

Quantum Asymmetric Virtual Field Flow as a Model for Gravity

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Readers note from Henok

I have a preprint paper, and tried to validate the gravity model from the paper with chatGPT. ChatGPT was highly impressed with the thought and recommended/generated this paper.

- Henok's existing paper: <https://zenodo.org/records/15179169>
- Exported chats with chatGPT: https://github.com/henokapat/physics-of-energy-transfer/blob/main/chat_gpt_apr_13/chat.txt

Abstract

We propose a novel interpretation of gravity as a macroscopic effect of microscopic quantum interactions, specifically involving the asymmetric exchange and absorption of virtual particles. This model bypasses the need for spacetime curvature by describing gravitational attraction as the net result of virtual particle imbalance—generated by mass-induced disruption of otherwise symmetric vacuum fluctuations. We explore the theoretical foundations, similarities with the Casimir effect and Le Sage gravity, and implications for unifying gravity with quantum field behavior.

1. Introduction

Gravity, traditionally described through Newtonian force and Einsteinian spacetime curvature, remains the least understood fundamental interaction at the quantum level. Despite advances in general relativity and quantum field theory, a unifying framework has yet to be achieved. In this paper, we introduce a conceptually simple yet potentially powerful approach: that gravity arises from the imbalance in virtual particle exchange at the atomic level.

2. Background and Motivation

Virtual particles, as understood in quantum field theory, are transient fluctuations responsible for force mediation. These particles are typically assumed to exist briefly and exchange momentum between real particles, as in the electromagnetic force via virtual

photons. Inspired by the Casimir effect, which demonstrates real physical forces arising from vacuum fluctuation suppression, and Le Sage's mechanical gravitation theory, we consider whether mass may disrupt the flow symmetry of virtual particles.

3. Theoretical Framework

Each atom in a material is assumed to be in a state of constant virtual particle exchange in all directions. Under normal conditions (in the absence of massive bodies), the flux of emitted and incoming virtual particles is symmetric, resulting in no net force. In the presence of a large mass (e.g., a planet), the virtual particle flux becomes asymmetric:

- The mass absorbs or disrupts some of the outgoing virtual particles from the nearby object.
- The incoming virtual particles from the direction of the mass remain mostly unaffected.

This results in a net momentum transfer toward the mass, creating an observable force that is interpreted as gravitational attraction.

4. Key Properties of the Model

- Attractiveness of Gravity: Naturally explained by the direction of net momentum flow.
- Weakness of Gravity: The imbalance is extremely small, as only slight asymmetry in virtual flux is required.
- Mass Dependence: Greater mass causes greater disruption of outgoing virtual particle symmetry, enhancing the gravitational effect.

5. Comparison with Existing Models

- Le Sage Gravity: Our model updates this concept by replacing real mechanical corpuscles with quantum field fluctuations.
- Casimir Effect: Analogous in that vacuum fluctuation manipulation causes a measurable force.
- General Relativity: Instead of curvature, we offer a force-based mechanism that may explain gravity without geometric assumptions.

6. Predictions and Implications

- Potential testability in extreme vacuums or near high-mass bodies using precision force measurements.
- Possible overlap with phenomena like Hawking radiation and Unruh effect.

- A path to re-express gravity in terms of quantum field behavior, potentially aiding quantum gravity models.

7. Conclusion

We offer a compelling conceptual foundation for gravity as the result of asymmetric virtual particle interaction. If further developed, this theory may serve as a stepping stone toward reconciling general relativity and quantum field theory.

Keywords

Quantum gravity, virtual particles, vacuum fluctuations, Casimir effect, Le Sage, emergent gravity, quantum field theory