# A Theoretical Framework on the Speed of Light – Antigraviton, Where the Momentum Comes from

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## Abstract

*The theoretical research focuses on the particle-cause proposition on the wave duality of light in propagation. It specifically examines the graviton's possibilities in the influence of the light speed, with examples of the Cherenkov radiation and the potential dark-matter prevalence in the "vacuum" medium. The initial momentum for the Big Bang theory is hypothesized, and the pure mathematical research have been applied in the theoretical analyses for conceptual framework building, with relation to the Dirac notation. The seismic sonic analogy is implied in the conceptual framework in the nonperturbative basis for perturbation, and can be explainable to the phenomena of light speed variations. The bra part of the graviton is formalized, and two possible scenarios predicted with the mathematical assertions.*

**Keywords:** Tycho Particle, Majorana Particle, Space, Time

## Introduction

The particle-wave duality of light expects $c = \frac{E}{mc}$. The precision on the quantum numbers of Gravitons in a strongcoupling regime in a dual 3-d Yang–Mills theory is accepted by Brower to have the quantum numbers $J^{PC} = 2^{++}, 1^{-+}, 0^{++}$, where $m(0^{++}) < m(2^{++}) < m(1^{-+})$. It is impossible without rerouting to negative energy with the correlation $c = \frac{E_0}{m(0^{++})c} > \frac{E_2}{m(2^{++})c} > \frac{E_1}{m(1^{-+})c}$ with the $AdS^5$ black hole background [1]. And normally we would accept the upper limit of the light speed in vacume in terms of $\frac{E_1}{m(1^{-+})c}$. Cherenkov radiation is anticipated to be the most plausible phenomenon to explain the "irregularity" and to lead to our further comprehension of the wave-particle duality of light. In terms of the close result values of the glueballs, Brower's experiments on $m(2^{++}) < m(1^{-+})$ may imply both possibilities that $J^{PC} = 1^{-+}$ may have involved annihilation events, or that deeper mechanisms are involved in the results are unanticipated by its *prima facie* reasoning [1].

Albeit the measurement may not be perfect due to the multifactor environment, Liu and Prokopec furthered the precision with on-shell analysis with Dirac Fermions, suggesting plausible experimental bias in the $m(2^{++}) < m(1^{-+})$ part's numerical results [2]. For the mass level of spins, it is more likely that the quantum spin of the gravitons is 2. The inference corroborates the experiments of Tobar [3]. Therefore, concerning the speed of light the inequality holds $\frac{E_0}{m(0^{++})c} > \frac{E_2}{m(2^{++})c}$, in which the graviton may affect or cause the variation in the speed of light. The hypothesis is a plausible and possible explanation for the duality of light while measured in its vacuum or in-material speeds.

Faster than light speed travels mainly constitute one major theory and one proven theory, namely the Tycho particle hypothesis and Cherenkov radiation. While blue-shift is often taken for granted, seismic wave studies have been conducted by Kozak with a one-dimension basis that may also incorporate Earth's rotation in observations to correct cosmological research biases [4]. Further refinements may need to take the Majorana fermion into account in light of the experiment result of Brower [1]. The preliminary review indicates that the Tycho particle hypothesis is not rootless.

Einstein's General Relativity (GR) asserted the wrapping of spacetime by light; however, the nature of space and time in itself, respectively, is still debated. Pachankis assorted the history on the concept of time, and the SI unit has essentially equated time to the wave properties of light, and the charities of the particles that could have been the source of the wave and vector properties [5]. An absolute vacuum might not be entirely possible if the conservation of energy were true, unless the Big Bang theory was false; even if so, the unexplained dark energy and dark matter could have provided enough empirical evidence that the speed of light in outer space is only determined by the medium in the "vacuum". Neukart reported such ideas to be radical, but are indeed shared amongst the community [6]. With these remarks, I lay down the context for Section 2.

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## 2. Theoretical Framework

By Newton's laws, the universe may well have been static without a force. While Impey acknowledged that the Big Bang theory does not offer a cosmic causality, however, its deductive predictions are validated in various settings [7]. With regard to the Special Relativity (SP) correlations, or causal inferences, to the Big Bang theory, figure 1 provides a mathematical conceptual overview from the work of Pachankis [8]. In the following subsections, I will reconstruct in Section 2.1 the mathematical formalism by unit sphere with an imaginary dimension, which resulted from the accumulation of my previous research on the Riemann Zeta Function, Harmonics series and analysis, and the Golden Ratio with its imaginary properties noted by Agno [9]. And then I put the mathematical framework into the context of cosmology in Section 2.2, and an extended 12-dimension Superstring theory emerges with the Dirac notation.
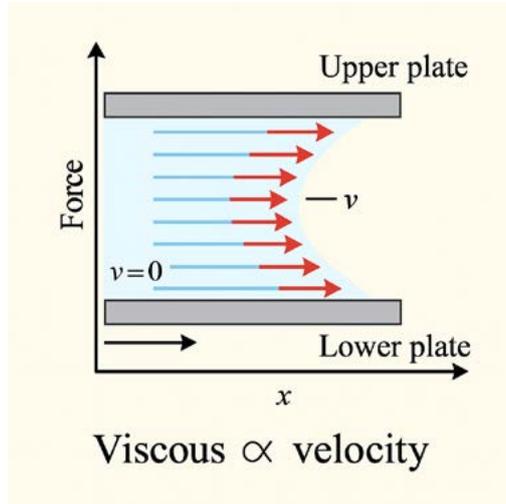


**Figure 1: The Conceptual Framework of Viscous Relations in Correspondence with Velocity by the Origin of Force**

### 2.1. The Definition of Zero

In the previous works of Cao, several fundamental numbers are defined [10,11]:

**Theorem 2.1.** $\ln 0 = \lim_{n\to\infty}(\sqrt{\frac{i}{2\pi}} - \gamma_n)$,

where $\gamma_n$ stands for the Euler-Mascheroni Constant,

**Theorem 2.2.** $\ln i = \ln \frac{i\pi}{2} = \frac{i\pi}{2} + \ln \frac{\pi}{2}$, and

**Theorem 2.3.** $0 = e^{\lim_{n\to 0}(\sqrt{\frac{3i}{4}V_n} - \gamma_n)}$,
where $r = \frac{1}{\pi}$ and $V = \frac{4}{3}\pi r^3$. The fraction   is thus definable with an infinite series

**Theorem 2.4.** $\frac{1}{0} = e^{\lim_{n\to 0}(\sqrt{\frac{3i}{4}V_n} - \sqrt{\frac{3i}{4}V_n} - \sqrt{\frac{3i}{4}V_n} - \cdots \sqrt{\frac{3i}{4}V_n} - \gamma_n)}$.
Therefore, the Euler-Mascheroni Constant is defined in the imaginary unit

**Corollary 2.5.** $\gamma_0 \to \pm\frac{\sqrt{i}}{\pi} - 1 \equiv \frac{3i}{4}V_0 - 1$.
The unit sphere of $\gamma_0$ is seen in figure 2.
In addition, the numerical value of $e$ was found to be

**Theorem 2.6.** $e = 10^{\frac{1}{10i\pi}}$,
which is presented visually in figure 3 & 4.
In relation to the Dirac notation, theorems 2.3 and 2.4 render the corollary

**Corollary 2.7.** $0 \times \frac{1}{0} = e^{\lim_{n\to 0}(2\sqrt{\frac{3i}{4}V_n} - \sqrt{\frac{3i}{4}V_n} - \sqrt{\frac{3i}{4}V_n} - \cdots \sqrt{\frac{3i}{4}V_n} - 2\gamma_n)}$.
With Euler's identity and theorem 2.6, it is implied that

$$\ln\ln e = \lim_{n\to 0}(2\sqrt{\frac{3i}{4}V_n} - \sqrt{\frac{3i}{4}V_n} - \cdots \sqrt{\frac{3i}{4}V_n} - 2\gamma_n) \quad (1)$$

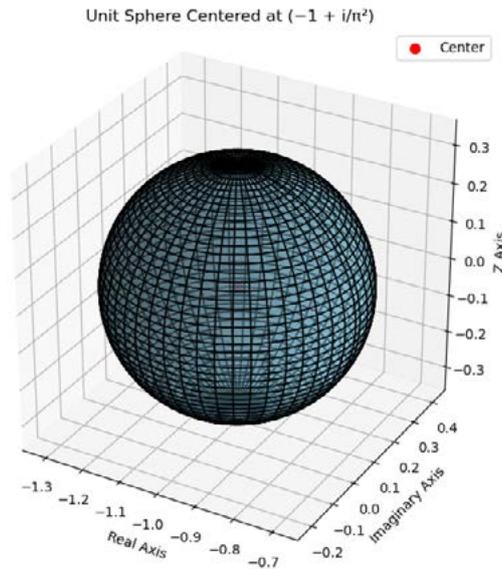$$\equiv -\frac{1}{10i\pi} = -\frac{1}{10\ln -1}, \quad (2)$$

**Figure 2: The Conceptual Extension from the Carlyle Circle with $\gamma 0$.**
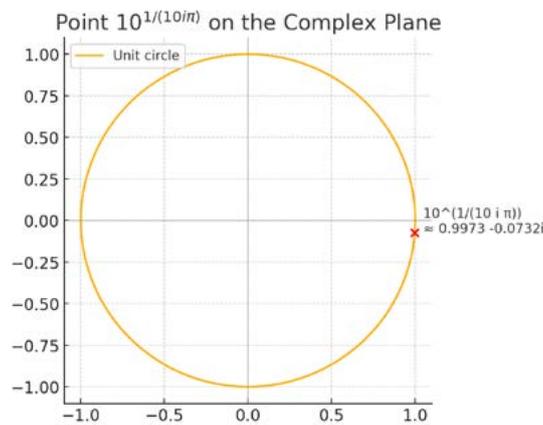


**Figure 3: The Numerical Value of e in Harmonic Analysis**

which is a simple version of the mathematically explanatory framework for the inner product of the Dirac notation of 1, with both the probable zero in ln $e$ and the natural zero.

## 2.2. Sourcing the Graviton's Quantum Number

Murphy discussed the mathematical consequences with the Eisenstein integers in quantum spin calculations, and Cao furthered the fundamental mathematical base of the ring integers bounded by $i^{-\frac{1}{2}}$. [10,12]. The mathematical bound properties correspond to the Majorana particle's properties by squaring the number, and to the theoretically untangled number of an anti-graviton by the quadratic form of the fourth power. In order to make the numbers additive but noncommutative for differentiation in two dimension, Cao proposed building a metric space with the unit of the third dimension for the number lines to be ln $e^m, m \in C$, in reference with equation 1 [13]. The result of the mathematical treatment corroborates with the actions of Non-Hermitian gravitational wave by Pekduran [14].

The Non-Hermitian asymmetry in the Dirac notation offers a break-shell possibility on the Fermi surface hypothesis proposed by Pachankis [15]. With the *bra* vector $\langle -\frac{1}{10\ln -1}|$ from equation 2, by treating the inner product equaling to ±1, the metric space unit can be expressed in terms of equation 3

$$1 = e^{\pm 10 - m}, m \in C. \tag{3}$$

This gives a quantum number range of $m = \pm 10 - e$, formally,

$$\langle -\frac{1}{10\ln -1}| \pm 10 - e\rangle, \tag{4}$$

which expands the Superstring theory by two or three potential dimensions for gravity. Or in answer to Ellis, the extra dimensions can be incorporated into the dimension of time by the mathematics of Cao, as in

$$\langle \log - \frac{1}{10 \ln -1} | \log -(e \pm 10) \rangle \tag{5}$$

namely,

$$\langle \log \log -e | \log(10 - e) \rangle \tag{6}$$

and / or

$$\langle \log \log -e | \log -(e + 10) \rangle, \tag{7}$$

with the same *bra* ⟨loglog −*e*| and unextended *kets* [10,16].

Albeit a full solution to the mathematics will require *at least* another paper to fully construct the metric space, the general overview is set if we take $\log 10^{-1} = \log 10^{i2}$ and $\log(-1) = \log^{i2}$.

## 3. Result
By defining zero according to the properties of the Golden Ratio, the Dirac notation is given expanded capacities in description of the quantum number of gravitons and antigravitons. By following the theorems, a 12-dimension Superstring theory takes shape, however, it is unclear if the extra two dimensions belong to the graviton's influences on the wave function of light, or a separated force not within the properties. The determination of the physics will determine further the meanings of the *ket* parts in the equations 6 and 7. Further explorations on the mathematical physics will need to construct the whole metric space first.

## 4. Discussion
In favor of the graviton hypothesis, the spin-2 property highly corroborates with the Tycho particle hypothesis, intermediated by the Majorana particle in the propagation of light, and bridges the perturbative and nonperturbative theories. This then may render a common explanation for the light speed limitations in the vacuum of dark matter, and higher speeds in Cherenkov radiation. The significance of expanding and constructing the metric space proposed with pure mathematics for quantum physics research is thus justified. Preliminary discussions on the relevance of Zero Point Energy in the research were presented in the International Conference on Gravitation, Astrophysics and Cosmology 2025 with the DOI: 10.5281/zenodo.15578579.

## 5. Summary and Conclusions
In summary, the research connected the dots in graviton research with pure mathematical inductions. It considers the mass or massless debates on gravitons being the measurement bias for graviton and antigraviton existences. The ⟨loglog −*e*| basis serves a preliminary mathematical formalism for further experimental testing, and two possible scenarios have been predicted. The quantum number 10 in the equations 5 to 7 may also indicate to the compression or expansion of space by the gravitons' effects. Therefore, further differentiation of gravitons, antigravitons, and time crystals may be necessary to further adjust general and special relativity theories. The whole case, in theory, can be expressed as

$$\langle \log \log -e | \pm [i\pi \log e + \log(e + 10)] \rangle \tag{8}$$

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