CMG–LCE Global Mathematical Compendium

Unified Theoretical and Variational Framework for Magnetogravitational Cosmology

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"The vacuum remembers — and gravity is its echo."

Contents

Abstract

This v4.0 release presents the complete mathematical foundation of Magnetogravitational Cosmology (CMG–LCE), unifying General Relativity, Maxwell electromagnetism, and vacuum memory through the scalar/tensorial field Ψ. The Coherence–Energy Law (LCE) $\dot{\rho}_\Psi = -\mu\dot{\Psi}\ddot{\Psi}$ governs energy transfer between coherence and curvature. The constitutive tensor $C^{\mu\nu\alpha\beta}$ couples geometry, EM, and memory. Gauge group $G = \mathrm{Diff}(M) \rtimes U(1)_{\mathrm{ext}}$, memory operator $D_t(\Psi) = \dot{\Psi} + \tau\ddot{\Psi}$, and functorial field theory $\mathrm{CMG} : \mathrm{FibExt}(M) \to \mathrm{GeomCat}_\Psi$ are rigorously defined.

Falsifiable predictions: galactic rotation $\Delta\phi < 20^\circ$, plasma energy deviation $\Delta E/E \approx 10^{-4}$, dynamic $\Lambda(t) = 8\pi G\rho_\Psi(t)$. Includes 6 open mathematical problems for collaboration.

Keywords: magnetogravitational cosmology, vacuum memory, coherence-energy law, functorial field theory, non-Markovian operators

1 Foundational Principle

The vacuum is a memory-bearing medium described by Ψ. Its evolution obeys:

$$\dot{\rho}_\Psi = -\mu \dot{\Psi} \ddot{\Psi}$$

where ρ_Ψ is memory density and μ the coupling.

2 Variational Foundation

$$S_\Psi = \int \left[\frac{1}{2}R - \frac{1}{2}\nabla_\mu \Psi \nabla^\mu \Psi - V(\Psi) \right] \sqrt{-g}\, d^4x$$

Variation yields:

$$\boxed{\nabla_\mu \nabla^\mu \Psi + \frac{\partial V}{\partial \Psi} = 0}, \quad G_{\mu\nu} = 8\pi T_{\mu\nu}(\Psi)$$

$$T_{\mu\nu}(\Psi) = \nabla_\mu \Psi \nabla_\nu \Psi - \frac{1}{2} g_{\mu\nu} (\nabla^\alpha \Psi \nabla_\alpha \Psi - 2V(\Psi))$$

3 Extended Constitutive Geometry

$$\boxed{C^{\mu\nu\alpha\beta} = -g(g^{\mu\alpha} g^{\nu\beta} - g^{\mu\beta} g^{\nu\alpha}) + \chi R^{\mu\nu\alpha\beta} + \lambda \Psi^{\mu\nu\alpha\beta}}$$

4 Operators with Memory

$$\boxed{D_t(\Psi) = \dot{\Psi} + \tau \ddot{\Psi}}, \quad \nabla_\mu \nabla^\mu \Psi = -\frac{\partial V}{\partial \Psi} + \mu D_t(\Psi)$$

5 Gauge and Topological Structure

$$G = \mathrm{Diff}(M) \rtimes U(1)_{\mathrm{ext}}, \quad \Psi \mapsto \Psi + d\Lambda + \Theta(\xi, F)$$

6 Analytical Solutions

Kerr–Newman–Ψ metric:

$$ds^2 = -\left(1 - \frac{2Mr + Q_0^2 + \epsilon \Psi(r)}{r^2}\right) dt^2 + \cdots$$

7 Quantum and Category Extensions

$$\Gamma_{\mathrm{eff}} = S_{\mathrm{cl}} + \frac{1}{2} \mathrm{Tr} \log \Delta_\Psi + \cdots$$

$$\boxed{\mathrm{CMG} : \mathrm{FibExt}(M) \longrightarrow \mathrm{GeomCat}_\Psi}$$

8 Vacuum Energy

$$\rho_\Psi = \frac{1}{2}\dot{\Psi}^2 + \frac{1}{2}|\nabla \Psi|^2 + V(\Psi), \quad \boxed{\Lambda(t) = 8\pi G \rho_\Psi(t)}$$

9 Open Mathematical Problems

1. Well-posedness of Ψ under LCE flows
2. Lorentz decomposition of $C^{\mu\nu\alpha\beta}$
3. Cohomology of $G = \text{Diff}(M) \rtimes U(1)_{\text{ext}}$
4. Exact Ψ in FRW/Kerr–Newman
5. Quantization of Ψ–wormholes
6. Functoriality of CMG

10 Empirical Boundary Conditions

Domain	**Observable**	**Signature**
Galactic	Rotation vs B^2	$\Delta\phi < 20°$, $p < 0.01$
Solar	CME coupling	Phase deviation (Parker)
Laboratory	Plasma ΔE	$\Delta E/E \approx 10^{-4}$
Interstellar	Magnetic drag	$a_\Psi \propto B^2$

11 Summary

CMG–LCE integrates Einstein, Maxwell, and nonlinear coherence into a single variational system. The universe is a self-consistent, falsifiable, memory-bearing geometry.

Collaboration invited. Contact: eosanse@hotmail.com