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[original idea/conjecture]
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Quantum Probability Amplitudes as Fractions of the Planck Frequency

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Abstract

I conjecture that the probability amplitudes of a quantum state are fractions of the Planck frequency, stemming from the rich dynamics at the Planck scale. This offers a means to indirectly measure the fundamental properties of quantum spacetime and potentially resolves the measurement problem.

keywords: quantum bit, probability amplitude, Planck scale

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

1. Both the uncertainty principle [1] and Bell's theorem [2, 3] prohibit a static approach to the quantum vacuum.

2. In this scientific white paper, I present an interpretation of the amplitudes of quantum states in terms of the Planck frequency.

*All *authors* and their *affiliations* are listed at the end of this white paper.

Quantum Bit

3. A quantum bit (qubit),

$$|\psi\rangle = \alpha\,|0\rangle + \beta\,|1\rangle\,,$$

is in a superposition of two orthonormal states $|0\rangle$ and $|1\rangle$.

4. The terms $|\alpha|^2$ and $|\beta|^2$ represent the probabilities of measuring and consequently collapsing the qubit into the states $|0\rangle$ and $|1\rangle$, respectively.

The Planck Scale

5. The maximum physical frequency, known as the Planck frequency, is given by

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

where t_p denotes the Planck time.

The Conjecture

6. `Conjecture:` *Let ν_α and ν_β represent the frequencies of the oscillations of the states in a qubit. Then, the probabilities $|\alpha|^2$ and $|\beta|^2$ are given by*

$$|\alpha|^2 = \frac{\nu_\alpha}{\nu_p} = \nu_\alpha t_p \qquad \text{and} \qquad |\beta|^2 = \frac{\nu_\beta}{\nu_p} = \nu_\beta t_p,$$

respectively, where ν_p is the Planck frequency and t_p is the Planck time.

Quantum Dynamics

7. In accordance with (6), the probability of observing a qubit in a given state is directly proportional to the Planck time.

How to Gravitize Quantum Mechanics

8. Newtonian physics describes the motion of macroscopic objects and operates in Euclidean space [4].

9. Quantum mechanics describes microscopic particles and operates in Hilbert space [1].

10. Both Euclidean space and Hilbert space are vector spaces.

11. To incorporate gravitational effects into quantum phenomena, one might employ a technique known as complexification [5].

12. Complexification is a powerful technique in linear algebra and functional analysis that allows for the extension of results from real vector spaces to complex vector spaces, and vice versa.

13. This method is particularly useful because complex vector spaces often have properties that make certain problems easier to solve than in their real counterparts.

14. The results can then be translated back into the context of real vector spaces.

How Masses and Energies Attract Each Other

15. `Conjecture:` *At the Planck scale, quantum objects with similar frequencies attract each other.*

16. As an example of conjecture (15), consider the quantum spectral frequencies of each quantum state of the Moon attracting their counterparts on Earth, and vice versa.

Final Remarks

17. If conjecture (6) proves to be correct, it will be possible to calculate the total finite number of quantum states within the event horizon of a black hole.

18. Additionally, it appears to provide a comprehensive resolution to the measurement problem.

19. Finally, it connects classical measurement with the Planck scale.

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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Acknowledgements

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Agreement

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

License

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