

Extrinsic Gravitation as a Homeostat in a CPT-Symmetric Universe: A Proof of Concept

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Abstract

We propose that gravity, as it appears in Einstein's general relativity, is not entirely intrinsic to a single space-time manifold but instead the emergent trace of an extrinsic coupling between two CPT-symmetric manifolds. This extrinsic gravitation acts as a homeostat: a recursive balancing agent across mirrored ontologies. Building on Hegel's conception of sublation, Koestler's holonic hierarchies, and von Baer's formative centripetal force, we reinterpret the Einstein-Hilbert action as a boundary-effective theory of a deeper two-manifold interaction. Roy Frieden's information-theoretic amplitude functions already hint at such duality, where variational principles generate coupled solutions. We propose that the CPT dual structure provides the additional degrees of freedom necessary for a coupling Lagrangian, one that employs "ghost" contributions such as mirrored Ricci scalars or logarithmic determinants of paired metrics. The result is a proof of concept: the hunt for an extrinsic gravity theory is not only feasible but natural, providing a unified framework that explains the appearance of intrinsic general relativity, accommodates quantum nonlocality, and sustains homeostatic balance at both cosmic and quantum scales.

Keywords: CPT Symmetry, Extrinsic Gravitation, General Relativity, Gravity, Homeostat, Holon, Lagrangian, Sublation, Two-sheeted, Two-sided.

1. Introduction

Einstein's general relativity (GR) is traditionally framed as intrinsic: curvature arises entirely from the geometry of a single space-time manifold. Yet this framework is strained when confronted with quantum nonlocality and with the puzzle of gravity's weakness and universality. The alternative proposed here, building on Smith (2021, 2025a & b), is that GR represents only the intrinsic "face" of a deeper, extrinsic gravitation that couples two CPT-symmetric manifolds.

Extrinsic gravitation, like Hegel's "second negation," is not reducible to mechanics but functions as a homeostat—an attractor that maintains balance between mirrored realities. This perspective explains why gravitation appears as an integrative principle across physics, biology, and cognition, and why variational formulations often contain "ghost" degrees of freedom that only make sense when treated bilaterally.

Some new interpretations that break from tradition are needed to understand this paper. First, spacetime is inherently two-sided or two-sheeted with each side coming with its own metric, and where the in-between represents an extrinsic dimension. Because the two sides are joined in synthesis and because it is impossible to distinguish one side from its other, only one set of spacetime coordinates are needed for both sides. Nevertheless, a relativity is permitted within the perspective of one side where the other side becomes its CPT inversion, it is just that the sides cannot be distinguished and are joined to make the visible universe. What we call “matter” may be interpreted as a synthesis of both matter and antimatter partners across the two manifolds. Local inversions may reveal antimatter, but such conditions are unstable and manifest as annihilation. In this view, the event horizon of a black hole is the seamless junction where the manifolds exchange roles, effectively making the black hole a mirror (Tzanavaris, Boyle, and Turok 2025) as well as the big bang (Boyle, Teuscher and Turok, 2022).

2. Dialectical Origins of Extrinsic Gravity

Hegel regarded gravity as the sublation of space into inwardness, balancing inertia and attraction in a homeostatic act (cf., Stone 2000, Smith 2025a). Similarly, Koestler (1967) described holons as simultaneously self-regulating and integrated, requiring a higher-order binding force. Von Baer emphasized centripetal forces in embryological development (cf., Lenoir 1982), while Buffon suggested reproduction as a gravitational cohesion (cf., Eddy 2023). In each case, gravity is not merely intrinsic motion but a principle of synthesis.

This historical lineage points to an ontology where extrinsic gravitation is not an extra hypothesis but the very principle that converts contradiction into coherence across domains.

3. CPT Symmetry and the Dual Manifold Picture

Boyle, Finn, and Turok (2018) proposed that the universe may be CPT-symmetric, consisting of two mirrored manifolds. In such a model, the Einstein-Hilbert action of each manifold would be symmetric, yet their coupling—mediated by extrinsic gravitation—would produce the observed asymmetries and trajectories of matter.

Let $g_{uv}^{(1)}$ and $g_{uv}^{(2)}$ be the two metrics. A naive identification of the determinants of each metric, $g^{(1)} = g^{(2)}$, at the level of the Lagrangian collapses the formalism into triviality. Instead, one retains them as independent during variation, only enforcing mirror equivalence post-Euler-Lagrange. This is analogous to Frieden’s (2004) amplitude expansion, where extra degrees of freedom generate correct field equations before collapsing to physical solutions.

Some homeostatic conditions may be enforced locally. Two standard choices are used in the literature: (i) hard (local) enforcement via a Lagrange multiplier field $\Lambda(x)$ that imposes the equality $\psi(x)=0$ (or full metric equality) on-shell, and (ii) soft enforcement via a local potential V that energetically favors identity $g^{(1)} = g^{(2)}$. Both strategies will be employed in different model variants; the Lagrange multiplier is useful for mathematical clarity and for proving bijection results, while potentials are preferable in physical model-building because they provide dynamical approach to homeostasis and avoid over-constraining the system.

4. Candidate Coupling Terms

A scalar (or a scalar function of scalars) must be multiplied by a density before it can be turned into a Lagrangian. Every term under the spacetime integral must be a scalar density. One generic density could be $\sqrt{-g_*}$, where g_* could be a symmetric combination of $g^{(1)}$ and $g^{(2)}$, but it need not be. Several ghost-like Lagrangians and scalars may serve as couplers between mirrored manifolds:

1. Mirrored Ricci Scalars:

$$\mathcal{L}_{ext} = \sqrt{-g^{(1)}} R^{(1)} - \sqrt{-g^{(2)}} R^{(2)}$$

Variation respects independent dynamics; post-variation identification ensures balance.

2. Determinant Differences:

$$\psi = \ln \sqrt{-g^{(1)}} - \ln \sqrt{-g^{(2)}},$$

This scalar, ψ , couples the volume elements of each manifold, linking extrinsic gravitation to probability measures. One possible density is $\sqrt{-g_*}V(e^\psi)$ for some suitable potential function V , with a minimum at $\psi=0$, and as illustrated in the concrete model of Figure 1.

3. Trace–Trace Contractions: Quadratic functions of Christoffel traces (normally non-scalars) may be bilaterally symmetrized:

$$\mathcal{L}_\Gamma = \sqrt{-g^{(1)}} \mathcal{C} [g_{uv}^{(1)}] - \sqrt{-g^{(2)}} \mathcal{C} [g_{uv}^{(2)}],$$

where $C = g^{\mu\nu} \Gamma_{\mu\rho}^\rho \Gamma_{\nu\sigma}^\sigma$ is the trace–trace contraction. The difference, $C[g_{uv}^{(1)}] - C[g_{uv}^{(2)}]$, cancel boundary ambiguities, yielding an effective scalar. The trace-trace contraction, C , is not a Ricci scalar— it captures the conformal kinetic sector. To obtain curvature one needs the Einstein combination M–T plus boundary removal. Our constructions exploit C and determinant differences as controlled probes of the conformal/volume homeostasis, not as replacements for the full Ricci curvature.

These couplings express homeostatic balancing: each side mirrors the other, ensuring that no excess curvature or volume distortion persists unopposed. When combining Ricci densities or adding kinetic terms for ψ , appropriate boundary terms (Gibbons–Hawking–York type) must be included for each metric or for the chosen composite measure to make the variational principle well posed (Hassan and Rosen, 2012).

5. Frieden’s Amplitude Functions as Duality Hints

Frieden (2004) introduced amplitude functions q_S to derive Fisher information-based Lagrangians. These amplitudes, while auxiliary, expand the system’s degrees of freedom, producing coupled Euler-Lagrange equations that often come in mirrored pairs. In effect, amplitude functions play the role of a “ghost tensor,” hinting at a dual structure reminiscent of CPT symmetry.

By analogy, mirrored metrics may be treated as amplitude-like degrees of freedom, enlarged during variation and collapsed afterward. This procedure both avoids trivial collapse and allows room for extrinsic gravitation to appear.

6. Extrinsic Gravitation as a Homeostat

Drawing on Friston’s (2006) free energy principle and Ashby’s (1947) homeostat, we define extrinsic gravitation as a recursive regulator. It operates not within either manifold but between them:

- **Flatness Requirement:** A bijection plane ensures that mirrored curvatures can be mapped without distortion, maintaining CPT invariance (Smith 2025a).
- **Homeostatic Balance:** Distortions in one manifold induce compensating responses in the other, ensuring stability across scales.
- **Emergent Intrinsic Gravity:** Observers confined to one manifold perceive the extrinsic coupling as intrinsic curvature—the Einsteinian gravity of GR.

Thus, extrinsic gravitation explains how apparent intrinsic general relativity arises as an effective theory of bilateral homeostasis.

7. Proof of Concept and Future Directions

This framework is not a final Lagrangian but a proof of concept:

1. **Feasibility:** By treating CPT dual metrics as independent until variation, one can write enlarged Lagrangians that do not collapse into triviality.
2. **Universality:** The homeostatic function of extrinsic gravitation naturally explains both cosmic flatness and quantum nonlocality.
3. **Scalability:** From biological form (von Baer) to consciousness (Koestler) to cosmology (Einstein), the same extrinsic principle can act across scales.

Future work should test explicit models where $\mathcal{L}_{ext}, \psi, \mathcal{L}_\Gamma$ are combined, and explore whether path integral or holographic formulations can realize extrinsic gravitation consistently. For a concrete example refer to Figure 1.

$$S = \frac{M_1^2}{2} \int \sqrt{-g^{(1)}} R[g^{(1)}] - \frac{M_2^2}{2} \int \sqrt{-g^{(2)}} R[g^{(2)}] + \frac{\alpha}{4} \int (\sqrt{-g^{(1)}} g^{(1)\mu\nu} + \sqrt{-g^{(2)}} g^{(2)\mu\nu}) \partial_\mu \psi \partial_\nu \psi - \mu^4 \int \sqrt{-g_*} V(e^\psi) + S_{\text{matter}}[g_m, \Phi].$$

Notes:

- $\psi = \ln \sqrt{-g^{(1)}} - \ln \sqrt{-g^{(2)}}$.
- g_* may be chosen symmetric or equal to $g^{(1)}$ or $g^{(2)}$.
- S_{matter} couples matter to a chosen metric g_m (phenomenologically you might choose $g^{(1)}$).
- Vary with respect to $g^{(1)}, g^{(2)}, \psi$. Only after variation you can study minima where $\psi \rightarrow 0$ (homeostasis) and $g^{(1)} \approx g^{(2)}$, recovering an effective single-metric Einstein action plus corrections.

Figure 1. A concrete proof-of-concept model (symmetric, includes Ricci backbone, ψ kinetic, and a soft potential).

8. Conclusion

Extrinsic gravitation, acting as a homeostat across CPT-symmetric manifolds, provides a conceptual bridge between geometry, information, and meaning. What we observe as Einsteinian curvature is only the intrinsic residue of this bilateral synthesis. The feasibility of constructing enlarged Lagrangians with ghost-like structures shows that the search for a more complete theory is not only possible but already underway. In such a

universe, gravity is not merely intrinsic bending of space-time, but the extrinsic principle of sublation that allows reality to appear at all.

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