



[white paper]

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On the Quantum Law of Attraction

Open Quantum Collaboration*

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Abstract

We propose that quantum frequencies generate gravitational interactions.

keywords: Planck scale, frequency, quantum gravity

The most updated version of this white paper is available at
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Introduction

1. The robustness of the Planck scale suggests that the foundations of quantum gravity will arise from a deep theoretical analysis of this scale, as direct experimental evidence for it does not exist at present [1–4].
2. The purpose of this white paper is to provide an interpretation of gravitational force due to frequencies.

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Premises

3. *The physics governing the very large and the very small are fundamentally the same.*
4. *Space is discretized.*

Fundamental Constants

5. \hbar , G , and c are linked to quantum mechanics, gravity, and special relativity, respectively.

Planck Scale

6. The Planck length, time, and mass are given below.

7.

$$\ell_p = \sqrt{\frac{\hbar G}{c^3}}$$

8.

$$t_p = \sqrt{\frac{\hbar G}{c^5}}$$

9.

$$m_p = \sqrt{\frac{\hbar c}{G}}$$

Frequency

10. The maximum physical frequency, known as the Planck frequency, is

$$\nu_p = \frac{1}{t_p} = \sqrt{\frac{c^5}{\hbar G}},$$

where t_p denotes the Planck time.

Mass

11. The Planck mass can be written as

$$m_p = \sqrt{\frac{\hbar c}{G}} = \left(\frac{\hbar c}{G} \cdot \frac{c^4}{c^4} \cdot \frac{\hbar}{\hbar} \right)^{1/2} = \frac{\hbar}{c^2} \sqrt{\frac{c^5}{\hbar G}}.$$

12. Therefore, the Planck mass in terms of the Planck frequency is

$$m_p = \frac{\hbar}{c^2} \nu_p.$$

Quantum Gravity

13. The gravitational force between two bodies is given by

$$F(r) = G \frac{m_1 m_2}{r^2}.$$

14. Letting $m_1 = m_2 = m_p$, $r = n \ell_p$, and inserting (12) and (7) in (13), the Planck force is

$$F_p(r) = \frac{1}{n^2} G \frac{m_p^2}{\ell_p^2} = \frac{1}{n^2} G \frac{\hbar^2 \nu_p^2}{c^4} \cdot \frac{c^3}{\hbar G},$$

where $n \in \{1, 2, 3, \dots\}$.

15. Thus, the quantum gravitational force written in terms of ν_p is

$$F_p(r) = \frac{1}{n^2} \frac{\hbar}{c} \nu_p^2.$$

16. The force can also be expressed as

$$F_p(r) = \frac{1}{n^2} \frac{c^4}{G}.$$

17. Substituting (12) in (15), we write $F_p(r)$ as a function of m_p ,

$$F_p(r) = \frac{1}{n^2} \frac{c^3}{\hbar} m_p^2.$$

18. Let the gravitational force between two objects with identical frequencies ν_i , separated by a distance $r_i = n_i \ell_p$, be

$$f_i(r_i) = \frac{1}{n_i^2} \frac{\hbar}{c} \nu_i^2,$$

where $n_i \in \{1, 2, 3, \dots\}$.

19. Then, the gravitational force of $2N$ particles, as described in the form of (18), can be expressed as

$$F = \sum_{i=1}^N f_i(r_i) = \frac{1}{n_i^2} \frac{\hbar}{c} \sum_{i=1}^N \nu_i^2.$$

The Big Bang

20. The Planck density is given by

$$\rho_p = \frac{m_p}{\ell_p^3} = \left(\frac{\hbar c}{G} \cdot \frac{c^3}{\hbar G} \right)^{1/2} \cdot \frac{c^3}{\hbar G} = \frac{c^5}{\hbar G^2} = \frac{1}{G} \frac{c^5}{\hbar G} = \frac{\nu_p^2}{G}.$$

21. If the Big Bang were produced by two Planck frequencies, then the explosion would have produced the Planck density,

$$\rho_p = \frac{\nu^2}{G} = \gamma \nu_p^2,$$

where $\gamma = 1/G$ is the coupling constant for the interaction of two objects with frequency ν_p .

22. The reason why only equal frequencies attract each other stems fundamentally from the term ν_p^2 in (21).

Frequency Synchronization

23. Frequency Synchronization (FS) refers to the phenomenon where two periodic oscillators adjust their frequencies to be the same when coupled, leading to entrainment of their phases and frequencies [5].

24. According to the principle of superposition, any wave can be expressed as a sum (or superposition) of harmonic waves, each with a specific frequency, amplitude, and phase.
25. Therefore, in FS, the dominant frequencies attract each other, and through resonance, they induce other waves.

Final Remarks

26. *Identical quantum frequencies attract each other.*
27. Our universe was created by a cosmic printer of matter and energy through the interaction of two Planck frequencies.

Open Invitation

*Review, add content to, and co-author this white paper [6, 7].
Join the **Open Quantum Collaboration**.*

Supplementary Files

[8]

How to Cite this White Paper

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Agreement

All authors are in agreement with the guidelines presented in [7].

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