

Loop Ontology of Gravity | LOG

Abstract

This paper develops a reinterpretation of gravity within the framework of the Loop Ontology, derived from the axiom “Something Is, Nothing Isn’t.” The axiom establishes that space cannot be void but must exist as indivisible closures at the Planck boundary. From this foundation, gravitational phenomena are understood not as the curvature of an elastic spacetime fabric, but as the structural consequence of loop saturation and field interaction. Gravity emerges as the tendency of saturated closures to overlap and unify, while cosmic expansion and the phenomenon referred to as “dark energy” arise from the universal reflection of closure at both the edge and the center of being.

1. The Axiom of Being

Axiom: Something Is, Nothing Isn’t.

Immediate consequences:

1. Non-being is logically excluded.
2. Existence is necessarily continuous and closed.
3. Persistence requires closure; entities must be self-contained.
4. The minimal closure is the loop — the simplest topology that prevents leakage into non-being.

2. Empirical Anchors

1. Energetic vacuum. Quantum fluctuations, Casimir forces, and zero-point energy establish that “empty” space contains measurable energy.
2. Relativity’s geometry. Einstein’s General Relativity successfully models gravity as spacetime curvature, but this should be understood as an effective geometry, not literal elastic bending.
3. Planck boundary. At scales below the Planck length ($\sim 10^{-35}$ m), current theories fail, implying the existence of indivisible structural units.

3. Gravity as Loop Saturation

In Loop Ontology, Planck-scale loops are indivisible: they cannot shrink or stretch. Additional energy does not alter their size but increases their saturation.

- Local gravity. Saturated loops project stronger, more extended fields. When neighboring saturated regions overlap, they tend toward unified closure. This produces the observed phenomenon of gravitational attraction.
- Photon deflection. Light does not travel through bent void; photons trace the geometry of these saturated closures. Gravitational lensing thus arises from structural density, not elastic curvature.

4. Gravity and Cosmic Expansion

Gravity and cosmic expansion are not separate phenomena but two manifestations of closure.

- At local scales: Matter densifies the loop structure. Saturated loops draw others into alignment, producing the attraction we measure as gravitational force.
- At cosmic scales: The axiom requires that being has no exterior. Every point is simultaneously edge and center. Closure at the Planck boundary reflects inward universally, producing the appearance of expansion from every vantage point.
- Dark energy explained: The observed acceleration of expansion is not a new or exotic force. It is the necessary appearance of closure when extended across cosmological scales: the farther one looks, the faster regions appear to recede, because closure scales geometrically with distance.

5. Logical Extensions

1. No void-bending. Curvature of emptiness is incoherent; only structural saturation and overlap occur.
2. No true emptiness. Every region is structured by indivisible closures.
3. Continuity of being. Loops interconnect seamlessly; there are no gaps in persistence.
4. Unified interpretation. Local attraction (gravity) and large-scale expansion (dark energy) are complementary consequences of the same principle: saturation and closure.

6. Conclusion

Gravity does not exist as an independent force but as the structural consequence of indivisible closures saturating and overlapping. Local density produces attraction, while universal reflection produces apparent expansion. Both are inevitable expressions of the axiom "Something Is, Nothing Isn't."

The Loop Ontology of Gravity thus reframes gravitational and cosmological phenomena, eliminating the paradox of void curvature and unifying gravity with cosmic acceleration as natural outcomes of closure at the Planck boundary.