

# Hypergeometrical Electromagnetism and Gravitation

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*The Gravitational and Electromagnetism Laws and Cosmological Constants derived from the Hypergeometrical Universe mode are presented.*

## Introduction

Newton's Law of Gravitation and Biot-Savart Law of Magnetism provide the classical framework for Einstein Gravitational equations and covariant laws of electromagnetism. These laws are important since they represent limits that should be obeyed by the more sophisticated theories.

Here we present the equivalent equations derived in accordance with the Hypergeometrical Universe model proposed by Dr. Pereira<sup>1</sup>.

The model represents the 3D Universe as a lightspeed expanding hyperspherical shockwave Universe within a four dimensional 4D spatial manifold. The lightspeed expansion is not ruled out by Strict Relativity since relativity relates only to the 4D spacetime represented in the right panel of Figure 1. This theory makes use of an absolute time  $\phi$  without ruling out the relativity of proper time. Proper times are hyperbolic projections of the Absolute Time  $\phi$  onto the local coordinate systems  $\tau X$ . The hyperbolic nature is naturally governed by Lorentz transformations assuring that this cross-section obeys Strict Relativity. The left cross-section corresponds to  $RX$  (where X stands for any direction within our 3D space). This is a linear subspace.

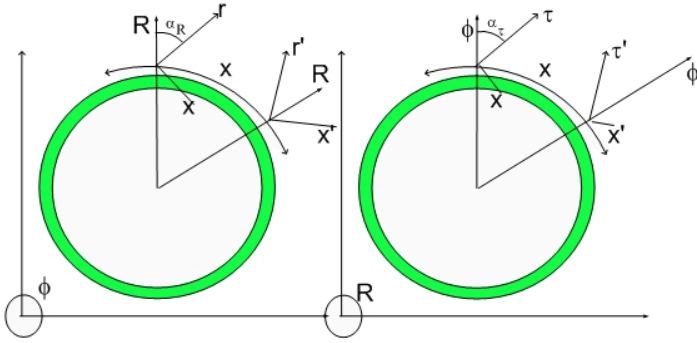


Figure 1. These are the two cross-sections of the 5D Spacetime.

## Results

Here are the equations for Electromagnetism and Gravitation:

$$\vec{F}_2 = \frac{C_1 C_2}{4\pi\epsilon_0} \frac{\begin{pmatrix} \vec{V}_1 \cdot \hat{R} \\ 1 - \frac{\vec{V}_1 \cdot \hat{R}}{c} \end{pmatrix}}{\left( 1 + \frac{\vec{V}_1 \cdot \hat{R}}{c} + \frac{\vec{V}_2 \cdot \hat{R}}{c} + \frac{\vec{V}_1 \cdot \vec{V}_2}{c^2} \right)^2} \frac{\hat{R}_{12}}{R^2} \quad (1)$$

Where  $C_1$  and  $C_2$  are the charges traveling at  $V_1$  and  $V_2$  and  $c$  is the speed of light.  $R_{12}$  is a vector from charge 1 to charge 2.

Similarly for Gravitation:

$$\vec{F}_2 = Gm_1m_2 \frac{\left( \frac{\vec{V}_1 \cdot \hat{R}}{1 - \frac{V_1^2}{c^2}} \right) \hat{R}_{12}}{\left( 1 + \frac{\vec{V}_1 \cdot \hat{R}}{c} + \frac{\vec{V}_2 \cdot \hat{R}}{c} + \frac{\vec{V}_1 \cdot \vec{V}_2}{c^2} \right)^2 R^2} \quad (2)$$

Setting a referential frame on the body 1 for a moment thus having  $V_1=0$ , one obtains:

$$\vec{F}_2 = Gm_1m_2 \frac{\hat{R}_{12}}{R^2} \frac{1}{\left( 1 + \frac{\vec{V}_2 \cdot \hat{R}_{12}}{c} \right)^2} \approx Gm_1m_2 \frac{\hat{R}_{12}}{R^2} \left( 1 - 2 \frac{\vec{V}_2 \cdot \hat{R}_{12}}{c} \right) \quad (3)$$

This means that there is antigravity right within the Law of Gravitation. Hence, the gravitational force decreases as the outwards velocity increases, thus Gravitation produces an unaccounted for outwards acceleration. Similarly, if the body 2 is falling onto body 1, then the Gravitational strength will increase unexpectedly if one considers Newton's Gravitational Law.

This is a much more complex view of Gravitation and it is the only view derived from a more fundamental model. It reduces to Newton's Law at zero relative velocity.

The cosmological constants as given by:

$$\mu_0 = 1Kg \frac{\lambda_2}{2\pi^2 q_e^2 P} \text{ and } \varepsilon_0 = \frac{2P\pi^2 Nq_e^2}{(1Kg)c^2 \lambda_1} \quad (4)$$

Thus

$$\mu_0 \cdot \varepsilon_0 = \frac{\lambda_2}{2P\pi^2 q_e^2} \frac{2P\pi^2 Nq_e^2}{c^2 \lambda_1} = \frac{1}{c^2}$$

Newton's equation is written as:

$$F_{Gravitational} = \left[ \frac{c^2 \left( \frac{N}{1Kg} \right) \lambda_1}{P(2\pi)^3} \frac{\lambda_1}{R_0} \xi \right] \frac{m_1 m_2}{R^2} = G \frac{m_1 m_2}{R^2} \quad (5)$$

Thus

$$G = \left[ \frac{c^2 \left( \frac{N}{1Kg} \right) \lambda_1}{P(2\pi)^3} \frac{\lambda_1}{R_0} \xi \right] \quad (6)$$

Where N is the number of hydrogen atoms (not molecules) in a 1Kg mass of Hydrogen or approximately 1000 times Avogadro's number,  $\lambda_1$  is the Compton wavelength associated with the fundamental dilator. The fundamental dilator is the basic element of the Hypergeometrical Standard Model; a coherence between two stationary deformational states of the metric. The mass associated with a single fundamental dilator is equal to a Hydrogen atom. Its phases are associated with the four fundamental particles (proton, electron, positron and antiproton).  $R_0$  is the radius of the Universe (15.82 Billion Light Years) indicating that the Universe is 15.82 Billion years old. P is 3 for spin zero mass (neutral mass) and 3.5 for spin 0.5 charged particles. This is a constant that defines how fast the dilaton field decays with each cycle of Universe expansion. The theory was derived using cross-sections and there are three spatial cross-section (RX, RY, RZ) where the dilaton intensity spreads. For spin 0.5 particles, at each cycle of spatial expansion, the dilator also expands through the cross-section  $R\phi$  by half cycle at each full cycle of spatial expansion, thus yielding  $P=3.5$ . Lastly,  $\xi$  is the Fabric of Space elasticity. It tells you how much tilting can be generated by Gravitation interaction.

This new perspective on Gravitation and Electromagnetism might be relevant to explain jets in Black Hole environments, magnetohydrodynamics in Tokamaks and the dynamics of celestial bodies , etc.

## References

1) Hypergeometrical Standard Model – Hadron models and related New Energy issues, edited by F.Smarandache and V. Christianto – ISBN: 978-1-59973-042-4

## Appendix

The Fundamental Dilator can be represented by this diagram:

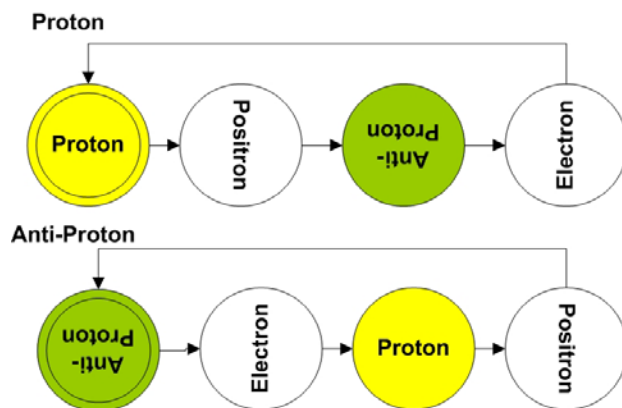


Figure 1. Balls Diagram for the Proton, represented by a phase of the Fundamental Dilator.

Where the lettering direction points to the overlap between the dilator and the Fabric of Space (hyperspherical lightspeed expanding 3D shockwave universe locus). The phase which is in phase (overlaps) the Fabric of Space defines the character of the "particle". Each phase is considered to be a

displacement volume which is much narrower at the direction R, like a very flat 4D ellipsoid of revolution. Interaction occurs when the dilator is overlapping with the Fabric of Space. At any other angle, the overlap is minimal and thus the interaction is minimal.

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