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1.0 Abstract

When a charged particle travels faster than light, it emits Cherenkov radiation. When a charged particle is accelerated it emits a braking radiation called Bremsstrahlung. Inside a proton are the many configurations of the nucleons. It is proposed here, and likely proposed by others that there may be some equivalent process that there is a constant acceleration of charged particles or superluminal movement of charged particles that causes the mass of the proton or other particles.

It is proposed that the ratios of the masses of particles to the mass of the neutron is related to ratio of the Bremsstrahlung to the Bremsstrahlung where velocity is parallel to acceleration.

In the case of the mass ratio of the proton to the neutron, the possible form of the equation was found first. This paper is an attempt of an explanation and derivation for the equation that very closely, within the known Codata 2014 mass ratio of the proton to the neutron, gives the mass ratio of the proton to the neutron. An equation is developed below that uses the coupling dependence and Cherenkov radiation angles summing the radiation angles from 0 to $\frac{pi}{2}$ angles, assuming an ideal case of a non-dispersive medium (where phase and group velocity are the same(14), and integrating through what may appear to be multiple levels of dimensions. This equation then uses a component of Bremsstrahlung radiation and proposes that there may be some relationship to both Bremsstrahlung radiation and Cherenkov type radiation within the nucleons that causes some type of resonance that stabilizes the masses of the fundamental particles, which is further proposed to be a function of an orbital type structure of the nucleons. This resonance is potentially demonstrated for a proton.

This is a continuation of Sarnowski's Sphere Theory for the construction of the universe.

2.0 Equations

In an MIT course the Cherenkov radiation satisfied both a resonance and dispersion relation (1)

This is the following equation in their analysis.

$$Cos\theta = \frac{1}{\nu\beta} \qquad [1]$$

Where θ is the possible emission solution angles, ν is relative permittivity, and β is velocity divided by the speed of light. If $\nu = 1$, which is a possibility inside the nucleons.

$$Cos\theta = \frac{1}{\beta} \qquad [2]$$

Note: In this case the velocity is greater than the speed of light. This is true of Cherenkov radiation.

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If we look at the following google book (2) and equation 232 we find that θ must be divided by two to keep the sum of the angular momentums equal. Therefore we have

$$\frac{Cos\theta}{2} = \text{Possible emission solution angles.} \qquad [3]$$

If we integrate the possible emission solution angles $\frac{Cos\theta}{2}$ from 0 to $\frac{\pi}{2}$ but do this as the Cherenkov type radiation of the nucleons goes through 9 physical dimensions we than have the following equation.

$$\int_{pi/2}^{-pi/2} (\frac{Cos\theta}{2})^9 d\theta \qquad [4]$$

If we set equation 4 equal to $\frac{p(1-p)}{\sqrt{3}}$ we obtain the following

$$\frac{p(1-p)}{\sqrt{3}} = \int_0^{pi/2} (\frac{Cos\theta}{2})^9 d\theta \qquad [5]$$

And if we substitute p as follows, we get

$$p = \beta^2 = \frac{v^2}{c^2} \qquad [6]$$

We can substitute equation 6 into equation 5 and obtain the following.

$$\frac{\beta^2(1-\beta^2)}{\sqrt{3}} = \int_0^{pi/2} (\frac{Cos\theta}{2})^9 d\theta \qquad [7]$$

Beta^2=0.99862346164408415496780005

Or

$$\frac{\frac{v^2}{c^2}(1-\frac{v^2}{c^2})}{\sqrt{3}} = \int_0^{pi/2} (\frac{Cos\theta}{2})^9 d\theta \,. \qquad [8]$$

It is not known why setting equation [5] should be set equal to $\frac{p(1-p)}{\sqrt{3}}$. The value of $\frac{1}{\sqrt{3}}$ could be due to the Cherenkov nucleon type radiation going through a cuboctahedron angles of 60 degrees or the summing of the scalar number of 3 equal forces in the x, y, and z direction.

How do we obtain the relationship of $p(1-p)$

Let's propose that the value p is a ratio. Here we show that p may be the ratio of the mass of the proton to the neutron. Let's propose that this ratio may come about by calculating the ratio of the Bremsstrahlung type radiation of the Proton to the Neutron. It is called Bremsstrahlung type radiation since it would be a radiation of photons that are absorbed back into the nucleons which would actually not get emitted outside of the nucleons. If we look at the most established for Bremsstrahlung Radiation, we have the following.

$$P = \frac{q^2\gamma^6}{6\pi\epsilon c}(\dot{\beta}^2 * (1-\beta^2) - (\vec{\beta}\times\dot{\vec{\beta}})^2) \qquad [9]$$

If we look at the case where the acceleration is parallel with the velocity, then

$$P_{parallel} = \frac{q^2\gamma^6}{6\pi\epsilon c}\dot{\beta}^2_{parallel} \qquad [9.1]$$

When we divide Equation 9 by Equation 9.1 we obtain

$$\frac{P}{P_{parallel}} = \frac{\dot{\beta}^2 * (1-\beta^2) - (\vec{\beta}\times\dot{\vec{\beta}})^2}{\dot{\beta}^2_{parallel}} \qquad [9.2]$$

Lets propose that this equation contains some special situations.

1) $\dot{\beta}^2$ is constant and is equal to $\frac{1}{\sqrt{3}}$
2) $\dot{\beta}^2_{parallel} = 1$
3) $(\vec{\beta}\times\dot{\vec{\beta}})^2 = 0$

Then equation 9.2 becomes the following

$$\frac{P}{P_{parallel}} = \frac{1}{\sqrt{3}}(\beta^2(1-\beta^2))$$

We can then set this equal to the Cherenkov Radiation through 9 dimensions as proposed below.

We can then change the equation 5

$$\frac{p(1-p)}{\sqrt{3}} = \int_0^{pi/2} (\frac{Cos\theta}{2})^9 d\theta \quad [5]$$

To $$\frac{(\beta^2)(1-\beta^2)}{3^{0.5}} = \int_0^{pi/2} (\frac{Cos\theta}{2})^9 d\theta \quad [10]$$

$$p_x = \beta_x^2 = 0.9986234616\,44 \text{ , } \quad p_y = \beta_y^2 = 0.0013765383559\,15846 \quad [10.1]$$

The following equations of 7 and 8 propose that the mass of the electron has a small relativistic affect on the mass of the proton. This is not the actual electron, but because it would be an action inside of the proton nucleon, but is a hint that electron type of interactions are inside the proton as well. It also shows that there may be some relativistic affects within the nucleons and that masses are related to a dimensionless relationship to the speed of light as equation [11] appears to be a variation of the Lorentz factor.

$$\alpha = \frac{1}{\sqrt{1-(\frac{3^{0.5}\pi Me}{16Mn})^2}} = 1.0000000170555 \quad [11]$$

$$\frac{Mp}{Mn} = px * \alpha = 0.998623461644084 * 1.0000000170555 = 0.9986234786761 \quad [11.1]$$

$$\frac{Mp}{Mn} = 0.9986234786761 \quad [11.2]$$

The value of $\beta_x^2 = 0.9986234786761$, is very close to the ratio of the mass of the proton over the mass of the neutron.

Which is with less than one sigma of the proton-neutron mass ratio from Codata shown below.

Proton-neutron mass ratio m_p/m_n	
	0.998 623 478 44
Standard uncertainty	0.000 000 000 51
Relative standard uncertainty	5.1×10^{-10}
Concise form	0.998 623 478 44(51)

(4)

If we take equation 10

$$\frac{(-\beta^2(1-\beta^2)-(\vec{\beta}\times\dot{\vec{\beta}})^2)}{\sqrt{3}} = \int_0^{pi/2} (\frac{Cos\theta}{2})^9 d\theta$$

It is possible that there are other factors. We could multiply the left hand side of the equation to an orbital energy level as shown in equation 11

$$\frac{\lambda_p}{\lambda_n}\frac{(-\beta^2(1-\beta^2)-(\vec{\beta}\times\dot{\vec{\beta}})^2)}{\sqrt{3}} = \int_0^{pi/2} (\frac{Cos\theta}{2})^9 d\theta \qquad [11]$$

Where $\frac{\lambda_n}{\lambda_p}$ is defined below.

The Energy levels for the Bohr hydrogen atom is as follows.

$\frac{1}{\lambda_x} = R_\infty(\frac{1}{n_1^2} - \frac{1}{n_2^2})$ where $R_\infty = \frac{m_e q^4}{8\varepsilon_0^2 h^3 c}$ and where n_1 and n_2 are any two different positive integers (1, 2, 3, ...), and λ is the wavelength (in vacuum) of the emitted or absorbed light.

We will called λ_p for the electron and λ_n for the neutron. It is not possible to measure these levels, but we can see if these wavelengths follow a pattern for the masses of particles.

It is proposed that the ratio of the mass of the proton to the neutron, and of course other particles is related to the ratio the energy levels of a similar process to the Bohr hydrogen, but at a deeper level. It is not expected that R_∞ is not the same number for this deeper level, but this number does not need to be known since we will be taking ratios of the wavelengths and the R_∞ ratio will become one. For the proton to neutron orbital energy ratio the following equation is proposed.

$$\frac{\lambda_n}{\lambda_p} = \frac{R_\infty(\frac{1}{n_{1p}^2} - \frac{1}{n_\infty^2})}{R_\infty(\frac{1}{n_{1n}^2} - \frac{1}{n_\infty^2})} \qquad [12]$$

The following values are substituted in. $n_{1p} = 1$, $n_\infty = \infty$, $n_{1n} = 1$, $n_\infty = \infty$ which yields

$$\frac{\lambda_n}{\lambda_p} = \frac{R_\infty(\frac{1}{1^2} - \frac{1}{\infty^2})}{R_\infty(\frac{1}{1^2} - \frac{1}{\infty^2})} = 1 \qquad [13]$$

Whatever the value of, R_∞, at the next level of dimensions, it cancels with the ratio in equation 2. Why have an equation for ratios of nucleon type of orbitals, when the ratio turns out to be “one”. It will be shown in future preprints, that this ratio is needed for the electron, muon, tauon, and other particles.

3.) Discussion

We see that Cherenkov type of radiation from the nucleons could offer some explanation for the mass of the proton. We also see that the equation use of integrating radiation angles to the ninth power, which may be an indication of the 9 physical dimension of string theory. More work needs to be done to determine why this particular equation for the proton neutron mass ratio and can this type of equation be applied to other particles of mass.

Equation 7 and 8 show that there could be some relationship between Cherenkov radiation to Bremsstrahlung radiation when calculating the mass ratio of the proton to the neutron. It is also interesting to note that the ratio would be equivalent to some type of ratio of velocity of a particle squared to the speed of light squared.
This relationship isn’t proven, but the relationship seems to be more than mere coincidence. It seems to be a start to finding the causes for the mass relationships of particles.

It is not known why the value of $\beta^2 * (1-\beta^2)$ should be used. It however does look like it would be a special case of Bremsstrahlung radiation, which in here, it is named a special case of Nucleon Bremsstrahlung Radiation.

The equation, $\frac{(\beta^2)(1-\beta^2)}{3^{0.5}} = \int_0^{pi/2} (\frac{Cos\theta}{2})^9 d\theta$, is empirical for the proton/neutron mass ratio. Since we cannot actually see at $10^{-35} meters$ or ever hope to, it is likely that the equations will continue to be empirical unless overwhelming evidence shows Sarnowski’s Sphere Theory to be a consistent model for the universe and particles. However it may be possible to improve on Equation 9 shown below.

$$P = \frac{q^2 \gamma^6}{6\pi \epsilon c} (\dot{\beta}^2 * (1-\beta^2) - (\vec{\beta} \times \dot{\vec{\beta}})^2) \quad [9]$$

If we look at equation 9 it can be simplified under certain conditions. For the situation when the velocity is parallel to acceleration the equation simplifies as follows. (14)

$$P_{aparallelv} = \frac{q^2 \gamma^6}{6\pi \epsilon c^3} \quad [14]$$

Or when velocity in perpendicular to acceleration, then

$$P_{a\,perpendicular\,v} = \frac{q^2\gamma^4}{6\pi\epsilon c^3} \qquad [15]$$

We can see that it is conceivable that the left hand side of equation 10, $\frac{(-\beta^2(1-\beta^2)-(\vec{\beta}\times\dot{\vec{\beta}})^2)}{\sqrt{3}}$, could be part of some ratios of special conditions of Bremsstrahlung radiation like equations 14 and 15.

> We see the possibility that the ratio of the mass of the proton to the neutron could also be related to a nucleon type of orbital, and we see that the proton mass may also include a relativistic component related to the electron mass. We also see, consistently that particles seem to be related to a geometric factor related to 90 and 60 degree angles, both observed in a cuboctahedron structure.

Brian Greene states in “The Elegant Universe”. Page 203 (10), “Why does string theory require the particular number of nine space dimensions to avoid nonsensical probability values?” If one looks at how the fine structure, alternative derivation shown in “Evidence for Granulated Space” (8) Equation 2, shows that the aether is made of spheres made of spheres. The discontinuities inherent in a sphere made of spheres, being responsible for all properties we can measure, as evidenced by the calculations in “How can the Particles and Universe be Modeled as a Hollow Sphere.” (9)

In the following quote it is indicated that vibrating strings at certain resonances could account for forces and masses.

The basic idea behind **String Theory** is that all of the different "fundamental particles" of the Standard Model are really just different versions of one basic object: - a vibrating oscillating string. Ordinarily an electron is pictured as a point with no internal structure. A point cannot do anything but move. But, if string theory is correct, then under an extremely "powerful microscope" (way beyond today's capabilities) we would realize that the electron is not really a point, but a tiny loop of vibrating string (sometimes called a filament). A string can do somethings besides move - it can oscillate in different ways. If it oscillates one way, then from a distance we see an electron and we are unable to tell it is really a string. But if it oscillates some other way, we call it a photon, or a quark, and so forth. If **String Theory** is correct, the entire universe is made of oscillating strings. See the illustration at the left showing some strings that might make up a quark.[12]

In Sarnowski’s Sphere Theory it is not strings, but rotating spheres and imperfections that may be creating these stable resonances that give properties to our universe.

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This paper doesn't show the universe is granulated, but does show it is possible that Cherenkov type radiation and Bremsstrahlung radiation in the nucleon, could help account for the particular mass of particles.

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