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Finite Virtual Particles, maximum acceleration and maximum gravity

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Abstract

This is a microarticle exploring the connection between Planck scale and the finite number of virtual particles. We start from some premises and draw the conclusion that there are a finite number of virtual particles.

keywords: virtual particles, Planck scale, quantum gravity

Introduction

This is an **open science experiment**. **Peer** and **Citizen Review** are *very welcome*. Please contact the author (click in the email address).

Finite number of virtual particles

1. The quantum vacuum (spacetime) is "composed" of entangled virtual particles [1].

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2. Acceleration and gravity can extract virtual particles from the quantum vacuum (check [2, 3] and the references therein).

3. The extraction of virtual particles from the vacuum means to break what we will call "*one unit of quantum entanglement*".

4. Spacetime is limited by the Planck density of mass-energy.

5. Spacetime is also limited by the number of units of quantum entanglement.

6. The limit (4) imposes a maximum value of gravity and a maximum acceleration in spacetime in pretty much the same way that light imposes a limit on the maximum speed.

7. Therefore, we can **conclude** that there is a **finite number of virtual particles** in the **quantum vacuum**.

8. Let's define the symbol ~ meaning *logical relation*.

9. In summary, we have the following: limit ~ Planck scale ~ virtual particles ~ entanglement ~ spacetime ~ virtual particles ~ finite.

Final Remarks

The possibility of **finiteness** of the **Planck scale** leads to the conclusion of a **finite number** of **virtual particles**, and it can bring new physics, specially in extreme scenarios, such as the **interior** of a **black hole** [4, 5].

Open Invitation

Please *review* this article, *add* content, and *join* the **Open Physics Collaboration**.

Ethical conduct of research

This original work was pre-registered under the OSF Preprints [6], please cite it accordingly [7]. This will ensure that researches are conducted with integrity and intellectual honesty at all times and by all means.

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