Fluxonic Time Dilation: The Emergence of Relativity from Fluxonic Interactions

Independent Theoretical Study

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Abstract

This paper explores the emergence of relativistic time dilation from fluxonic interactions. We investigate how solitonic structures modify time evolution at near-light speeds, suggesting that time itself may arise as an emergent property of fluxonic wave interactions rather than a fundamental dimension. The results challenge conventional spacetime interpretations and offer a new pathway to unifying quantum mechanics with relativity.

1 Introduction

Traditional physics treats time as a fundamental dimension, yet quantum mechanics and relativity provide conflicting descriptions. This study investigates whether time emerges from fluxonic interactions rather than existing as a predefined variable.

2 Mathematical Framework

We model fluxonic time dilation using a modified nonlinear Klein-Gordon equation:

$$\frac{\partial^2 \phi}{\partial t^2} - \frac{\partial^2 \phi}{\partial x^2} + m^2 \phi + g\phi^3 = 0. \tag{1}$$

Introducing a velocity-dependent time dilation factor:

$$t' = \frac{t}{\sqrt{1 - v^2/c^2}}, \tag{2}$$

where fluxonic field evolution is modified as:

$$\frac{\partial \phi}{\partial t} \to \frac{1}{\sqrt{1 - v^2/c^2}} \frac{\partial \phi}{\partial t}. \tag{3}$$

3 Numerical Simulation and Results

A numerical simulation of fluxonic waves at near-light speed (velocity factor $v = 0.8c$) showed:

$$\begin{aligned} \text{Initial Evolution Rate} &= 1.00, \\ \text{Final Evolution Rate} &= 0.60, \\ \text{Relative Time Dilation} &= 40\%. \end{aligned}$$

This confirms that time evolution slows down as velocity increases, mirroring special relativity predictions.

4 Discussion and Implications

1. **Emergent Time:** Time may not be fundamental but arises from fluxonic interactions. 2. **Relativity Without Spacetime:** If time dilation emerges naturally, Lorentz invariance could be a fluxonic phenomenon rather than a geometric property. 3. **Quantum Time Correlations:** This theory could explain nonlocality and quantum entanglement as time-linked fluxonic resonances.

5 Conclusion

Our results suggest that time is an emergent property of fluxonic interactions rather than a fundamental coordinate. Future work will explore how fluxonic models generalize to full relativistic frameworks.