**.

But here's the thing: in the standard model, it's this **interaction with zilch**, this flipping between Z-boson and ziggs, that's thought to give this particle its… **interactive** , **inertial** type of mass.

So why is **this** interesting? Well, scientists currently use a similar scheme to give **electrons** this same **interactive** kind of mass.



In the standard model, electrons continually flip between left- and right-hand states,

- in their left-hand state, electrons have zilch, or weak hypercharge.
- in their **right**-hand state, no zilch.

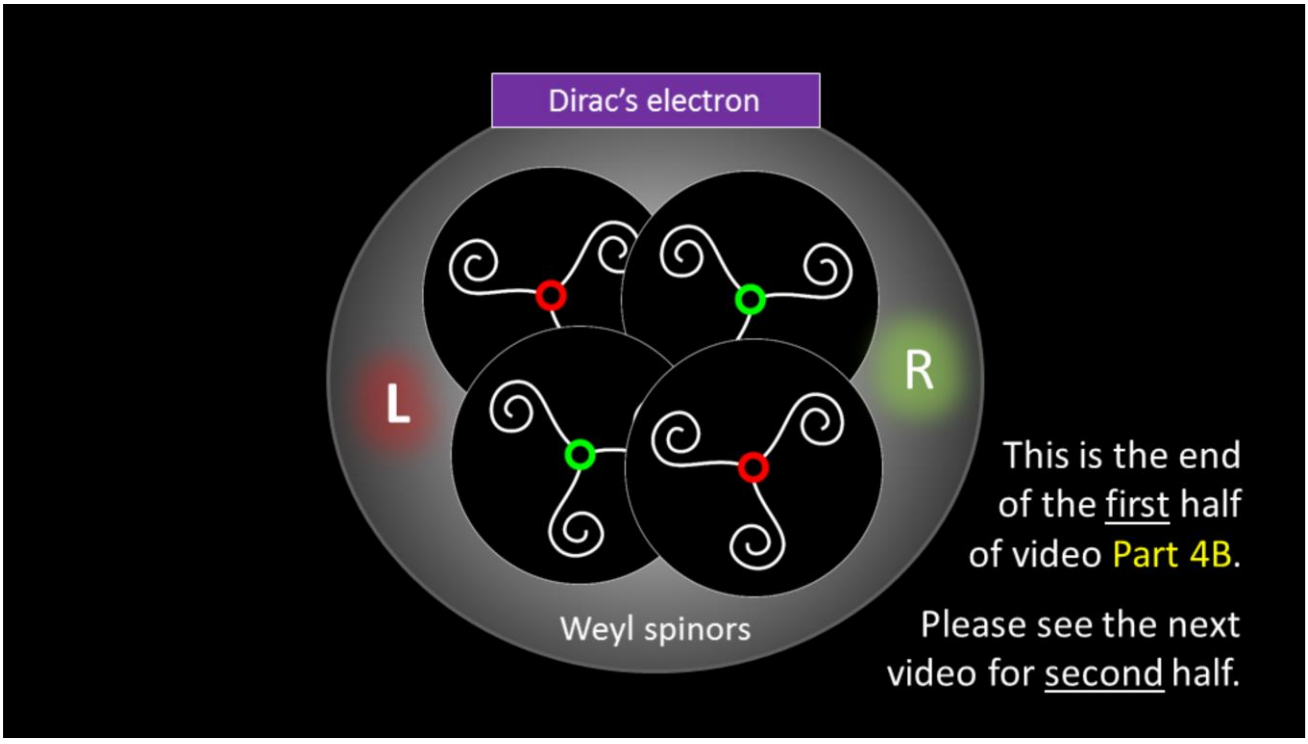
To explain this **difference** between left and right-hand states, this so-called "**broken symmetry**", the standard model requires that electrons continually absorb and then emit some… **quantum of zilch**.

Mathematically, they absorb and emit a "ziggs". It's this **ziggs** that carries the **zilch**.

And it's the **rate** at which electrons absorb and emit this zilch – the **rate** at which they **interact** and flip between left- and right-hand states – that **defines** their interactive (or Higgs-type) mass.

In 1930 – Schrodinger gave this "flipping", this… *trembling oscillation*, a name: (let's call it " **zitter**… " for short!)

But here's where it gets weird. Mathematically, for this left-right flipping to work, the electron… needs a few moving parts.



In the standard model, the so-called **Dirac electron** is actually a tangle of more primitive things: two *pairs* of virtual **Weyl spinors**.

Dirac used these… entangled **spinors** to help **define** those left and right hand states; mathematically, it's these… "internal parts" that interact with **zilch**.

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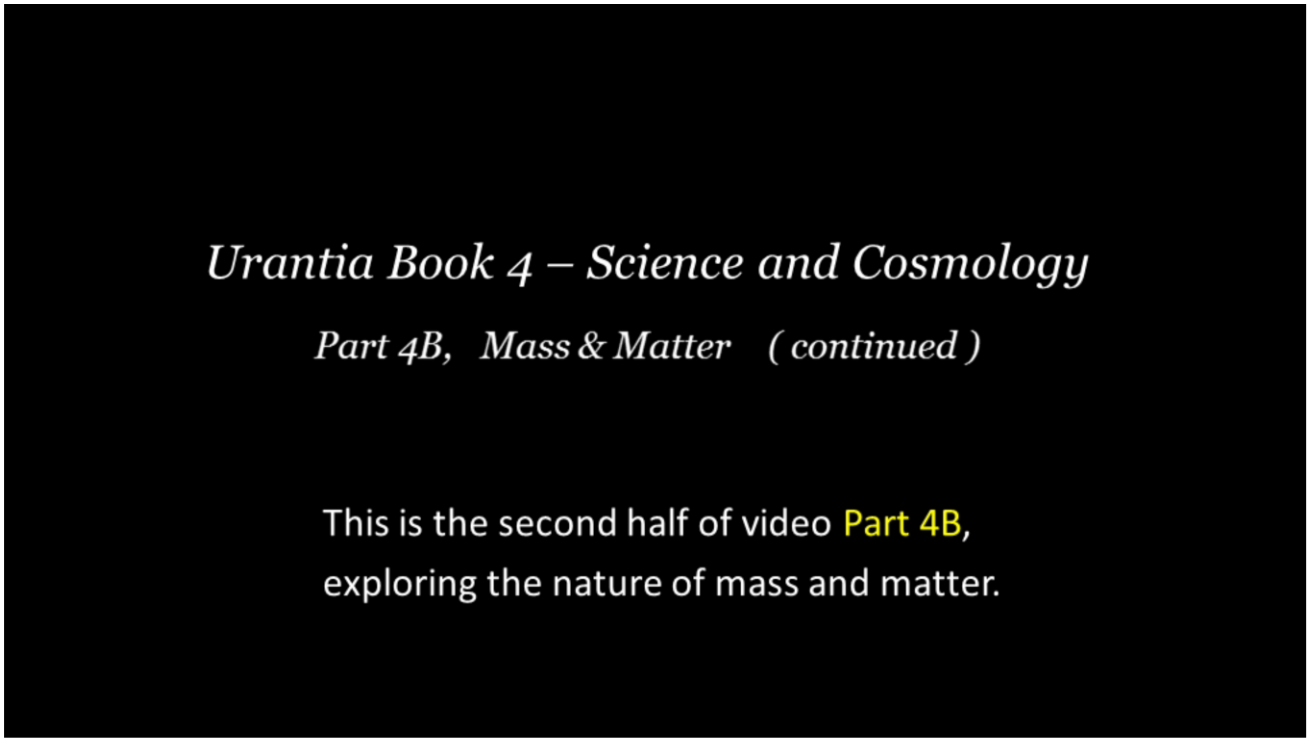

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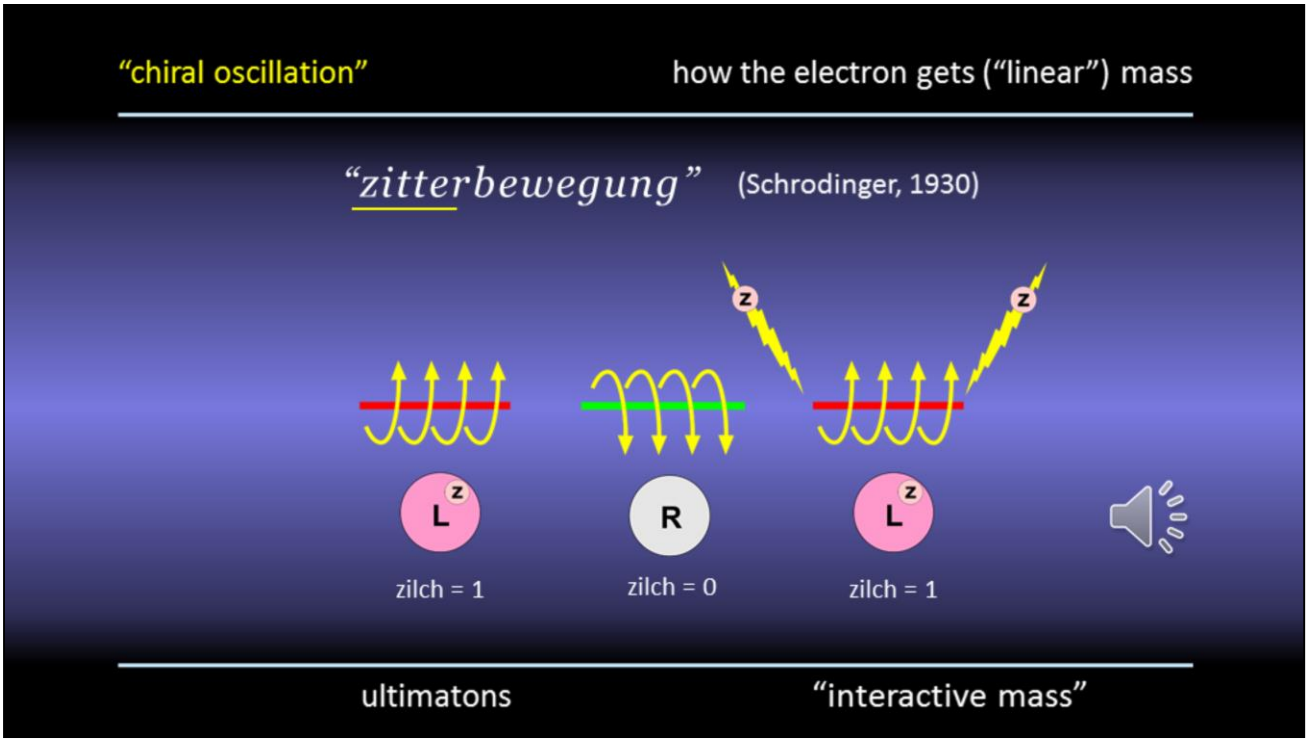
The second half of Part 4B, exploring
the nature of mass and matter.



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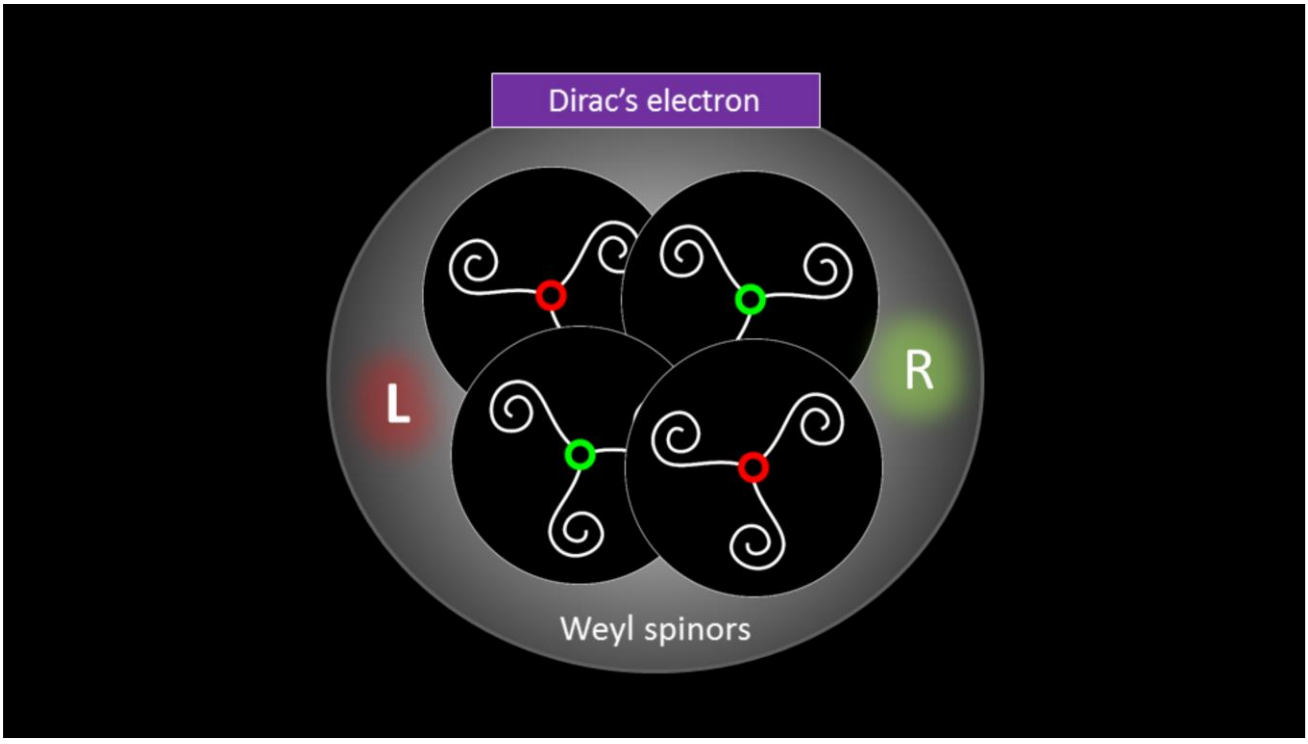

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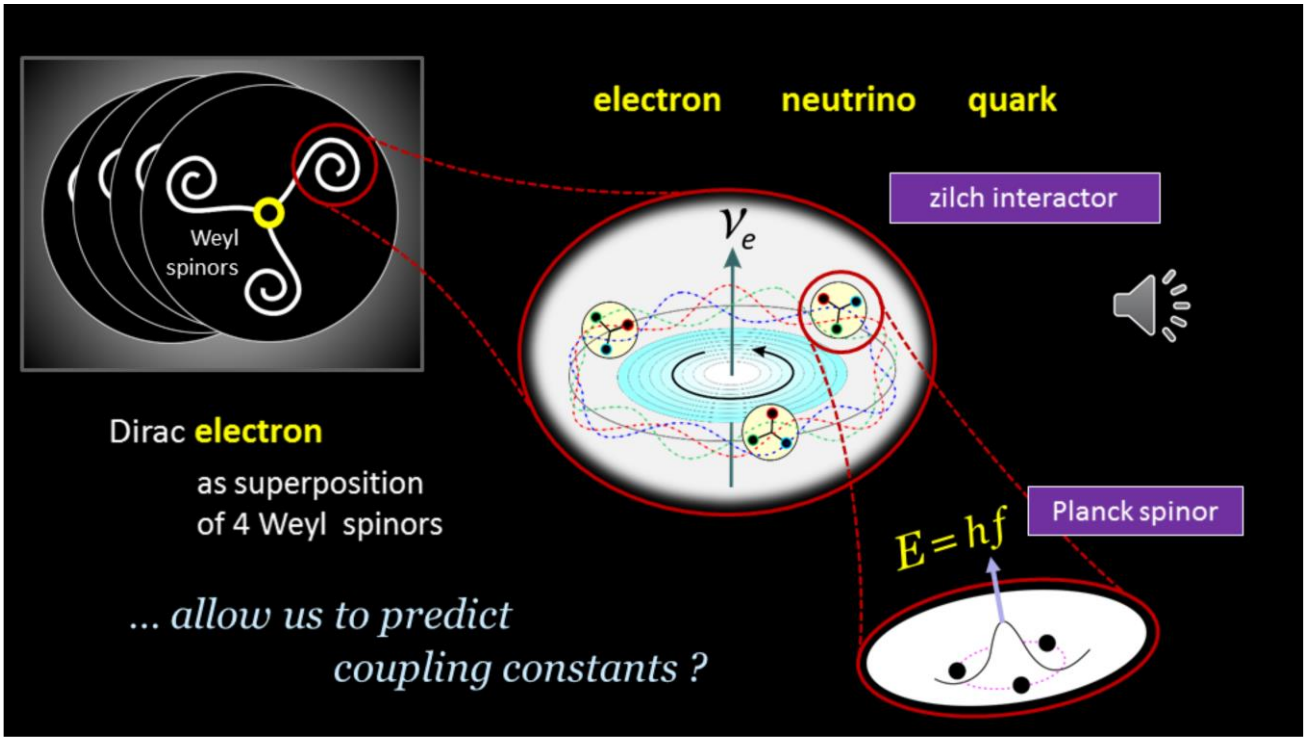


In a Urantia Book scheme, we'd still **build up** the electron from these…
virtual spinning parts,

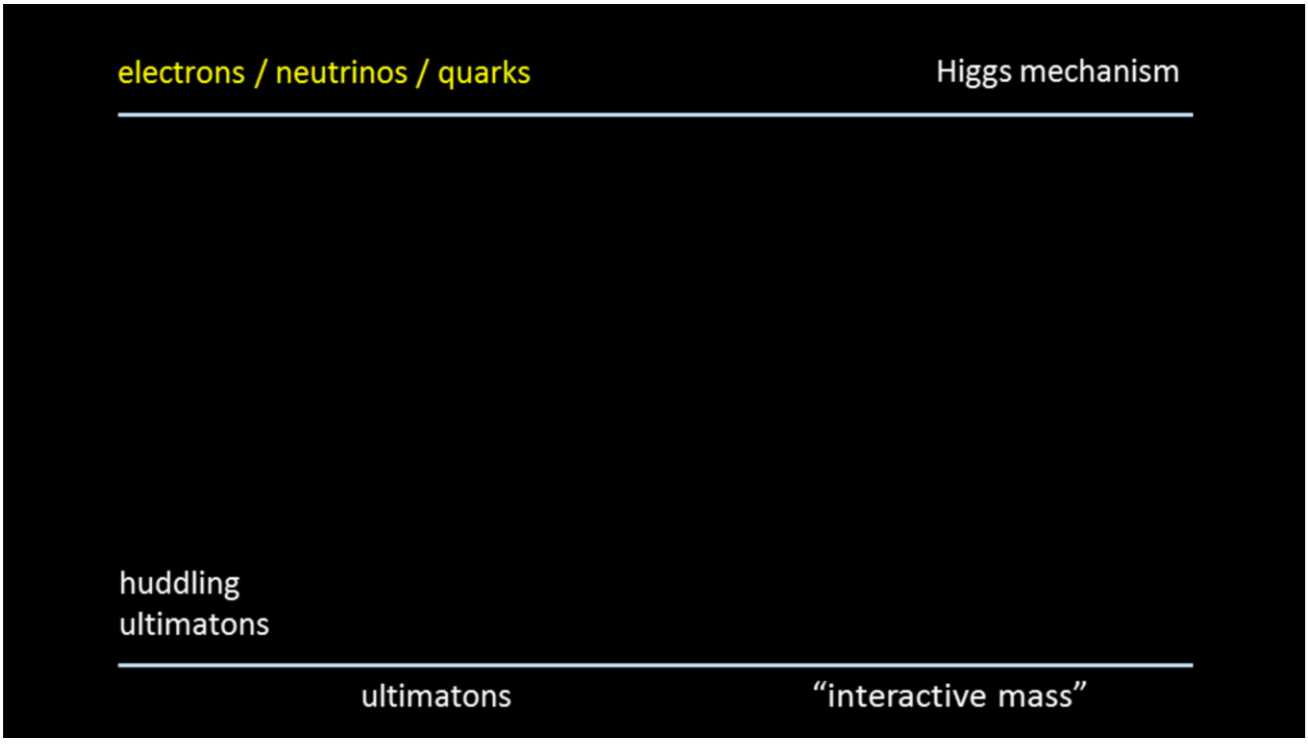
but we'd build these spinors from **smaller** parts;
parts **designed** and **tuned**… *to interact with zilch*.

And we'd 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 you might expect, accounting for all these *internal , spinning* parts might even allow us to **predict** – to *predict* – the so-called coupling constants of all standard model particles…

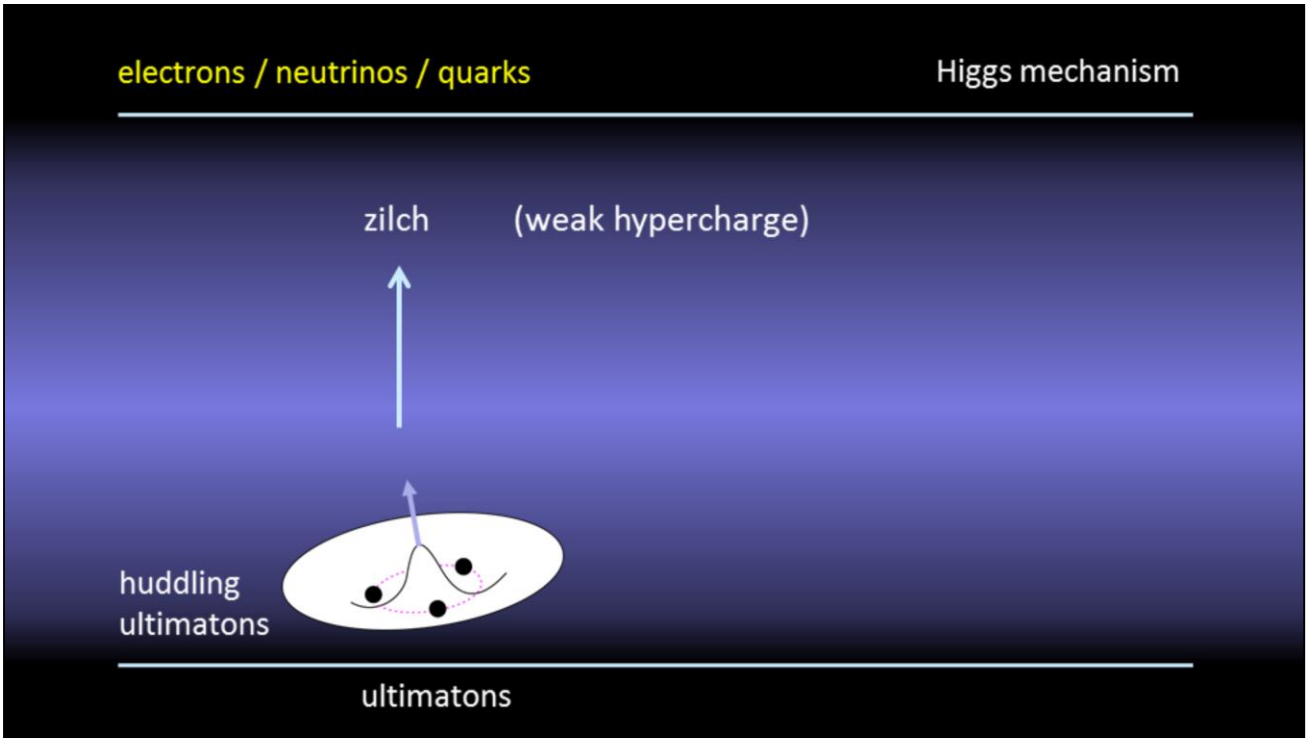
which is something that **all** physicists are **very** keen to do.



So how do we connect all this with real particles that collide?

[**Movie: electrons_collide.avi**]

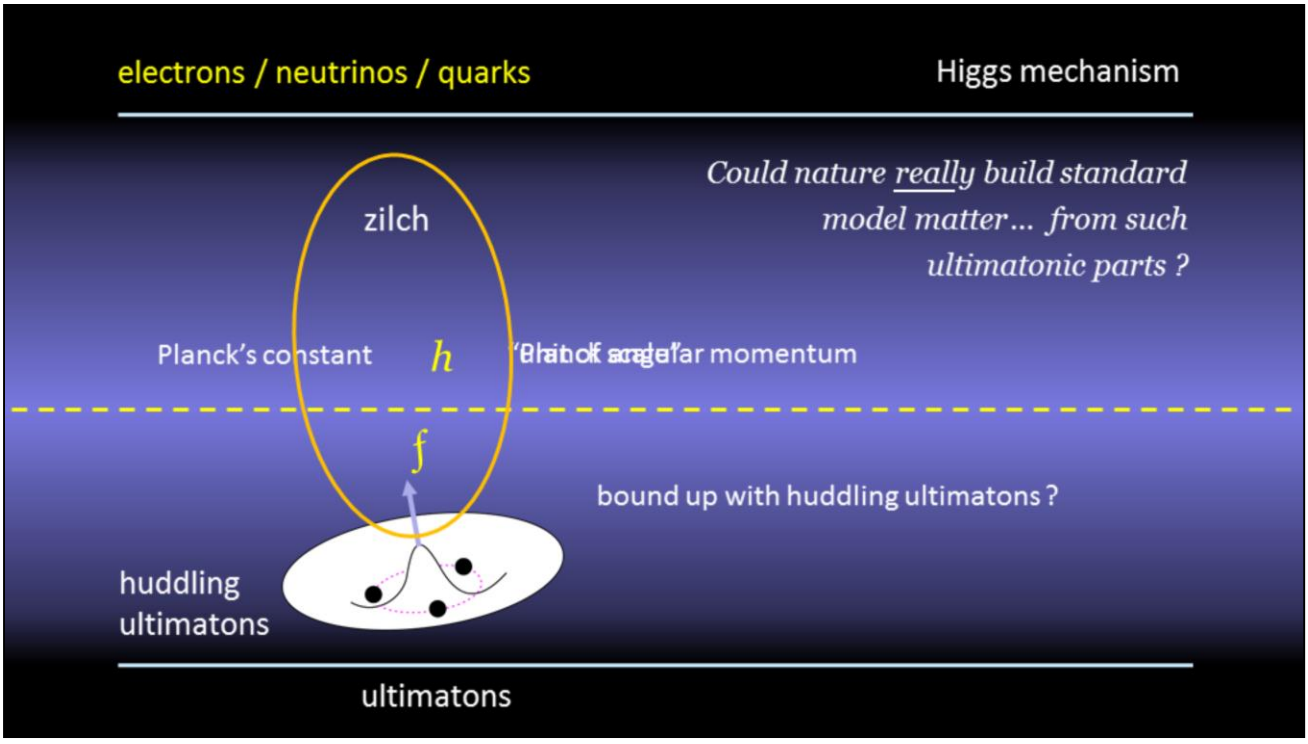
Remember, to make contact with the standard model, …



… all we need is for [**this**] huddle of ultimatons…

to interact with [**this**] condensate of weak hypercharge.

For argument's sake, let's say these primitive ultimatonic structures



… exist at – or even **define** – the so-called **Planck scale**. Then notice what we have: something that's "Planck-sized", and quantized, and spinning.

Which makes you wonder: is **this** where Planck's constant comes from?

In the standard model we use Planck's constant to **define** the unit of **angular momentum**, one of those parameters we have to put in by hand.

But in this **ultimatonic** scheme, Planck's constant becomes simply a *measure* of how this primitive spinor spins.

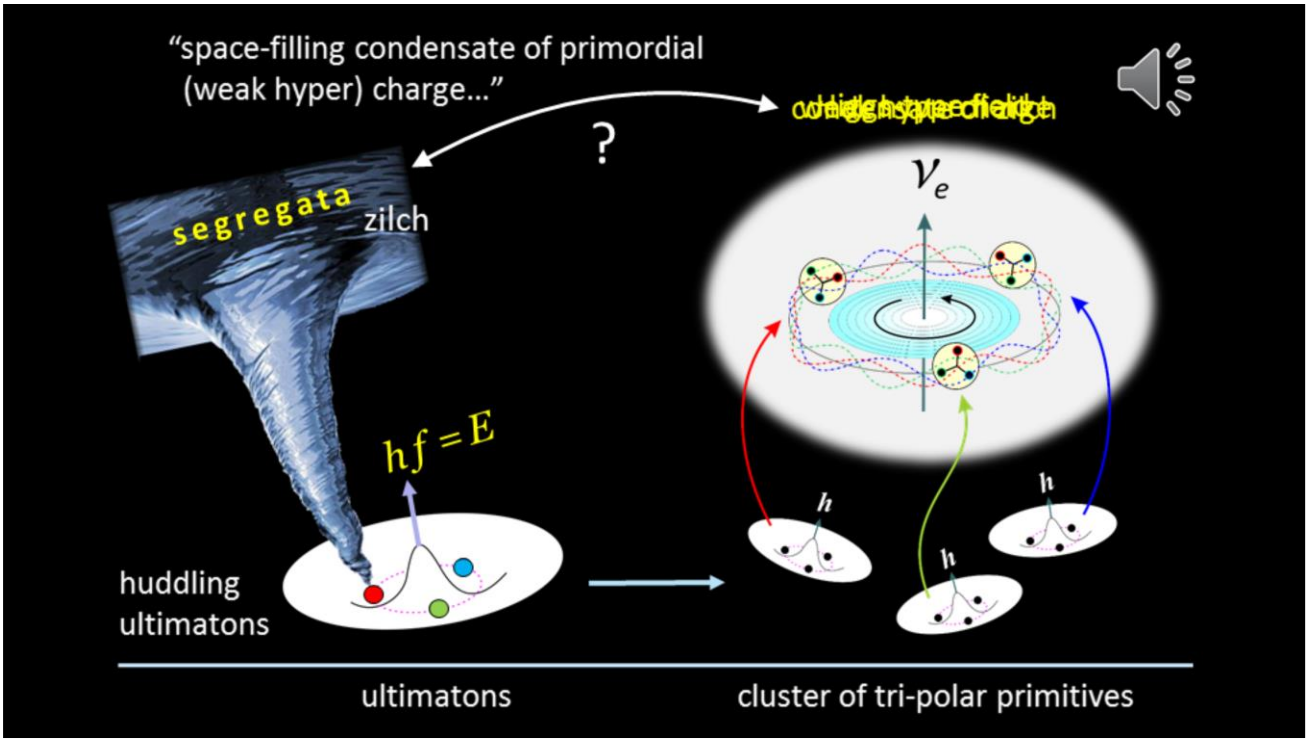
So here we are, at that *extraordinary* place,

- where spin gets tangled up with charge, [8]
- where revelation may be making contact with standard model physics.

* * *

But the question is: could nature **really** build standard model matter from such ultimatonic parts?

Let's see how this might work.



Imagine this basic, spinning block to be some **photon-like** thing,
and then imagine a simple cluster of such blocks.

Neutrinos are thought to be something like this – a mixture of three primitive spinning things. And what are neutrinos famous for? Interacting with **zilch** !

In fact zilch – weak hypercharge – is the only thing a neutrino can feel. So picture this as some handed, "**chiral**" structure in that condensate of zilch. What we have here is a standard model **particle**, interacting with standard model **zilch**… but built from very **non-standard** parts.

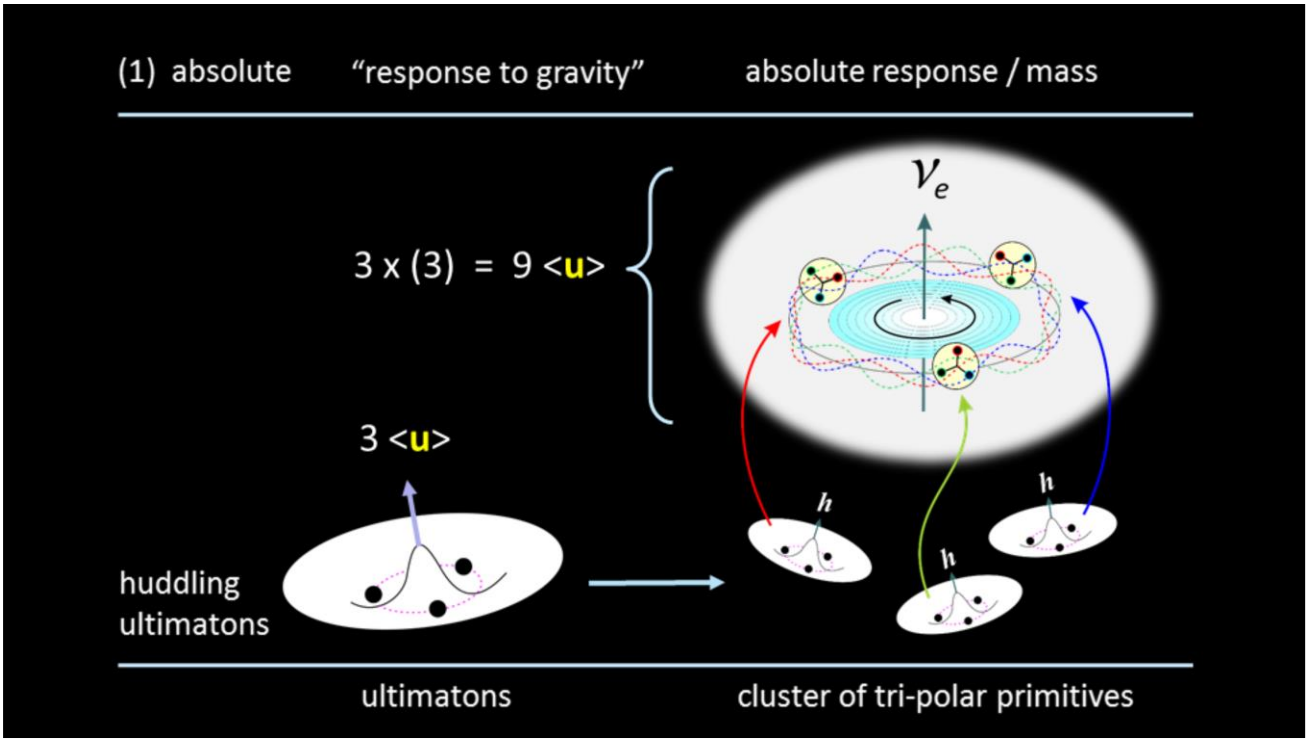
But there's more. As we know, this Higgs-type field is thought of as a

- "*space-filling condensate of primordial charge* ". Which sounds a lot like
- "*space-filling condensate of primordial charge* ", in other words, **segregata** ,

the very stuff from which these primitive particles are made.

So here's that question again: could a region **dense with segregata** behave **locally** like the sort of "Higgs-type field" our standard model needs?

At this point, let's recall **why** a Higgs-type field was invented:



… to give a quantum property called **mass** to standard model particles.

Does the Urantia Book say anything about how particles get mass?

Yes it **does**. In fact, if we think of **mass** as "**response to gravity**", then these papers describe two **very different types of mass** a particle can have:

The first is an intrinsic property of ultimatons, their so-called "absolute response" to the source and center of gravity.

The second is described as "**an interactive phenomenon**" (12:3.8).

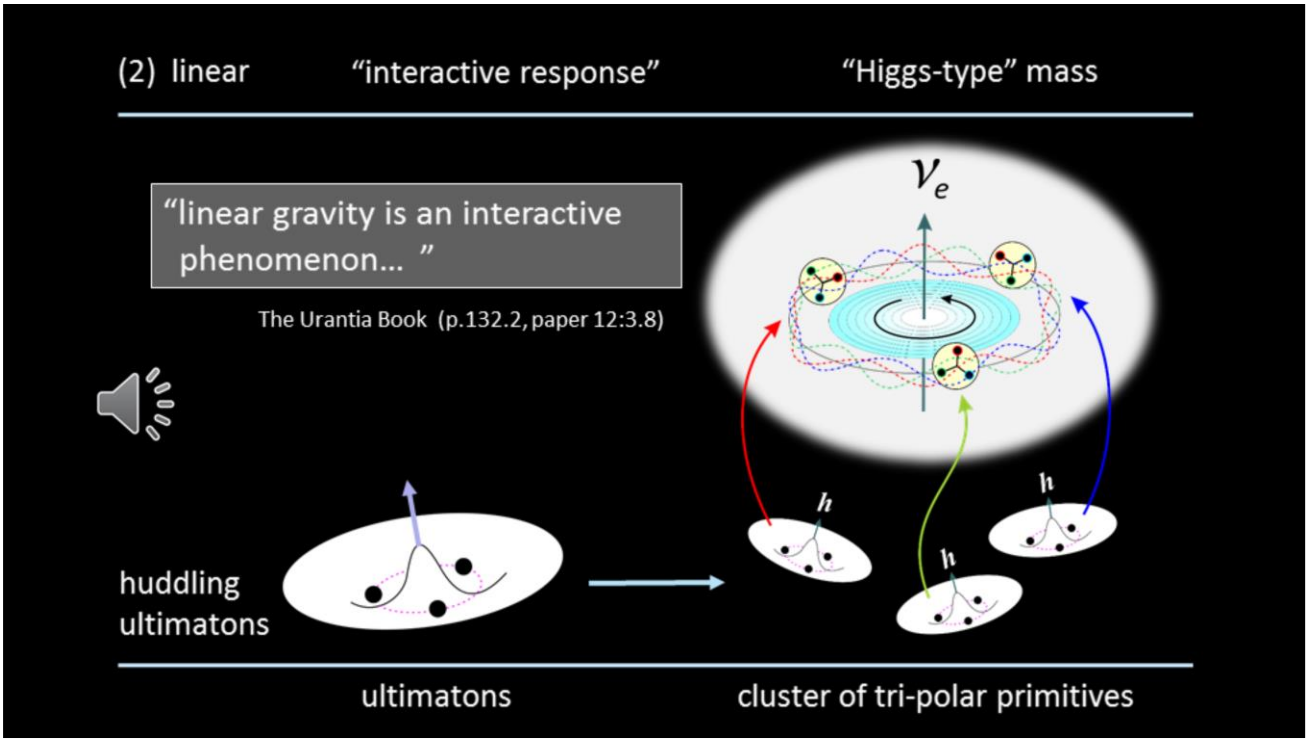
So for example, if our building block has 3 ultimatons, and we build a **tiny structure** from three such blocks, then we have 3 x (3), or **9** ultimatons,

9 units of **absolute**, ultimatonic, **gravitational response**.

9 units of **absolute**, ultimatonic **mass**.

But in the standard model, this tiny structure – with its **9 units** of intrinsic, **absolute** mass – will be… **interacting with zilch**.

It's this **interaction** that induces a second type of mass, a second type of "gravity and response" which the Urantia Book…



… calls "**linear**". (132.2, 12:3.8)

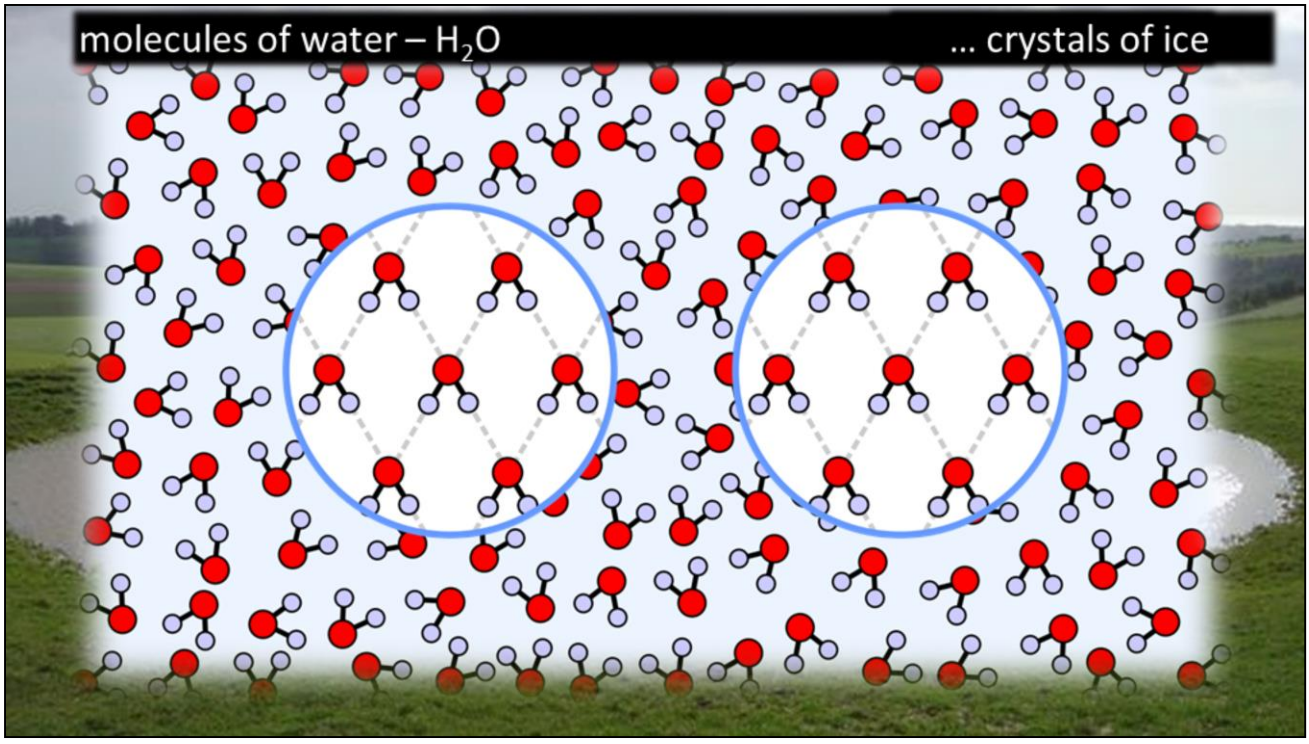
From paper 12 section 3: [quote]

"linear gravity is an interactive phenomenon..."

It's precisely this second type of mass, this linear or **interactive** response, that the **Higgs mechanism** was invented to explain.

To help get a feel for this **distinction**, between two very different types of mass, …

From paper 12:3.8 "; linear gravity is an interactive phenomenon which can be computed only by knowing the actual Paradise gravity." (12:3.8)



… think of a small pond of water. The water in this pond will have a certain, well-defined total gravitational mass. Where does this **mass** come from?

It's just the total sum of the mass of each molecule.

Here we see these molecules (H_2O) in their random fluid state.

Now imagine a few of these molecules, as their temperature drops, *arranging* themselves... as **crystals of ice**.

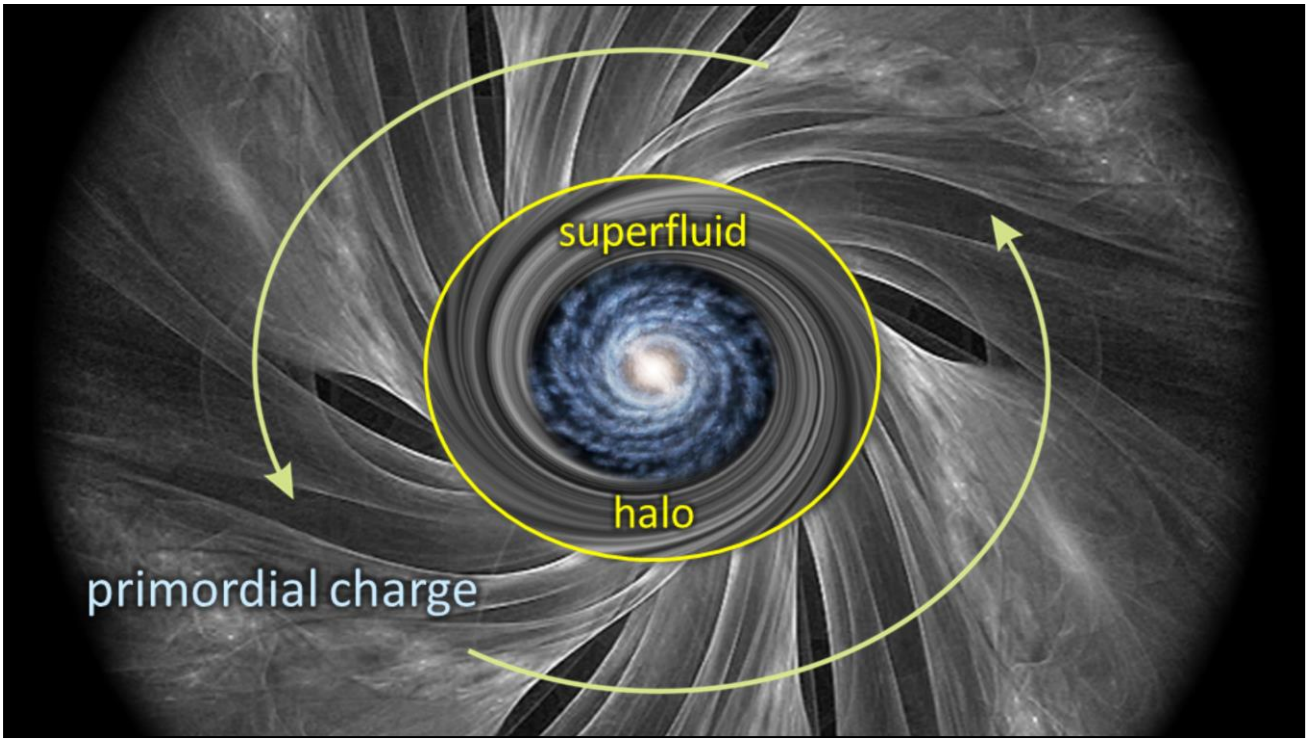
Notice, the **gravitational mass** of the water in the pond hasn't changed; we still have exactly the same number of molecules of H_2O.

But now we have these… **crystals of ice**, with certain properties,

properties that make them **different** … from the water in which they float.

The Urantia book scheme for **mass** is just like this.

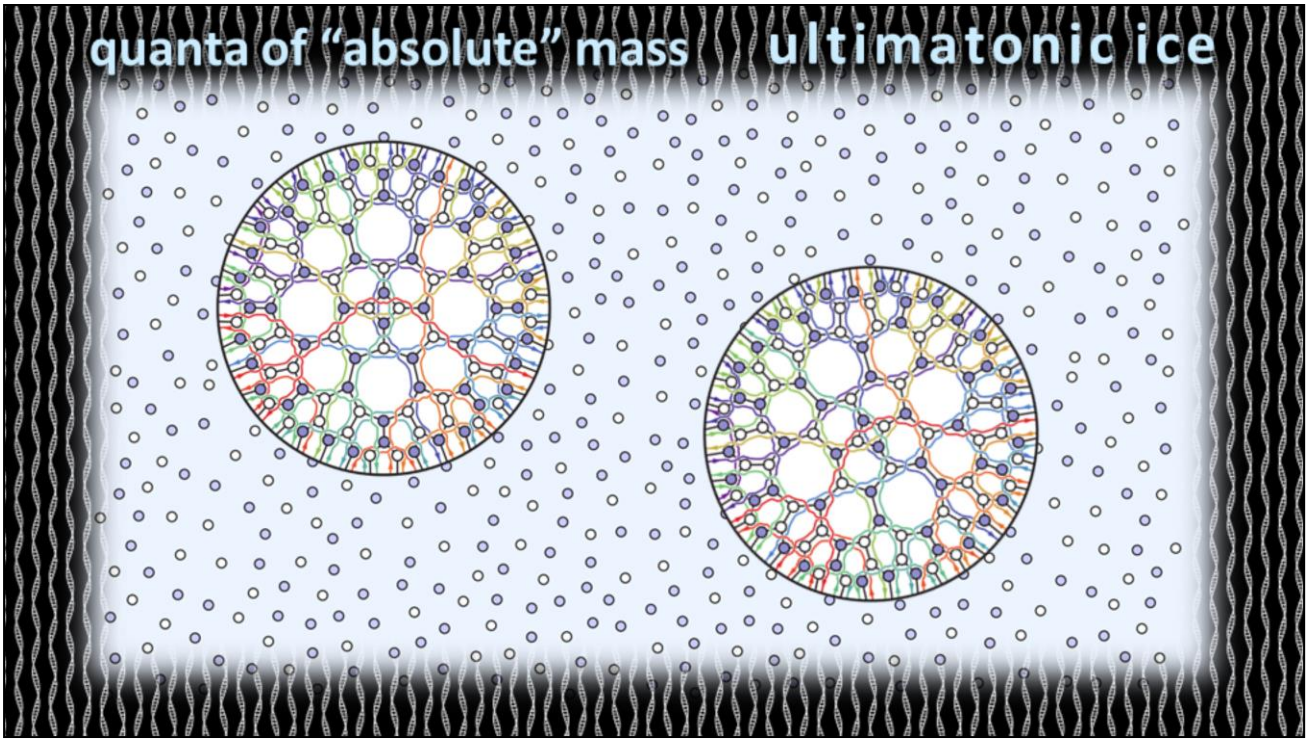
Imagine a much bigger pond, ...



… a superfluid **galactic** halo… of *invisible* **ultimatons** ,

swirling in that condensate of charge.

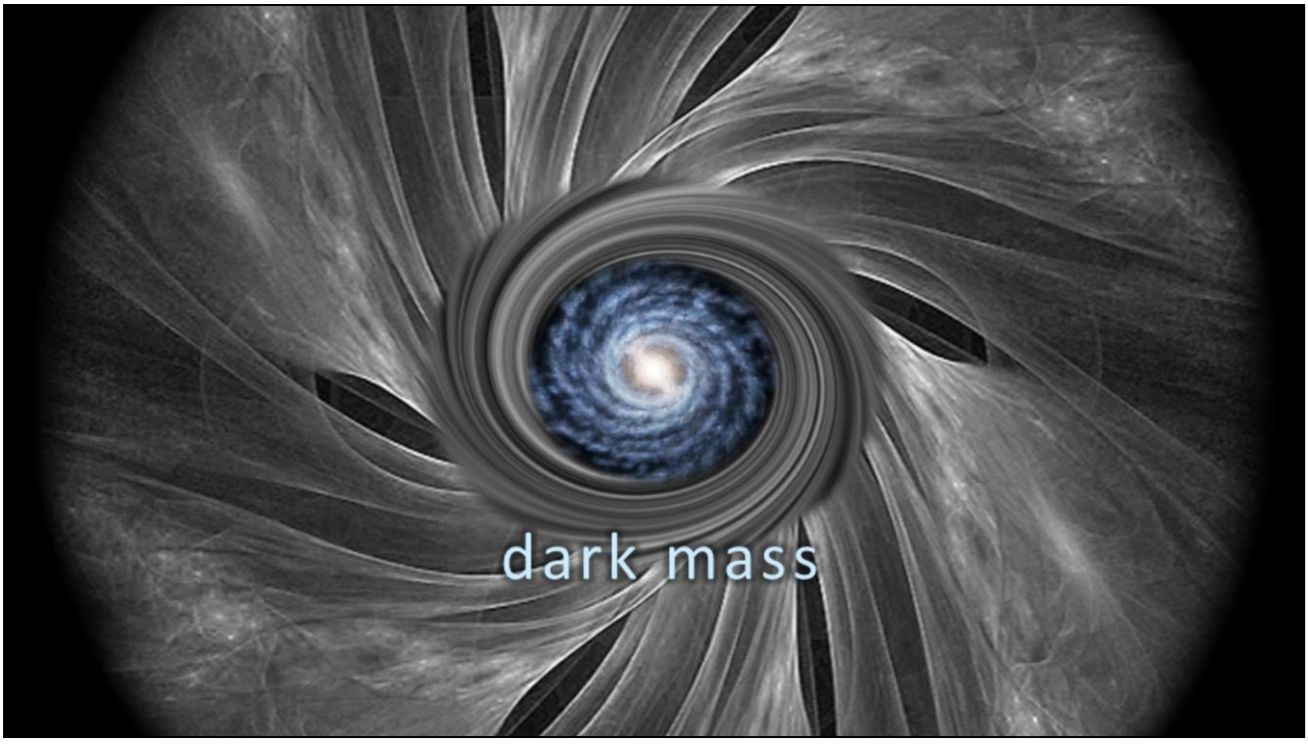
Such a pond will have a well-defined total of **absolute** , ultimatonic mass – simply…



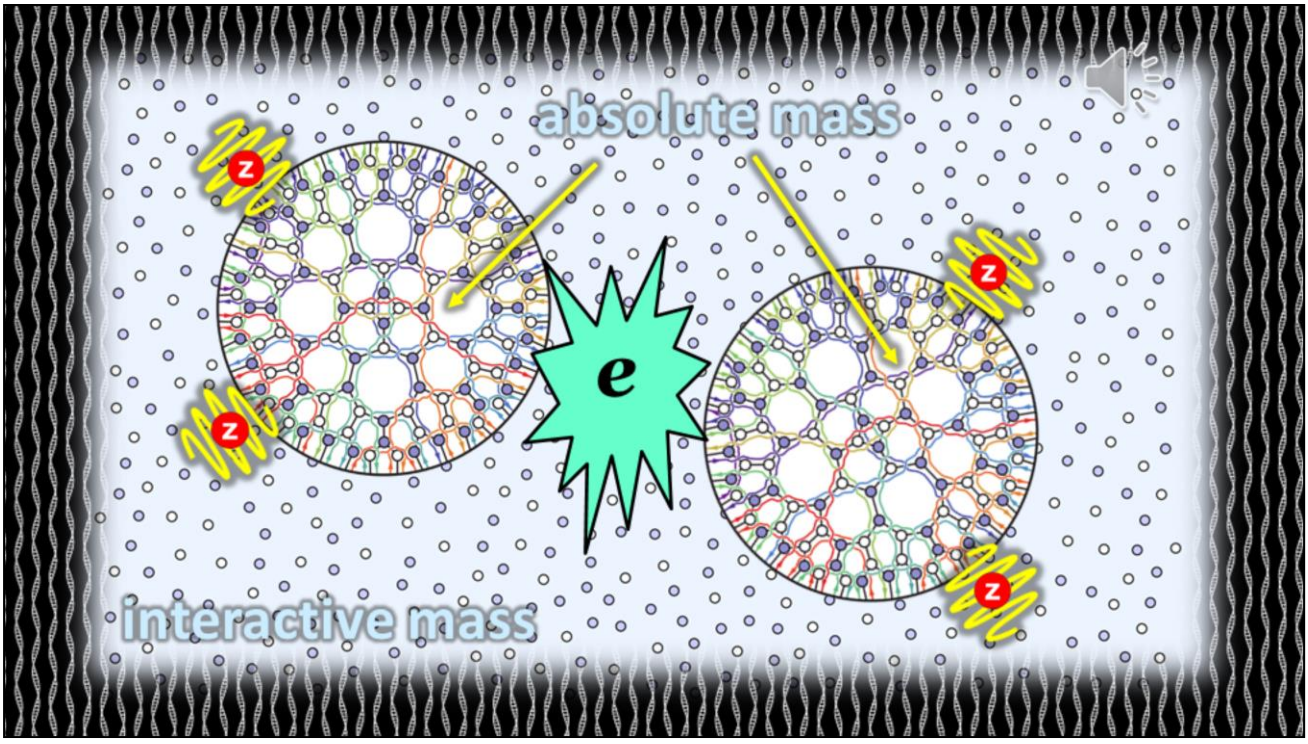
... the **sum** of each ultimaton's tiny **bit** of this *absolute* kind of mass.

Now once again, imagine a few of these ultimatons, as their temperature drops, arranging themselves… as crystals of ice. But this time… **ultimatonic ice** .

Once again, this **internal** arrangement hasn't changed the **number** of ultimatons,



… so the **absolute** gravitational response (or **dark mass**) of this *invisible* galactic halo hasn't changed.



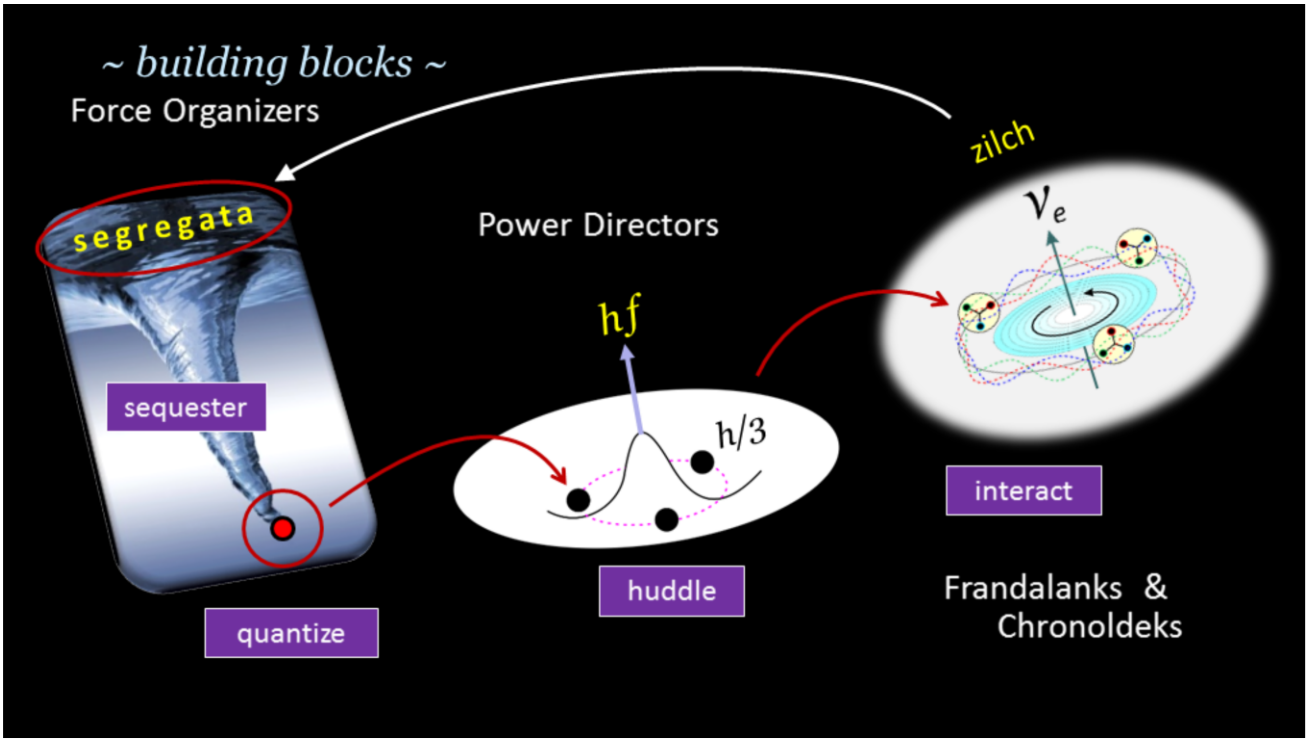
But these **crystals of ultimatons** come with – or rather **generate** – two interesting properties: (1) electric charge, and (2) **interaction** with weak **hypercharge**, that Higgs-type field in which they float.

And so these "**electronic crystals**" (in fact **all** leptons and quarks) end up with their tiny allocation of two *very different* types of mass:

(1) an "absolute mass" – from the number of their internal ultimatons, and

(2) an "interactive mass" – from their interaction with "primordial zilch".

This distinction – between two *very different types of mass* – has surprising implications for **black holes**, and for **galaxies**, as we'll see in the next two sections.



So here's (what seems to be) the Urantia Book story so far:

From transcendental **Force Organizers** to finite **Power Directors**, all the way down to **Frandalanks** and **Chronoldeks** embedded in space and time,

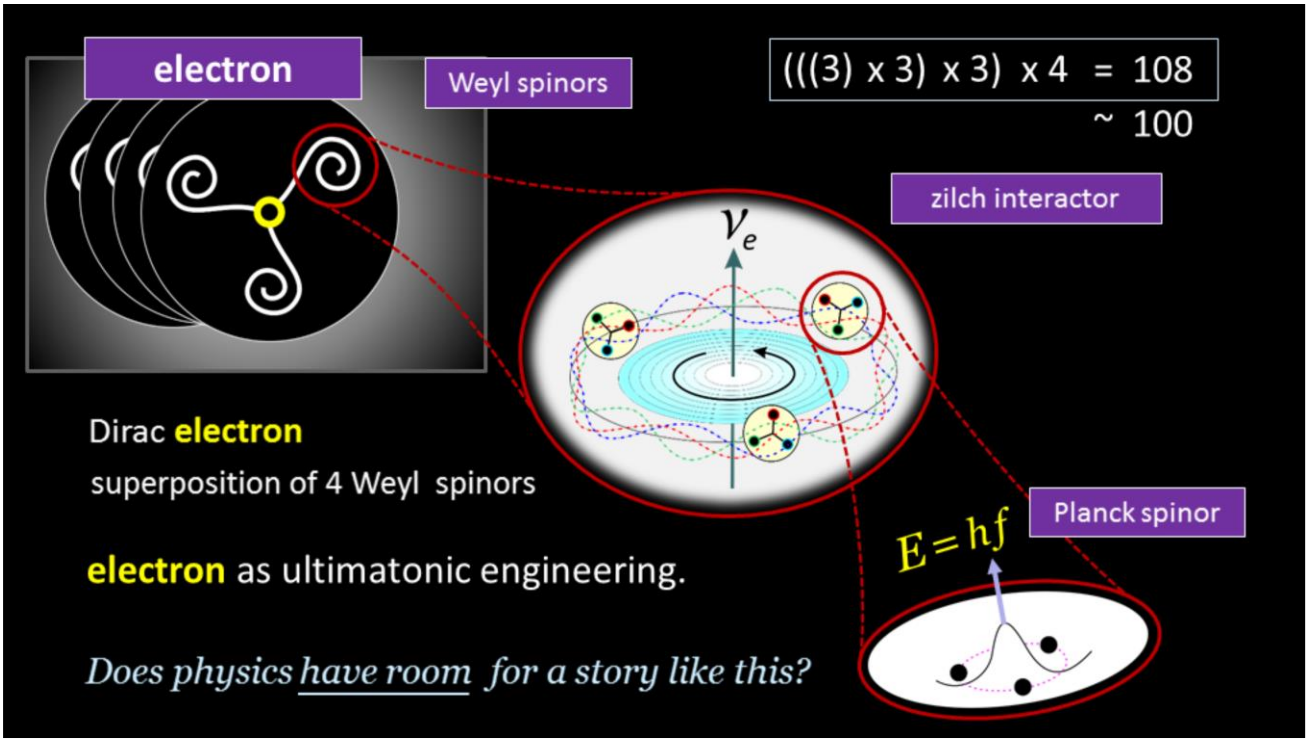
a condensate of space potency is sequestered… and quantized… and made to huddle. And then to interact with… **that same condensate** from which it came.

The point is – if we're going to build standard model matter from ultimatons, we're going to need *building blocks* something like this.

* * *

Ok, so we have hypothetical building blocks. What about that electron?

Paper 42 says electrons are built from **100** ultimatons. How might this work?



Well, with our "**Dirac electron**" as a tangle of **Weyl spinors**;

and with these Weyl spinors built up from interactive, neutrino-like parts;

and with these interactive parts built up from Planck-scale things (our huddling ultimatons), let's do the math:

(((3) x 3) x 3) x 4 … that's **108**.

108 tiny units of absolute gravitational response.

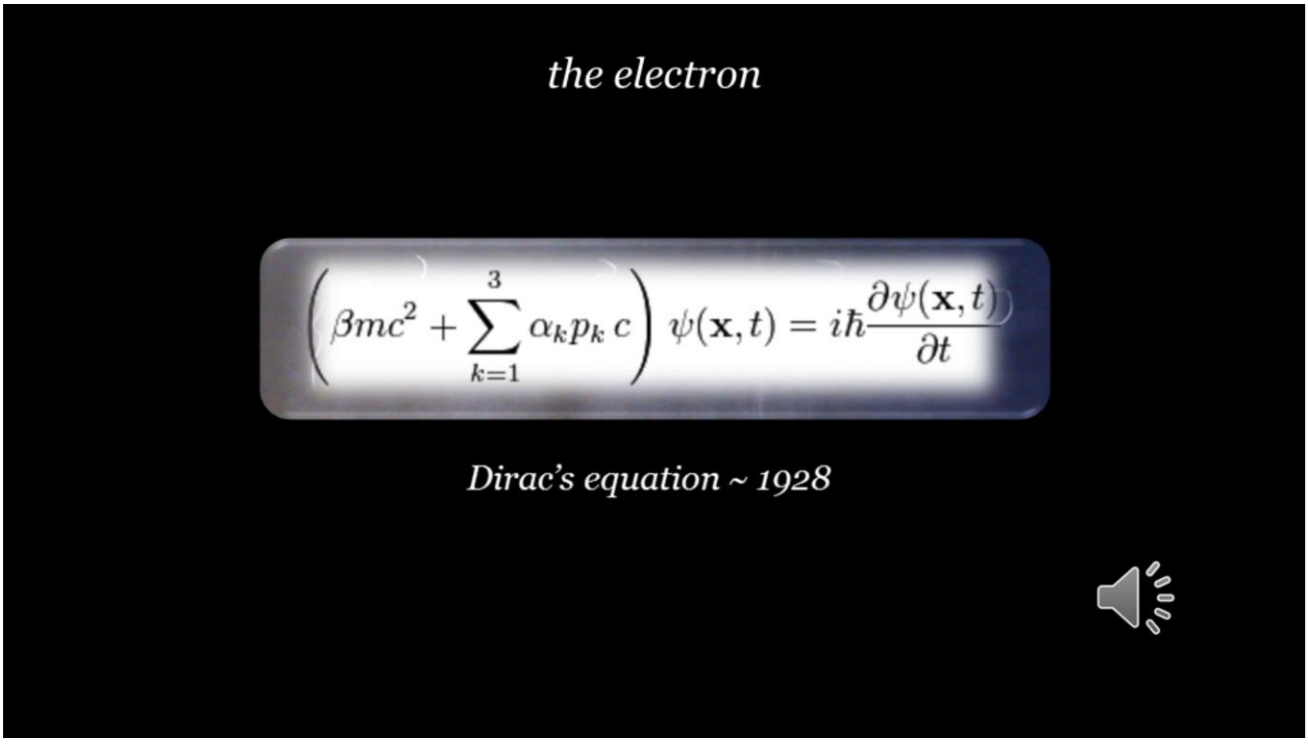
Now, if we allow a few of these clusters to share dipoles and tripoles, like atoms in a molecule share electrons, then we can round this down to an even 100.

And there we have it, the electron as **ultimatonic engineering**.

Of course the issue here is that such **ultimatonic engineering** implies design.

Which may be something that physics is not yet ready to explore.

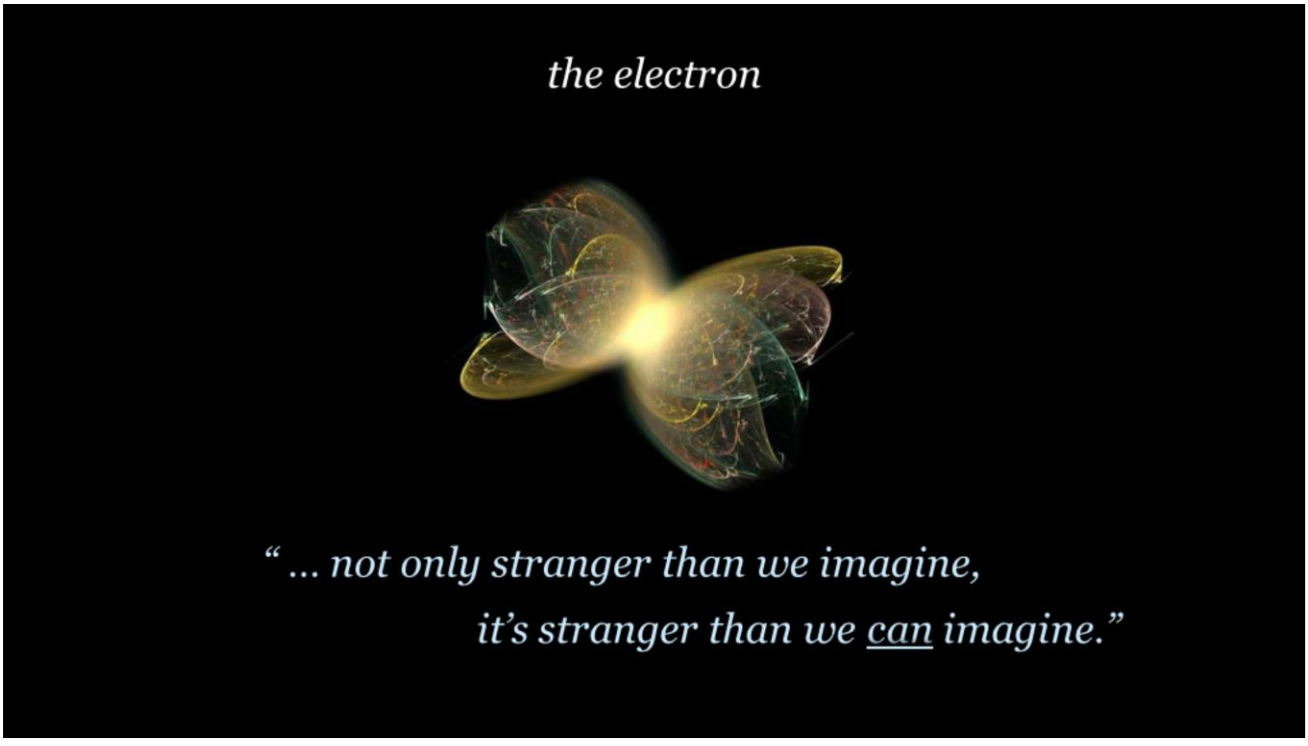
Nevertheless, does physics *have room* for a story like this?



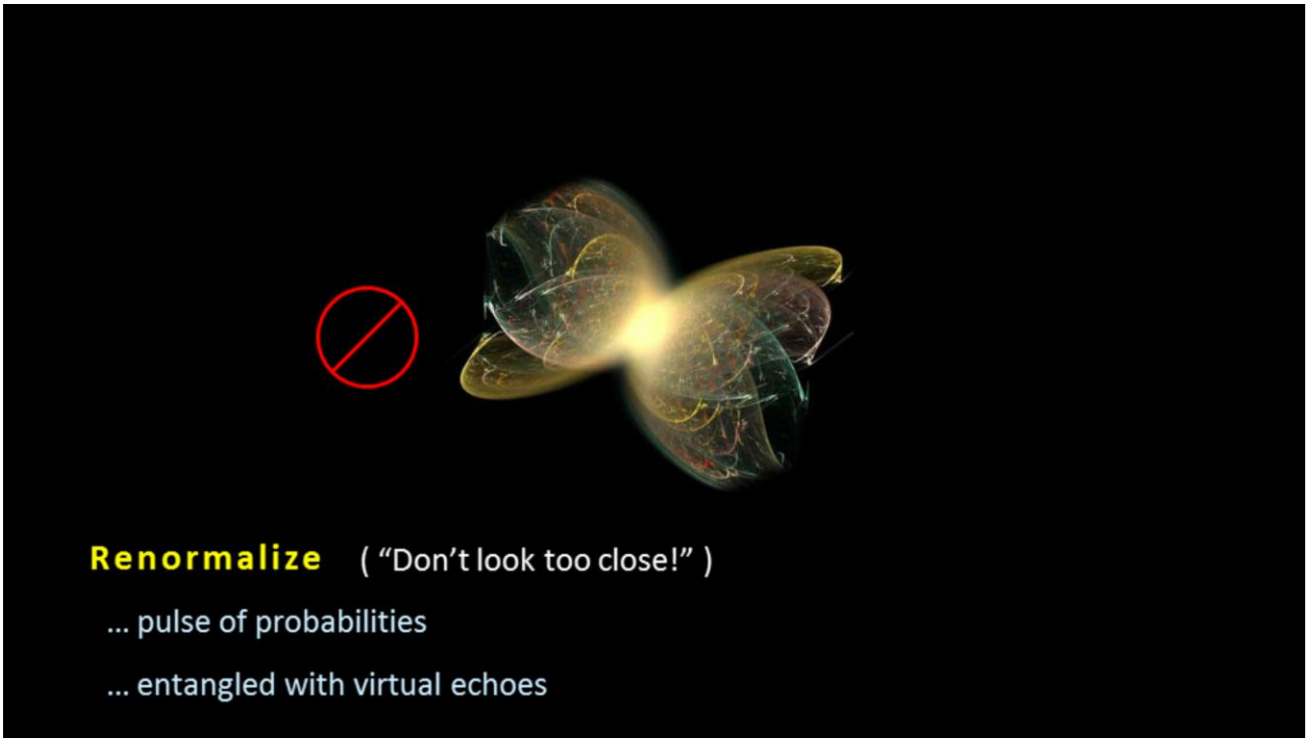
Think about Dirac's famous (1928) equation for the electron, which we still use today.

This equation tells us nothing about what the electron actually **is** ;

it simply helps us to predict (**with extraordinary precision**) certain values that we can expect to measure.



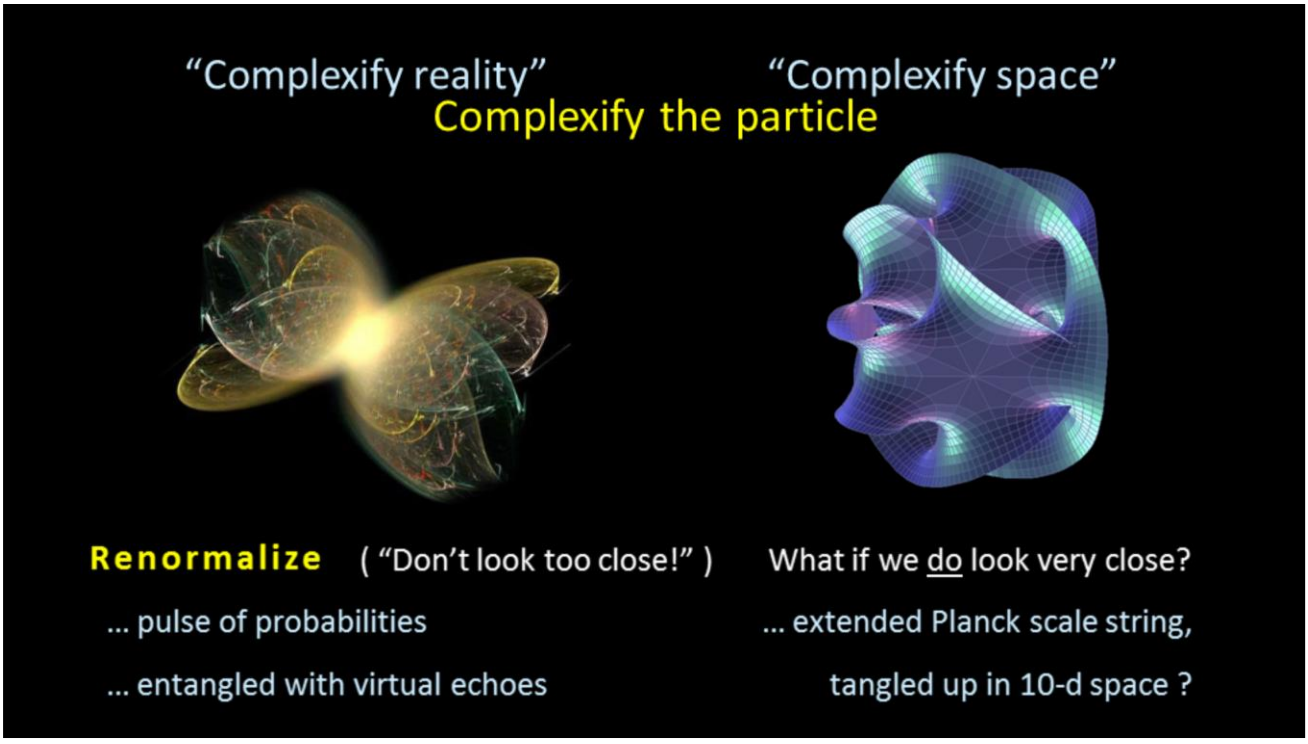
Which leaves plenty of scope for speculation…



The current **standard** view sees the electron as a so-called “**point of charge**”.

But this standard view comes with a rule: **renormalize** (or, don’t look too close!)

In this scheme, **reality itself gets slippery**. The electron becomes a pulse of probabilities, somehow entangled with virtual echoes of itself… (!)

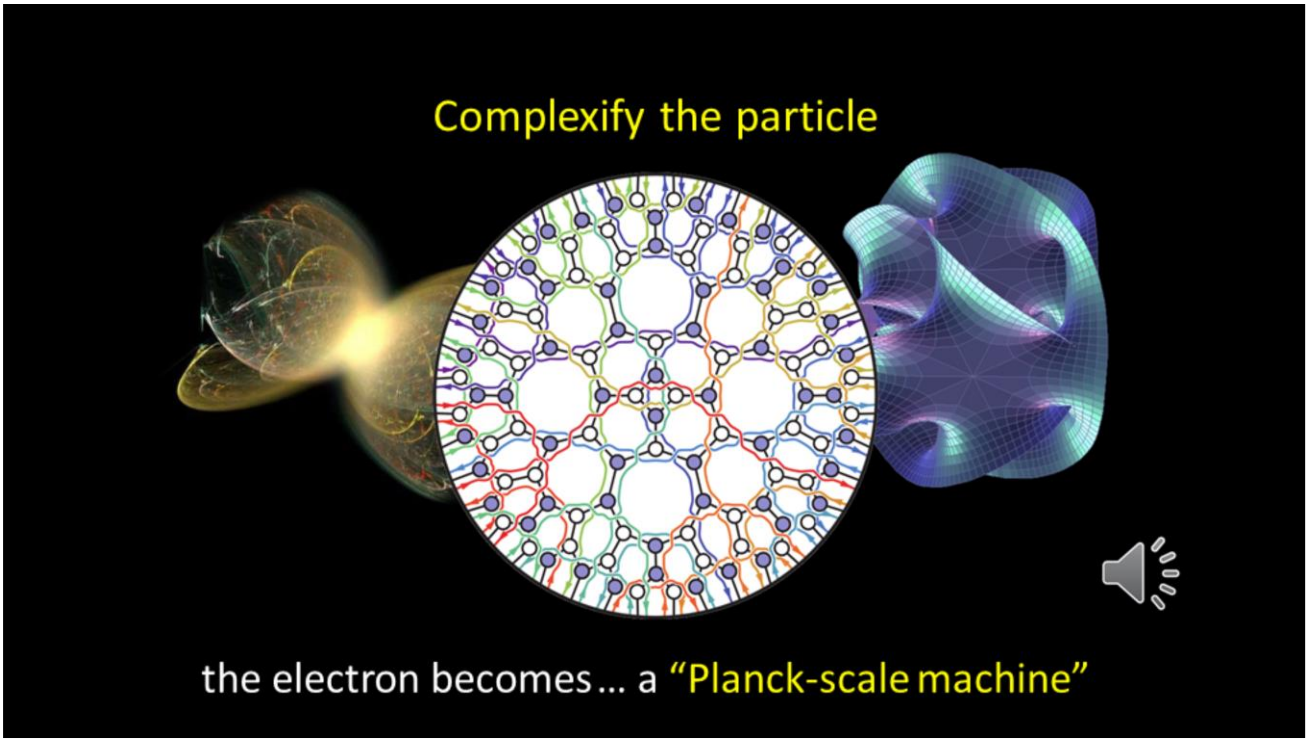


But what if we do look very, very close? Well, then things get weird. So weird that electrons **must** be something more than mere "**fluctuations in a field**".

One famous alternative is a Planck-scale **string**, tangled up in 10-dimensional space.

Of these two currently popular (but incompatible) schemes, one requires that we complexify **reality**, the other that we complexify **space**.

The Urantia Book suggests a third possibility…

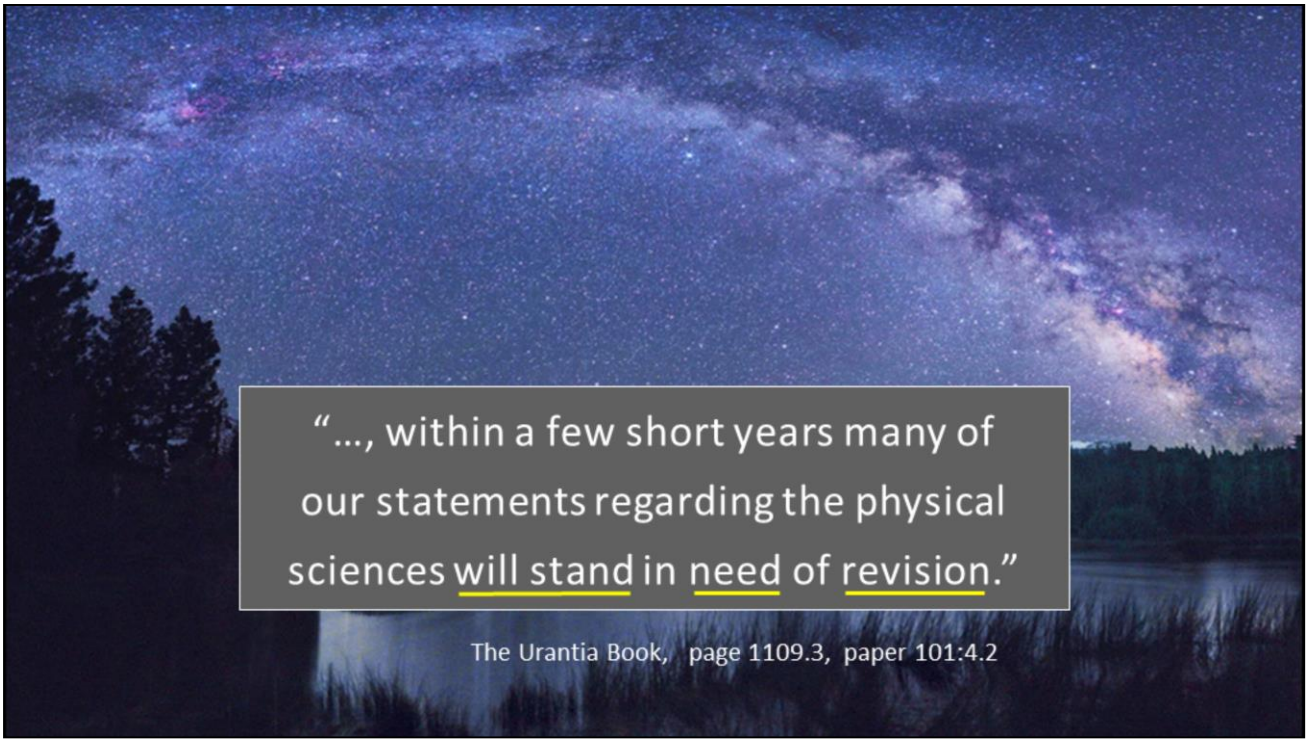


… complexify the **particle**.

In this Urantia Book scheme, the electron becomes…
a truly **fabulous** Planck-scale machine.

* * *

Remember how in paper 101 section 4, "**The Limitations of Revelation**", …



the author states that [quote],

> "… within a few short years many of our statements regarding the physical sciences **will stand in need of revision**".
>
> (1109.3, 101:4.2)

"Will stand in need of revision."

So far we haven't attempted **to revise** the Urantia Book story.

With regard to the nature of mass and matter, and expressed in modern terms, **this** – or something like it – **is** that story.

And quite a tale it turns out to be!

So much 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.

(continued in Part 4C: Cosmology – Exploding Dark Islands)