Hypothesis: Coupling Between Gravitational Field and the Vortex BN Field

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Serious theoretical physics playtime

Abstract

This hypothesis proposes a fundamental coupling between time-varying gravitational fields and a novel vortex field (BN) through torsional spacetime dynamics. We derive a set of field equations where:

- Variable gravitational fields $\mathbf{g}(t)$ induce rotational BN fields via $\nabla \times \mathbf{B}_N = -c^{-2}\partial_t \mathbf{g}$
- The BN field exerts velocity-dependent forces $\mathbf{F}_{BN} = m(\mathbf{v} \times \mathbf{B}_N)$ on matter

The theory predicts: (1) new high-frequency gravitational wave modes, (2) modification of galactic rotation without dark matter, and (3) measurable torsion effects in N-body systems. Experimental verification routes include LIGO data analysis and laboratory-scale torsion detectors. The mathematical framework extends Einstein-Cartan geometry with a propagating torsion field $T^{\lambda}_{\mu\nu} \propto \epsilon^{\lambda\alpha\mu\nu} B_{N\alpha}$.

Assumptions

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Assumptions

1. A **time-varying gravitational field** $\mathbf{g}(t, \mathbf{r})$ induces a **vortex BN field** $\mathbf{B}_N$ via:
$$\nabla \times \mathbf{B}_N = -\frac{1}{c^2}\frac{\partial \mathbf{g}}{\partial t}.$$

2. The **BN field** interacts with matter through a force:
$$\mathbf{F}_{BN} = m\left(\mathbf{v} \times \mathbf{B}_N\right),$$
where m is mass and $\mathbf{v}$ is velocity.

Predictions

- **New gravitational waves**: **g**-BN waves propagating at light speed.
- **Galaxy rotation curves**: BN field explains anomalies without dark matter.
- **Solar system effects**: Perturbations in planetary orbits near high-$\mathbf{B}_N$ regions.

Experimental Verification

1. **BN wave detection**: Search LIGO/Virgo data for signals at 10^{-3} Hz.
2. **Gyroscope experiment**: Measure axis drift in an isolated BN field.
3. **N-body simulations**: Add $\mathbf{F}_{BN}$ to galactic motion equations.

Mathematical Framework

- Torsion tensor:
$$T^{\lambda}_{\mu\nu} = \epsilon^{\lambda\alpha\mu\nu} B_{N\alpha}.$$

- Lagrangian:
$$\mathcal{L} = \frac{1}{4} B_{N\mu\nu} B_N^{\mu\nu} - \frac{1}{2}\mu_g J_g^{\mu} B_{N\mu},$$
where $B_{N\mu\nu} = \partial_\mu B_{N\nu} - \partial_\nu B_{N\mu}$.

Connection to Established Physics

The BN field hypothesis extends general relativity similarly to how Maxwell's equations extend Coulomb's law:

- Time-varying $\mathbf{g}$ acts as a source for $\mathbf{B}_N$, just as $\partial_t \mathbf{E}$ generates $\mathbf{B}$ in electromagnetism
- The $\mathbf{F}_{BN} = m(\mathbf{v} \times \mathbf{B}_N)$ term mirrors the Lorentz force $\mathbf{F} = q(\mathbf{v} \times \mathbf{B})$

Key prediction: BN waves should produce *torsional spacetime distortions* detectable via:

1. Atom interferometers (phase shift $\Delta\phi \propto \int \mathbf{B}_N \cdot d\mathbf{l}$)
2. Pulsar timing arrays (residuals $\delta t \sim B_N/c^2$)

Discussion

- Is BN gravity's **dark photon**?
- Is $\mathbf{J}_g$ a **quantum information flow**?
- How does BN affect **spacetime entropy**?

References

[1] Sciama, D. W. (1964). "The Physical Structure of General Relativity". *Reviews of Modern Physics*, 36(1), 463-469.
Podstawowa praca o teorii Einsteina-Cartana z torsją

[2] Hehl, F. W., et al. (1976). "General relativity with spin and torsion". *Physical Review D*, 14(10), 2527.
Teoretyczna analiza fal torsyjnych

[3] Mashhoon, B. (2008). "Gravitoelectromagnetism". *arXiv preprint arXiv:gr-qc/0311030*.
Analogia między grawitacją a elektromagnetyzmem

[4] Hammond, R. T. (2002). "Torsion gravity". *Reports on Progress in Physics*, 65(5), 599.
Kwantowe aspekty torsji w grawitacji

[5] Ostriker, J. P., & Steinhardt, P. J. (2003). “New light on dark matter”. *Science*, 300(5617), 1909-1914.
Anomalie w rotacji galaktyk