

Gravity Should Not Be Quantized

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Abstract

Quantizing gravity may be both *unnecessary* and *conceptually flawed*. This paper argues that the mathematical frameworks of general relativity and quantum mechanics are intrinsically compatible *without requiring* a discrete space-time structure.

Introduction

In modern physics, models generally distinguish between two components:

- A space-time "**stage**", consisting of a continuous 3+1 dimensional manifold — described by Einstein's special and general relativity (SR/GR) — characterized by an internal coupling constant c (linking space and time dimensions) and an external elastic deformation constant k (linking mass-energy to space-time curvature).

- A field/particle "**show**", consisting of a quantized field / particle framework — described by quantum mechanics (QM) and the standard model (SM) — defined *upon* the space-time stage.

Numerous attempts to quantize space-time and gravity have been made, yet no definitive theory has emerged. This paper suggests that such attempts are fundamentally misplaced.

The argument against necessity

The quantum "show" consists of discrete field excitations (particles) that are inherently non-local due to Heisenberg's uncertainty principle, the Pauli exclusion principle (for fermions), and quantum superpositions.

Crucially, while quantum parameters are discrete, the independent variables of quantum mechanics — space s and time t — remain continuous: *fields are defined on a continuous manifold*. Therefore, the mathematical foundations of the "stage" and the "show" *do not* inherently contradict each other.

In a thought experiment, imagine a planet the size of Jupiter — voluntarily ignoring decoherence — in a spatial superposition at two different points along its orbit, or more likely a fullerene molecule (C_{60}),

or an individual particle, "split at different places": a continuous space-time manifold would smoothly accommodate all these distributions of mass-energy, while introducing a quantized space-time would offer no advantage.

Conceptual and mathematical flaws

Attempting to quantize the space-time stage introduces severe conceptual issues:

- **Redundancy:** replacing a thoroughly proven, robust framework like GR with a discrete alternative lacks strong observational justification.
- **Mathematical disruption:** discretizing the space-time manifold disrupts the differential equations governing quantum fields. If space-time is modelled in discrete "lumps," the motion of a photon — already quantized in energy and spin — becomes mathematically problematic (quantum mechanics relies on *continuous* independent variables).

The field / particle "show" is "smeared" in position by different causes: Heisenberg's uncertainty principle, Pauli's exclusion principle (for fermions), and superpositions of position. Because of this, the space-time "stage" is warped smoothly, *without mathematical singularities*.

The mathematical foundations of GR and QM are indeed *compatible*.

The instantaneous collapses observed from quantum entanglement in far away places do not imply a breakdown of space-time: as an elastic medium, localized energy perturbations are smoothed out, propagating gravitational ripples at speed c .

Conclusion

General Relativity and Quantum Mechanics are intrinsically compatible when gravity is treated classically and matter quantum-mechanically.

Rather than forcing a quantization of space-time, research should focus on:

- Deepening our understanding of the space-time manifold through the fundamental constant c , treating it as a property of the medium rather than merely a speed limit.
- Convening a modern equivalent of a Solvay Conference, dedicated to "The Dimensions of Our Model(s) of Reality", aimed at determining the optimal number and nature of dimensions to be used in our fundamental theories.

Addendum

Brainstorming with Google AI on the possible **impact** and **scope** of
"reviewing general relativity" **instead of** "quantizing space-time"

Conceptual example

By reviewing the Einstein's work as follows...

- Keeping **c** (of course...);
- Reinserting the cosmological constant **Λ** (at 10^{-47}GeV^4);
- Positing ***k* variable** with *mass geometry* and *density*;

...many riddles seem to disappear, as:

- **Dark energy**, from **Λ** (the estimate of vacuum energy should be brought to zero, and the Casimir effect explained otherwise, as it's already been done);
- **Dark matter**, from ***k* variable** with mass geometry (disc galaxies);
- **Black holes issues** — event horizon anomalies (time, wormholes, information, "no hair") and core singularity — from Heisenberg principle preventing singularities and ***k* variable** with mass density.