Fluxonic Zero-Point Energy and Emergent Gravity: A Deterministic Alternative to Spacetime Curvature

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Abstract

This paper develops a fluxonic framework for zero-point energy and gravity, demonstrating that vacuum fluctuations and gravitational effects emerge from nonlinear fluxonic interactions rather than stochastic quantum effects or spacetime curvature. We derive a unified fluxonic field equation, simulate vacuum energy density, black hole formation, and propose experimental tests to detect gravitational wave deviations and vacuum energy shifts. These challenge quantum field theory and General Relativity, offering a deterministic alternative.

1 Introduction

Quantum mechanics attributes vacuum fluctuations to uncertainty, and General Relativity ties gravity to spacetime curvature, yet unification remains elusive. We propose that fluxonic interactions provide a deterministic explanation for zero-point energy and gravity, akin to solitonic models seen in nonlinear Klein-Gordon systems. Our approach extends recent findings on solitonic unification [**?**] and fluxonic black hole analogues [**?**].

2 Fluxonic Zero-Point Energy and Gravity Equation

We propose the governing equation:

$$\frac{\partial^2 \phi}{\partial t^2} - c^2 \nabla^2 \phi + \alpha \phi + \beta \phi^3 - \eta \frac{\partial \phi}{\partial t} = 8\pi G \rho, \tag{1}$$

where:

- ϕ is the fluxonic field,
- c is the characteristic wave speed,

- α and β govern nonlinearity,

- η is a damping coefficient related to vacuum energy dissipation,

- $8\pi G\rho$ represents the fluxonic coupling to gravitational mass density.

This equation unifies vacuum energy and gravity as emergent fluxonic effects, avoiding singularities seen in General Relativity [**?**].

3 Numerical Simulations of Fluxonic Vacuum and Gravity

Simulations validate the following:

- **Fluxonic Casimir Effect:** Attractive force from boundary conditions.

- **Fluxonic Vacuum Polarization:** Charge-like fluctuations without virtual pairs.

- **Fluxonic Dark Energy Scaling:** Energy scales with cosmic expansion.

- **Fluxonic Black Hole Formation:** Non-singular vortex structures.

- **Fluxonic Gravitational Waves:** Wave dispersion as a function of fluxonic field interaction.

3.1 Predicted Outcomes

Standard Prediction	Fluxonic Prediction
Stochastic vacuum fluctuations	Structured fluxonic effects
Gravity via spacetime curvature	Emergent from fluxonic interactions
Singular black holes	Non-singular fluxonic vortices
Stochastic gravitational waves	Fluxonic wave dispersion

Table 1: Comparison of Vacuum and Gravity Predictions

4 Experimental Proposal

We propose an experimental test for fluxonic gravitational shielding:[**?**]:

- **Setup:** High-density Bose-Einstein Condensate (BEC) as a medium for modulating gravitational waves.

- **Measurement:** LIGO interferometers for wave deviations; force sensors for Casimir shift detections.

- **Expected Outcome:** A measurable attenuation of gravitational wave amplitude, suggesting fluxonic mediation of gravity.

References