

The secret of the Electron-Positron pair

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"Our first endeavors are purely instinctive prompting of an imagination vivid and undisciplined. As we grow older reason asserts itself and we become more and more systematic and designing. But those early impulses, though not immediately productive, are of the greatest moment and may shape our very destinies. Indeed, I feel now that had I understood and cultivated instead of suppressing them, I would have added substantial value to my bequest to the world. But not until I had attained manhood did I realize that I was an inventor." - *Nikola Tesla*

Abstract: It is a fact that a great number of scientific papers and patents have been published related to Quantum Gravity, Unified Field, Space-Time Engineering, Gravity Control, Propulsion without the need of a propellant, Instantaneous Telecommunications, Warp Drives, Over Unity devices est. Most of them have a complicated theory or unclear results which makes the scientific community to have doubts if they are feasible. The Author starting from the known Electron-Positron pair creation phenomenon, will reveal the entire matter creation process which will lead to the discovery of the Aether and ultimately to the topology and the properties of our universe. A simple experiment which was carried out successfully by the Author agrees with the findings of the proposed theory. A part of this work is inspired by Rhythmodynamics of Dr. Y.N.Ivanov.

Keywords: Rhythmodynamics, Pair production, Aether, Moving Standing Waves, Gravity Control, Warp Drive, Space-Time Engineering, Casimir Force, Strong Force, Quantum Newtonian Gravity, Unified Field.

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Electron-Positron pair creation

Starting with the basic Maxwell equation of the conservation of Energy we have:

$$\frac{\partial E}{\partial t} = -\int_V \vec{E} \cdot \vec{J} dV - \int_S (\vec{E} \times \vec{H}) \cdot d\vec{s} \quad eq.(1)$$

The eq. (1) means that the decrement of E/M field energy $\frac{\partial E}{\partial t}$ is due to the

dissipation upon matter as Joule Energy

$$\frac{\partial E_{Joule}}{\partial t} = -\int_V \vec{E} \cdot \vec{J} dV$$

and as Radiation Energy to the environment with an amount of

$$\frac{\partial E_{radiation}}{\partial t} = -\int_S (\vec{E} \times \vec{H}) \cdot d\vec{s}$$

In case of Electrostatic Fields, eq. (1) becomes:

$$\frac{\partial}{\partial t} \int \left(\frac{1}{2} \vec{E} \cdot \vec{D} \right) dV = -\int_V \vec{E} \cdot \vec{J} dV - \int_V \vec{\nabla} \cdot (\vec{E} \times \vec{H}) \cdot dV \quad eq.(2)$$

Now in vacuum with static charges which create an Electrostatic Field and with absence of currents the eq. (2) concludes there is no variance on the energy of the E/M field (in this case we have only Electrostatic Field) as also with no created current it gives:

$$-\int_V \vec{\nabla} \cdot (\vec{E} \times \vec{H}) \cdot dV = 0 \quad eq.(3)$$

Eq. (3) concludes when we move the minus to the right side (it can be claimed as two opposing energies); it is like the meaning that the radiation is zero coming from the environment according to some new theories. In the following pages we will prove with simple formulations that something is created from the vacuum, when a wave approaches an Electrostatic Field, with increasing Field Intensity.

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These formulations will be applied on the pair creation where a γ -photon approaches a heavy nucleus.

It is known the creation of an Electron-Positron pair needs an amount of energy given by: $m_{e^+} \cdot c^2 + m_{e^-} \cdot c^2 = hf_\gamma$

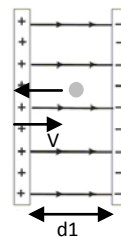
So the γ -photon must have Energy:

$$E_\gamma = hf_\gamma = 1.022 MeV = 1.637 \cdot 10^{-13} \text{ Joule}$$

$$\text{and } f_\gamma = 2.47055 \cdot 10^{20} \text{ Hz}$$

Opposite to eq. (2) where the change of energy related to the distance from the nucleus becomes equal to the energy of the γ -photon, and then starts the process of matter creation. The vanishing of the γ -photon could be initially due to the interaction with the strong Electrostatic Field of the nucleus.

A thought experiment: Let us suppose we have a capacitor with parallel plates at a finite distance d_1 which creates a linear Electrostatic field E_1 .



We put instantly in the middle of the distance d_1 , a negative charge. The negative plate is kept stationary and with an external force the positive plate starts to move with a speed (V) towards the negative plate. At a specific moment the value of the Electrostatic field will increase to E_2 and the distance between the plates will be d_2 .

Note: The above corresponds illustrative to the motion of the γ -photon towards a radial Electrostatic Field.

Initially the negative charge has zero velocity and when the distance between the plates is equal to d_1 , it accelerates and reaches a final speed given by:

$$V_{q^-} = \sqrt{\frac{2KQ_+ \cdot q_-}{m_{q^-} \cdot d_1}}$$

If we take the positive plate as the observer then when the distance is d_1 and after the pass of time equal to Δt_1 , the negative charge will be in a new position equal to $d_x + \Delta d$. During this transit the positive plate moves towards the negative plate with velocity (V) and the new distance between the plates will be:

$$d_2 = d_x + \Delta d - V \cdot \Delta t_1$$

It is exactly what happens when a stationary light source radiates and the observer moves towards the source which results to a longitudinal Blue Doppler shift for the moving observer.

The above thought experiment does not have the purpose to calculate the final speed of the electron during the transit. Instead of this, it gives the idea that a radial field can be replaced in function with a variable linear Field which its intensity is proportional to the velocity of one pole moving towards the other stationary pole.

Proportionally we could say that the photon experiences an increasing force opposing its momentum. Initially due to the distance, this force will be very limited and when the distance reaches a minimum value between the photon and the nucleus, then this force will be on its maximum. We expect at that distance the photon to stop completely.

This can be expressed as follow:

$$\begin{aligned} \Delta E_\gamma &= \Delta E_{Field} \Rightarrow \\ h \frac{c}{\lambda_\gamma} - h \frac{V}{\lambda} &= \frac{KQ_{Tot}^2}{r_1} - \frac{KQ_{Tot}^2}{r_2} \quad eq.(4) \end{aligned}$$

For the distance:

$$r_1 \rightarrow \infty \Rightarrow \frac{KQ_{Tot}^2}{r_1} = 0 \Rightarrow h \frac{c}{\lambda_\gamma}$$

This is the energy of the photon before it enters the field which is equal to its initial one. Eq. (4) can be also written:

$$\begin{aligned} \Delta E_\gamma &= \Delta E_{Field} \Rightarrow \partial E_\gamma = -\frac{KQ_{Tot}^2}{r} \Rightarrow \\ \partial \frac{hV}{\partial \lambda} &= -\frac{KQ_{Tot}^2}{r} \Rightarrow h \partial V = -\frac{KQ_{Tot}^2}{r} \partial \lambda \Rightarrow \end{aligned}$$

$$\begin{aligned} \int \partial V &= -\frac{1}{h} \int \frac{KQ_{Tot}^2}{r} \partial \lambda + C \Rightarrow \\ V &= C - \frac{KQ_{Tot}^2}{hr} \lambda \quad eq.(5) \end{aligned}$$

For initial conditions where C equals to the speed of light in vacuum and λ equals to the γ -photon wavelength, eq. (5) becomes:

$$V = c - \frac{KQ_{Tot}^2}{hr} \lambda_\gamma \quad eq.(6)$$

Eq. (6) tells us that the velocity of the γ -photon decreases with decreasing distance.

For nucleus with atomic number more than 80, Electron-Positron pair creation may occur. So if we could take ten different heavy nucleuses with different atomic numbers, Eq. (6) would give a different result at a time.

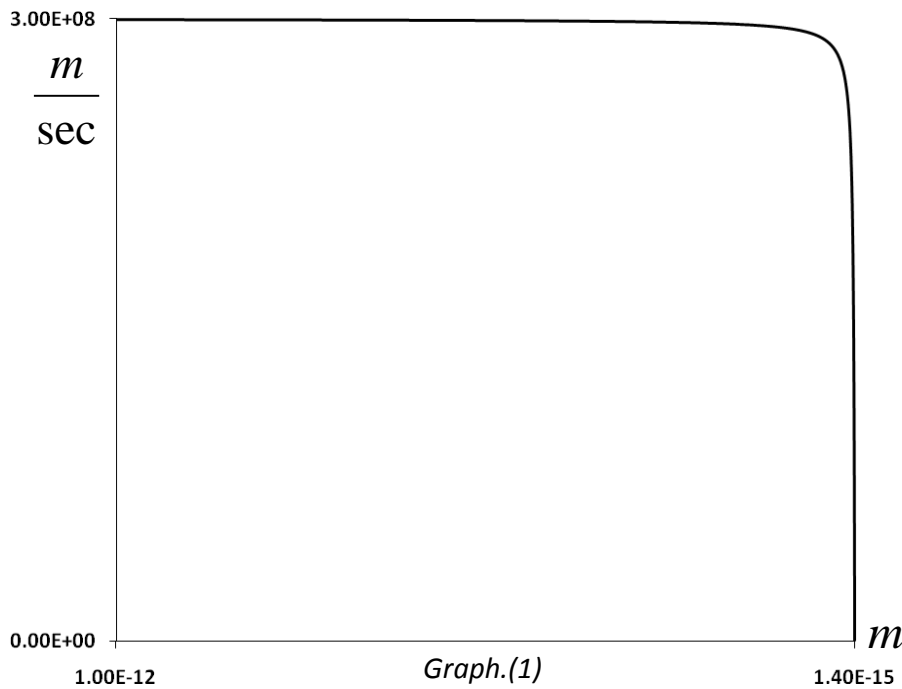
From the moment that the γ -photon vanishes and gives its position to the Electron-Positron pair, we could claim that the energy of the γ -photon becomes equal to the energy of the Electrostatic Field

created by a “frozen immovable” Electron (instead of a nucleus) at distance (Δr).

$$\text{So: } Q_{Tot} = -Q_e \Rightarrow Q_{Tot}^2 = Q_e^2$$

Velocity of the EM Wave

$$V = c - \frac{KQ_e^2}{hr} \lambda_\gamma \quad \text{eq.(7)}$$



For infinite distance (in reality we could use the today's calculated radius of the universe), the velocity of the E/M Wave becomes equal to the speed of light in vacuum.

$$\lambda_\gamma = 1.214307 \cdot 10^{-12} \text{ m}$$

$$Q_e = 1.602176565 \cdot 10^{-19} \text{ Cb}$$

$$h = 6.626068 \cdot 10^{-34} \frac{\text{m}^2 \cdot \text{Kgr}}{\text{sec}}$$

$$K = 8.987551787 \cdot 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{Cb}^2}$$

Eq. (7) shows some very interesting characteristics and the most important is the crossing with the X-Axis where the velocity of the E/M wave (γ -photon) goes to zero:

$$V = 0 \Rightarrow r = \frac{KQ_e^2}{hc} \lambda_\gamma \Rightarrow$$

$$r_c = \frac{KQ_e^2}{hc} \lambda_\gamma = 1.4085 \cdot 10^{-15} \text{ eq.(8)}$$

$$r_c = 1.4085 \text{ fm}$$

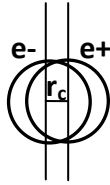
This is a surprising result since the order of magnitude of this distance is related with the Coulomb barrier as also with the initiation of the so called strong nuclear force.

Eq. (8) shows the distance from the “frozen” electron (will occur inside it, but this is valid only theoretically and has the purpose to calculate the initial distance between the pair) as also the initial separation distance of the Electron-Positron as it was claimed on the previous page. It is exactly the half of the classical electron radius:

$$\frac{r_c}{\lambda_\gamma} = \frac{KQ_e^2}{hc} \quad \text{and} \quad \lambda_\gamma = \frac{\lambda_{ce-}}{2} = \frac{h}{2m_e c} \Rightarrow$$

$$r_c = \frac{KQ_e^2}{hc} \lambda_\gamma = \frac{KQ_e^2}{hc} \cdot \frac{h}{2m_e c} = \frac{KQ_e^2}{2m_e c^2} \Rightarrow$$

$$r_c = \frac{r_e}{2}, \text{ eq.(8.1)}$$



Another important observation on Eq. (8) is the following:

$$\frac{r_c}{\lambda_\gamma} = \frac{KQ_e^2}{hc} = \frac{\alpha}{2\pi} \text{ eq.(8.2)}$$

Eq. (8.2) and Eq. (7) tell us that the ratio between the critical distance and the wavelength is equal to the reduced fine-structure constant; results to the vanishing of the E/M forces. The mystery of the fine structure constant origin is finally solved. It shows that the fine structure constant is depended by the wavelength and the critical distance. This has a fundamental consequence in all interactions.

For a proton and antiproton the critical distance will be equal to the half of the classical proton radius:

$$r_c = \frac{r_p}{2} = \frac{KQ_p^2}{2m_p c^2} = 0.7665 \cdot 10^{-18} \text{ m}$$

The Author claims that all the scattering processes like Compton, Rayleigh, Mie, Brillouin, and Raman can be explained via the reduction of the E/M wave velocity with distance by measuring the velocity inside the Electrostatic Field (Out of the field the velocity is c). The scattering mathematical formulations were developed to explain effects that were impossible using only the classical electron radius and a constant speed of light.

Another implication of this discovery where the E/M wave velocity varies with distance, opposes the second postulation of Einstein in Theory of Relativity, which supports a constant E/M wave velocity from whatever non accelerating inertial frame is measured. Under these circumstances the Coulomb force takes a new form:

$$K = \frac{1}{4 \cdot \pi \cdot \epsilon_0} = \frac{c^2 \cdot \mu_0}{4 \cdot \pi} \text{ eq.(9)}$$

$$K_v = \frac{1}{4 \cdot \pi \cdot \epsilon_0} = \frac{V^2 \cdot \mu_0}{4 \cdot \pi} \text{ eq.(10)}$$

$$K_v = K \frac{V^2}{c^2} \text{ eq.(10.1)}$$

Combining the above equations the Coulomb force generally is given by:

$$F_{cb} = \frac{KQq}{r^2} \cdot \left(c - \frac{KQ^2}{hr} \lambda \right)^2 \cdot \frac{1}{c^2} \text{ eq.(10.2)}$$

Then the Coulomb force between the Electron-Positron pair is:

$$F_{e^-e^+} = -\frac{KQ_e^2}{r^2} \cdot \left(c - \frac{KQ_e^2}{hr} \lambda_\gamma \right)^2 \cdot \frac{1}{c^2} \text{ eq.(11)}$$

It is clear for the distance given by eq. (8) the Coulomb force between the pair, drops to zero.

Eq. (10.2) incorporates the screening of the Electrostatic Field as also the dependence of the Coulomb force with the wavelength of the E/M wave. A similar conclusion is that at the critical distance appears a shielding effect against the E/M force.

Now to calculate the required Field Strength for an Electron-Positron pair creation is a kind of a paradox. We have proved above that when the distance reaches a critical value, the Coulomb force drops to zero, which is exactly the moment of matter creation.

It is needed such a field strength where the field itself will be self cancelled as Electrostatic Field. It means a field at the critical distance:

$$r_c = 1.4085 \text{ fm}$$

$$E_F = K \frac{|Q_e|}{r_c^2} = 7.258 \cdot 10^{20} \frac{\text{V}}{\text{m}} \text{ eq.(12)}$$

The last years there are several unsuccessful attempts to create Electron-Positron pair in vacuum by crossing laser beams, according to the prediction of the Schwinger effect which is two orders less than the found result of Eq. (12).

The required field strength for pair creation is huge according to Eq. (12) which makes more difficult the goal to be reached even with near future powerful laser beams. A laser beam needs to have a Power density as follow:

$$D = \frac{E_F^2}{Z_{\text{vacuum}}} = \frac{E_F^2}{377 \text{ Ohm}} = 1.39 \cdot 10^{39} \frac{\text{Watt}}{\text{m}^2} \text{ eq.(13)}$$

Let us suppose pair creation using the heavy nucleus ${}_{82}\text{Pb}^{208}$ (Lead) and a γ -photon. Then the distance from the center of the nucleus where the pair creation will take place according to eq. (8) and eq. (12):

$$(d_{pb}) = \sqrt{\frac{KQ_{pb}}{E_{\text{Field}}}} = \sqrt{\frac{K \cdot 82Q_e}{E_{\text{Field}}}} = \sqrt{82} \cdot r_c$$

$$(d_{pb}) = 9.055r_c = 12.76 \cdot 10^{-15} \text{ m}$$

The nucleus radius of ${}_{82}\text{Pb}^{208}$ (Lead) is estimated by (based on fixed Speed of light):

$$R_{\text{nuc}} = r_0 A^{\frac{1}{3}}, r_0 = 1.25 \cdot 10^{-15} \text{ m} \pm 0.2 \text{ fm}$$

$$R_{pb} = 1.25 \cdot 10^{-15} \cdot 208^{\frac{1}{3}} \approx 7.27 \cdot 10^{-15} \text{ m}$$

An interesting proposal by the Author is the Neutrino-Antineutrino pair creation by using an intense Electrostatic Field and a Laser beam or by crossing powerful laser beams. Let us take photon energy of 1eV which corresponds to an infrared 1240nm photon. The critical distance according to Eq. (8.2) is:

$$\frac{r_c}{\lambda_{1240\text{nm}}} = \frac{KQ_e^2}{hc} = \frac{\alpha}{2\pi} \Rightarrow$$

$$r_c = \frac{\alpha}{2\pi} \lambda_{1240\text{nm}} = \frac{\alpha}{2\pi} 1240 \cdot 10^{-9} \text{ m} \Rightarrow$$

$$r_c = 1.438 \cdot 10^{-9} \text{ m} \text{ eq.(13.1)}$$

The required field for the creation of the pair according to Eq. (13.1) and Eq. (12):

$$E_F = K \frac{Q_e}{r_c^2} = 6.96 \cdot 10^8 \frac{\text{V}}{\text{m}} \text{ eq.(13.2)}$$

The Power density for crossing infrared beams of 1240nm using Eq. (13.2) and Eq. (13), is:

$$D = \frac{E_F^2}{Z_{\text{vacuum}}} = \frac{E_F^2}{377 \text{ Ohm}} = 1.28 \cdot 10^{15} \frac{\text{Watt}}{\text{m}^2} \text{ eq.(13.3)}$$

The above results are a first approach to the Schwinger effect. Since it was never observed such kind of effect, the Author of this document will suggest totally two different ways of calculation which they give two different results (on the next pages).

Now as we proved the attractive Coulomb force drops to zero at the critical distance which means the particle pair is not influenced at the moment of its creation by its own Electrostatic Field. So the only force that acts upon them is the Gravitational force due to their mass:

$$m_{e^-} = m_{e^+} = 9.109 \cdot 10^{-31} \text{ Kgr}$$

$$r_c = 1.4085 \text{ fm}$$

Then:

$$F_G = G \frac{m_{e^-} \cdot m_{e^+}}{r_c^2}$$

$$F_G = G \frac{m_{e^-} \cdot m_{e^+}}{r_c^2} = 2.78 \cdot 10^{-41} \text{ N eq.}(14)$$

Although Eq. (14) gives an extremely small amount of force, this force is the only force at the moment which acts upon the pair with the result the attraction between them according to Newton's Gravitational Law (We will mention later the Newton's Universal Gravitational Law and how it is involved with these findings).

But we know from experiments that the pair at the end will be separated. So something needs to be added in the process to separate the pair and not to collapse.

But:

$$F_{e^-e^+} = -\frac{KQ_e^2}{r^2} \cdot \frac{1}{c^2} \left(c - \frac{KQ_e^2}{hr} \lambda_\gamma \right)^2$$

$$\left(c - \frac{KQ_e^2}{hr} \lambda_\gamma \right)^2 = c^2 +$$

$$\left(\frac{KQ_e^2}{hr} \lambda_\gamma \right)^2 - 2c \frac{KQ_e^2}{hr} \lambda$$

It is clear the term above is the Repulsive Force:

$$F_{rep} = -\frac{KQ_e^2}{r^2} \cdot \frac{1}{c^2} \left(\left(\frac{KQ_e^2}{hr} \lambda_\gamma \right)^2 - 2c \frac{KQ_e^2}{hr} \lambda_\gamma \right)$$

eq.(15)

This means:

$$\vec{F}_{e^-e^+} = \vec{F}_{NormalCb} + \vec{F}_{rep} \text{ eq.}(15.1)$$

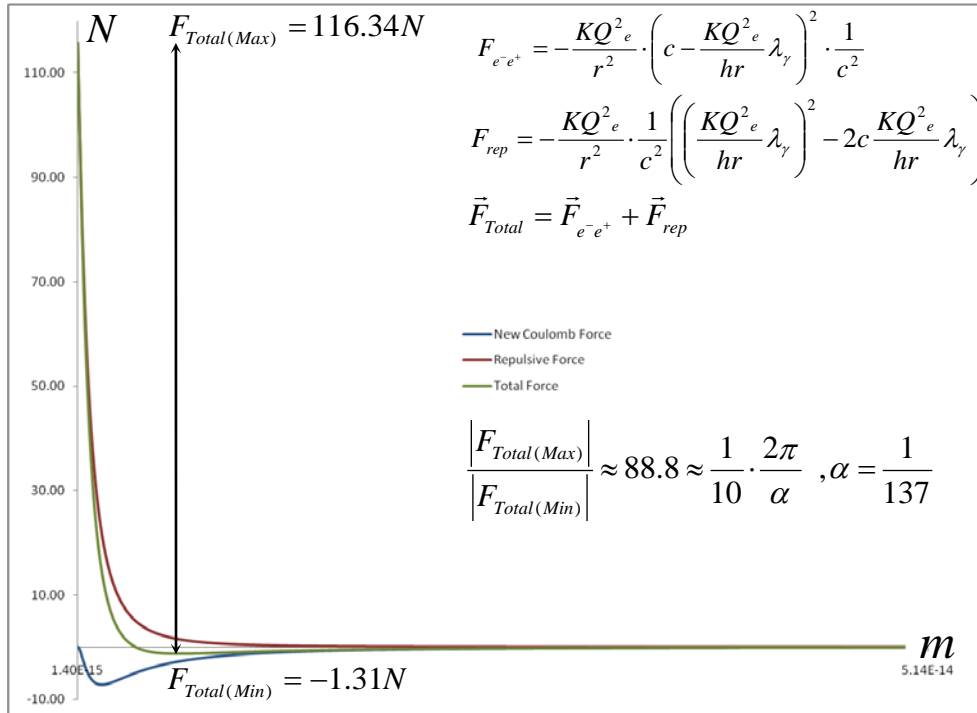
The new Coulomb force is the sum of the known regular Coulomb force plus the Repulsive force.

Eq. (15) as we see is integrated in Eq. (11). The Repulsive Force is an independent Force which comes from the pair itself as also influences the Coulomb force created by the pair. It is needed to be clear since the new Coulomb force is not the total Force which acts upon the pair.

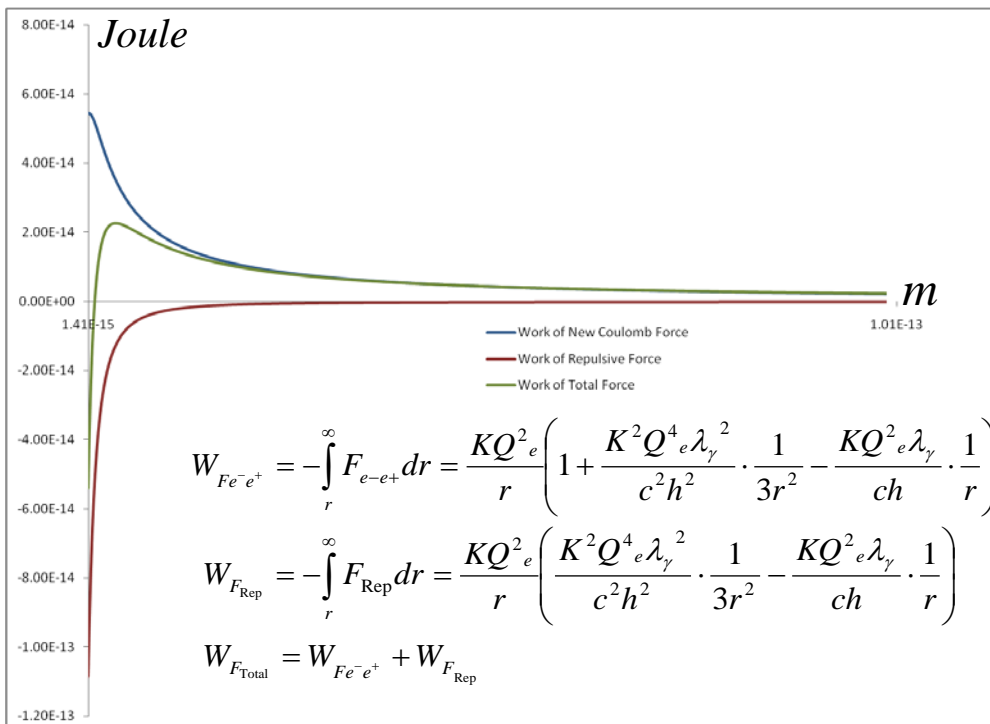
The total Force is given by:

$$\vec{F}_{Total} = \vec{F}_{e^-e^+} + \vec{F}_{rep} \text{ eq.}(16)$$

The Graphs on the next page show the Forces and the Work done by them.



Graph.(2)



Graph.(3)

The above Graphs were developed in relation with a stationary electron instead of a nucleus. Today Physics supports that Electron-Positron pair may occur when the energy of the γ -photon is more than the threshold energy of 1.022MeV since it is needed a nucleus to absorb the momentum of the photon according to the following equation:

$$E_{\gamma(Total)} \geq 2m_e c^2 \left(1 + \frac{m_e}{m_N} \right) \text{ eq. (17)}$$

The term m_N is the mass of the nucleus. According to our theory the deceleration of light creates an acceleration field or momentum when there is a mass present and this was shown via the discovery of the Repulsive force between the Electron-Positron pair.

Now when we have only one electron and the approaching γ -photon, the deceleration of light will become acceleration (due to Action-Reaction law) for the electron since its mass cannot absorb the entire momentum of the photon with result the continuously acceleration of the electron. It is needed an opposite force which will be applied to the electron to keep it stationary. This force will be equal to the Repulsive force as calculated above:

$$F_{ext} = -F_{Rep} \Rightarrow W_{F_{ext}} = -W_{F_{Rep}}$$

Then Eq. (17) becomes:

$$E_{\gamma(Total)} \geq 2m_e c^2 \left(1 + \frac{E_{\gamma(Threshold)}}{W_{F_{ext}}} \right) \text{ eq. (18)}$$

Then for pair creation using an electron as momentum absorber will be needed a total additional energy (for $r=r_c$):

$$W_{F_{ext}} = -W_{F_{Rep}} = \int_{r_c}^{\infty} F_{Rep} dr = 1.09 \cdot 10^{-13} \text{ Joule}$$

$$E_{\gamma(Threshold)} = 1.637 \cdot 10^{-13} \text{ Joule}$$

Then Eq. (18) gives the following result:

$$E_{\gamma(Total)} = 2m_e c^2 \left(1 + \frac{1.637 \cdot 10^{-13} \text{ Joule}}{1.090 \cdot 10^{-13} \text{ Joule}} \right)$$

$$E_{\gamma(Total)} = 2m_e c^2 (1 + 1.502) = 2.502 \cdot 2m_e c^2$$

$$\frac{E_{\gamma(Threshold)}}{W_{F_{ext}}} = Ratio \Rightarrow W_{F_{ext}} = 0.66 E_{\gamma(Threshold)}$$

It means 2.502 times the threshold energy or 2.502 times the threshold frequency. It is 0.502 times more than predicted by Eq. (17). Eq. (18) according to the results above with the electron as momentum absorber can be written as follow:

$$E_{\gamma(Total)} \geq 2m_e c^2 \left(1 + \frac{E_{\gamma(Threshold)}}{W_{F_{ext}}} \right) \Rightarrow$$

$$E_{\gamma(Threshold)} = \frac{KQ_e^2}{r_c}, r_c = 1.4085 \cdot 10^{-15} \text{ m}$$

$$W_{F_{ext}} = 0.66 \cdot Z^2 \frac{KQ_e^2}{r_c}$$

Then:

$$E_{\gamma(Total)} \geq 2m_e c^2 \left(1 + \frac{1}{0.66Z^2} \right) \text{ eq. (19)}$$

Z : Atomic Number of nucleus

Case $_{82}\text{Pb}^{208}$ (Lead) (The second suggestion from page 7):

$$r_z = 9.47 \cdot 10^{-12} \text{ m Distance from nucleus}$$

$$Z = 82$$

$$E_{\gamma(Total)} \approx 2m_e c^2 \left(1 + \frac{1}{0.66 \cdot 82^2} \right) = 2m_e c^2 \left(1 + \frac{1}{4437} \right)$$

$$E_{\gamma(Total)} \approx 1.022\text{MeV} + 230\text{eV}$$

Case $_{92}\text{U}^{238}$ (Uranium):

$$E_{\gamma(Total)} \approx 1.022\text{MeV} + 182\text{eV}$$

Case $_{111}\text{Rg}^{280}$ (Roentgenium):

$$E_{\gamma(Total)} \approx 1.022\text{MeV} + 125\text{eV}$$

A very important conclusion comes from the above calculations and Graphs: The additional energy which will be added to the threshold energy is used only against the Repulsive force which opposes the photon momentum and due to action-reaction law (the nucleus will try to move away) needs to be cancelled to have as result the pair production. Similarly today Physics supports the same according to Eq. (17), which means that the additional energy is named, recoiling particle.

A new effect is discovered during the pair creation and this is the Repulsive force as it was analyzed above. At the critical distance appears the Repulsive force with a maximum value. This force is the cause for the separation of the pair and not the additional energy (above the threshold) of the γ -photon. When we use γ -photon collisions, we do not need to have additional energy for the photons which will be given to the created pair. Two photons of exact threshold frequency and opposite momentums are needed to create the Electron-Positron pair. Such kind of experiment of colliding photons at exact threshold frequency (the problem is to find the necessary γ -photon radiation source) as far as the Author knows, never published.

Note: The Author did not use the escape angles of the pair for simplicity reasons as also for the next calculations they will be ignored.

Now to calculate the Kinetic Energy which is given to the pair due to the Repulsive force, we need to calculate the work of the total force to separate the pair from the critical distance to infinity (as seen on Graph. (3)):

$$W_{F_{\text{Total}}} = W_{F_{e^-e^+}} + W_{F_{\text{Rep}}} \Rightarrow$$

$$W_{F_{\text{Total}}} = -\int_{r_c}^{\infty} F_{e^-e^+} dr - \int_{r_c}^{\infty} F_{\text{Rep}} dr$$

Using the Graph (3) we see that the necessary energy to separate the pair from the critical distance to infinity is:

$$W_{F_{\text{Total}}} = -5.407 \cdot 10^{-14} \text{ Joule}$$

The sign of this energy is negative and this means that the pair is receiving this impulse of energy from the vacuum (We will call it like this for the moment. Later it will be revealed the cause of it.) and not by the additional γ -photon energy (as it is claimed today).

The pair at the critical distance has zero velocity. So all this impulse of energy will give a final velocity to the pair (we will ignore the differences in velocity of the positron due to the nucleus Coulomb repulsion force). The relativistic Kinetic Energy of the pair is given by:

$$KE^{++} = 2m_e c^2 \left[\frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} - 1 \right] \Rightarrow$$

$$v = \sqrt{1 - \left(\frac{2m_e c^2}{KE^{++} + 2m_e c^2} \right)^2}$$

$$KE^{++} = -W_{F_{\text{Total}}} = 5.407 \cdot 10^{-14} \text{ Joule}$$

$$m_e = 9.109 \cdot 10^{-31} \text{ Kgr}$$

$$v = 1.978 \cdot 10^8 \frac{m}{\text{sec}} = 0.6593c$$

$$v_{e^-} = -v_{e^+} = 0.6593c \text{ eq.(19.1)}$$

The maximum (not final) acceleration given to Electron-Positron pair according to Graph. (2) is:

$$a_{e^-} = -a_{e^+} = \frac{F_{\text{Total(max)}}}{2m_e} = \frac{116.34N}{2 \cdot 9.109 \cdot 10^{-31} \text{ Kgr}} \Rightarrow$$

$$a_{e^-} = -a_{e^+} = 6.386 \cdot 10^{31} \frac{m}{\text{sec}^2}$$

Strong Nuclear Force

From Eq. (15.1) and Eq. (16) we have:

$$\vec{F}_{e^-e^+} = \vec{F}_{NormalCb} + \vec{F}_{rep}$$

and

$$\vec{F}_{Total} = \vec{F}_{e^-e^+} + \vec{F}_{rep}$$

Then:

$$\vec{F}_{Total} = 2\vec{F}_{rep} + \vec{F}_{NormalCb} \quad eq.(19.2)$$

But in case of the force between two protons the Normal Coulomb force is Repulsive due to the positive sign of the charge. This means that the Total force formula will have positive sign in front of the equation (opposite to Electron-Positron Total force). Additionally instead of the γ -photon wavelength will be used the half of the proton's Compton wavelength according to Eq. (8.1) (The same we could do for the Electron-Positron pair and the Total calculated force would be the same as calculated by using the γ -photon wavelength). Eq. (19.2) is valid for the Electron-Positron pair. For the protons the Repulsive force in Eq. (19.2) becomes attractive and for the Normal Coulomb force is Repulsive. So eq. (19.2) becomes:

$$\vec{F}_{Total} = 2\vec{F}_{attr} + \vec{F}_{NormalCb} \quad eq.(20)$$

$$\vec{F}_{Total} =$$

$$2 \frac{KQ_p^2}{r^2} \cdot \frac{1}{c^2} \left(\left(\frac{KQ_p^2}{hr} \lambda \right)^2 - 2c \frac{KQ_p^2}{hr} \lambda \right) + \frac{KQ_p^2}{r^2}$$

$$\lambda = \frac{\lambda_{cp}}{2} = \frac{h}{2m_p c}$$

$$Q_p = Q_e$$

Then:

$$F_{StrongForce} = F_{Total}$$

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$$F_{StrongForce} =$$

$$2 \frac{KQ_p^2}{r^2} \cdot \frac{1}{c^2} \left(\left(\frac{KQ_p^2}{hr} \lambda \right)^2 - 2c \frac{KQ_p^2}{hr} \lambda + \frac{c^2}{2} \right)$$

Finally:

$$F_{StrongForce} =$$

$$2 \frac{KQ_e^2}{r^2} \cdot \frac{1}{c^2} \left(\left(\frac{KQ_e^2}{hr} \cdot \frac{h}{2m_p c} \right)^2 - 2c \frac{KQ_e^2}{hr} \cdot \frac{h}{2m_p c} + \frac{c^2}{2} \right)$$

eq.(20)

Eq. (8.2) can replace the Coulomb constant and Electron charge and so Eq. (20) becomes:

$$KQ_e^2 = \frac{hc\alpha}{2\pi}, \alpha = \frac{1}{137} \quad (\text{fine str.const.})$$

$$F_{StrongForce} =$$

$$2 \frac{hc\alpha}{2\pi r^2} \cdot \frac{1}{c^2} \left(\left(\frac{hc\alpha}{2\pi hr} \cdot \frac{h}{2m_p c} \right)^2 - 2c \frac{hc\alpha}{2\pi hr} \cdot \frac{h}{2m_p c} + \frac{c^2}{2} \right)$$

Then:

$$F_{StrongForce} = \frac{h\alpha}{c \cdot \pi r^2} \left(\left(\frac{h\alpha}{4\pi m_p} \right)^2 - \frac{hc\alpha}{2\pi m_p} + \frac{c^2}{2} \right)$$

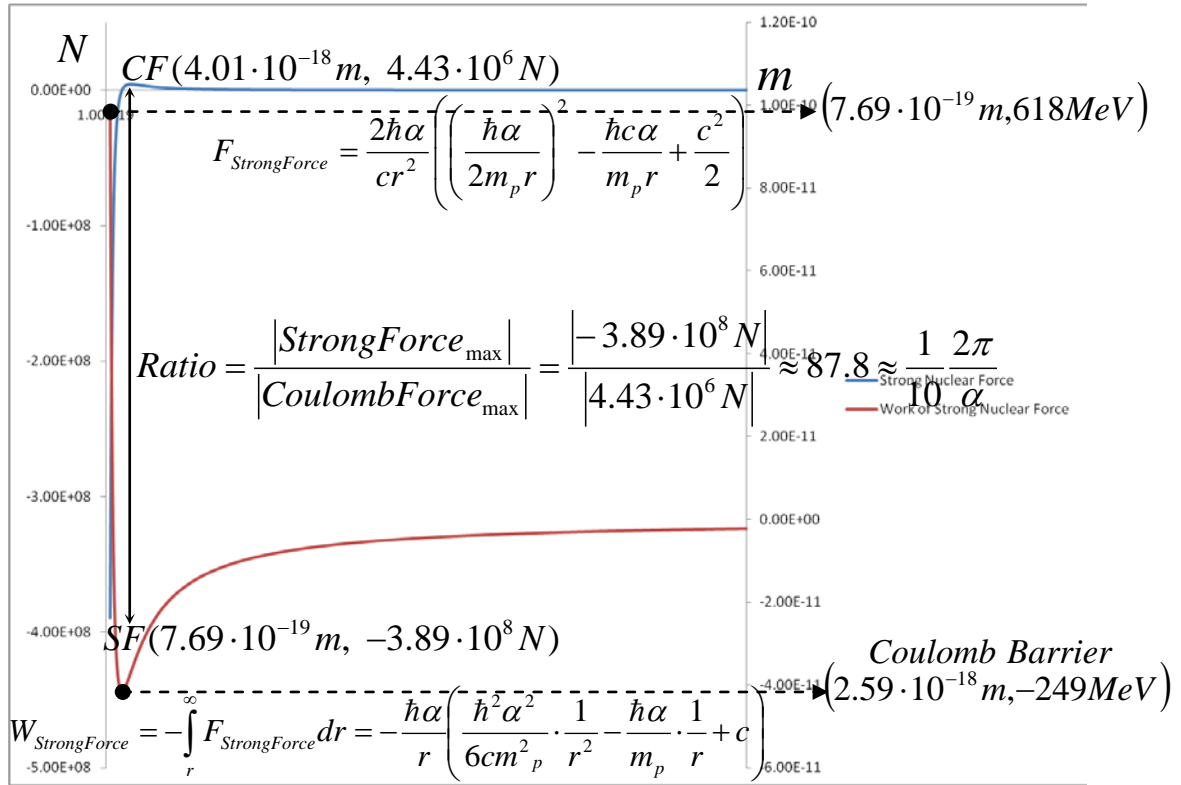
And finally:

$$\hbar = \frac{h}{2\pi}$$

Strong Nuclear Force

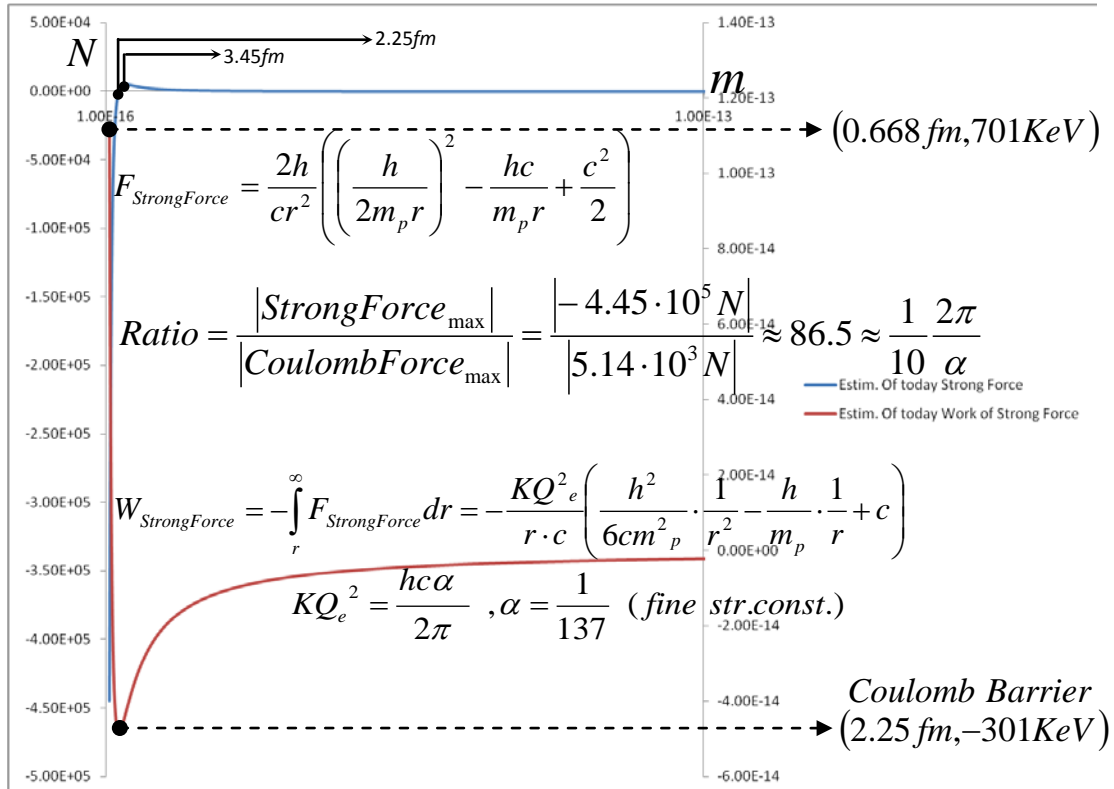
$$F_{StrongForce} = \frac{2\hbar\alpha}{cr^2} \left(\left(\frac{\hbar\alpha}{2m_p r} \right)^2 - \frac{\hbar c\alpha}{m_p r} + \frac{c^2}{2} \right)$$

eq.(21)



Graph.(4)

Note: Graph.(4) uses the classical proton radius and the reduction of the E/M wave velocity with distance inside an Electrostatic Field. Graph.(5) is an estimation of today accepted values which uses the 1.32fm proton radius, constant E/M wave velocity equals to c and reduced energy at $\alpha/2\pi$. **Attractive Nuclear Force Range: 0.668fm to 2.25fm. Repulsive Nuclear Force Range: 2.25fm to infinity.**



Graph.(5)

Casimir Force

Eq. (15) gives us the Repulsive Force
(Between the Electron-Positron pair):

$$F_{rep} = -\frac{KQ_e^2}{r^2} \cdot \frac{1}{c^2} \left(\left(\frac{KQ_e^2}{hr} \lambda \right)^2 - 2c \frac{KQ_e^2}{hr} \lambda \right)$$

$$\Rightarrow -\frac{KQ_e^2}{r^2} \cdot \frac{1}{c^2} \cdot \frac{KQ_e^2}{hr} \lambda \left(\frac{KQ_e^2}{hr} \lambda - 2c \right) \Rightarrow$$

But from Eq. (8.2), we have:

$$\frac{r_c}{\lambda} = \frac{KQ_e^2}{hc} = \frac{\alpha}{2\pi} \Rightarrow KQ_e^2 = \frac{h\alpha c}{2\pi}$$

Then the Repulsive Force becomes:

$$-\frac{h\alpha c}{2\pi} \cdot \frac{1}{r^2 c^2} \cdot \frac{h\alpha c}{2\pi} \cdot \frac{\lambda}{hr} \left(\frac{h\alpha c}{2\pi} \cdot \frac{\lambda}{hr} - 2c \right) \Rightarrow$$

$$F_{rep} = -\frac{\hbar c \alpha^2 \lambda}{2\pi r^3} \left(\frac{\alpha \lambda}{2\pi r} - 2 \right)$$

But from Eq. (8.2), we have again:

$$\frac{r_c}{\lambda} = \frac{\alpha}{2\pi}$$

Then:

$$F_{rep} = -\frac{\hbar c \alpha^2 \lambda}{2\pi r^3} \left(\frac{\alpha \lambda}{2\pi r} - 2 \right) \Rightarrow$$

$$-\frac{2\pi}{2\pi} \cdot \frac{\hbar c \alpha^2 \lambda}{2\pi r^3} \left(\frac{\alpha \lambda}{2\pi r} - 2 \right) \Rightarrow$$

$$-2\pi \left(\frac{\alpha}{2\pi} \right)^2 \frac{\hbar c \lambda}{r^3} \left(\frac{\alpha}{2\pi} \cdot \frac{\lambda}{r} - 2 \right) \Rightarrow$$

$$-2\pi \left(\frac{r_c}{\lambda} \right)^2 \frac{\hbar c \lambda}{r^3} \left(\frac{r_c}{\lambda} \cdot \frac{\lambda}{r} - 2 \right) \Rightarrow$$

$$-2\pi^2 c \frac{\hbar c}{\lambda r^3} \left(\frac{r_c}{r} - 2 \right) \Rightarrow -\frac{4}{4} \cdot 2\pi^2 c \frac{\hbar c}{\lambda r^3} \left(\frac{r_c}{r} - 2 \right) \Rightarrow$$

$$F_{rep} = -\frac{4\pi^2}{4\pi^2} \cdot 2\pi^2 c \frac{\hbar c}{\lambda r^3} \left(\frac{r_c}{r} - 2 \right) \Rightarrow$$

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$$A = 4\pi \left(\frac{r_c}{2} \right)^2 \text{ eq.(21.1)} \Rightarrow$$

$$F_{rep} = -A \frac{\pi^2 \hbar c}{2\pi^2 \lambda r^3} \left(\frac{r_c}{r} - 2 \right) \text{ eq.(22)}$$

$$\left(\frac{r_c}{r} - 2 \right) \approx -2 \text{ for } r \gg r_c \Rightarrow$$

Then Eq. (22) reduces to:

$$F_{rep} = A \frac{\pi^2 \hbar c}{\pi^2 \lambda r^3} \text{ eq.(23)}$$

If we consider the distance of the parallel plates as a transmission line with reflections, then we take as a rule of thumb that the length of the line must be greater than 0.1 times the transmitted wavelength:

$$\frac{\lambda}{10} \leq r \text{ or } \lambda \leq 10r$$

Purposefully we will set the half of the wavelength to:

$$\frac{\lambda}{2} \leq 12r \text{ eq.(23.1)}$$

Then Eq. (21) becomes:

$$F_{rep} = A \frac{\pi^2 \hbar c}{\pi^2 24r \cdot r^3} \Rightarrow \frac{1}{\pi^2 \cdot 24} \approx \frac{1}{240} \Rightarrow$$

$$F_{rep} = A \frac{\pi^2 \hbar c}{240r^4} \text{ eq.(24)}$$

We see on the Eq. (24) a positive sign which means repulsive and not attractive as it appears for the Casimir Force calculations in many scientific papers. The reader must take care that the above formulations are the result of the Electron-Positron pair creation effect where the repulsive force acts upon the pair to separate it.

Now the Casimir force can become attractive if we have a pair of electrons or pair of protons. Then Eq. (15) from negative sign goes to positive and the Casimir force:

$$F_{attractive} = -A \frac{\pi^2 \hbar c}{240r^4} \text{ eq.(25)}$$

This observation explains why on two parallel uncharged plates separated by a small distance, appears the attractive Casimir effect. This means minimum equal and same charge on both plates. When we apply a voltage difference this turns to Repulsive Casimir force according to the findings of the Electron-Positron pair.

The new way to prove the Casimir force as was provided by the Author can give more insight into this force and how can be controlled. There is a fundamental difference in understanding of this force which according to the Author of the present paper, Casimir forces appear not due to ZPF (Zero point fluctuations or Vacuum fluctuations) but due to radiation presence where the deceleration of light (interaction with the free electrons of the metal or the nucleuses of the metal) as we proved creates a force.

Let us choose a distance between those parallel plates equals to $r=100\text{ nm}$. Then Eq. (23.1) gives:

$$r = 100\text{nm}$$

$$\frac{\lambda}{2} \leq 12r \Rightarrow \lambda \leq 24 \cdot 100\text{nm} = 2.4\mu\text{m}$$

$$\lambda \leq 2.4\mu\text{m} \Rightarrow \frac{c}{\lambda} \geq \frac{c}{2.4\mu\text{m}} \Rightarrow f \geq 1.25 \cdot 10^{14}\text{ Hz}$$

These frequencies will be reflected on the plates with a gradient decreasing of their velocity. This will result to attraction in case of uncharged plates.

Another example:

$$r = 580\text{nm}$$

$$\frac{\lambda}{2} \leq 12r \Rightarrow \lambda \leq 24 \cdot 580\text{nm} = 13.9\mu\text{m}$$

$$\lambda \leq 13.9\mu\text{m}$$

On the bandwidth of $8\mu\text{m}$ to $14\mu\text{m}$, dominates the environmental thermal radiation (Infrared Radiation).

A third example shows a special interest:

$$r = 125\mu\text{m}$$

$$\frac{\lambda}{2} \leq 12r \Rightarrow \lambda \leq 24 \cdot 125\mu\text{m} = 3\text{mm}$$

$$\lambda \leq 3\text{mm} \Rightarrow \frac{c}{\lambda} \geq \frac{c}{3\text{mm}} \Rightarrow f \geq 100\text{ GHz}$$

On the Bandwidth of 100 GHz to 500 GHz dominates the Cosmic Microwave Background Radiation (CMBR), if there is not present other human made radiation sources.

The complete formula for the Repulsive Casimir force is given by Eq. (22):

$$F_{rep} = -A \frac{\hbar c}{2\lambda r^3} \left(\frac{r_c}{r} - 2 \right) \text{ eq.}(25.1)$$

And the attractive complete Casimir force:

$$F_{Casimir} = A \frac{\hbar c}{2\lambda r^3} \left(\frac{r_c}{r} - 2 \right) \text{ eq.}(26)$$

Or

$$F_{Casimir} = A \frac{\hbar f}{2r^3} \left(\frac{r_c}{r} - 2 \right) \text{ eq.}(27)$$

Eq. (23.1) and Eq. (26) revealed that in the process is involved the half of the wavelength which points to standing waves between the two parallel plates. By varying the phase of this standing wave on a specific frequency, it could be possible to change the force from Attractive to Repulsive.

On the next page it will be revealed the relation between the Casimir force and the Newtonian Universal Gravitational Law.

Quantum-Newtonian Gravity

The Newtonian Universal Gravitational law has proved its validity through the centuries for the large and small bodies of the Universe, but it found a great obstacle to be applied on atomic and subatomic level. The Author presents a solution which is related to the variance of the Gravitational Law in Quantum Level by several orders of magnitude.

Eq. (14) uses Newton's Gravitational law to calculate the attraction at the critical distance between the electron and positron. As we saw it gives an extremely small value of attraction force and later we proved that the pair is repelled from each other although having opposite signs due to the Coulomb force (which is zero at that distance). So we miss definitely something about the Gravitational law of Newton.

The Gravitational force between the pair for any distance is given by:

$$F_G = G \frac{m_{e^-} \cdot m_{e^+}}{r^2} \text{ eq.(28)}$$

Now we will replace the masses with the corresponding Compton wavelength:

$$m_{e^-} = m_{e^+} = \frac{h}{\lambda_{ce} c}$$

Eq. (28) then becomes:

$$F_G = G \frac{h^2}{\lambda_{ce}^2 \cdot c^2 r^2} \text{ eq.(29)}$$

The pair at the critical distance will be repelled from each other according to Eq. (25.1):

$$F_{rep} = -A \frac{\hbar c}{2\lambda r^3} \left(\frac{r_c}{r} - 2 \right)$$

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By making the Repulsive force equal to Eq. (29), we have:

$$F_{rep} = F_G \Rightarrow -A \frac{\hbar c}{2\lambda r^3} \left(\frac{r_c}{r} - 2 \right) = G \frac{h^2}{\lambda_{ce}^2 \cdot c^2 r^2}$$

Eq. (21.1) gives:

$$A = 4\pi \left(\frac{r_c}{2} \right)^2$$

Then the above is equal to:

$$\begin{aligned} -4\pi \left(\frac{r_c}{2} \right)^2 \cdot \frac{\hbar c}{2\lambda r^3} \left(\frac{r_c}{r} - 2 \right) &= G \frac{h^2}{\lambda_{ce}^2 \cdot c^2 r^2} \Rightarrow \\ -4\pi \left(\frac{r_c}{2} \right)^2 \cdot \frac{hc}{2 \cdot 2\pi\lambda r^3} \left(\frac{r_c}{r} - 2 \right) &= G \frac{h^2}{\lambda_{ce}^2 \cdot c^2 r^2} \Rightarrow \\ -\left(\frac{r_c}{2} \right)^2 \cdot \frac{c}{\lambda r} \left(\frac{r_c}{r} - 2 \right) &= G \frac{h}{\lambda_{ce}^2 \cdot c^2} \Rightarrow \end{aligned}$$

But:

$$\lambda = \lambda_\gamma = \frac{\lambda_{ce}}{2}$$

Then:

$$\begin{aligned} -\left(\frac{r_c}{2} \right)^2 \cdot \frac{2c}{\lambda_{ce} r} \left(\frac{r_c}{r} - 2 \right) &= G \frac{h}{\lambda_{ce}^2 \cdot c^2} \Rightarrow \\ -\left(\frac{r_c}{2} \right)^2 \cdot \frac{2c}{r} \left(\frac{r_c}{r} - 2 \right) &= G \frac{h}{\lambda_{ce} \cdot c^2} \Rightarrow \end{aligned}$$

$$G = -\left(\frac{r_c}{2} \right)^2 \left(\frac{r_c}{r} - 2 \right) \cdot \frac{2\lambda_{ce} \cdot c^3}{h \cdot r} \text{ eq.(30)}$$

For $r=r_c$, Eq. (30) gives:

$$\begin{aligned} G &= -\left(\frac{r_c}{2} \right)^2 \left(\frac{r_c}{r_c} - 2 \right) \cdot \frac{2\lambda_{ce} \cdot c^3}{h \cdot r_c} \Rightarrow \\ G &= \frac{r_c \lambda_{ce} \cdot c^3}{2h} = \frac{1.4085 \cdot 10^{-15} \cdot 2.4286 \cdot 10^{-12} \cdot (3 \cdot 10^8)^3}{2 \cdot 6.626 \cdot 10^{-34}} \end{aligned}$$

$$G = 6.9623 \cdot 10^{31} N \frac{m^2}{Kgr^2} \text{ eq.(31)}$$

Let us now solve Eq. (30) to find which distance corresponds to the today measured Gravitational constant:

(<http://physics.nist.gov/cgi-bin/cuu/Value?bg>)

$$G = 6.67384 \cdot 10^{-11} N \frac{m^2}{Kg r^2} \text{ eq.(32)}$$

As we can understand the difference between Eq. (31) and Eq. (32) is huge and this means that Eq. (32) corresponds to very large distances according to Eq. (30):

$$G = -\left(\frac{r_c}{2}\right)^2 \left(\frac{r_c}{r} - 2\right) \cdot \frac{2\lambda_{ce} \cdot c^3}{h \cdot r} \Rightarrow$$

$$\left(\frac{r_c}{r} - 2\right) \approx -2, \text{ for } r \gg r_c$$

Then the Eq. (30) becomes:

$$G = \frac{r_c^2 \cdot \lambda_{ce} \cdot c^3}{h \cdot r} \text{ eq.(33)} \Rightarrow$$

$$r = \frac{r_c^2 \cdot \lambda_{ce} \cdot c^3}{h \cdot G} \text{ eq.(34)}$$

Eq. (34) can be re-arranged as follow:

$$r = \frac{r_c^2 \cdot \lambda_{ce} \cdot c^3}{h \cdot G} \Rightarrow \frac{c^2}{r} = \frac{h \cdot G}{r_c^2 \cdot \lambda_{ce} \cdot c} \Rightarrow$$

$$\frac{c^2}{r} = \frac{1}{r_c} \cdot \frac{h \cdot G}{r_c \cdot \lambda_{ce} \cdot c} \text{ eq.(35)}$$

The term on the right side gives also acceleration:

$$a_{e-\text{accel}} = \frac{1}{r_c} \cdot \frac{h \cdot G}{r_c \cdot \lambda_{ce} \cdot c}$$

The meaning of the Eq. (35) is that the acceleration at far distance (r) of the Universe is equal to the acceleration of the Electron, if and only if the Gravitational constant is equal to its today value. The velocity of the Electron as also that of the Universe cannot be equal to the speed of light which is prohibited due to the Special Relativity Theory for matter.

So the final velocity for the Universe will be equal to the final velocity of the Electron at an almost infinite distance (which is actually finite). If we use the velocity given by Eq. (19.1) then we need to accept and expect a Material and Anti-material Universe.

The Author suggests that without Antimatter there was not possible the Big-Bang (due to mechanism of pair creation and separation) as also the calculated diameter is due to the Repulsive Force which is created only by the presence of Antimatter.

Then the question, where is Antimatter? As will be shown later on this work, the Aether was responsible for the capture of Antimatter which means it can be found at the point where the Big-Bang occurred (The center of the Universe). According to the Author's theory Antimatter became Aether (it will be proved) at the center of the Universe and if it is not (highly impossible) then it could be a "White Hole" due to compression of the Anti-Vortices (it will be shown later).

Due to the above assumption we need to re-calculate the velocity of the Electron, since the Positron (represents Anti-matter) was captured by the Aether (became stationary immovable Aethereal-particle) and this means that the entire Repulsion Energy was absorbed only by the Electron as Kinetic Energy. Then:

$$KE^{-+} = m_e c^2 \left[\frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} - 1 \right] \Rightarrow$$

$$v = \sqrt{1 - \left(\frac{m_e c^2}{KE^{-+} + m_e c^2} \right)^2}$$

$$KE^{-+} = -W_{F_{\text{Total}}} = 5.407 \cdot 10^{-14} \text{ Joule}$$

$$m_e = 9.109 \cdot 10^{-31} \text{ Kgr}$$

Then:

$$v = 2.3947 \cdot 10^8 \frac{m}{\text{sec}} = 0.798241c \text{ eq.}(35)$$

The Eq. (34) becomes:

$$r = \frac{r_c^2 \cdot \lambda_{ce} \cdot v^3}{h \cdot G} \text{ eq.}(36)$$

Now for:

$$r_c = 1.4085 \cdot 10^{-15} \text{ m}$$

$$\lambda_{ce} = 2.4286 \cdot 10^{-12} \text{ m}$$

$$h = 6.626068 \cdot 10^{-34} \text{ kgr} \frac{m^2}{\text{sec}}$$

$$G = 6.67384 \cdot 10^{-11} \text{ N} \frac{m^2}{\text{Kgr}^2}$$

$$v = 2.3947 \cdot 10^8 \frac{m}{\text{sec}}$$

Eq. (36) gives:

$$r = 1.49626 \cdot 10^{27} \text{ m} \text{ eq.}(37)$$

This is the distance between the electron-positron pair where the today Gravitational constant is valid. It means clearly the current radius of the Universe (taking as center the captured Antimatter by the Aether).

The accepted today value of the Universe diameter is somehow controversial and between $1.3 \cdot 10^{26} \text{ m}$ to $1.47 \cdot 10^{27} \text{ m}$.

According to Eq. (37) the diameter of the material Universe (with Antimatter captured by the Aether) is:

$$d_{\text{Universe}} = 2.99251 \cdot 10^{27} \text{ m} \text{ eq.}(38)$$

or

$$d_{\text{Universe}} = 316.315 \cdot 10^9 \text{ ly} \text{ eq.}(39)$$

The calculation of the Age of the Universe needs to know the velocity of expansion. Today is supported that the Universe expands with the speed of light c .

Eq. (35) gave us the final velocity of matter (with Anti-matter captured by the Aether):

$$v = 2.3947 \cdot 10^8 \frac{m}{\text{sec}}$$

We will use again the above final velocity as the expansion velocity of the Universe:

$$V_{\text{expansion}} = 2.3947 \cdot 10^8 \frac{m}{\text{sec}}$$

According to the Author's theory with the captured Anti-matter by the Aether, results that another Electron travelling oppositely (diametrically opposite) with the first one, will cover the same distance on the same time, which means the Age of the Universe must be based on the radius of the Universe:

$$T_{\text{Age}} = \frac{r_{\text{Universe}}}{V_{\text{expansion}}} = \frac{1.49626 \cdot 10^{27} \text{ m}}{2.3947 \cdot 10^8 \text{ m} \cdot \text{sec}^{-1}} \Rightarrow$$

$$T_{\text{Age}} = 6.2481 \cdot 10^{18} \text{ sec} \text{ eq.}(40)$$

or

$$T_{\text{Age}} = 198.126 \cdot 10^9 \text{ years}$$

Conclusively the initial diameter of the Universe will be equal to the critical distance between the Electron-Positron pair:

$$d_{\text{Initial Universe}} = 1.4085 \cdot 10^{-15} \text{ m} \text{ eq.}(41)$$

When we use the proton's Compton wavelength and the critical distance between the Proton-Antiproton we have as result about 10 billion times less diameter of the Universe than the calculated on page 16.

The non further division of the electron is a fundamental property which can be used to probe the dimensions of the material Universe. The question which arises is what happens with the sub-particles like the neutrinos which have smaller mass than the electron? (They will not be mention on this work)

If the Universe diameter given by the Eq. (38) will be proven correct, then all the Planck units (provided by dimensional analysis) need to be re-evaluated.

From the Eq. (36) we can calculate the acceleration of the Universe:

$$a_{univ(r)} = a_{e-accel} \Rightarrow \frac{V_{expansion}^2}{r_{univ}} = \frac{1}{r_c} \cdot \frac{h \cdot G}{r_c \cdot \lambda_{ce} \cdot V_{expansion}} \quad eq.(41.1)$$

$$r_{univ} = \frac{d_{univ}}{2} \quad and \quad , r_c = 1.4085 \cdot 10^{-15} m$$

By replacing the constants with their corresponding values, we receive:

$$a_{univ} = a_{e-accel} = 3.8327 \cdot 10^{-11} \frac{m}{sec^2} \quad eq.(42)$$

Then the mass of the material Universe (Anti-matter captured by the Aether) which corresponds to the above acceleration is:

$$G = 6.67384 \cdot 10^{-11} N \frac{m^2}{Kgr^2}$$

$$\frac{GM_{univ}}{r_{univ}^2} = a_{univ} \Rightarrow$$

$$M_{univ} = \frac{d_{univ}^2}{4G} a_{univ} \quad eq.(43)$$

Then the material Universe Mass (Antimatter is captured by the Aether (Ch.5)):

$$M_{univ} = 1.2857 \cdot 10^{54} Kgr \quad eq.(44)$$

The density of the material Universe will be in case the Universe is spherical:

$$\rho_{univ} = \frac{M_{univ}}{V_{univ}} = \frac{M_{univ}}{\frac{4\pi r_{univ}^3}{3}} = 9.1629 \cdot 10^{-29} \frac{Kgr}{m^3}$$

The equivalent Energy which corresponds to the mass of the material Universe is:

$$E_{univ} = M_{univ} c^2 \quad eq.(45)$$

$$E_{univ} = 1.1571 \cdot 10^{71} \text{ Joule } \quad eq.(46)$$

The previous value of Eq. (46) gives the necessary energy to create the rest mass of the material Universe.

Today theories of Cosmology calculate the Big-Bang temperature as also the Cosmic Background Radiation (what is left from the Big-Bang) according to Stefan-Boltzmann formula:

$$D_{univ} = \frac{E_{univ}}{t_{univ} \cdot S_{univ}} = \sigma T^4 \Rightarrow T_{univ} = \sqrt[4]{\frac{E_{univ}}{\sigma \cdot t_{univ} \cdot S_{univ}}}$$

$$\sigma = 5.6704 \cdot 10^{-8} \frac{\text{Joule}}{sec^2 \cdot m^2 \cdot K^4}$$

It means that the Power Density of the Energy is proportional to the fourth power of the Temperature. The calculation of the power density requires knowledge of the surface of the Universe.

In our calculations we will use the surface of a sphere, but in a later chapter we will introduce the real surface of the universe which is not spherical.

$$S_{univ} = S_{Sphere} = 4\pi \cdot \left(\frac{d_{univ}}{2}\right)^2 \quad eq.(47)$$

Eq. (47) gives a surface:

$$S_{univ} = 2.81333 \cdot 10^{55} m^2$$

Then for:

$$t_{univ} = 6.2481 \cdot 10^{18} \text{ sec}$$

$$E_{univ} = 1.1571 \cdot 10^{71} \text{ Joule}$$

$$\sigma = 5.6704 \cdot 10^{-8} \frac{\text{Joule}}{\text{sec}^2 \cdot m^2 \cdot K^4}$$

$$D_{univ} = \frac{E_{univ}}{t_{univ} \cdot S_{univ}} = \sigma T^4 \Rightarrow$$

$$T_{univ}^{emp} = \sqrt[4]{\frac{E_{univ}}{\sigma \cdot t_{univ} \cdot S_{univ}}} \text{ eq.(48)}$$

Eq. (48) gives:

$$T_{univ}^{emp} = 10.380 \text{ K} = 3.809 \times T_{COBE}$$

$$T_{COBE} = 2.725 \text{ K (Satellite COBE)}$$

The above difference is due to different diameter, time and Energy for the material Universe as also reduced expansion velocity and a simpler formula to calculate the Thermodynamic Temperature.

The calculation of the Big-Bang Temperature needs to know the critical time which will be approximated as the reverse of the maximum frequency:

$$f_{critical} = \frac{E_{univ}}{h} = 1.7463 \cdot 10^{104} \text{ Hz} \Rightarrow$$

$$t_{critical} = \frac{1}{f_{critical}} = 1.0501 \cdot 10^{-104} \text{ sec eq.(49)}$$

(Physics today does not use the above value since is below the Planck time and instead of it, uses a modified formula consisted with the Planck time and other parameters regarded to particle creation)

Then Eq. (49) gives:

$$T_{Big-Bang} = 5.9658 \cdot 10^{31} \text{ K eq.(50)}$$

The previous results about the today's Universe Temperature as also that of the Big-Bang are almost near to those accepted by the Scientific Community.

Note: Hubble constant is not present in our calculations.

At this point of this work, we are going to calculate the real photon frequency as also the number of photons that took place at the Big Bang event. This requires to know the quantum length (quantization of space) which will give us the opportunity to calculate the maximum frequency for a photon to collapse and to have as result Anti-matter capturing according to Author's theory.

Eq. (30) is one of the remarkable discoveries of this work:

$$G = -\left(\frac{r_c}{2}\right)^2 \left(\frac{r_c}{r} - 2\right) \cdot \frac{2\lambda_{ce} \cdot c^3}{h \cdot r} \Rightarrow$$

for $r_c = r \Rightarrow$ minimum possible distance

$$G = \frac{\lambda_{ce} \cdot c^3}{2h} r \Rightarrow r = \frac{2hG}{\lambda_{ce} \cdot c^3} \Rightarrow$$

$$l_{quantum} = r = \frac{2hG}{\lambda_{ce} \cdot c^3} = \frac{hG}{\lambda_{\gamma} \cdot c^3} \text{ eq.(51)}$$

For:

$$G = 6.67384 \cdot 10^{-11} \text{ N} \frac{m^2}{\text{Kgr}^2}$$

$$h = 6.626068 \cdot 10^{-34} \text{ kgr} \frac{m^2}{\text{sec}}$$

$$\lambda_{ce} = 2.4286 \cdot 10^{-12} \text{ m}$$

$$c = 3 \cdot 10^8 \text{ m} \cdot \text{sec}^{-1}$$

Then:

$$l_{quantum} = 1.3488 \cdot 10^{-57} \text{ m eq.(52)}$$

At quantum length Energy collapses and this will be shown on Ch. 5.

The photon frequency which took place at the Big-Bang event needs to collapse almost instantly from the moment of its presence, which results to a pair creation (Matter-Antimatter) and capturing of Antimatter by the Aether (this will be shown on Ch. 5).

Eq. (8.2) gives the condition of such collapse:

$$\frac{l_{quantum}}{\lambda_{B-B}} = \frac{KQ_e^2}{hc} = \frac{\alpha}{2\pi} \Rightarrow$$

$$\lambda_{B-B} = l_{quantum} \frac{2\pi}{\alpha} \Rightarrow$$

$$\lambda_{B-B} = 1.1613 \cdot 10^{-54} m \text{ eq.}(53)$$

Then the photon frequency of the Big Bang:

$$f_{B-B} = \frac{c}{\lambda_{B-B}} = \frac{3 \cdot 10^8 m \cdot sec^{-1}}{1.1613 \cdot 10^{-54} m} \Rightarrow$$

$$f_{B-B} = 2.5832 \cdot 10^{62} \text{ eq.}(54)$$

The number of photons is given by dividing the equivalent Energy of the material Universe with the half of the photon energy (only material Universe without Antimatter present) of the Big Bang:

$$n_{photons} = \frac{E_{univ}}{0.5hf_{B-B}} = \frac{2 \cdot 1.1571 \cdot 10^{71}}{6.626068 \cdot 10^{-34} \cdot 2.5832 \cdot 10^{62}} \Rightarrow$$

$$n_{photons} = 1.3520 \cdot 10^{42} \text{ photons eq.}(55)$$

The critical time of the Big-Bang is:

$$t_{B-B} = \frac{1}{f_{B-B}} = 3.8711 \cdot 10^{-63} \text{ sec} \Rightarrow$$

$$T_{BigBang} = \sqrt[4]{n_{photons} \frac{E_{univ}}{\sigma \cdot t_{B-B} \cdot S_{univ}}} \Rightarrow$$

$$T_{BigBang} = 7.0945 \cdot 10^{31} \text{ Kelvin eq.}(56)$$

The challenge will be today to detect this photon (of course indirectly due to its collapse) coming directly from the Big-Bang event, having energy:

$$h = 6.626068 \cdot 10^{-34} \text{ kgr} \frac{m^2}{sec}$$

$$E^{\gamma}_{creation} = hf_{B-B}$$

$$E^{\gamma}_{creation} = 1.7117 \cdot 10^{29} J = 1.06835 \cdot 10^{39} GeV$$

The corresponding possible created mass according to the mass-energy equation is:

$$m_{PBH} = \frac{E^{\gamma}_{creation}}{2c^2} = 9.5092 \cdot 10^{11} \text{ Kgr eq.}(57)$$

The above value is near the predicted value for the primordial Black holes created short after the Big Bang (Antimatter captured by the Aether (Ch.5)). The creation of the particles will not be covered by this work.

After the above now we are able to calculate the quantum frequency, time, length, as it is done theoretically by the Planck units which they do not have a natural meaning.

$$f_{min} = \frac{1}{Age_{univ}} = \frac{1}{6.2481 \cdot 10^{18} \text{ sec}} = 1.6005 \cdot 10^{-19} \text{ Hz}$$

$$f_{max B-B} = 2.5832 \cdot 10^{62} \text{ Hz}$$

$$l_{\text{quantum}} = 1.3488 \cdot 10^{-57} \text{ m}$$

[Quantum Graininess Link](#)

$$t_{\text{quantum}} = \frac{l_{\text{quantum}}}{c} = 4.4959 \cdot 10^{-66} \text{ sec}$$

The maximum possible time and length that could be measured is:

$$t_{\text{max Measure}} = t_{\text{quantum}} \cdot \frac{2\pi}{a} = 3.8711 \cdot 10^{-63} \text{ sec}$$

$$l_{\text{max Measure}} = l_{\text{quantum}} \cdot \frac{2\pi}{a} = 1.1613 \cdot 10^{-54} \text{ m}$$

Beyond these values photon energy cannot be sustained and collapses by becoming one with the Space-Time (Aether) (it was proved indirectly in Electron-Positron pair theory).

And finally the quantum mass:

$$m_{\text{quantum}} = \frac{hf_{\text{min}}}{2c^2} = 5.8916 \cdot 10^{-70} \text{ Kgr}$$

Comparing the above quantum units with the Planck units, we see a huge difference due to the acceptance by the scientific community that the velocity of an E/M wave does not vary with distance.

The Planck units are given by dimensional analysis and in our case we discovered Eq. (51) by making equal the general Casimir Repulsive force formula with the Newton's Gravitational force, which are both a reality.

The Planck length is given by:

$$l_p = \sqrt{\frac{\hbar G}{c^3}} \Rightarrow l^2_p = \frac{\hbar G}{c^3} \text{ eq.(58)}$$

And Eq. (51) gives:

$$l_{\text{quantum}} = \frac{\hbar G}{\lambda_\gamma \cdot c^3} \Rightarrow l_{\text{quantum}} \cdot \lambda_\gamma = \frac{\hbar G}{c^3}$$

Eq. (58) and Eq. (51) could become equal if and only if:

$$\lambda_\gamma = 2\pi \cdot l_{\text{quantum}}$$

But this is impossible since the wavelength of the γ -photon which takes place in the Electron-Positron creation is a fixed constant and so:

$$\lambda_\gamma \neq 2\pi \cdot l_{\text{quantum}}$$

The Author claims that this is the fundamental mistake of the dimensional analysis and the origin of this error is due to acceptance that the velocity of the E/M wave does not change with distance. The result of the above makes all Planck units invalid (initiated by Max Planck himself).

Eq. (30) could give additionally how the two today constants (which are not through the centuries) can vary with the passing of time:

$$G = -\left(\frac{r_c}{2}\right)^2 \left(\frac{r_c}{r} - 2\right) \cdot \frac{2\lambda_{ce} \cdot c^3}{h \cdot r} \Rightarrow$$

for $r \gg r_c \Rightarrow \left(\frac{r_c}{r} - 2\right) \approx -2 \Rightarrow$

$$G = r^2_c \frac{\lambda_{ce} \cdot c^3}{h \cdot r} \text{ eq.(59)}$$

And to be more accurate due to reduced velocity of expansion as it has been calculated, we can use the below formula which can give us the value of G at any radius of the Universe beyond the critical distance:

$$G = r^2_c \frac{\lambda_{ce} \cdot V_{\text{expansion}}^3}{h \cdot r} \text{ eq.(60)}$$

Eq. (59) and Eq. (60) prove that the values of the Planck, Gravitational and the fine structure constant are based on the current diameter or radius of the Universe, which indicates a past radius of the Universe, could result on different values of these constants.

Aether and the Unified Field

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Now let us take Eq. (7) which describes the velocity of a photon inside an Electrostatic Field:

$$V = c - \frac{KQ_e^2}{hr} \lambda_\gamma \text{ and } \frac{r_c}{\lambda_\gamma} = \frac{KQ_e^2}{hc} = \frac{\alpha}{2\pi}$$

Then Eq. (7) can take a variety of forms:

$$V = c \cdot \left(1 - \frac{\alpha}{2\pi r} \lambda_\gamma\right) \text{ eq. (60.1)}$$

For:

$$\frac{r_c}{\lambda_\gamma} = \frac{KQ_e^2}{hc} = \frac{\alpha}{2\pi} = \frac{2r_c}{\lambda_{ce}} \text{ Using the Compton}$$

wavelength for the Electron:

$$V = c \cdot \left(1 - \frac{\alpha}{4\pi r} \lambda_{ce}\right) \text{ eq. (61)}$$

Eq. (60.1) gives the velocity of a complete E/M wave depended by the distance. Then someone could say that is nonsense since if it was like that we would not have photons and everything would remain in the eternity of Darkness. Correct! This darkness corresponds to the time before the Big-Bang.

If we set the distance equal to the Universe radius (measured from the center of the Universe) or diameter then we receive the today value for the speed of light. Whatever value for distance we use we need to give a reference of start. A distance of a meter from a nucleus will give again almost the known light speed. But when we approach a nucleus or a free electron the speed is reduced.

In free space absence of matter the speed of light is constant. The presence of matter decelerates the velocity of light even at a distance of one meter (reduction about $10^{-13}\%$ the initial velocity c).

The velocity is an indirect measuring unit and needs the distance and the time or the inverse of a frequency to be calculated. If it can be really reduced this means that the time or the inverse frequency or the distance can vary to have a reduction in velocity.

The Compton scattering concludes:

$$\lambda_{scat} - \lambda_{ini} = \frac{h}{m_e c} (1 - \cos \theta) \text{ eq. (62)}$$

$$\text{due } \lambda_{scat} f_{scat} = \lambda_{ini} f_{ini} = c$$

This means that Compton scattering uses the variance of the wavelength and frequency to meet the accepted constant velocity of light.

Eq. (7) gives us:

$$V = c - \frac{KQ_e^2}{hr} \lambda_\gamma \Rightarrow V - c = -\frac{KQ_e^2}{hr} \lambda_\gamma \Rightarrow$$

When we divide with λ_γ we take:

$$\frac{V}{\lambda_\gamma} - \frac{c}{\lambda_\gamma} = -\frac{KQ_e^2}{hr} \Rightarrow$$

$$f_{scat} - f_{ini} = -\frac{KQ_e^2}{hr} \text{ eq. (63)}$$

or

$$f_{scat} - f_{ini} = -\frac{\alpha}{2\pi r} c \text{ eq. (63)}$$

Eq. (63) shows that the scattering process is due to decrement of the frequency with distance from the center of an electron. It points to an increase in propagation time of the E/M wave which travels through an Electrostatic field. It takes more time to travel the same distance inside the field than outside the field in free space. When the photon leaves the Electrostatic Field it can travel at normal constant speed equal to c , but with decreased momentum which corresponds to the decrement of its frequency.

How can be used Eq. (63) in practice? Eq. (62) and Eq. (63) are equal since they will measure the same exiting (scattered) photon frequency either by using constant speed or variable. Eq. (63) is the complete scattering formula for the entire spectrum.

The Compton formula was developed with the principle that the electron which receives the energy is stationary. In Eq. (63) the electron will interact with the radiation and the distance on Eq. (63) is the interaction distance from the center of the electron which is different for every frequency.

The previous report of the reduction of the E/M wave velocity was made to show that there is not any violation of the nature's laws since as we know the reduction of the speed of light really occurs in mediums with high refractive indexes like that of water or of the Radio Waves in Ionosphere. It is logical and not extreme to claim the reduction of E/M wave velocity when enters an Electrostatic field.

Let us analyze Eq. (7):

$$V = c - \frac{KQ_e^2}{hr} \lambda_\gamma = c - \frac{KQ_e^2}{h} \cdot \frac{\lambda_\gamma}{r}$$

The term $\frac{KQ_e^2}{h}$ has the dimensions of a constant velocity we will name it V_A . Now the equation becomes:

$$V = c - \frac{V_A}{r} \lambda_\gamma \text{ eq. (64)}$$

The value of V_A is:

$$V_A = \frac{KQ_e^2}{h} = c \frac{\alpha}{2\pi} = 3.484229 \cdot 10^5 \frac{m}{\text{sec}} \text{ eq. (65)}$$

We see that this unusual speed is integrated inside the velocity of the E/M wave or is something out of the E/M wave which influences its velocity. Actually it is both and it will be proved a little bit later. Eq. (64) can be further written as:

$$\omega_r = \frac{V_A}{r}$$

$$V = c - \omega_r \lambda_\gamma \text{ eq. (66)}$$

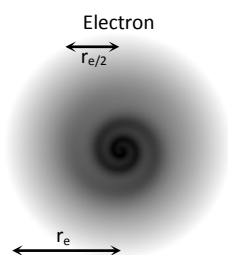
Eq. (66) indicates that the E/M wave velocity is depended except of the constant transverse light speed, with an angular velocity which increases with decreasing distance. It reveals a topology of a Vortex where the angular velocity increases as we go down to a smaller scale. The multiplication of the angular velocity with the distance will give always a constant linear speed given by Eq. (65):

$$V_A = 3.484229 \cdot 10^5 \frac{m}{\text{sec}}$$

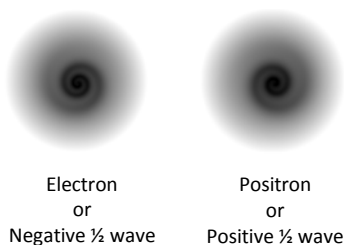
$$V_A \approx 1000 \times \text{Speed of Sound}$$

$$c = \frac{2\pi}{\alpha} \times V_A \approx 861 \times V_A$$

We proved at the critical distance the γ -photon vanishes by interacting with an enormous opposing force (coming from a stationary electron instead of a nucleus). This means at critical distance (equal to $\frac{1}{2}$ classical electron radius) the angular velocity of the Vortex has a maximum value. This can be illustrated in case of the electron with the below picture:



The created pair from the vanished photon will have opposing Vortices due to the E/M wave itself, which means Eq. (66) reveals that also the E/M wave contains two opposing Vortices (Positive half-wave and Negative half-wave):



The opposing Vortices are the cause of the pair separation and not an additional energy that will be given to the initial γ -photon momentum.

If it is so then how a Positron and an Electron could be annihilated?

If we let a pair at distance of 1mm with zero initial speed, then due to the opposite charge, the Coulomb force will attract each other till the Coulomb barrier which is around 5 fm (using the classical radius for calculation. see Graph.(3)). At this point they will be repelled back.

They need an initial minimum speed of about $0,62c$ to surpass the Repulsive Barrier and to annihilate.

Then another question could be, why a photon does not collapse from the moment it has very (Vanishing like the Electron-Positron pair) near opposing Vortices?

This is a difficult question, since it has many implications as how the photon moves. Initially we could claim that the Vortices are found at a distance equal to the Coulomb barrier (about two times the electron radius in case of a γ -photon) which is kept trapped due to the Coulomb Field and that of the Repulsive Field of the Vortices.

The discovery of a Vortex at the center of matter and inside the photons due to Eq. (66) gives the cause (Spinning Aether) of the existence of spin in the Universe.

The opposite internal spin of the Positron is connected with its charge. This means that electron and protons have opposite internal spin which is the reason that in case of the Nuclear force which appears in very short distances, an attractive force opposes the Coulomb force.

The fact that Eq. (51) connects the Gravitational, Planck constant with the quantum length as also the model of the photon and that of the Electron is pure Vortices, the conclusion is:

Space-Time is filled with the Aether and the Masses and Energy which appear in the material world are manifestations of Aether compression.

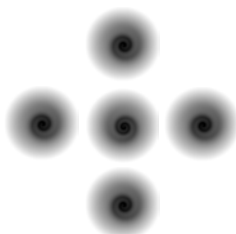
As we saw on the previous page a photon can be described as two opposing vortices and from the moment it travels in Space, then the Space itself or the Aether structure will be the same as in a photon.

The structure of the Aether can be mostly pair of Vortices and Anti-Vortices (opposite spinning). This means in three Dimension Space topology corresponds one Vortex to six Anti-Vortices to have always a pair of them. It reveals an initial topology of an Octahedron where at its center exist a Vortex and in periphery six Anti-Vortices.

The distances are equal only in the X-Z Axes and on the Y-Axis the distances (the Height of the Octahedron to the center) is about 1.732 times the quantum distance. But as we know the Octahedron cannot equally fill space and as we will see the Octahedron is at the center of the Universe's topology.

The complete topology of the Universe which includes the Aether it will be proved on the next chapter as an Expanding Stellated Octahedral topology.

In two dimensional Rombus (equi-distant) the Aether would look like as below:



If we add two more Anti-Vortices in Z-Axis then we have always a pair of Vortex-Anti-Vortex in 3D-Space. Later it will be shown on the peripheral Anti-Vortices comes one more Anti-Vortex.

Totally we have:

$$2 \times 6 \text{AntiV} + 1V = 13 \text{Vortices}$$

Why we need to have pairs in Space? Due to the Repulsive Force, the Aether cannot collapse. If the Aether was only made by Anti-Vortices, then due to the Attractive Force, it would collapse with result the manifestation of Antimatter or a White hole (Anti-Black hole). Probably this kind of White hole could exist at the center of the Universe, but not to the entire structure of the Aether.

The Cold Dark matter is nothing else than the Aether itself which travels about 861 times less than the speed of light or equal to 1000 times the sound velocity in air.

An approximation according to Stellated Octahedral topology can give:

$$\text{Matter / Energy} = \frac{1}{13} = 0.0769 = 7,69\%$$

$$\text{Dark Matter / Energy} = \frac{12}{13} = 0.923 = 92.3\%$$

The above initial Aether topology helps in a way to understand how matter can move through space. It is a need to exist Anti-Vortices which will propel the material Vortices according to the Electron-Positron Theory.

In case of photon surrounded by the Aether, it seems that the negative part of the wave will be repelled from the Aether and the positive part will be attracted from the Aether.

It is very difficult to assume how could motion really occurs on the Aether Scale and so for the moment we will let this subject open.

The initial Octahedral Aether topology possibly can give clues of what happened to Antimatter at the moment of creation.

The Author claims that Anti-matter was captured by the Aether due to the effect of an Anti-Vortex can attract another Anti-Vortex.

How can this happen? We have purposefully calculated the maximum frequency to be depended by the quantum length. This gives a photon wavelength:

$$\lambda_{B-B} = \frac{2\pi}{\alpha} l_{\text{quantum}} \Rightarrow$$

$$f_{B-B} = \frac{c}{\lambda_{B-B}}$$

Eq. (60.1) gives:

$$V = c \cdot \left(1 - \frac{\alpha}{2\pi r} \lambda_{\gamma} \right) \Rightarrow$$

$$V = c \cdot \left(1 - \frac{\alpha}{2\pi \cdot l_{\text{quantum}}} \lambda_{B-B} \right) \Rightarrow$$

$$\text{but } \frac{\lambda_{B-B}}{l_{\text{quantum}}} = \frac{2\pi}{\alpha}$$

Then:

$$V = c \cdot \left(1 - \frac{\alpha}{2\pi} \cdot \frac{2\pi}{a} \right) = 0 \text{ eq. (67)}$$

The result of the Eq. (67) reveals many things. First that the Aether pre-existed to be able the photons initially to shortly move and later the matter to be expanded.

The collision of photons pre-supposes space to move or as we proved Aether to move. The dimensions of the Aether probably are larger than the visible Universe. What really happened at the Big Bang is that the photons of creation acquired space equal to the initial Universe's diameter and had such energy that they collapsed almost instantly due to the Aether presence. The created Antimatter at such small scale will be captured from the Anti-Vortices of the Aether (Anti-Vortex and Anti-Vortex attract each other) and the matter will be repelled (Vortex and Anti-Vortex at critical distance are repelled).

The captured Antimatter plays the role of the Repulsive force in the Unified Force Formula which is nothing else than the Electron-Positron Total Force discovered by the Author in the beginning of this work.

This points that the captured Antimatter (not manifested as Antimatter, but due to collapse at quantum length will become Aether) could be possibly found (if it did not collapse) at the center of the universe having a diameter equal to the initial Universe's diameter.

Additionally this proves that the Universe seems to accelerate due to proportionality and scaling in calculations but actually according to (Graph.2, Graph.3) the total force(becomes negative) drops with distance which indicates a deceleration.

Since the Aether is mostly Anti-Vortices we could claim that the Aether travels or has a linear velocity according to Eq. (65):

Aether velocity

$$V_{\text{Aether}} = \frac{KQ_e^2}{h} = c \frac{\alpha}{2\pi} = 3.484229 \cdot 10^5 \frac{m}{\text{sec}}$$

$$V_{\text{Aether}} \approx 1000 \times \text{Speed of Sound}$$

A new type of motion formula can be created by Eq. (7) which will show the action of the Aether upon motion:

$$V = c - \frac{KQ_e^2}{hr} \lambda \Rightarrow c - V = \frac{KQ_e^2}{hr} \lambda \Rightarrow$$

$$\frac{c - V}{\Delta t} = \frac{KQ_e^2}{hr} \frac{\lambda}{\Delta t}$$

The above equation gives the deceleration of a complete E/M which represents the creation of matter-antimatter. For only matter we need:

$$\lambda_{ce} = 2\lambda$$

Then the previous equation becomes:

$$\frac{c - V}{\Delta t} = \frac{KQ_e^2}{hr} \frac{2\lambda}{\Delta t} \Rightarrow a_{\text{cceler}} = \frac{KQ_e^2}{hr} \frac{2\lambda}{\Delta t}$$

$$\text{And } \Delta t = \frac{1}{\Delta f}$$

Then:

$$a_{cceleration} = \frac{KQ_e^2}{hr} 2\lambda\Delta f \text{ eq.}(68)$$

or

$$a_{cceleration} = c \frac{\alpha}{2\pi r} 2\lambda\Delta f \text{ eq.}(68)$$

For:

$$\frac{r}{\lambda} = \frac{\alpha}{2\pi}$$

Eq. (73) becomes:

$$a_{cceleration} = 2c\Delta f \text{ eq.}(69)$$

Eq. (69) is exactly what predicts Rhythmodynamics by Yuri.N.Ivanov.

The meaning is, if we have a mass and it could be possible to drive this mass with opposing waves of the same frequency, then as it is understood the E/M waves would "freeze" (Standing Wave). By changing slightly the frequency of these two opposing waves simultaneously, then it could create an acceleration for the mass itself.

Eq. (69) can be expanded for all mediums, where the velocity of the E/M wave is given by:

$$V_{Medium} = \frac{1}{\sqrt{\frac{\epsilon_r \cdot \epsilon_0 \cdot \mu_r \cdot \mu_0}{2} \left[\sqrt{1 + \left(\frac{\sigma}{\omega \cdot \epsilon} \right)^2} - 1 \right]}}$$

Eq. (8.2) gave us:

$$\frac{r}{\lambda} = \frac{\alpha}{2\pi} = \frac{KQ_e^2}{hc} = \frac{V_{Aether}}{V_{medium}}$$

Then the Eq. (72), Eq. (74) become:

$$a_{cceleration} = \frac{V_{Aether}}{r} 2\lambda\Delta f \text{ eq.}(70)$$

$$a_{cceleration} = 2V_{Medium}\Delta f \text{ eq.}(71)$$

$$a_{cceleration} = \frac{4\pi V_{Aether}}{\alpha} \Delta f \text{ eq.}(72)$$

Eq. (72) proves that all motion in the Universe is based on the velocity of the Aether since as we proved in the previous pages that Energy and Mass is the compressed manifestation of the Aether.

Oscillators placed at the Earth's surface will show a frequency shift of $1.633 \cdot 10^{-8} \text{ Hz}$ due to the presence of the earth's Gravitational Field. When we place this value on Eq. (72) as also acceleration equal to the earth's Gravity acceleration, we will receive the velocity value for the Aether given by Eq. (65).

The Author carried out succesfully an Experiment where an electromagnetic mass moves via the slight change of the frequency. The velocity of the E/M wave in that medium was calculated about 802 m/sec which points to an Aether velocity of about 0.93 m/sec.

The Force which created the Universe is given by Eq. (16):

$$\vec{F}_{Total} = \vec{F}_{e^-e^+} + \vec{F}_{rep}$$

$$\vec{F}_{e^-e^+} = \vec{F}_{NormalCb} + \vec{F}_{rep}$$

Then as Eq. (19.2), we have:

$$\vec{F}_{Total} = 2\vec{F}_{rep} + \vec{F}_{NormalCb}$$

$$F_{rep} = -\frac{KQ_e^2}{r^2} \cdot \frac{1}{c^2} \left(\left(\frac{KQ_e^2}{hr} \lambda \right)^2 - 2c \frac{KQ_e^2}{hr} \lambda \right)$$

$$F_{NormalCb} = -\frac{KQ_e^2}{r^2}$$

The total force is given by:

$$F_{Total} = -2\frac{KQ_e^2}{r^2} \cdot \frac{1}{c^2} \left(\left(\frac{KQ_e^2}{hr} \lambda \right)^2 - 2c \frac{KQ_e^2}{hr} \lambda \right)$$

$$-\frac{KQ_e^2}{r^2} \Rightarrow$$

$$F_{Total} = -2 \frac{KQ_e^2}{r^2} \cdot \frac{1}{c^2} \left(\left(\frac{KQ_e^2}{hr} \lambda \right)^2 - 2c \frac{KQ_e^2}{hr} \lambda + \frac{c^2}{2} \right)$$

We know that:

$$\frac{r}{\lambda} = \frac{\alpha}{2\pi} = \frac{KQ_e^2}{hc} = \frac{V_{Aether}}{V_{medium}} \quad \text{and} \quad \hbar = \frac{h}{2\pi}$$

Then the Total force becomes:

$$F_{Total} = -\frac{\hbar \alpha}{\pi^2 c} \left(\left(\frac{c\alpha}{2\pi r} \lambda \right)^2 - \frac{c^2 \alpha}{\pi r} \lambda + \frac{c^2}{2} \right)$$

Then the force which created the Universe is the half of the total force (only matter):

$$F_{Univ} = -\frac{\hbar \alpha}{r^2 c} \left(\left(\frac{c^2 \alpha}{2\pi f_{B-B} \cdot r} \right)^2 - \frac{c^3 \alpha}{\pi f_{B-B} \cdot r} + \frac{c^2}{2} \right)$$

eq.(73)

The previous equations can be written in relation with the Aether's velocity:

$$\frac{\alpha}{2\pi} = \frac{V_{Aether}}{c} \Rightarrow$$

$$F_{Univ} = -\frac{\hbar V_{Aether}}{r^2 c^2} \left(\left(\frac{c V_{Aether}}{f_{B-B} \cdot r} \right)^2 - \frac{2c^2 V_{Aether}}{f_{B-B} \cdot r} + \frac{c^2}{2} \right)$$

eq.(74)

Eq. (74) as is gives the Force for just one photon in the Big Bang. The test to see if the above formula created the Universe, must predict the acceleration at the radius of the todays Universe. We have to remember that the acceleration was calculated with reduced velocity due to the theory of the Electron-Positron creation. Additionally we have to multiply the above formula with the number of the photons which took place at the Big Bang event.

Then Eq. (74) becomes:

$$f_{\max B-B} = 2.5832 \cdot 10^{62} \text{ Hz}$$

$$n_p = n_{photons} = 1.3520 \cdot 10^{42} \text{ photons}$$

$$V_e = V_{expansion} = 2.3947 \cdot 10^8 \frac{m}{sec}$$

$$V_A = V_{Aether} = 3.484229 \cdot 10^5 \frac{m}{sec}$$

$$F_U = F_{univ}$$

$$F_U = -\frac{\hbar V_A}{r^2 V_e^2} n_p \left(\left(\frac{V_e \cdot V_A}{f_{\max B-B} \cdot r} \right)^2 - \frac{2V_e^2 \cdot V_A}{f_{\max B-B} \cdot r} + \frac{c^2}{2} \right)$$

eq.(75)

Well Eq. (75) is now ready to give us the calculated acceleration found on page 18 when we divide the force with the mass of the Universe. But it does not work!?!

At this point the Author after some attempts made a very crucial discovery. We have seen in Eq. (51) that the Planck constant changes with distance and is equal to its today value when the distance takes a critical value which is the quantum length. Eq. (75) has application on quantum level and to make it work on the scale of the Universe, it needs to adapt the Planck constant in relation with the dimensions of the today Universe. Additionally a very small correction parameter will be used due to the use of a constant expansion velocity from the quantum length to the radius of the Universe. Normally we have to find the expansion velocity at any radius of the Universe, but we will not do this (We will let this for the reader as exercise) for simplicity:

$$r = \frac{\hbar G}{\lambda_\gamma \cdot c^3} \Rightarrow \hbar = \frac{r \cdot \lambda_\gamma \cdot V_e^3}{G} \quad \text{eq.(76)}$$

$$\xi = 0.79634$$

$$\lambda_\gamma = 1.21319 \cdot 10^{-12} \text{ m}$$

Eq. (75) becomes:

$$F_U = -\xi \frac{V_e \cdot V_A}{r G} \lambda_\gamma n_p \left(\left(\frac{V_e \cdot V_A}{f_{B-B} \cdot r} \right)^2 - \frac{2V_e^2 \cdot V_A}{f_{B-B} \cdot r} + \frac{c^2}{2} \right)$$

eq.(77)

Now Eq. (77) can give exact acceleration at the today radius of the Universe as it was calculated in this work by the Author. Eq. (77) incorporates the Newtonian Gravitational constant and it can work at any scale from the Quantum Level to the radius of the Universe.

The Author using only one formula for the Force which acts upon the Electron-Positron pair, the Strong Nuclear Force, the deduction of the Casimir Force and at the end the Force which created the Universe, concludes that there is only the Electric Force in nature and the forms they can take, are described generally by the following formulas. They can be also applied to quarks which they have fractional charge.

Unified Field Force

$$F_{UFF} = S_c \frac{2KQ_e^2}{r^2} \cdot \frac{1}{c^2} \left(\left(\frac{KQ_e^2}{2mcr} \right)^2 - \frac{KQ_e^2}{mr} + \frac{c^2}{2} \right)$$

OR

$$F_{UFF} = S_c \frac{2c \cdot V_A}{rG} \lambda_\gamma \left(\left(\frac{cV_A}{f \cdot r} \right)^2 - \frac{2c^2 \cdot V_A}{f \cdot r} + \frac{c^2}{2} \right)$$

OR

$$F_{UFF} = S_c \frac{2hV_A}{r^2 c^2} \left(\left(\frac{hV_A}{2mc \cdot r} \right)^2 - \frac{hV_A}{m \cdot r} + \frac{c^2}{2} \right)$$

OR

$$F_{UFF} = S_c \frac{2\hbar\alpha}{cr^2} \left(\left(\frac{\hbar\alpha}{2m \cdot r} \right)^2 - \frac{\hbar c\alpha}{m \cdot r} + \frac{c^2}{2} \right)$$

$S_c = +1$ (Like charges)

$S_c = -1$ (Opposite charges)

$$V_A = V_{Aether} = \frac{KQ_e^2}{h} = c \frac{\alpha}{2\pi} = 3.484229 \cdot 10^5 \frac{m}{sec}$$

$$\lambda_\gamma = 1.214307 \cdot 10^{-12} m$$

$$h = 6.626068 \cdot 10^{-34} kgr \frac{m^2}{sec}$$

$$G = 6.67384 \cdot 10^{-11} N \frac{m^2}{Kgr^2}$$

An interesting concept arises from the discovery of the variable Planck, Gravitational, fine structure and velocity of the E/M wave, through time. This concept we will name it as "Quantum Energy Transformer". Eq. (51) gives:

$$h_{planck} = \frac{l_{quantum} \cdot \lambda_\gamma \cdot c^3}{G} \Rightarrow h_{planck} f_p = E_p$$

$$h_{pr.univ} = \frac{r_c \cdot \lambda_\gamma \cdot c^3}{G} \Rightarrow h_{pr.univ} f_u = E_u$$

When we make equal these two photon energies we have:

$$E_u = E_p \Rightarrow l_{quantum} f_p = r_c \cdot f_u \Rightarrow$$

$$f_p = \frac{r_c \cdot f_u}{l_{quantum}} \text{ eq.(78)}$$

The above equation can transform frequencies coming from the Big Bang, measured today via the known planck constant which corresponds to the quantum length and vice versa.

Example #1:

$f_u = 2.47055 \cdot 10^{20} Hz$ corresponds to the photon frequency to create an Electron-Positron pair.

$f_p = 2.5799 \cdot 10^{62} Hz$ is almost (-0.127% divergence) the frequency of the photon which took place at the Big Bang.

Example #2:

[Kelvin-Hertz Relationship Link](#)

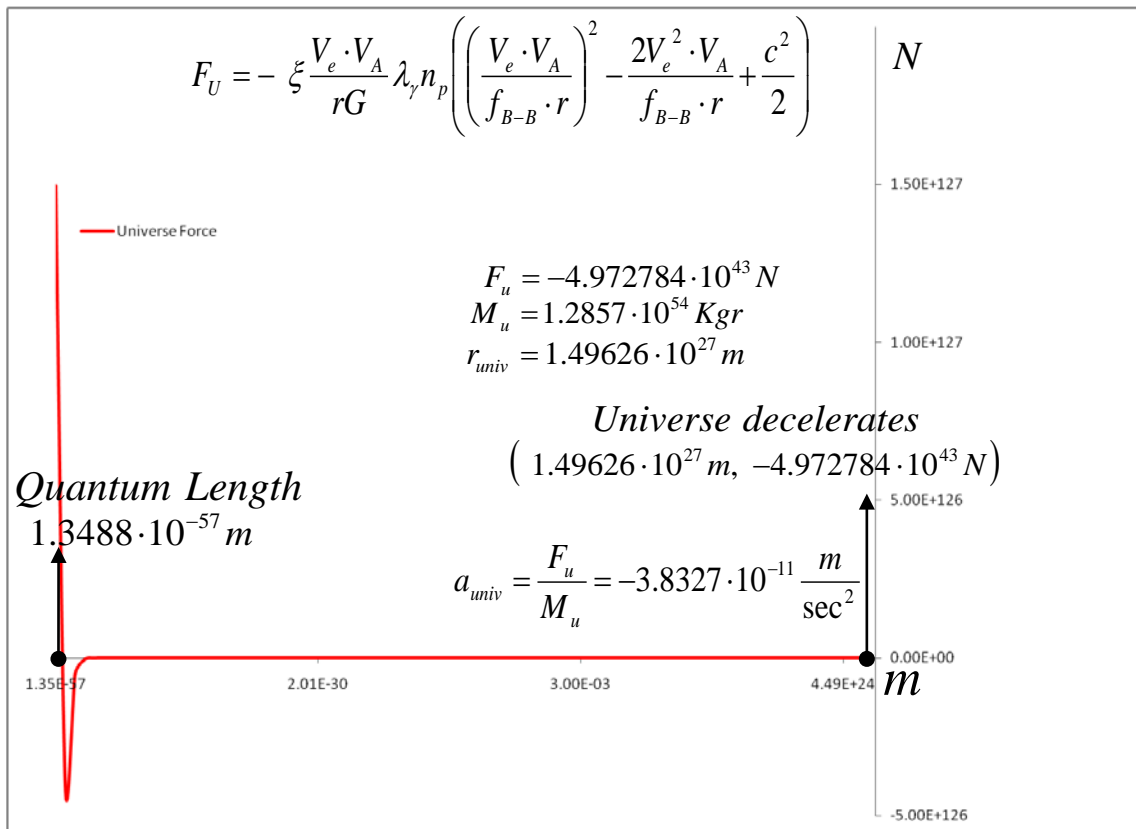
$T = 10.380 Kelvin \Rightarrow f_u = 2.1628 \cdot 10^{11} Hz$

corresponds to the today Cosmic Microwave Background Radiation.

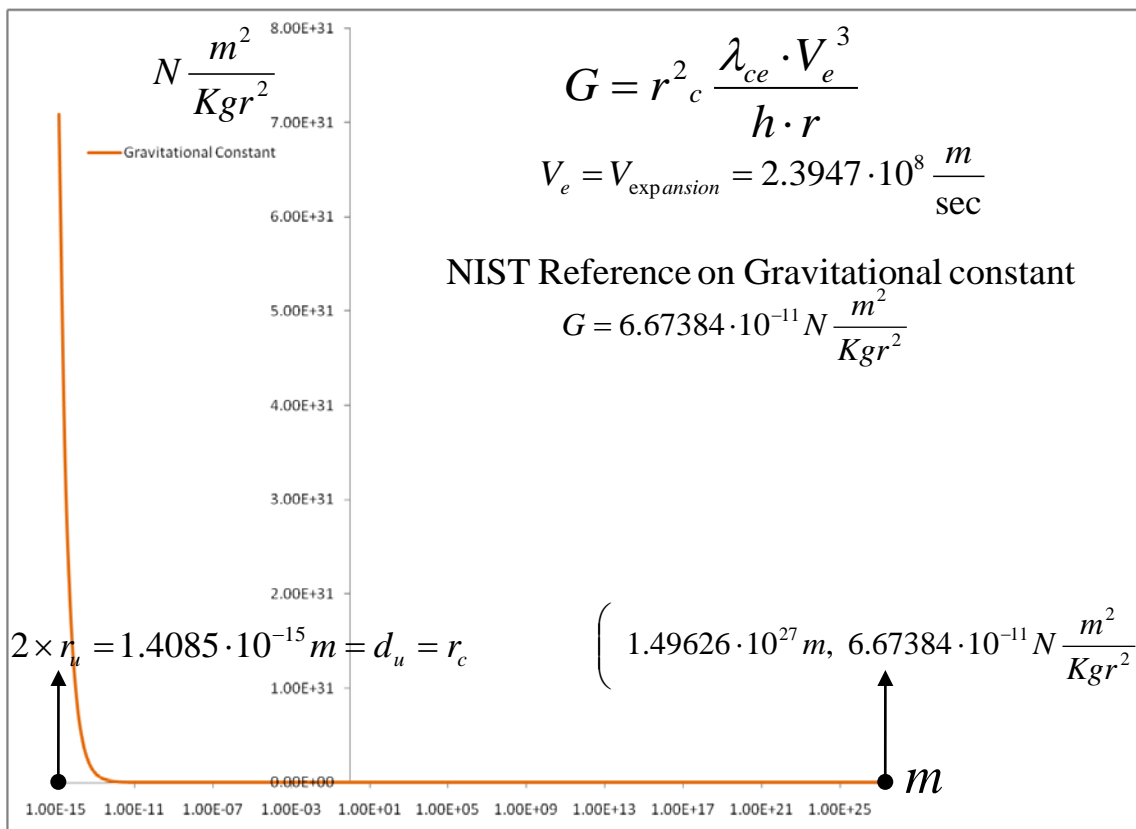
$f_p = 2.2586 \cdot 10^{53} Hz$ is the photon frequency started from Big Bang.

With other words Eq. (78) gives us the frequency shift due to the reduction of the photon momentum traveling through the Aether a distance equal to the today Universe radius.

Follows the Graph of the Universe Force as also the variance of the Gravitation constant with distance.



Graph.(6) X-Axis: Logarithmic Scale



Graph.(7) X-Axis: Logarithmic Scale

Expanding Stellated Octahedral Creation

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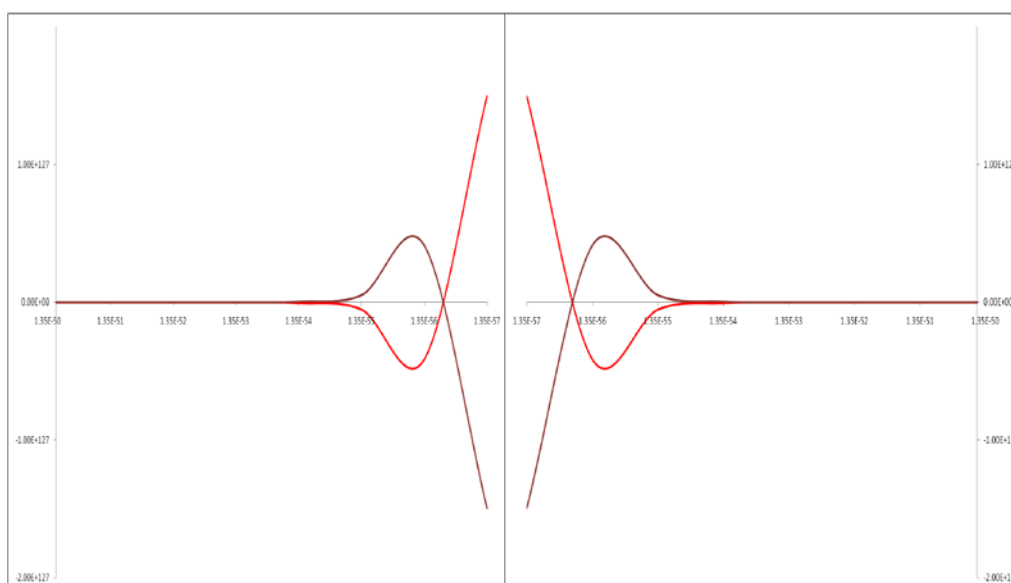
After the discovery of the Unified Field Force which describes also the Big Bang, we expect from this Force to reveal us the topology of the Universe or better the topology of the Aether which is the primary substance in the whole Universe. The Author mentioned that the topology must have at least a regular Octahedron with the thought that the Aether contains Vortex-Antivortex pairs (One Vortex with six Antivortices) to exclude its collapse. But as we know Octahedrons cannot fill space without gaps.

Then the Author suggested also that the Octahedron will be at the center of the topology and the total topology will be a Stellated Octahedron.

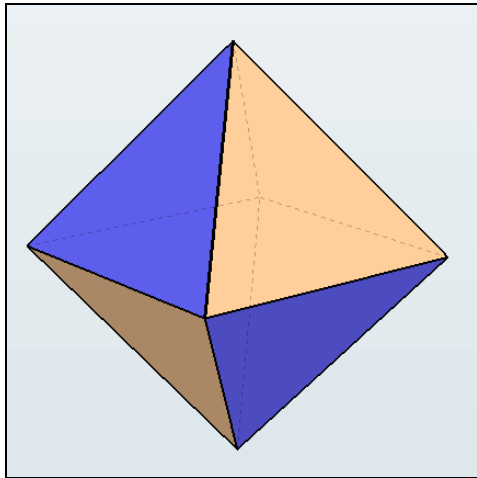
Again a Stellated Octahedron cannot fill space without gaps.

It can, but with some help. This means starting with a Stellated Octahedron, then fitting Octahedrons between the dihedral angles created by the peripheral Pyramids and then repeating again a Stellation. If we do not follow this principle but a simpler one like starting with an Octahedron, then followed by Tetrahedron and then again Octahedron space can be filled indefinitely and the result will be the same. To prove this notion if it is correct we have created symmetrical diagrams of the Universe Force in both Axis to check our hypothesis.

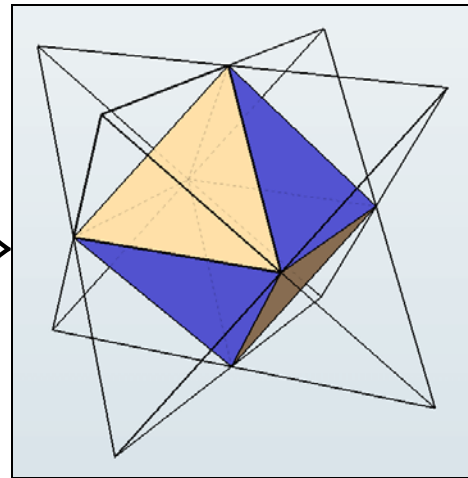
Seeing the below glued Graphs of the Universe Force it is revealed at the center a picture of a Rombus and on the side of it smaller structures of Rombus or curved triangles.



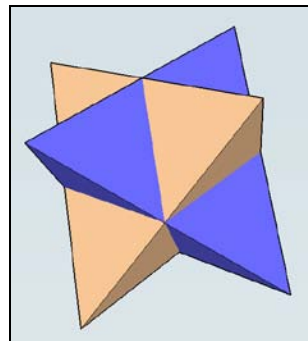
Graph.(8) X-Axis: Logarithmic Scale



Graph.(9) Octahedron

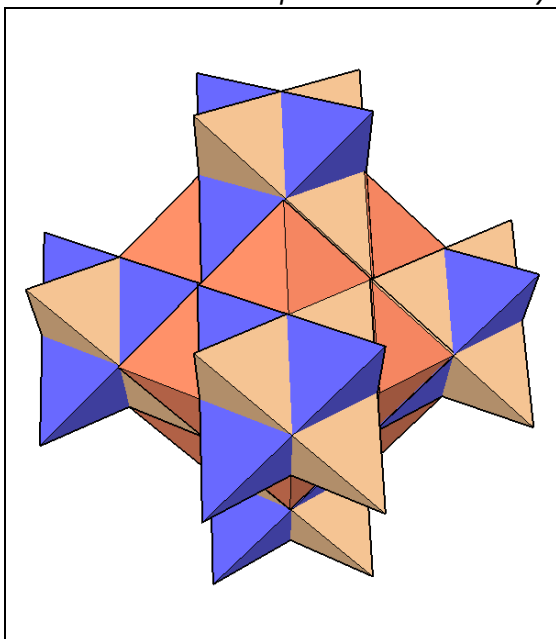


Graph.(10) Stellated Octahedron

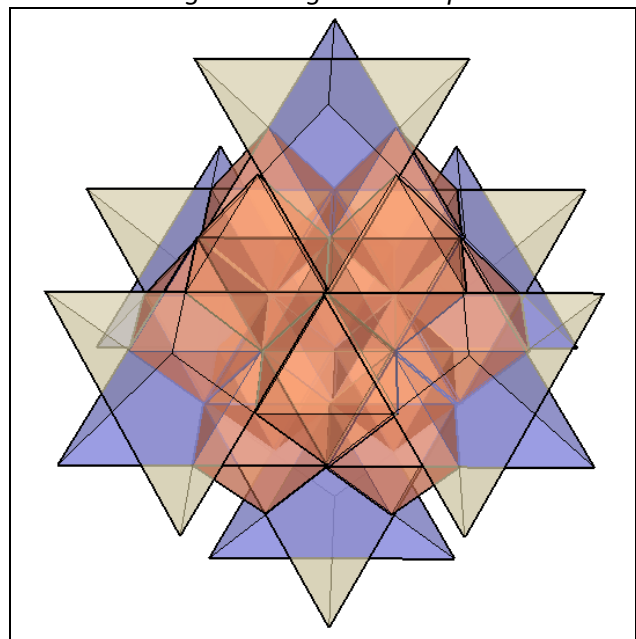


Graph.(11) Shaded Stellated Octahedron

These Graphics were created by the Author using the Google Sketchup 8



Graph.(12) Universe topology



Graph.(13) Universe topology in X-Ray mode

Note: The Ultimate Proof: 2-D Graph. (8) looks the same like the 3-D Graph. (12)

Conclusion

Graph. (12) reveals that starting with an Octahedron and fit a Tetrahedron on its surface and again an Octahedron and so on, it will give the Graph. (12). Again starting with a Stellated Octahedron and fit Octahedra and then Stellated Octahedra, we can fill equally space without gaps. As we see on Graph. (12) the Octahedron structure dominates from quantum to large scale. *Finally Graph. (8) (2-D) proves that Graph. (12) (3-D) have the same topology.*

Note: *A Stellated Octahedron is nothing else than an Octahedron at its center and Tetrahedra on its periphery.*

The Author discovered independently of what is believed and accepted by today Science by implementing the idea of the vanished photon in Electron-Positron pair creation due the reduction of the E/M wave velocity; the Unified Field Force, the quantization of Space-Time, the Aether and finally the topology of the Universe.

Science made a mistake almost 100 years ago, would be today repeated?

"I am even grateful to Einstein and others because through their erroneous theories they lead Mankind away from that dangerous path I followed." - *Nikola Tesla*

„A part of this work is inspired by Rhythmodynamics of Dr. Y.N.Ivanov, in particular what is written about the Aether itself. The Aether and its properties (which was made possible this work to be completed) presented is a gift to Dr. Y.N.Ivanov whom is an inspiration, support, and respected by Ioannis Xydous. „

Ioannis Xydous , October 2011

"Частью этой работы вдохновлен Ритмодинамика доктора Ю.Н.Иванов, в частности то, что написано о Эфир себя. Эфир и его свойства (что стало возможным эта работа будет завершена) представил это подарок доктора Ю.Н.Иванов которых является вдохновение, поддержку и уважать Иоаннис Ксидоус."

Иоаннис Ксидоус , Октябрь 2011

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