BN Supplementary Materials

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Repository: GitHub/BN-Field-Hypothesis
Status: Preprint — Open for Discussion

Abstract

We propose a novel vortex field $\mathbf{B}_N$ coupled to gravity via torsional spacetime dynamics. The field is sourced by time-varying gravitational potentials $\mathbf{g}(t)$ and gravitational currents J_g^μ, inducing velocity-dependent forces on matter ($\mathbf{F}_{BN} = m\mathbf{v} \times \mathbf{B}_N$). Key predictions include:

- Modified galactic rotation without dark matter,
- Transient torsional effects in core-collapse supernovae ($\tau \sim 1\,\text{ms}$),
- High-frequency gravitational wave polarizations detectable by LISA.

1 Introduction

While General Relativity (GR) successfully describes gravity at macroscopic scales, observational anomalies (e.g., galaxy rotation curves, gravitational wave signatures) suggest missing physics. We introduce $\mathbf{B}_N$ as a **torsional companion** to the gravitational field, analogous to magnetism in electromagnetism.

Key motivation: If variable $\mathbf{g}(t)$ induces $\mathbf{B}_N$, and $\mathbf{B}_N$ backreacts on matter, could this explain dark matter/energy phenomena?

2 Mathematical Framework

2.1 Field Equations

The field $\mathbf{B}_N$ obeys:

$$\nabla \times \mathbf{B}_N = -\frac{1}{c^2}\left(\frac{\partial \mathbf{g}}{\partial t} + \frac{\mathbf{g}}{\tau}\right) \quad \text{(Damped induction law)}$$

where $\tau \sim 1\,\text{ms}$ is the field's decay timescale.

2.2 Coupling to Matter

The interaction Lagrangian:

$$\mathcal{L}_{\text{int}} = 10^{-19}\,\bar{\psi}\gamma_\mu\psi B_N^\mu \quad \text{(Ultra-weak coupling)}$$

3 Observational Signatures

3.1 Supernovae

- **Prediction**: $\mathbf{B}_N$ briefly slows core collapse, altering neutrino emission timing.
- **Test**: Compare SN 1987A neutrino data with τ-dependent models.

3.2 Gravitational Waves

- **Prediction**: Torsional polarizations ($h_\otimes$) below 10 Hz (LISA band).
- **Null result in LIGO**: Explained by $\mathbf{B}_N$'s decay for $f > 100\,\text{Hz}$.

4 Discussion

4.1 Strengths

- No conflict with current GW/SN data.
- Testable via low-frequency GW detectors (LISA) or neutrino telescopes.

4.2 Open Questions

- Quantum origin of $\mathbf{B}_N$?
- Does $\mathbf{B}_N$ couple to dark sector particles?

5 Conclusion

The $\mathbf{B}_N$ hypothesis offers a torsion-based alternative to dark matter/energy in specific regimes. While speculative, it is **falsifiable** and merits further study.

Invitation: We welcome collaboration to refine predictions or analyze archival data.

References

1. Einstein, A. (1915). *GR field equations.*
2. Hulse, R. & Taylor, J. (1975). *Binary pulsar PSR B1913+16.*
3. LIGO Collaboration (2016). *GW150914 detection.*