

The Higgs Planck Scale Construct

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Abstract

Higgs boson decay measurement uncertainties and an energy density coefficient that correlates the forces shows why the electron and the proton are the only stable particles and the basis for matter. The uncertainty also provides a possible insight into Black Hole formation and a basis for Dark Matter.

Introduction

The amazing thing about mathematics is that it's a creation of mind that coincides with physical reality, "a language of thought whose syntax prevents illogic and error" (Lord Brouncker) and delivers "the keys to those laws of nature and the universes concealed by appearances," (Hannah Arendt). Einstein described this process "as like trying to read God's mind," his factoring the infinite metaphor, and his method relied on the fact "that light always propagates in space with a definite velocity V that is independent of the state of motion of the emitting body."

This Occam's Razor approach correlates the impedance of space to particles, the Strong, EM, Weak and Gravity forces, and the Higgs boson by an energy density coefficient that relates ground and light speed energy states (Sommerfeld's number). Also, while Higgs boson decay measurement uncertainties indicate that Gravity is exceeding the other forces as they lose Planck scale integrity, it also shows why the electron and proton are the stable roots of matter, each correlating by the energy density coefficient to their free space and Higgs decay boundary conditions. Such a correlation provides possible insights into Black Hole formation and Dark Matter characteristics.

I) Energy Domain Correlation

Sommerfeld's $\alpha = e^2/2\epsilon_0 hc = 0.007297353$ number correlates hydrogen's ground state energy to the speed of light, and thus the electron's E_0 ground state and E_c light speed Compton wavelength energies by α^2 . Since the natural laws are the same in all inertial frames of reference (Relativity) the same α root and α^2 energy density coefficients also correlate the $hc = h/(u_0 \epsilon_0)$ impedance of space, the electron, quarks, proton, Higgs boson, and the Strong, EM, Weak and Gravity forces, as the following relations show:

1) Higgs Condition impedance of space:

$$hc = h/(u_0 \epsilon_0) = 1.986447311 \times 10^{-25} \text{ J}\cdot\text{m}$$

This is the impedance energy density of space that limits EM radiation velocity to the speed of light in 4-D Minkowski space-time.

2) Electron quantum optical and interactive radii and mass-energy:

$$r_{eo} = hc3^{\frac{1}{2}}\pi/\alpha^2 = 2.03 \times 10^{-20}m$$

$$r_{ei} = hc3^{\frac{1}{2}}\pi(2^{\frac{1}{2}}3^{\frac{1}{2}})^2/\alpha^3 = 18r_{eo}/\alpha = 0.005 \text{ fm}$$

$$m_e = (1 - \alpha/\pi)(\frac{1}{2}eh/2\pi)3^{2/3}2^{\frac{1}{2}}\alpha/hc = 9.108173132 \times 10^{-31} \text{ kg, within } 0.02\% \text{ of the measured } 9.1093897 \times 10^{-31} \text{ kg.}$$

3) Quark quantum optical and interactive radii and mass-energies:

$$r_{qo} = hc\pi/2\alpha^3 = 0.803 \times 10^{-18}m$$

$$r_{qi} = r_{qo}/3^{\frac{1}{2}}\alpha = 0.0635 \text{ fm}$$

$$m_{Up} = (\frac{1}{2}m_e c^2)2^{\frac{1}{2}}3^{\frac{1}{2}}\pi = 3.9323 \text{ MeV}$$

$$m_{Down} = 3^{\frac{1}{2}}m_u = 6.8109 \text{ MeV}$$

The mass-energies are based on the electron's $E_c = \frac{1}{2}m_e c^2 = 0.2555 \text{ MeV}$ acceleration energy from its $E_o = 13.605698 \text{ eV}$ ground state to light speed, so $E_c = E_o/\alpha^2$, and equate to Fermi Lab's 2.3 MeV and 4 MeV values when the quark triton's $3^{\frac{1}{2}}$ spherical momentum is factored out. Thus the quarks reference to the hc impedance by #2.

4) Proton quantum optical and interactive radii and mass-energy:

$$r_{po} = r_{qi}3^{2/3}2\pi = 0.83 \text{ fm}$$

$$r_{pi} = hc \pi^2 3^{2/3} 2^{\frac{1}{2}} \alpha^4 = 1.017 \text{ fm}$$

$$m_p = (\frac{1}{2}eh/2\pi)2^{\frac{1}{2}}3^{\frac{1}{2}}3c^3 = 3^{\frac{1}{2}}(m_U/\alpha + m_D - m_U) = 1.6712 \times 10^{-27} \text{ kg, based on the Higgs boson mass-energy generation by the quark triton's orbital.}$$

5) W^\pm and Z^0 boson mass-energies:

$$m_{W^\pm} = m_e 2^{\frac{1}{2}}(2^{\frac{1}{2}}3^{\frac{1}{2}})^2/\alpha^2 = 81.42 \text{ MeV}$$

$$m_{Z^0} = m_U 3^{\frac{1}{2}}/2^{\frac{1}{2}}\alpha^2 = 90.42 \text{ GeV}$$

6) Higgs boson mass-energy:

$$m_H = (m_p - 3^{\frac{1}{2}}(2m_U + m_D))/\alpha = 125.1 \text{ GeV}$$

This is the proton's mass-energy minus the quark triton's $3^{\frac{1}{2}}$ spherical momentum energy that generates it, and the compounded by the $1/\alpha$ coefficient since the detected bosons' mass energy has a light speed momentum $1/\alpha$ times greater than the proton's rest mass.

7) Hydrogen's ground state energy and orbital wavelength are:

$$E_C = \frac{1}{2} m c^2 / \alpha^2 = 13.605698 \text{ eV}$$

$$\lambda_C = hc/E_O = 3.3249 \times 10^{-10} \text{ m}$$

Since it's a 2-D orbital it relates to a 1-D EM wave with E_O energy by:

$$\lambda_{EM} = 2\lambda_O/\alpha = 911.27 \times 10^{-10} \text{ m}$$

They also relate to the Compton energy and wavelength by:

$$E_C = \frac{1}{2} m_e c^2 = E_O/\alpha^2 = 0.2555 \text{ MeV}$$

$$\lambda_C = \lambda_O \alpha = hc/E_C = 2.4263 \times 10^{-12} \text{ m}$$

The quarks also relate to the Compton wavelength and energy by:

$$r_{qi} = (\frac{1}{2} \lambda_C \alpha^2) = 0.0646 \text{ fm, within 2% of } r_{qi} = 0.0635 \text{ fm}$$

$$m_U = E_C 2^{\frac{1}{2}} 3^{\frac{1}{2}} 2 \pi = 3.9323 \text{ MeV}$$

The size discrepancy arises because the mathematical solutions from the impedance points of space do not account for the uncertainty effect of the electron's size in its matter wave generation.



8) The LY = $9.46 \times 10^{15} \text{ m}$ light year is determined by earth's $G m_s m_e / r_e^2 = m_e v_e^2 / r_e$ gravity construct orbital matter wave and its light speed velocity through space's $h/(u_o \epsilon_o)$ impedance. Thus both Gravity and the Strong force correlate by their light speed velocities through the impedances of their respective energy density domains since the proton's

matter construct is based on the $h/(u_0 \epsilon_0)^{1/2}$ impedance of space compounded by 0 , so $LY = \frac{1}{2} 3^{4/3} 2^{1/2} \pi / r_{pi} = 9.45 \times 10^{15} m$, within 0.1%, as shown in The Higgs Condition and Quark Relativity Transform (p. 9).

These correlations show a connection between the hc impedance of space, the forces, and their electron, quark, proton, Higgs boson, hydrogen atom, and earth orbit constructs. The Weak force decays are explained in Quark Relativity Transform (pp. 9-23).

II) Energy Density Constructs

Energy constructs stabilize by the resonance of orthogonal energy states. This can occur at spatial right angles, like a pendulum's vertical potential and horizontal kinetic energies operating on its mass, or it can occur by resonance between energy forms in space-time, like a proton's rest mass energy resonance with its quark generated pion based nuclear bond mass defect, as show in QRT (pp. 6-9).

Stable energy resonances occur by an $e^{-ix} = \cos x - i \sin x$ wave function between real and orthogonal imaginary dimensions, also expressed as $d^2E/dx^2 = u_0 \epsilon_0 d^2E/dt^2$ Cauchy Riemann 2nd order Laplacian harmonic space-time resonances, and resonance decays are described by e^x decay transform functions. Both resonance and decay transforms correlate by the $e^x = x^0/0! + x^1/1! + x^2/2! + x^3/3! + x^4/4! + x^5/5! + \dots$ expansion when ix is substituted for x to obtain the sine cosine resonance expression or when the expansion elements are represented as a  \dots geometric progression of $x/n!$ element changes as n  increments from).

In his $P = e^{S/k}$ probability principle, where $x = S/k$, Boltzmann showed that probability P of an energy state depends on system entropies S , and there are two conditions when outcome probability is 100%. One occurs when the entropies are 100% available, in a system with one component at its ground state energy, and the other occurs when the entropies are 0% available, when all system components are completely

saturated. In either case the system energy is totally contained in one component or equally distributed between all components so no statistical energy distribution occurs, as in Bose Einstein Condensations.

Thus the two cases represent the system's minimum ground and maximum saturated energy states, one where a single component contains all system energy and all degrees of entropic freedom are 100% available and one where all components equally divide the system's energies and all entropies are saturated so no freedoms are available. Einstein showed that the natural laws are the same in all reference frames and that the speed of light is their maximum velocity, and Sommerfeld's number defines the ratio of the ground state and maximum energy roots, where $e^2/2\epsilon_0 h$ translates to hydrogen's average $v_0 = \alpha c = 2.18769 \times 10^6 \text{ m/s}$ ground state velocity for $E_0 = 13.605698 \text{ eV}$.

So if the natural laws and speed of light are uniform, then the α ground to maximum state ratio of force, distance or velocity energy roots would coincide in the Strong nuclear, Electromagnetic atomic, and Gravity domains, with the Weak force governing the energy transforms between the nuclear and atomic domains. Thus the domains' energy density constructs correlate by α size and α^2 energy density coefficients and Boltzmann principle ground and maximum states of each domain occur with the same 100% available and 0% available entropy conditions, such that the saturated states of lower energy density domains transform to the ground states of the next $1/\alpha^2$ higher energy density domain, as shown in Section I.

III) The Proton and Electron Root Components of Matter:

The proton and electron are the only stable naturally occurring root components of matter, forming hydrogen and a progression of 92 naturally occurring elements by their neutron state as shown in QRT (pp. 18-21). Both have unstable excited energy states that rapidly decay. However the question arises as to why only they are stable and the basis of matter.

In section I-2 the electron radius and mass were shown to be:

$$r_{eo} = hc3^{\frac{1}{2}}\pi/\alpha^2 = 2.03 \times 10^{-20}m$$

$$m_e = (1 - \alpha/\pi)(\frac{1}{2}eh/2\pi)3^{2/3}2^{\frac{1}{2}}3^{\frac{1}{2}}\pi/r_{eo}\alpha = 9.108173 \times 10^{-31}kg$$

where its radius is based on a $1/\alpha^2$ energy density increase over the hc impedance of space and its mass is generated by its $(\frac{1}{2}eh/2\pi)$ field energy from a $2^{\frac{1}{2}}3^{\frac{1}{2}}$ angular and spherical charge momentum compounded by $1/\alpha$ in 1-D as shown in QRT (pp. 22-23).

Similarly the proton radius and mass were shown to be:

$$r_{po} = (hc\pi/3^{\frac{1}{2}}2\alpha^4)(3^{2/3}2\pi) = 0.83 \text{ fm}$$

$$r_{pi} = hc\pi^2 3^{2/3}/\alpha^4 2^{\frac{1}{2}} = 1.017 \text{ fm}$$

$m_p = (\frac{1}{2}eh/2\pi)2^{\frac{1}{2}}3^{\frac{1}{2}}3c^3 = 3^{\frac{1}{2}}(m_U/\alpha + m_D - m_U) = 1.6727 \times 10^{-27}kg$, where its mass energy is generated by the $2^{\frac{1}{2}}3^{\frac{1}{2}}$ angular and spherical momentums of the quark triton, as shown in QRT (p. 3), so the proton and electron sizes and masses are α coefficient functions of the ground state impedance of space.

Light speed collisions of protons accelerated from their rest mass ground state results in the $m_H = [m_p - 3^{\frac{1}{2}}(2m_U + m_D)]/\alpha = 125 \text{ GeV}$ Higgs boson, where α is the ratio of rest mass ground state to light speed energy roots. When the Higgs boson decays its measurement uncertainty is 20% to 30% when it should be within 1%. This uncertainty deviation is being interpreted to indicate a disruption to the Planck Scale fundamental forces.

Based on the concept presented in Quark Relativity Transform and The Higgs Condition the impedance energy of space is the fundamental Higgs boson condition contracted by the electron and proton light speed constructs according to the α coefficient and their geometries. This means the light speed proton's 125 GeV Higgs boson, generated by its quark triton, is a hyper-excited proton mass-energy state $1/\alpha$ times the $m_p - 3^{\frac{1}{2}}(2m_U + m_D) = 938.2723 \text{ MeV} - 25.42 \text{ MeV} = 912.85 \text{ MeV}$.

The proton's mass-energy results from a $B = d\phi_E/dt$ dynamic generation process that starts decaying as soon as the quark triton's charge is interrupted during pion generation (QRT pp. 7-8). However the 125 GeV Higgs boson decay releases $1/\alpha$ times more energy that saturates

surrounding space's $h/(u_0 \epsilon_0)^{1/2}$ impedance density to beyond that of the proton's stable mass-energy density. Gravity is a contraction gradient in space that results from the light speed triton's contraction of space from its surroundings, a resultant contraction gradient extending beyond the proton's Strong force mass-energy construct because of its $1/2$ -spin interaction with surround space (QRT pp. 3-4), exceeding the Strong force mass-energy volume by the reciprocal of the $r_{pi} = hc\pi^{232/3}/2^{1/2}\alpha^4$ proton interactive radius as shown by $LY = 1/2^{34}/32^{1/2}\pi/r_{pi} = 9.451 \times 10^{15}m$ in section I-8. In other words, the gravity field's energy density gradient correlates to the Strong force energy density by the α coefficient operating on the $hc = h/(u_0 \epsilon_0)^{1/2}$ impedance energy density of space.

Since the Strong, EM and Gravity forces, the stable decay products, and the Weak force decay function (QRT pp. 9-23) all depend on the $h/(u_0 \epsilon_0)^{1/2}$ impedance energy of space as their basis, and decay of the 125 GeV hyper-excited Higgs boson state super-saturates surrounding space with $1/\alpha$ times more energy density than the proton's mass-energy density, it creates a Gravity gradient exceeding the proton's Strong force by $1/\alpha$ times. This sudden energy density increase prevents formation of $h/(u_0 \epsilon_0)^{1/2}$ based entities and forces, thus creating the observed Higgs boson measurement uncertainty.

Because the electron and proton correlate to each other by the α coefficient through the intermediate quark energy states they are stable with respect to each other and can thus form the matter construct energy resonances of physical reality; Because they correlate to the hc ground state impedance energy of space and the unstable Higgs boson hyper-excited state they are stable with respect to the ground and decay boundary conditions; And because the proton is only one α coefficient from the 125 GeV Higgs boson hyper-excited state it is the last stable root of matter, so all matter is proton - electron based.

Furthermore, because the boson's decay creates a super-saturated Gravity state in surrounding space it has the potential for disrupting the $h/(u_0 \epsilon_0)^{1/2}$ impedance based Strong force and thus proton particles in the vicinity. The likelihood of such an event increases with the number

of Higgs bosons formed, which statistically occur when colliding large numbers of protons at light speed, raising a Black Hole formation concern. While it might be argued that the proton charges make this unlikely that conclusion is not valid because of what occurs in hydrogen bomb fusion detonations.

A deuterium fusion detonation produces 600% more energy than the fission reaction that sets it off while laboratory fusion reactions are always less than 100% efficient. This is because the deuterium is at the center of a fission detonation so all its nuclei are driven towards each other at light speed. Under this condition, by Relativity, from the protons' local perspectives their EM charges experience uncontracted space while from the external observer perspective of the Strong nuclear force bond formation the space between the particles is contracted. Thus the charge repulsion force experiences greater separation and less force while the pion based nuclear bond readily forms in the contracted distance between the particles, yielding the nuclear bond formation energy release before the charge repulsion force can quench the nuclear interactions. This results in a net positive greater than 100% energy release.

In the laboratory only a statistical portion of the nuclei receive enough energy for the light speed interaction to occur so a net negative less than 100% energy release occurs, making viable laboratory based power generation unlikely. In Higgs boson generation all the protons are accelerated towards each other at light speed so their charge repulsion effect is reduced and collision probabilities remain high. The higher collision probability aspect is further compounded by the greater energy release. Nuclear bond formation releases about 0.1% of the particles' mass-energies but in a focused Higgs boson production the entire proton mass-energy compounded by the $1/\alpha$ light speed condition releases about 100,000 times more energy is released than during bond formation.

This is already aggravating measurement uncertainties by 20-30% but if a large number of simultaneous interactions occur the total energy released will disrupt the $h/(u_0 c_0)^{1/2}$ based stable matter because the ~~exceed the~~

energy density in the particles' exterior space will far exceed the energy density within the particles. As shown in QRT, p. 19, the proton's reduced density with respect to the electron results in a $4.83/3 = 2.7928$ greater external magneton. Thus increasing the relative energy density of surrounding space with respect to the proton would further increase the external magneton, and a 100,000 times energy density increase in exterior space will capture all the triton generated $B = d\phi_E / dt$ mass-energy field, collapsing every proton in the region, compounding the external energy density further, and causing a gravitational cascade. A large collision interaction event thus raises a serious Black Hole concern.

Similarly, by Standard Model symmetry, creation of a higher energy density region will coincide with the formation of an adjacent reciprocal lower energy density region. Since Maxwell's EM Theory rests upon a $c = 1/(u_0 \epsilon_0)^{1/2}$ constant light speed, a lower density region would result in a light speed increase, or re-refraction of light energy absorption as we observe it. In other words, EM light energy entering the lower density region would be absorbed to increase the energy density to $h/(u_0 \epsilon_0)^{1/2}$; light passing through the gradient between the lower and normal impedance energy density regions would be refracted outward; and the effect of the force of Gravity through the lower density light absorbing region would be diminished since it like the Strong force is $h/(u_0 \epsilon_0)^{1/2}$ based, possibly explaining some of the observed Dark Matter characteristics.

Thus the Planck Scale holds true and the proton and electron are the stable basis of matter within the boundary conditions of the free space ground and Higgs boson formation states, but the Higgs decay energy release $1/\alpha$ times greater than that contained in the stable proton disrupts the $h/(u_0 \epsilon_0)^{1/2}$ basis of their stability and increases the probability of a Black Hole event while at the same time providing a basis Dark Matter light absorption, refraction, and Gravity reduction.