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## **Economy of Space and Time**

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# Economy of Space and Time

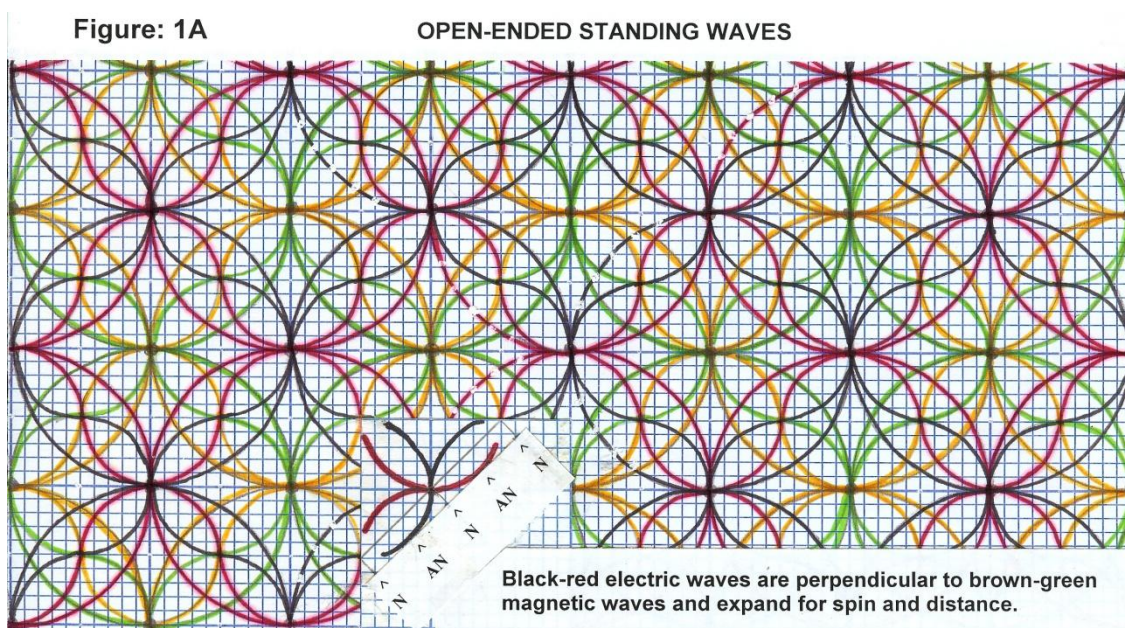
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**Abstract:** This report will graphically show the coupling between QED and General Relativity. Space is from two types of energy in standing waves; energy with mass which is finite energy and energy without mass which is infinite. Standing half waves are twice light speed in a timeless vacuum on contraction harmonics where energy is infinite without mass and finite only with mass on the reversal expansion as time. Photons at the antinodes in the magnetic field are gravity forces on mass in the electric field.

**Keywords:** Cosmology, Space-Time, Standing Waves.

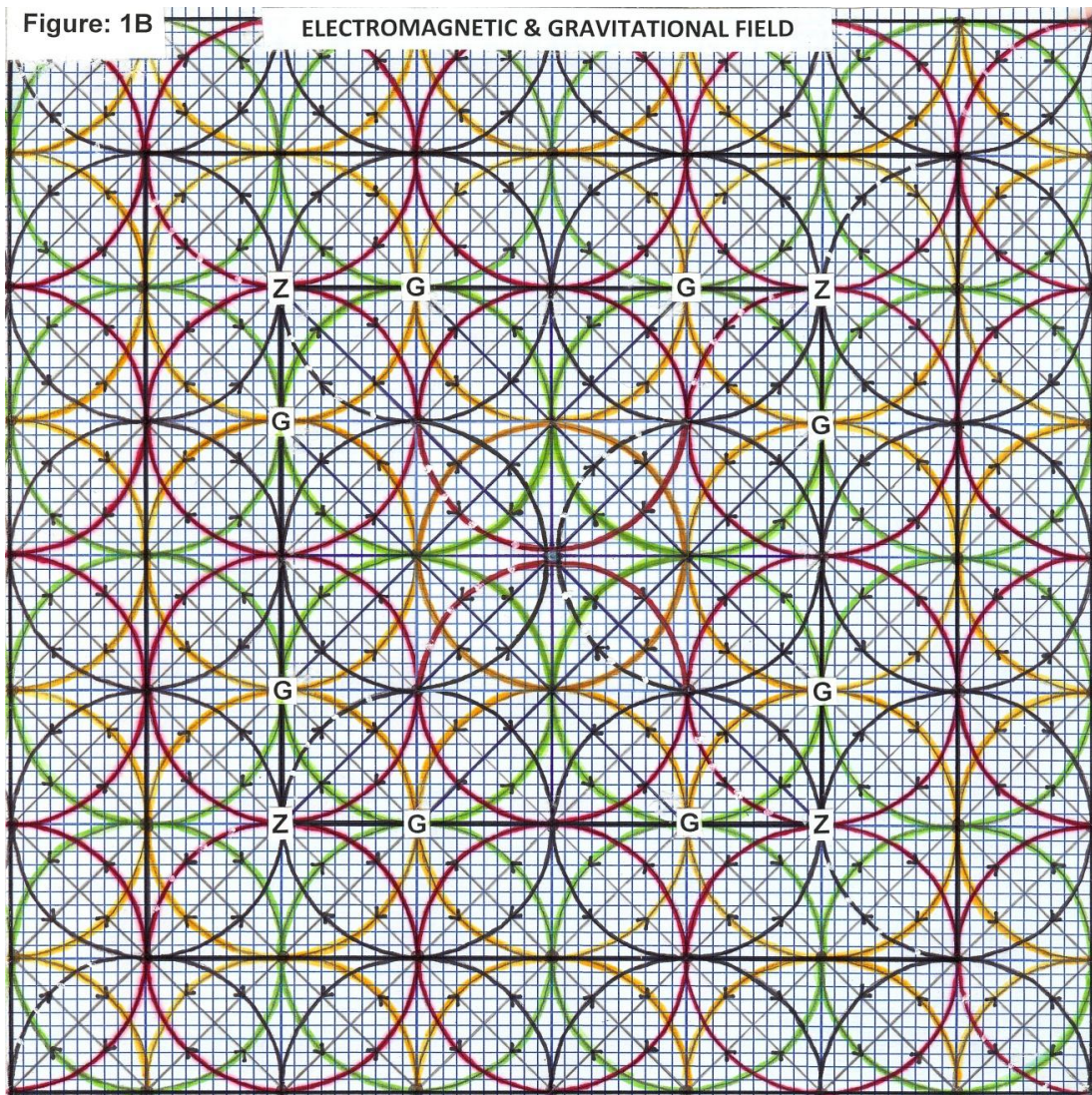
## 1. Introduction

From Figure 1A below, energy is formed into half wavelengths at ultra high frequency standing waves. The black-red (dark) electric waves are transverse waves perpendicular to the brown-green (light) magnetic waves. Half waves are open-ended where anti-nodes are in the middle and nodes at the ends such that each half wave keeps multiplying indefinitely completing whole wavelengths. Each quadrant in the magnetic field is a photon. Each photon half wave is equivalent to two smaller half waves within it making a complete wavelength where light speed is a constant in the EM field,  $C = f\lambda$ .



## 2. Report

From Figure 1B below, moving two half waves from center in direction Z and squaring, there are four complete green magnetic circles in the square. On three half waves from center and squaring, there are nine complete brown magnetic circles in the outer square and so on at the inverse-square distance from center. The black-red and brown-green waves are perpendicular to each other with black-red electric propagating in direction Z and brown-green magnetic propagating in direction G. If the black-red electric waves are on the Y axis propagating in direction Z, then the brown-green magnetic waves are on the X axis propagating in direction G in conjunction with the electric waves in direction Z. Photon waves in the magnetic field interact with the electric field at the inverse square distance from mass center. On the next increase in electric wave amplitude moving in direction Z, the magnetic wave amplitude will be center at the anti-nodes as an inner attraction on a cone apex. Gravity forces are from the brown-green magnetic waves inside the black-red electric waves and an inward attraction force at the anti-nodes.



Fundamental frequency is the span of energy without mass from the zero force state. The final harmonics are contracting high energy before the energy reverses into expansion. Frequency of the standing waves on contraction is high enough that it changes into matter on reversal. A reversal half wave is comprised of two smaller half waves within it and is a complete wavelength at light speed. The half waves are twice light speed on total harmonics and reversal half waves are light speed with mass on half harmonics. In Figure 1B, the black electric and brown magnetic are outward/inward circular waves respectively while the red electric and green magnetic are expanding/contracting sine waves. Quarks deep in the apex of a right circular cone include the black electric circular waves, the black electric sine waves and green magnetic sine waves as the proton while the brown magnetic circular waves, the brown magnetic sine waves and red electric sine waves are the neutron. Gluons are the amplitude of the waves like the e coupling constant but are much stronger in the cone apex holding protons and neutrons together. Beta decay is the interaction of the black-red sine waves between the protons and neutrons. At the base of the quantum cone, electrons are the red-brown and positrons are the black-green half wavelengths. Electron(s) continue outwardly from the quantum base where the amplitude of the red-brown and black-green half waves first experience gravity forces from the antinodes of the brown-green photon waves which are part of the e coupling constant. [The e coupling constant as the inverse of its square: about 137.03597 is the amplitude for a real electron to emit or absorb a real photon.][1]. Gravitation is photon attraction at the anti-nodes on mass in the electric field. Finite energy equal  $MC^2$  when light speed is a constant from A to B; however, light speed has zero time without mass.

### 3. Conclusion

Extended Equation:  $E = ZG^2$  Where  $ZG^2$  is standing wave energy at twice light speed in a vacuum.

Finite energy requires a boundary expanding into the static equilibrium. Finite energy is stored matter from expanding half waves where everything finite is time connected. Mass in the electric field already includes part of the magnetic field as subatomic forces; the remaining magnetic field spectrum is light and gravity on mass, the remaining electric field spectrum not subject to light and gravity is dark energy. [A star is formed when a large amount of gas (mostly hydrogen) starts to collapse in on itself due to its gravitational attraction.][2]. Mass as finite energy is receding due to expansion in the field evidenced by the redshift and distance. The propagation of standing waves with mass is finite energy and the orbital path of mass is gravity in general relativity. [Space-time in general relativity is not flat but curved by the distribution of mass and energy in it.][3]. The three spatial dimensions plus time are relative to mass where time is synonymous with mass as finite energy. In summary, standing half wavelengths are twice light speed in a timeless vacuum on total harmonics where light speed is infinite without mass and finite only with mass on the reversal expansion as time.

### References

- [1] Feynman, R.P. (1988) *QED The Strange Theory of Light and Matter*, Princeton University Press, p129.
- [2] Hawking, S. (1996). *The Illustrated A Brief History of Time*, Bantam Books, p105.
- [3] Ibid, pp 40-42