The Planck Mass and the Cosmic Movie Projector

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In OBSERVER PHYSICS I calculate three different ways to derive my version of the Planck Mass.

1) The **Electro-Gravity Equilibrium Derivation** for the crossover point between the EM and the Gravity forces. (See OP 8.8-15).
2) The **Black Hole Derivation** taking the de Broglie wavelength as the Schwarzschild radius, modulated by the fine structure constant. (See OP 12.1-3)
3) The **Vacuum Density Permittivity Derivation** in terms of the inverse Coulomb constant (1/k) times the unit (1-meter radius) spherical volume times the ratio of the area of that same sphere to the area of its maximum cross section. (e.g., see OP 12.7; 13.12-13)

- $Bu = \sqrt{k e^2 / G}$
- $Bu = \sqrt{\hbar c \alpha / G}$
- $Bu = (Ss / [\pi k^2] \varepsilon_0)$
- $k = (Ao / As \pi \varepsilon_0)$
- $\alpha = k e^2 / \hbar c$ (fine structure constant)
- $Ao = \pi Ru^2$ $(Ru = 1\ m)$
- $As = 4\pi Ru^2$
- $Ss = (4\pi Ru^3) / 3$

In this chart (Bu) stands for my version of the Planck Mass Unity Boson, (e) is the quantum unit of electric charge, (G) is the gravity constant, (h-bar) is Planck's constant, (c) is light speed, and (k) is the Coulomb constant from Coulomb's law. I interpret the permittivity constant (eo) as a pseudo mass density (units = kg / m^3) so that there is a smooth transition between EM units and mechanical units instead of the obfuscation that is rampant in standard physics to keep ordinary folks as well as scientists from the truth by compartmentalizing information. (Ru) is the marvelous Radial Unit that happens to be almost exactly 1 m,, the average distance between two hearts when they communicate in normal discourse. Armed with the Radial Unit we define a Unit Circle with Circumference (Oo), Area (Ao), plus a Unit Sphere with Area (As) and Volume (Ss). The (Bu) has the following approximate value, roughly equal to the rest mass-energy of a flea.

- **Bu = 1.86x10^-9 kg**

This is the tiny (but amazingly still at the edge of our human scale) mustard seed from which the entire physical cosmos grows: 1.86 nanograms. We might call it the mass of the soul of the universe.

1. The Electro-Gravity Equilibrium Derivation

Here are the details of the Electro-Gravity Equilibrium Derivation. We start with the gravitational force (Fg) between a proton (Mp) and an electron (Me). Then we consider the electrostatic force (Fe) between the same two particles, followed by the ratio between the two forces (Eg) so we can compare them. In the two force equations R^2 represents the interaction of the two radii that define the distance (in each direction) between the two center points of mass and between the two point charges. When we take the ratio of the two forces, all the units cancel out and we are left with a pure number.

- Fg = G Mp Me / R^2
- Fe = k e^2 / R^2
- Eg = Fe / Fg = k e^2 / (G Mp Me) = 2.3x10^39

This gives us the usual ratio of the electric force to the gravity force that is shown in physics textbooks. The gap is 39 orders of magnitude, so large that students get the idea the two forces must not be related in spite of the fact that the two force equations are identical in structure. Another way in which the Masters of Physics indoctrinate students with the disconnection between electricity and gravity is by using different units to talk about them. Instead of calling (e) a quantum unit of mass, or pseudo-mass, they call it a unit of charge. The main justification for this probably is that charge seems to be independent of mass. For example, the proton and the electron each have a single unit of charge, but their masses differ by a ratio of about 1836/1. Therefore charge is measured in terms of the coulomb, a unit that considers charge as a rate of pseudo-mass generation in kilograms per second (kg / s) if we want to think of it in mechanical terms.

Actually charge is quite as mysterious to physicists as gravity is. However charge clearly generates a force that behaves just like gravity, except that it focuses around centers of charge rather than centers of mass. There are also two poles to charge, so that charge can both attract and repel depending on the alignment of the charges. Gravity seems to have only one pole that always attracts. Careful observation, however, reveals that gravity also has a second pole that we can call the thermal force. This leads objects in a gravitational field to move in paths that trace conic sections. However, if you look closely at the field lines for two equal and opposite charges, you will find that they also trace out conic section paths. The difference is that we can manipulate the charge poles more easily than the gravity poles because both have physical foci, whereas the thermal center of a gravitational system is generally located at a non-material kinetic focus (actually a cold/rarified point), while the gravity focus is at the center of mass (the hot/dense point for the system).

The distribution or density of mass is variable over a given space. The distribution of charge is also variable because opposite charges can set up local centers of charge equilibrium. Therefore the gap between the two types of force is deceptive. The two forces naturally encounter equilibrium at crossover points. The (Bu) mass marks a fundamental quantum crossover point at the micro-scale, below which gravity dominates. In the medium scale where we live the EM force generally dominates. At the macro-scale we find that the tendency of charges to balance out in stable clusters of matter leads to the gravity force once again dominating over the EM force when large clusters of matter

interact. But we can also deliberately manipulate the two forces into equilibrium under various conditions and at various scales. The result is that objects **hover** or **float** between the two forces. Kinetic motion generates anti-gravity. An orbit around a gravity well is a dynamic equilibrium state between the force of gravity and the force of kinetic anti-gravity. A rocket is a kinetic anti-gravity device. A balancing of opposite charges against proper amounts of mass also generates anti-gravity effects, as MagLev trains demonstrate.

The classic oil-drop experiment performed by Robert Millikan to determine the unit of quantum charge actually also revealed the Planck Mass. Millikan placed electrostatic charges on tiny oil droplets until they floated over a similarly charged plate due to the repulsive force generated by the charges interacting. When he had the smallest possible amount of charge that could float an oil droplet, that droplet had the Planck Mass and fulfilled the equation for Electro-Gravity Equilibrium. Of course, the density of the particle we use in such an experiment determines its relative size, and the experiment can be done with any size or density of material. If we simply consider a pair of interacting particles of unknown mass (Mx)^2, but each with a single quantum unit of charge, we can solve for the amount of mass required so that the unit quantum electrical charge and the effect of gravity on the mass reach equilibrium.

- G Mx^2 / R^2 = k e^2 / R^2.
- Mx^2 = Bu^2 = k e^2 / G.
- **Bu = (k e^2 / G)^1/2**.
- **Bu = 1.86x10^-9 kg**.

Thus solving for (Mx) gives us our hypothetical Planck Mass, or (Bu) particle.

2) The Black Hole Derivation

The second derivation of the Planck Mass starts from the notion of the black hole. Once Newton produced a formula that described gravity, scientists soon noticed that a sufficiently dense material could generate such a strong gravitational force that nothing could escape its gravitational field, even light. Such a particle would look to an outside observer like a black hole in space. The size of a black hole did not seem to matter as long as it reached a critical density for the particular mass. In fact we probably live in a very large black hole from which no physical phenomena can escape. Our derivation of the Planck Mass begins with just such an assumption. We have no way to detect any spin on the universe, so we presume it to be a black hole of the Schwarzschild type with no net spin or charge. Cosmologists have played with this exercise, but to my knowledge, have not noticed the interesting connection to the Electro-Gravity Equilibrium solution to the Planck Mass.

Cosmologists imagine an original cosmic Big Bang particle as a compact black hole that became unstable and exploded for some reason. To explore its size limit they set the de Broglie wavelength and the Schwarzschild radius to be equal. The Schwarzschild radius is the distance from the black hole's singularity to its event horizon, the range within which nothing can escape. To find the escape velocity (Ve), we start with Newton's formula:

- Fg = - G M1 M2 / R^2

.We take M1 to be the black hole's mass, and M2 to be the particle trying to escape. The minus sign indicates the force acts against increasing values of R and then we use Newton's second law: force equals mass times acceleration.

- F = M2 A.

We set the two force equations to be equal.

- M2 A = - G M1 M2 / R^2.

We cancel out the escaping particle's mass M2, noting that the mass it may have is irrelevant to the problem!! (A = V / T.) Then we solve the differential equation.

- dV / dT = - G M1 / R^2.

The chain rule allows us to put the equation in terms of dR, using R as the independent variable instead of (T).

- dV/dT = (dV/dR) (dR/dT) = V dV/dR.
- V dV/dR = - G M1 / R^2.
- D_R (V^2 / 2) = DR (G M1 / R)
- V^2 / 2 = (G M1 / R) + C.

We can evaluate the constant (C) by setting Ro at t = 0, solving for C at the initial velocity V = Vo, and initial radial distance R = Ro.

- C = [(Vo^2) / 2] – (G M1 / Ro)
- V^2 = Vo^2 + 2 G M1 ((1/R) – 1/Ro)

If R = Ro, V^2 = Vo^2, and we stay put. If we escape, R goes to infinity and we have that V^2 > Vo^2 – 2 G M1 / Ro. To escape, V must stay positive. So Vo^2 must stay equal to or greater than 2 G M1 / Ro. This tells us the minimum escape velocity from a gravitational center of mass.

- Ve = (2 G M1 / Ro)^1/2.

The next step is to substitute c^2 for Ve^2, since light is the fastest physical phenomenon. If a photon can not escape, then we have a black hole.

- c^2 <= Vo^2 = 2 G M1 / Rbh.
- Rbh <= 2 G M1 / c^2

Here Rbh is the radius of the black hole from the singularity to the event horizon. This gives us a pretty good calculation for the Schwarzschild radius. Even though we did not do a thorough relativistic calculation, it turns out to be very close to the correct answer. We can take the maximum Schwarzschild radius as the event horizon for our black hole. Objects inside that radius presumably must stay inside. (However, we'll see that there are special exceptions to this rule due to quantum mechanical effects.)

The de Broglie wavelength (Ldb) is what defines the size of a particle as a wave structure. It is the ratio of Planck's constant (h) to the light-speed momentum (M c) of the particle. For example, here is the de Broglie wavelength of an electron (Me).

- Ldbe = h / Me c = 2.43x10^-11 m.

So there must be a de Broglie wavelength for our proposed black hole particle.

- Ldb = h / (M1 c).

We reduce (h), using (H) to represent the reduced form, and (P) for pi so that it becomes a "radius".

- h = 2 P H.
- Ldb = (2 P H) / (M1 c)

Then we set Ldb equal to the maximum Rbh and solve for M1 as our proposed Planck Mass.

- 2 G M1 / c^2 = 2 P H / M1 c.
- M1^2 = P H c / G.
- M1 = (P H c / G)^1/2. = 3.858x10^-8 kg.

This result looks suspiciously like our finding for the Electro-Gravity Equilibrium. Also, although the solution differs, it is in the same general ball park. Visual inspection of the two equations suggested to me that Bohr's formula for the fine structure constant (a) might be a link between the two.

- a = k e^2 / H c.

Sure enough, when we insert (a) as a factor in our Black Hole Derivation, the Black Hole Planck Mass equals the Electro-Gravity Equilibrium Planck Mass (within a factor of pi). This is not totally surprising if the EM force and the G force are supposed to become unified at the Planck Mass.

- Bu^2 = H c a / G.
- **Bu = (H c a / G)^1/2**.

Since the two derivations express the same result in different ways, we can equate them.

- H c a / G = k e^2 / G.

This reveals a deep inner connection between charge and Planck's constant that is independent of gravity.

- **H c a = k e^2**.
- e^2 = H c a / k.
- **e = (H c a / k)^1/2**.

This elegant formula, which is just a rearrangement of the fine structure constant, has the same structure as the Planck Mass Black Hole formula except that (e) takes the role of the Planck Mass, and (k) plays the role of (G)!! This formula also confirms the relation between (h-bar) as the unit of quantum spin and (e) as the unit of charge. The compound (H c) introduces the Dimensional Shift Factor (%) = 3.1622 m as a fractal mechanism governing the spin. This factor based on the square root of 10 is closely akin to the Golden Mean ratio which is based on the square root of 5. The halving of 10 gives 5. This may be the (1/2) factor that arises in quantum spin units (H / 2). These interesting relationships require further study.

3) The Vacuum Density Permittivity Derivation

Our third approach to deriving the Planck Mass involves the permittivity constant (eo). This constant commonly appears in equations involving electricity, and represents the constant for the permittivity of electricity in a vacuum. The apparent value of (c) changes when photons move through various media and the permittivity constant also appears to change.

The permittivity is often represented in units as Coulombs squared per Newton meter squared (C^2 / N m^2). We can translate this complicated ensemble of units into plain English and call it a density. I express the permittivity as kilograms of pseudo-mass per cubic meter of space (kg / m^3). That is much easier to visualize than the definitions ordinarily used by scientists. We have already encountered the permittivity as a

component of the compound constant (k), where (P) is pi.

- k = 1 / 4 P eo.

This constant (k) was designed to make EM calculations convenient and clearly relates to spherical geometry. Maxwell unified electricity and magnetism with the following relation, where (mo) is the permeability of a vacuum to magnetism

- 1 = (c^2) (eo) (mo).

If (eo) is really the constant governing the permittivity of mass in space, then it should describe the Planck Mass as its fundamental value. We will start by simply equating a hypothetical mass (Mx) per cubic meter of space (Ru^3) to (eo). We use as our standard meter stick Ru = 1 m.

- Mx / Ru^3 = eo = 8.854x10^-12 kg / m^3.
- Mx = eo (Ru^3) = 8.854x10^-12 kg.

We are already in the right ball park. Our (Mx) is off by just a small factor. Let's find out what that (x) factor is.

* x = 1.86x10^-9 kg / 8.854x10^-12 kg.
* x = 2.1x10^2 = 210.

That is not a big number, and it is a pure number ratio. What could it mean? Let's first consider that masses in space generally tend to form spherical shapes. So we can turn our mass into a sphere with a standard Ru radius. We set the volume of a standard sphere at Ss = (4/3)(P Ru^3) and assume that (eo) refers to a hypothetical black hole mass distributed in our standard spherical space within a context of a pure vacuum with no external influences. So we set (Mx) also in terms of our standard sphere.

- Mx = (Ss) (eo) = 3.7x10^-11 kg.

We have a mass expressed in kilos but are still off by a factor of slightly over 50.

- P (As^2 / Ao^2) = 50.26.
- **Bu = [P (As / Ao)^2] (Ss) (eo)**

The term (As / Ao) is the ratio of the area of our unit black hole sphere's outer surface to the area of its maximum cross section. The former refers to the black hole's event horizon, and the latter refers to the possible range traversed by any particle oscillating in an orbit inside the event horizon of the spherical black hole. The ratio has the value 4 / 1, a universal constant of geometry. We take that ratio as an abstract radius. The factor we need is the area of the circle described by that abstract radius. That means the Planck Mass is the Vacuum Density Permittivity Constant (eo) times the volume of a Unit Sphere with a radius of 1 meter (Ss) times the area of an abstract circle with the radius 4. The value 4 comes from the ratio of the area of our Unit Sphere (As) to the area of its maximum cross section (Ao). A sphere with a radius of 1 meter and a mass of 1.86x10^-9 kg would float in our atmosphere. Ordinary air at 0* C and 1 atm would have a mass of 5.4 kg / Ss (that is, a density of 1.29 kg / m^3). Hydrogen would come to 0.377 kg / Ss. A mass of only 1.86x10^-9 kg / Ss would automatically catapult out of our atmosphere into outer space. This could solve the lift-off bottle-neck in the space program. However, we first have to figure out how to create and manage a DENSITY MODULATOR that would not collapse under the weight of atmospheric pressure. Since the Bu particle gives birth to the entire universe, this should be possible. We must learn how to manage it. It must be stable, and we must be able to modulate it over a range of possible densities, Ss, presumably being the maximum inflation for a single Bu particle.

We simplify our Permittivity derivation of (Bu) by recognizing that the disc and (eo) have a close relationship to the Coulomb constant (k).

- **Bu = Ss / [P k^2] eo**.

In this case the constant (k) functions like the radius of an abstract circle. There is a lot hidden in this relationship that remains to be understood. Basically the Permittivity Derivation describes a black hole sphere (Ss) with an event horizon (As) and a disc-shaped cross-section (Ao) in which a trapped photon can exercise itself. The vacuum permits a mass of one Bu as the fundamental particle with photons zipping around inside it. But, when we consider the dynamics of the system, we find that any Bu particle must coexist with a Bu partner in order to set up a stable black hole ensemble.

The Proton Mass.

In **OP** 8.14-15 I show the connection of the quantum spin marker (h-bar) to energy and to the fundamental structure of the proton, whose essential makeup is pi times the ratio (e/c) with a Radial Unit for its magnetic field. This gives the elegant mass of the proton (Mp), which was previously unknown.

- Mp = (π b) (e / c).
- A. = πWb = π b^2.

Here (e) is the quantum of electric charge, (b) is the quantum of magnetic charge (square root of a weber, and thus = 1 Ru = 1 meter), and (c) is light speed. The ratio (e / c) also shows up in the Dirac equation for the electron, and is the fundamental ratio of charge to light speed.

* 2 P Ru = Oo. [Oo is the circumference of the Meter Unit Circle].
* 2 Mp = Oo (e / c)

This is the mass of a hydrogen molecule, H2. A single proton vibrates super fast, flipping backward and forward in time in a circular orbit that averages about 1 meter in radius and creates the illusion of two protons forming a molecule of hydrogen gas. Actually this is still just half of a helium atom that has lost its bond due to thermal agitation. Let's explore deeper into the relationship between hydrogen, helium, and the Bu Planck Mass particle.

Bu particles are unstable by themselves and immediately decay, which is why we do not see them lying around. They are also too heavy to create in high-energy particle collisions so we do not see them spewing out of particle accelerators. But an overlapping pair of Bu particles becomes extremely stable, forming a mini black hole in the center. This black hole has an inverse mass of 4.83x10^-10 kg^-1. The two interacting Bu masses multiplied together times the black hole inverse mass gives as its resultant product the mass of the proton. In terms of "real world" mass the black hole comes to 2.07x10^9 kg, a sizable hunk of virtual hyperspace/time warp energy.

* (1.86x10^-9 kg) (1.86x10^-9 kg) (4.83x10^-10 kg^-1) = (1.67x10^-27 kg).
* (1.86x10^-9 kg) (1.86x10^-9 kg) / (2.07x10^9 kg) = (1.67x10^-27 kg).

Stephen Hawking discovered that black holes can radiate by quantum processes. Virtual pair production at the event horizon of the black hole can result in one member of a virtual pair occasionally escaping from the hole, while the other member scatters back into the hole. Thus black holes can radiate. According to Hawking's formula, a radiating

black hole has a temperature. The smaller the hole, the hotter its temperature and the greater its radiation become. The Bu black hole with a "real world" mass of around 10^9 kg is very hot, with a temperature of around 10^13 or 10^14 K. This means it has a temperature and density right around the Quark-Hadron Transition Window (roughly 10^9 kg / m^3). This is at the equivalent of around 10^-7 seconds after the Big Bang. The Quantum Gravity Super-Symmetry breaks at 10^-42 seconds, and nuclear synthesis occurs at around 1 second. Hovering at the Quark-Hadron Transition Window a Bu black hole spontaneously spits out protons and neutrons at high frequency. But the ensemble immediately traps them and swallows them again. So the Bu ensemble becomes a proton movie projector. We see the movie of our physical universe as the resultant of this super high frequency zitterbewegung that may go on at a frequency of about 10^34 Hz.

The (h-bar) component in the Bu Black Hole Derivation has to do with the spin, justas it does in the Dirac equation and the Schroedinger equation. Once the Bu particle becomes an interacting pair, the appearance of spin can emerge. The compound (h-bar c) also introduces the fractal Dimensional Shift Operator (%), which is 3.1622 m (or the square root of 10 square meters) times a fundamental quantum unit of energy. (See my article "The Geometry of White's Dimensional Shift Operator %" at www.dpedtech.com.) A weber (or squared Radial Unit) shifted by one order of magnitude becomes (%) squared. The ratio of the Dimensional Shift circle (pi times % squared) to Ao is the pure number 10. The role of the Dimensional Shift Operator (%) that comes up both in geometry and physics is to enable the twisting spin-energy to tunnel as a fractal into and out of the Phi Vortex, not as an arbitrary spatial interval, but as the constant value formed by the conjunction of the Planck scale and the speed of photons (h-bar c). In other words PHI and (%) are fractal partners that bridge geometry and physics, as my D-Shift article demonstrates.

- **[%] = [(10/5)^.5] [(5)^.5] = (10)^.5.**
- **[%] = [(5)^.5] / [(.5)^.5].**
- **φ = [.5] [[(5)^.5] + 1]. (The usual formula for PHI.)**
- **φ = [.5] [[[(.5)^.5] [(10)^.5]] + 1].**
- **φ = [.5] [[[(.5)^.5] [%]] + 1]. (The [%] formula for PHI.)**

Each number in the above equations written inside ( )'s is understood to be in meters squared (m^2). [%] = 3.1622 m. These equations give some insight into the relation between phi and [%]. However, when we wish to spiral and tunnel fractally, we use pure ratios – for example, [**% / Ru = %**]. The fourth and fifth equations show how [%] hides inside PHI wherever it goes. And, of course, we can turn things around and see how PHI hides inside [%] wherever it goes.

- **[%] = [(2)^(1/2)] [[2φ] – 1].**
- **[φ] = [1/2] [[[(1/2)^(1/2)] [%]] + 1].**

Note how self-similar the definitions of these numbers are. We can free both PHI and [%] up from units and treat them as pure numbers. The meter unit occurs because in the physics of our universe these numbers are tied to that interval, as in the example of (h-bar c). They form the keys to the fractal tunneling system that allows energy to shift from the Planck scale to the macroscopic scale and vice versa. They create the illusion of multi-dimensional space and also warp it into self-similar vortexes. Using the Radial Unit meter as a standard, they range over at least 39 orders of magnitude in our physical

universe, and maybe more.

The main component of the universe is the neutron. This hadron oddly is unstable when alone and decays into a proton, an electron, and an electron anti-neutrino. If we pack the electron and the neutrino back into the proton, they become part of an interactive package. We indicate this ensemble by multiplying the components. (We divide by anti-particles.) The (a) is the fine structure constant indicating the EM-interaction of the electron and the proton. The mass of the electron neutrino I calculate to be as follows as a maximum size reasonable particle packet. (See "Phase Conjugate Feynman Diagrams" at www.dpedtech.com for more detailed discussion of the reasoning behind this neutrino hypothesis. We need more experiments to determine the exact neutrino threshold.)

- Mne = H / % c = 1.111x10^-43 kg.
- Mp Me / Mne a = 1.8756x10^-12 kg.
- Mx = (Ss) (eo) = 3.7x10^-11 kg

This interactive compound (Mp Me / Mne a) turns out to be right in the ball park of the Bu particle and is only off by a factor of 19.7 from our initial Density Permittivity ball park that we called (Mx). In fact it is off by a factor of about 993.43 from Bu, but if we put in another (a), then we are only off by a factor of 7.251. If we add a (2 P) factor we are only off by a factor of about 1.15.

- 2 P Mp Me / Mne a^2 = 1.615x10^-9 kg.

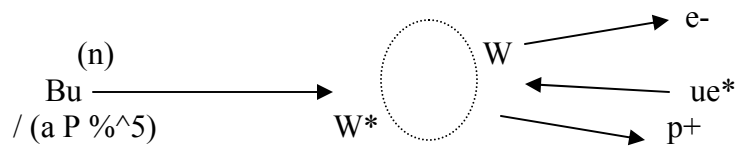
This is too close to be a coincidence. Our Black Hole Derivation was within a factor of (P) from the Electro-Gravity Derivation. This is a good deal closer than that. Considering that we range over 58 orders of magnitude, we have a very small discrepancy. Given the range of possible error on the electron neutrino's theoretical mass, which to date has not been accurately determined by experiment, we can surmise that we are just about on target. Below is my current adjusted version. The extra factor may reflect the constant tunneling that goes on between protons (Mp) and neutrons (Mn). A free neutron is unstable, and neutrons together with protons keep shuffling their quark identities back and forth as part of their zitterbewegung. We can temporarily call the extra factor (Ko) pending a determination of its exact value, components, and interpretation.

- **Bu = (Mp Me / Mne a) (P %^5 / Ru^5).**
- **Bu = (Mp Me / Mne) (Ko / a).**

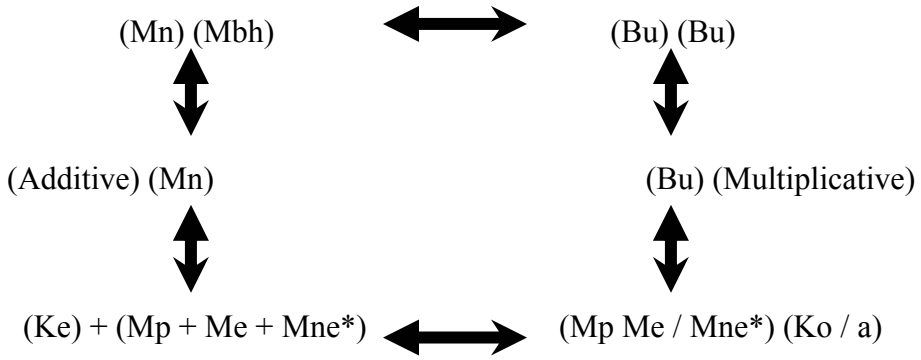
This gives us yet another derivation of the Planck Mass. Although it still leaves something to be desired on the level of precision, it combines all the basic stable particles. How do we interpret this equation? The constant (Ko) is a pure number that looks to me in the form I have written it like pi times the ratio (% / Ru) taken to the fifth power. We can simplify our notation for this ratio, using the underscore (_) to represent (%) as a pure numerical value without its distance unit.

- Ko = P %^5.
- **Bu = (Mp Me / Mne a) (P %^5)**.
- **(Bu)** (ve) / **(p+) (e-) = (P %^5)** (a)

This looks like 4-particle mixing phase conjugation. (In OP 10.49 I first derived this relationship as a rough approximation in terms of (eo) without equating it to (Bu).) The ensemble looks a lot like a neutron beta decay Feynman drawing with **(Bu / a P %^5)** or **(eo a^2 P % Ao)** playing the role of the neutron and the W-boson bubble. The (a) (P %^2) (%^3) may represent a scaling process to reduce (Bu).



The decay of a single (Bu) particle looks a lot like the decay of a neutron. According to our rules for interactions, the Bu first MUST become a neutron in order to undergo the beta decay reaction. A Bu times an electron neutrino is roughly equivalent to a proton times an electron. The secret to the cycle is recognizing that when components function as an integrated whole, we describe their interactions mathematically with multiplication. When the components "decay" into separate individual particles, we describe them as a collection mathematically by means of addition. Here is an overall picture of the cosmic jitter process. It can cycle in either direction.



The top line of the diagram describes the Bu pair with a black hole (Mbh) in the middle and a resultant neutron (Mn). The lower left hand side of the diagram describes the decay of the neutron into a proton, an electron, an electron anti-neutrino, and some kinetic mass-energy and/or radiation (around .2177 MeV/c^2, a little less than half an electron's worth). The lower right hand side of the diagram describes the three separate particles combined back into a single ensemble. They then interact by multiplication and generate a Bu particle. The constant (Ko) is (P %^5), and (a) is the fine structure constant. The Bu and its partner overlap to form the black hole (Mbh) that spits out a resultant neutron. This overall process jitters back and forth in a self-sustaining loop producing the illusion of atoms and molecules to an observer who has detached himself from the process. If the observer chooses to interact with the process, he experiences EM and gravitational forces depending on his local position relative to the process.

The first two of the three Bu derivations mentioned at the beginning of this article are equivalent via transformation with the fine structure constant over pi: **(a / P).** The two derivations follow very different approaches.

- Bu^2 = (P H c / G) (a / P) = H c a / G = k e^2 / G.

The third derivation shows how tightly connected the physical world is to pure geometry. The vacuum of space itself is programmed around a mustard seed of Big Bang potential. The pure geometry exists in the mental space of the observer. We can write all equations

of physics in terms of constants and variables. The invariant constants express the universal unchanging laws of our physical universe. The variables are supplied by the viewpoint an observer chooses to take. Observer physics proposes that by simply separating these two components of physics equations we can get a clearer understanding of what a non-local, universal "Law of Nature" (Time-Independent Core Belief about the Universe) is and what a local viewpoint held by an observer (Time-Dependent Personal Belief) is.

- G = Fg R^2 / M1 M2.

Newton's gravity equation contains one constant (G), while the forces, radius, and masses are all variable. (G) holds everywhere, while the variables hold depending on specific local conditions. The only thing universal about the variables is that their overall relationship must reflect the universal constant (G). We can also separate the constants of physics used in our descriptions of phenomena into constants related to energy and motion (the Physical World) and constants related to pure geometry (the Mental World). We can express every phenomenon as an equivalence relation between the mental geometry of space (ratios and scales) and a corresponding physical energy structure (conventional physical units and their relations).

- (As) = e^2 / Fs eo.

Here I have reformatted Coulomb's law for a pair of single charges at a unit meter separation, with the constants of geometry on the left (4 pi Ru^2) and the physical constants on the right. Since all components are constants, this gives us a standard constant value for the force (Fs). The equation becomes a universal law of nature that reflects in Mind Space as pure geometry and in World Space as a dynamic physical interaction. The pure geometry of Mind Space and the dynamic physical interaction of World Space are equivalent. This is the Unchanging Universal Law of Electrostatics as defined in the Core Beliefs of the Mass Consciousness of our Universe. We can solve for (Ru) in the proton formula and substitute into the above equation to see Coulomb's law in terms of protons.

* Ru = Mp c / P e.
* (4 / P) = e^4 / (Mp c)^2 (Fs eo).

We can express 4 as the ratio of a Unit Spherical Area (As) to a Unit Circular Area (Ao). This has direct bearing on Kepler's sweep law and the geometry of gravitational systems. Maximum electrostatic charge and maximum gravitational "charge" are found at the surface of a sphere. We can start a description of any phenomenon with a Unified Field of Nothing, a blank slate of pure zeroes. Then we define the seven fundamental universal constants of Euclidean Blank Mind Vacuum Geometry (7 chakra jewels for 7 quantum dwarves), plus an arbitrary set of five defined universal constant relationships that must be coherent among themselves. The seven jewels of geometry are Pi (P), the Unit Radius (Ru), the D-Shift Operator (%), the Unit Circumference (Oo), the Unit Circular Area (Ao), the Unit Spherical Area (As), and the Unit Spherical Volume (Ss). Other constants, such as Phi, are derived). In our universe the five fundamental physical constants are Planck's constant (h-bar), light speed (c), Newton's constant (G), elementary quantum charge (e), and the electric permittivity of the vacuum (eo). Other constants are derived. ("Snow White and the Seven Quantum Dwarves", OBSERVER PHYSICS, chapter 13, at www.dpedtech.com contains a handy procedure for constructing universes.)

To summarize, we can derive the Bu Unity Boson Planck Mass in at least three different ways. This fundamental particle, with a surprising mass of 1.86 nanograms, turns out to be the key to manifesting the structures of the neutron and proton. From the stability of the proton we gain a stable physical universe. The Planck mass only stabilizes when it can form an ensemble of two overlapping Planck masses yab-yum style. The two cosmic partners create a dynamic black hole IMPLOSION that produces a negative energy vortex between the Bu partners. This neg-energy vortex radiates by Hawking radiation, spitting out NEUTRONS that decay into PROTONS, and which the implosion then promptly swallows again. This high frequency zitterbewegung (zbw) appears to stabilize as the ecstatic flickering movie we call physical reality. The electron zbw is calculated at around 10^21 Hz, and generates winding and unwinding helical PHI vortexes of photon exchange that weave the color and texture of the movie. The overall proton zbw may well be in the range of 10^34 Hz and provides the structural framework for the EM designs traced on it.

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