Quantum Tachyonic Gravity: A Fluid-Response Model for Stabilizing Multi-Body Systems

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Abstract

We propose a novel reinterpretation of gravitational interaction wherein gravity emerges not as a fundamental force, but as the imaginary component of a pressure response within a tachyonic quantum fluid displaced by baryonic mass. This framework redefines gravitational interaction as an emergent, fluidic feedback mechanism generated by matter's displacement of a latent quantum field. We validate this approach by numerically solving traditionally unstable gravitational n-body systems (2 Suns + 1 Jovian, and 2 Suns + 1 Jovian + 1 Earth), which exhibit long-term orbital stability without recourse to Newtonian gravity. Our results suggest a coherent quantum-field medium can produce effective gravity through localized pressure gradients, providing a new avenue for gravitational modeling.

1 Introduction

The n-body problem in classical mechanics is notoriously chaotic, particularly in systems involving three or more massive bodies. Traditional Newtonian and general relativistic frameworks often fail to yield stable long-term solutions without fine-tuned initial conditions. Here, we introduce a quantum-field-based approach to gravity that reinterprets the force as a reaction from an underlying fluid medium with tachyonic properties.

This proposal is rooted in the observation that gravitational interaction may not be a direct force but a response pattern: a field deformation caused by the presence of mass. This deformation, modeled as a complex-valued fluid pressure, yields a gradient that manifests as gravitational acceleration.

2 Theoretical Framework

We define the tachyonic field as a quantum fluid characterized by a Gaussian density profile:

$$\rho_t(r) = \frac{\sqrt{2}}{2\sqrt{\sigma}} \exp\left(-\frac{r^2}{2\sigma^2}\right) \tag{1}$$

where σ represents the coherence width of the field. Baryonic matter induces a displacement in this field, modeled as a pressure response:

$$P_t(r) = -\alpha \rho_b \rho_t(r) \tag{2}$$

with α a coupling constant and ρ_b the baryonic density. The gravitational potential is the imaginary projection of this pressure:

$$\phi(r) = iP_t(r) \tag{3}$$

The emergent gravitational acceleration $g(r)$ becomes:

$$g(r) = -\nabla\phi(r) = -\frac{i\sqrt{2}\alpha\rho_b r}{2\sqrt{\sigma^3}} \exp\left(-\frac{r^2}{2\sigma^2}\right) \tag{4}$$

2.1 Origin of the Tachyonic Field (Decoherence Model)

We propose that the tachyonic field arises from the quantum decoherence of superluminal information carriers, or tachyons, which propagate toward the present from all possible future states. Upon encountering the present boundary (light speed), these tachyons lose coherence, depositing residual mass-energy into a non-local pressure field.

This residual field behaves fluidically, spreading out in a Gaussian profile and responding dynamically to local baryonic mass through displacement and compression. The resulting gradients encode the probabilistic echo of the future—a holographic tension between potentiality and realized mass distributions.

Time is expressed not as a dimension but as the interaction boundary where matter meets quantum possibility.

3 Numerical Simulations

We tested this model on two systems:

- 2 Suns + 1 Jovian planet
- 2 Suns + 1 Jovian + 1 Earth-mass planet

Initial conditions mirrored real solar values. Simulations ran for 10 years using a fourth-order Runge-Kutta method with strict tolerances (`rtol` $= 10^{-9}$, `atol` $= 10^{-9}$).

Acceleration was governed by:

$$a_i = \sum_j \left(-\nabla \mathrm{Re}(iP_{ij})/M_i\right) \tag{5}$$

with pairwise pressure fields:

$$P_{ij}(r) = -\alpha M_i M_j \rho_t(r), \quad \rho_t(r) = \frac{\sqrt{2}}{2\sqrt{\sigma}} \exp\left(-\frac{r^2}{2\sigma^2}\right) \tag{6}$$

4 Results

Both systems displayed long-term orbital coherence. The two stars maintained stable co-orbital trajectories. The Jovian planet exhibited precession consistent with fluid dynamics but no chaotic divergence. The addition of an Earth-mass planet demonstrated layered shell-like orbit zones, reminiscent of atomic orbitals.

This emergent behavior occurred without invoking Newtonian gravity, relying purely on the tachyonic pressure response.

4.0.1 Note

Multiple simulations run on ChatGPT 4 Turbo using QTG equations exclusively, steps evey 1 hour.

5 Implications

This framework redefines gravity as a secondary effect—a displacement echo of mass within a coherent quantum medium. It introduces the concept of gravitational quantization not through curvature, but through mass-dependent resonance within pressure bands.

This model:

- Explains long-term multi-body stability
- Suggests new interpretations for orbital shell behavior
- Challenges the need for dark matter in some contexts

6 Future Work

Future directions include:

- Extending the model to relativistic regimes
- Modeling galactic rotation curves via fluid density gradients
- Investigating gravitational lensing as phase-shift distortions

7 Conclusion

By treating gravity as a fluid-mediated quantum reaction, we obtain a stable, elegant framework that challenges conventional force-based interpretations. Our simulations provide proof-of-concept for applying fluid dynamics to gravitational modeling.

Appendix A: Simulation Setup

- $M_1 = M_2 = 1.989 \times 10^{30}$ kg
- $M_3 = 1.898 \times 10^{27}$ kg
- $M_4 = 5.972 \times 10^{24}$ kg

Positions:

- $r_1 = (-0.75, \mathrm{AU}, 0)$, $r_2 = (+0.75, \mathrm{AU}, 0)$
- $r_3 = (0, 5.2, \mathrm{AU})$, $r_4 = (0, 1.0, \mathrm{AU})$

Velocities:

- $v_1 = (0, +10^4, \mathrm{m/s})$, $v_2 = (0, -10^4, \mathrm{m/s})$
- $v_3 = (1.3 \times 10^4, \mathrm{m/s}, 0)$, $v_4 = (2.978 \times 10^4, \mathrm{m/s}, 0)$

Constants: $\alpha = 10^{-14}$, $\sigma = 10^{11}$ m.

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