

## Elementary Particles, A predictive measure of their relative mass from their relative radius ratios

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### Abstract

From the standard definitions of  
volume of a sphere &  
density of a solid:-

$(\text{cube root}[\text{mass}/\text{density}]) = (\text{cube root}[\text{volume}])$  & is proportional to radius.

If density is almost constant,

$\text{cube root}[\text{mass}/d] =$  is proportional to radius, where  $d$  is constant.

[cube root of the mass], equivalent to a radius parameter, is quantized & the radius ratios form consistent patterns for the different levels of matter.

The cube root of the masses of the fundamental particles become calculable relative to the cube root of the mass of the electron! [The cube of the values then give the masses (MeV).]

[Note:- The "standard letters" for the fundamental particles below are not for the particles themselves but one of their properties i.e. (cube root of the mass of the electron)]

[A "new" fourth level of matter is a possibility.]

[A "new "high-energy" "photon type"" is a possibility.]

[Decay of the higher energy neutrinos into those at lower energy is a possibility.]

[Red-shifting of photon energy with time is a possibility.]

$4*(e1=e/4) + u\{=10*e1\} = d\{=14*e1\}$ , where  $e1 = (\text{cube root of the mass of the electron})/4$

$8*(e2 = [mU]) + s\{=6*e2\} = c\{=14*e2\}$ , where  $e2 = 6*e1$

$10*(e3 = [tU]) + b\{=4*e3\} = t\{=14*e3\}$ , where  $e3 = 14*e1$

Also:- Higgs boson = 50:  $w[+-]$  boson = 43:  $(3*14 = 42)$   $z[0]$  boson = 45:

### Theory

This was largely based on a section of my original paper: vixra: 1311.0196: Sphere Geometry of Forces & Fundamental Particles of the Universe [S. C. Gaudie -email: tetrahedron\_1\_3\_6{at}aol.co.uk.]. The section has been much modified, clarified & expanded!

"Mass" is quantized, not in terms of mass itself, but in terms of the cube root of the mass {crm}!

[Suggested basic unit (cube root of the mass of the electron)/4.] This means that mass, at the fundamental particle level, seems to be arranged in spheres of the same mass-energy density!

Fundamentally, particle mass can be viewed as being in discrete, "quantum size dictated" spheres!

Mass, as the current descriptor of matter, has an implied density component. The cube root of the mass (radius) also has an implied density component, but is also "quantized", calculable & quantifiable [through the relative ratios] basis.

A black hole's mass is defined by its radius &, similarly, for any fundamental particles, its mass is defined by its radius [cube root of the mass]! This redefines the fundamentals of mass as "brown holes" or "mass holes" or "quantum radii of masses"!

The cube root of the mass radius for an electron [with accurately defined charge & mass values] can be used to inter-relate mass & length!

A proxy model of the mass radius ratios can be cannon balls stacked in a triangular tetrahedron. This is extended to two tetrahedrons stuck together base to base. The numbers for the layers are below in the Data -Appendix.

The proxy model of the cube root of the mass (radius) implies a basic spherical nature to matter, in four space dimensions. This arranged in a "tetrahedron structure arrangement" [of the discrete, "quantum size dictated" spheres] would be in the fourth space dimension. The cube root of the mass (radius), as a linear "description of matter", [with or without a non-dimensional vector, component] also, easily fits into the "origami" nature of the "two dimensional, holographic universe".

The different levels of matter have mesons & quarks with similar {crm} ratios within the level, when compared to other levels!

The patterns found indicate a possibility of a fourth level of matter! It would be at a much higher energy & much shorter lived!

As the energy from the big bang "cooled" & phase-transformed into matter, it would pass through the different levels of matter, from the highest level towards the lowest level! [Each "phase change" could lead to inflation!] There could have been a single "universe particle" created [at a much higher level of matter] initially when energy first turned into matter. This would have been like a soap bubble in air, isolated from its "environment". There could be "almost innumerable" "identical twins" of isolated, matter & anti-matter universes, "condensed out" of the "super-energy pre-universe". If "our", single "universe particle" was matter, almost all "radioactive decays" within it would produce matter! No need for the "anti-matter problem"! Whether, another, single, "universe particle" of anti-matter in another universe was created simultaneously or not is irrelevant [& most likely forever undetectable!] [unless it has a "dark matter" influence]! The "unconfined energy" needed to produce a "predetermined universe size" when

the “universe particle” was created. This would be the initial inflation for the universe, to accommodate the particle’s “mass sphere”! The structure of the universe would then be determined from the “decay of particles” within the universe. There is a hint of “fission-track” structure of multiple decays within the largest structures of the universe!

[See @ about 40 seconds in:- Laniakea: Our home supercluster:- <https://www.youtube.com/watch?v=rENyyRwxpHo> ]

The ratios also suggest that the values here for the relative radius ratio relative to electron for the third level of matter are too high. Substituting a value of 14 instead of 15 would keep an “internal consistency”. This would give recalculated values (MeV) of:-

$tU = 1444$  [1777];  $t = 140710$  [173070];  $b = 3400$  [4180] [=“std” values]

A positive or negative “binding energy factor” may be required on moving to another level.

The tet integers for the mesons 2, 6 & 12 don’t appear in this data. Let’s call the associated matter “shadow matter”. We can detect “normal” matter at levels “1, 2 & 3” [with tet integers for the mesons 4, 8 & 10] so, there is no reason to suppose that, if these levels of “shadow matter” existed, they would remain undetected. The “all possibilities exist in the universe” view might suggest “shadow matter” as “dark matter” or “shadow matter” might have positive mesons & negative quarks! The “meson values” of 2, 6 & 12 cannot be obtained by cumulative counting, from a (or two) tetrahedral peak(s), in complete layers, but the “known values” of 4, 8 & 10 can! This is “filled shells” like atomic orbitals!

For the possible fourth level of matter, the increasing size of the “electron equivalent” meson, relative to the largest quark value on a given level, suggests that at the fourth level of matter, the meson is too large to exist with two different sized quarks. However, there is an intriguing possibility. On going from level 1 to level 2, the tet integers for the mesons increase by 4. So, if, on going from level 3 to level 4, the tet integers for the mesons increase by 4 we arrive at 14.

The tet integers for the mesons of 14 is a special case, as the quark(s) & meson have the same energy. then our fourth level of matter must have only one type of quark, with no charge on it. This would also mean no charge on the meson, which also means no electric or magnetic [but gravimetric] attraction between the fundamental particles. Do the quark & meson flip between each other? There is “logical beauty” in the creation of the “first matter” [from energy] with mesons & quarks with the same value.

The special case, of the quark(s) & meson having the same energy & no charges could be a candidate for “dark matter”, but the very quick decay times and having it as very early matter seems much more logical.

As the big bang energy transformed into 4th level matter [on way to “our matter”], the creation of matter & the fact that the matter has no electric or magnetic attraction would both lead to enhanced inflation. The much higher densities then, probably meant that the 4th level of matter was more stable in the very early universe. Matter would be an un-ionised. The matter distribution variations of our universe now, would be greatly influenced by statistical variations in the density of this neutral mix of 4th level matter mesons & quarks!

The early 4th level massive quarks could have been the seeds for the later galactic black holes!

The creation of the 4th level of matter may have created the mass & space, from its quarks & its radiation, from its photons, of the “Big Bang” itself!

### Photon speculation

Where,  $tet\{yw\} 0 + 14 = 14$ , there are further possible consequences. The “meson equivalent” is massless & chargeless. This could mean that photons are relics of the creation of the 4th level matter!

[The chargeless quarks of 4th level matter eventually decay into “our normal matter”.] The 4th level matter creation would suggest an equal number of photons & quarks were created then. On the other hand, this could mean that the “meson equivalents” were “super-photons” which have “stretched to invisibility”, “decayed by energy dispersal” or just disappeared over time as the lower energy levels of matter were created!

The creation of the 4th level of matter “photonic radiation” & its dispersion / decay should have a “radiation signature fingerprint”, as does cosmic microwave radiation. It would be at a much longer wavelength than the cosmic microwave radiation because it would have been from a much younger universe. As there was no electric or magnetic charges on 4th level matter there would be no “electric or magnetic heating”.

If the assumption is made that all 4th level matter is inherently unstable, then, if photons are “created” as 4th level “matter”, then photons are unstable!

The “unstable photons” view, leads to the conclusion that a photon loses some energy with time. A further conclusion is that visible light [& all radiation] would become “redder” on losing energy. This would contribute to the red shift of radiation on viewing distant objects. A correction for less redshift from galaxy recession & expansion would lead to the age of the universe being younger!

### Neutrino speculation

If,  $tet\{yw\} 0 + 14 = 14$  equation, indicates the existence of a matter particle with no charge & no mass [or almost no mass] for the fourth level of matter.

The speculation that the “meson equivalent” [Tet{} value or {cmr} value = 0], as mentioned above, is represented by the chargeless & massless photons these could be changed to chargeless & almost massless neutrinos for the “meson equivalent”.

One condition would be required for this. Our current three types of neutrino must have been only one types of neutrino in the 4th level of matter universe! Assuming that the heaviest [the tau] neutrino was the “original” one, we are led to the conclusion that it is unstable & decays into the smaller, lower energy types of neutrinos. The three different types of neutrinos would, then, have appeared only with its own level of matter “appearing”. The W boson interaction could have started at level 1.

If neutrinos form a similar pattern of cube root of the mass {cmr} ratios to the mesons & quarks the possible ratios would be:-

	Actual mass [keV]	Low mass spread R	Med mass spread R <sup>3</sup>	High mass spread R	High mass spread R <sup>3</sup>
ve	<0.002	1	1	1	1
vmU	<170	3	27	6	216
vtU	<15500	6	216	14	2744

Where R is cube root of the mass {cmr} [so, R<sup>3</sup> is mass!]. Values are relative to the [electron neutrino]. More speculatively, on creating the fourth level of matter, the larger, denser, higher energy packets “condensed out” first into chargeless mesons & quarks. The more diffuse, lower energy packets “condensed out” later from most of the remaining energy!

The relationship could be:

in neutrino {cmr} terms: lowest + medium = highest.

Nucleosynthesis of suns have been calculated from half-lives & decay patterns of isotopes. Has the timescale of the birth of the universe been studied in terms of the decay patterns of mesons & quarks? Our universe would be the product of the decay of 4th, 3rd & 2nd level matter!

[NOTE:- We have :-

equal nos for + & - charges

equal nos for north & south poles

“almost all normal” for matter [tiny amounts of man-made anti-matter]

“all normal” for charge [no anti-charge particles known]

“+ value” only for mass [no negative mass]

“+ value” only for time [time moves in only one direction]

“+ value” only for entropy [entropy moves in only one direction]]

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## Data -Appendix

### Tetrahedral Sphere Stacking

[Two tetrahedrons stuck base to base]

The individual numbers in each layer:-

1; 3; 6; 3; 1;

The cumulative numbers in each layer:-

1; 4; 10; 13; 14;

4; 6; 4;

Special case for Higgs Boson

The cumulative numbers in each layer:-

1; 4; 10; = ONE 4-sided tetrahedron.

ONE 4-sided tetrahedron stuck on to each of the 4-sides = total number 50

Data from:-

[http://en.wikipedia.org/wiki/File:Standard\\_Model\\_of\\_Elementary\\_Particles.svg](http://en.wikipedia.org/wiki/File:Standard_Model_of_Elementary_Particles.svg)

Masses [Mev]

e 0.51:      u 2.3:      d 4.8:  
mu 105:      s 95:      c 1275:  
tu 1775:      b 4180:      t 173070:  
w[+-] 80400:      z[0] 91200:  
Higgs Boson 125000

Relative radius ratio [cube root of mass (Mev)] relative to electron

e 1.0:	u 1.65:	d 2.11:	ratios:-	s 1.65/1 =1.65	c 2.11/1 =2.11
mu 5.9:	s 5.7:	c 13.5:	ratios:-	s 5.7/5.9 =0.97	c 13.5/5.9 =2.29
tu 15.1:	b 20.1:	t 69.7:	ratios:-	b 20.1/15.1 =1.33	t 69.7/15.1 =4.60
w[+-] 43:		z[0] 45:			

Higgs Boson 50

Relative radius ratio [cube root of mass (Mev)] relative to electron

e = 1.0: mu = 5.9: tu = 15.1  
e = [1]: mu = [6]: tu = [15]

**FIRST** level - normal-charge - "Our normal matter"

e + \$u{+} = fd{-}  
[1] + [1]\*(1.65) :: [1]\*(2.11)  
[1]\*(0.3\*2) + [1]\*(0.3\*5) = [1]\*(0.3\*7)  
tet{e} 2 + 5 = 7  
tet{e} 4 + 10 = 14

**SECOND** level - "anti-charge" (\*)

#mU\* + \$s\*{+} = fc\*{-}  
[6] + [6]\*(0.97) :: [6]\*(2.29)  
[6]\*(0.3\*4) + [6]\*(0.3\*3) = [6]\*(0.3\*7)  
tet{mU} 4 + 3 = 7 or,  
tet{mU} 8 + 6 = 14

**THIRD** level - "anti-charge" (\*)

#tU\* + \$b\*{+} = ft\*{-}  
[15] + [15]\*(1.3) :: [15]\*(4.6)  
[15]\*(0.3\*10) + [15]\*(0.3\*4) = [15]\*(0.3\*14)  
tet{tU} 10 + 4 = 14

Possible:-

FOURTH level - normal-charge

3\*yw + xi\*{+} = zi\*{-}  
tet{yw} 4 + 3 = 7 or,  
tet{yw} 8 + 6 = 14 or,  
tet{yw} 14 + 0 = 14!  
tet{yw} 0 + 14 = 14!

tet{} means the tetrahedral stacking arrangements & equations

"anti-charge" (\*) means the anti-particles [with opposite charge] are used for the masses.

REFERENCES

Original source material:

[http://vixra.org/author/s\\_c\\_gaudie](http://vixra.org/author/s_c_gaudie); item: vixra: 1311.0196 Sphere Geometry of Forces & Fundamental Particles of the Universe [S. C. Gaudie -email: tetrahedron\_1\_3\_6{at}aol.co.uk

Data source:

[http://en.wikipedia.org/wiki/File:Standard\\_Model\\_of\\_Elementary\\_Particles.svg](http://en.wikipedia.org/wiki/File:Standard_Model_of_Elementary_Particles.svg)

Possible speculation:

Laniakea: Our home supercluster:- <https://www.youtube.com/watch?v=rENyyRwxpHo> ]