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Our Universe: Cause and Effects, Searching for a Fundamental Mechanism of Gravity

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The Standard Model of particle physics has provided a foundational understanding of the universe, describing twelve matter-carrying fields and four force-carrying fields. It enables visualization of interactions within the quantum vacuum field—primarily the Higgs field, which was confirmed through LHC experiments and led to a Nobel Prize. However, significant questions remain unresolved, particularly regarding the nature of the Higgs field and the mechanism of gravity.

This article proposes a novel conceptual framework involving a dynamic, non-isotropic quantum vacuum—an exotic superfluid termed the gravitoetherton superfluid. Within this framework, gravity emerges not as a fundamental force, but as a result of directional push from fermion gravitons, which are hypothesized to be massive particles (~750 proton masses). This theory challenges the Einsteinian concept of space-time curvature and Newton's force of attraction, offering a radically new vision that gravity, and potentially all fundamental forces, are emergent phenomena.

Rethinking the Vacuum

Current quantum physics considers the vacuum as a frothing, dynamic field where virtual particles constantly appear and vanish—an idea reinforced by QED/QCD calculations and experimental observations like the Casimir effect. However, a mismatch of 120 orders of magnitude in vacuum energy remains unresolved. This calls into question our assumptions about vacuum, light propagation, and the validity of the cosmological constant.

Contrary to Einstein's postulate of an isotropic and constant vacuum, this article argues for a non-isotropic quantum vacuum, filled with swirling matter and force fields, forming a gravitoetherton superfluid. In this view, vacuum is a medium teeming with dynamism—not an empty void.

The Gravitoetherton Superfluid Universe

In 2002, I introduced the concept of a gravitoetherton superfluid, through publications titled:

1. ETHER = GRAVITY = DARK ENERGY: Theory of Gravitoetherton Superfluid Universe
2. Balloon Inside Balloon: Matter and Antimatter Universes on Opposite Entropy Paths and Reverse Arrow of Time

These works propose that

- Our universe exists within an antimatter universe on an opposite entropy path.
- A rebounding event, rather than a Big Bang, initiates cosmic cycles.
- The boundary region between matter and antimatter universes is highly energetic, generating particles that seed universal growth.

Emergent Gravity and Fermion Gravitons

Traditional views define gravity as either:

- A force of attraction between masses (Newton),
- Or the curvature of space-time (Einstein).

However, neither model explains the mechanism by which gravity operates. I propose that gravity is:

- Not a fundamental force, but an emergent phenomenon.
- Caused by push of fermion gravitons on matter molecules.

Characteristics of Fermion Gravitons

- Hypothesized to have a mass ~750 times that of a proton.
- Flow directionally (e.g., towards Earth's center), exerting a gravitational push.
- Density increases with depth (proportional to $1/R^2$), explaining uniform acceleration of all masses.
- Responsible for equal falling of all objects (supports Avogadro's principle).

- Fundamental to galactic dynamics (e.g., explaining flat rotation curves without invoking dark matter).

Thus, dark matter is identified as fermion gravitons themselves—massive, invisible particles generating gravitational effects.

Redefining Forces: All Forces Are Emergent

I argue that none of the four known forces (gravity, electromagnetism, strong, and weak nuclear) are truly fundamental. They are emergent from interactions within the gravitoetherton superfluid:

- Gravity arises from directional push by fermion gravitons.
- Strong nuclear force is attributed to boson gravitons, interacting with quarks via charge coupling inside the nucleus.
- Outside the atom, boson gravitons lose coupling strength due to lack of fractional charges, explaining why strong force is confined.

This perspective reframes space as a dynamic medium filled with force and matter carriers, not a passive stage.

Implications for Cosmology and Fundamental Physics

Replacing the Big Bang:

- Universe emerges through Big Bounce events caused by opposing entropy interactions between matter and antimatter universes.
- Each bounce gives rise to a configuration of quarks (tetraquarks, pentaquarks) and physical laws tailored to that cycle.

Time as a Local Variable

- Time is not absolute, nor a fourth dimension of space-time.
- It is a local measure of entropy change and gravity potential, varying with speed and position.
- Time dilation is simply measurement dilation due to relativistic or gravitational conditions.

A Call for New Physics

Einstein's SR and GR were groundbreaking but limited. The current crises in vacuum energy, dark matter, and gravity demand a new theoretical framework:

- One that accepts emergent forces.
- Recognizes the non-isotropic, dynamic nature of space.
- Incorporates entropic, superfluid-like behavior of the universe.

The Standard Model, despite its successes, cannot explain the composition of dark matter or the cosmological constant problem. It fails to unify gravity with quantum physics or account for the deterministic cause-and-effect relationships believed to underpin reality.

Conclusion

The proposition is bold but grounded in a key insight: What we perceive as fundamental may itself be emergent.

- Gravity is not a pull but a push, arising from directional flow of fermion gravitons.
- Dark matter is fermion gravitons.
- Strong force is not intrinsic, but due to local boson graviton interactions.
- Space is not empty, but a superfluid matrix—the gravitoetherton superfluid.
- Time is not universal, but a local effect of entropy and potential.

This theory invites renewed experimental investigation, particularly at the LHC, and a philosophical re-examination of what we consider "fundamental" in nature.