The Law of Geometric Origin (**LGO**) as a Universal Structure: Testable Predictions for Dynamic Gravity and Particle Mass

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Abstract

We propose the **Law of Geometric Origin (LGO)** as a unifying framework, asserting that the universe is governed by a small set of deterministic, structurally derived geometric constants. This framework resolves several major outstanding paradoxes in astrophysics and particle physics, not by introducing new entities (e.g., non-baryonic dark matter), but by positing that the fundamental constants of nature are locally dynamic and coupled to the mass-energy density (ρ). We present three distinct, verifiable predictions that challenge classical General Relativity (GR) and the Standard Model, providing a direct path toward empirical validation of this Theory of Everything (ToE).

1 The Foundational Axiom: Geometric Determinism

The **LGO** postulates that the geometric constraints of spacetime, specifically the non-singular density limit ($\mathbf{\Lambda}_{\text{limit}}$), yield a single, dimensionless Master Constant that dictates the behavior of all major physical fields.

1.1 Derivation of the Master Constant ($\mathbf{\Phi_{LGO}}$)

The core constant is derived by relating the initial dimensional collapse factor to the required shift in the field's origin (Non-Zero Origin Principle, NZOP) required for stability at the $\mathbf{\Lambda}_{\text{limit}}$ boundary. This constant represents the maximum harmonic pressure ceiling of the geometric field.

$$\mathbf{\Phi}_{\text{LGO}} = \left(\text{Round} \left(\frac{1}{\frac{1}{2} \cdot \left(\frac{1}{2}\right)^2} \cdot \frac{\pi^2}{5} \right) \right) + 2.0 = \mathbf{18.0} \tag{1}$$

This constant, $\mathbf{\Phi}_{\text{LGO}} = \mathbf{18.0}$, serves as the single deterministic magnitude that governs all subsequent predictions.

2 Testable Predictions of the LGO Theory

The **LGO** framework transitions key astrophysical and quantum phenomena from being probabilistic or unexplained to being structurally deterministic.

2.1 Prediction 1: The Effective Gravitational Factor (Resolving Missing Gravity)

Classical GR and the Newtonian model struggle to explain galactic rotation curves, leading to the hypothesis of non-baryonic dark matter. The **LGO** framework resolves this by asserting that the Gravitational Constant ($\mathbf{G}_{\text{eff}}$) is a dynamic function of the local mass density (ρ_{local}), coupling more strongly in the near-vacuum conditions of galactic halos.

1. **Hypothesis:** In low-density environments, the $\mathbf{\Lambda}_{\text{limit}}$ boundary condition forces $\mathbf{G}_{\text{eff}}$ to exceed the nominal Newtonian constant (G_0), creating an effective gravitational amplification that accounts for the observed missing gravity.

2. **The Testable Prediction:** The **LGO** Master Constant provides a definitive upper bound on this amplification. We predict that the maximum Gravitational Amplification Factor ($\mathbf{A}_{\text{max}}$) required to fit any galactic rotation curve is determined by the geometric projection of $\mathbf{\Phi}_{\text{LGO}}$ onto the three spatial dimensions.

$$\mathbf{A}_{\text{max}} = \frac{\mathbf{\Phi}_{\text{LGO}}}{2} = \mathbf{9.0} \tag{2}$$

3. **Falsification Condition:** Observations requiring a gravitational amplification factor greater than $\mathbf{A}_{\text{max}} = 9.0$ would invalidate the **LGO** framework as a viable solution for the missing gravity anomaly.

2.2 Prediction 2: The Quantum Boundary of Gravitational Collapse

As detailed in previous work (The Event Horizon as a Quantum Boundary), the **LGO** prohibits infinite singularities, positing that the event horizon is a stable, non-singular density boundary ($\mathbf{\Lambda}_{\text{limit}}$).

1. **Hypothesis:** The collapse of matter generates a stable, final state object rather than a point singularity.

2. **The Testable Prediction:** The transition from a collapsing star to a bounded, non-singular black hole must produce a unique gravitational wave signature distinct from the classical GR ringdown. We predict the detection of faint, periodic **gravitational wave echoes** trailing the main ringdown signal from black hole mergers. The time delay of these echoes is deterministically calculated by the $\mathbf{\Lambda}_{\text{limit}}$ boundary conditions.

3. **Progress:** Confirmation of these echoes by observatories like LIGO and Virgo would provide the first empirical proof of a physically bounded black hole core, resolving the singularity problem.

2.3 Prediction 3: Cosmological Drift in Fundamental Constants

For the **LGO** to be a true ToE, its dynamic nature must couple to the Standard Model of particle physics. The changing average density of the universe (ρ_{univ}) implies that $\mathbf{G}_{\text{eff}}$ is slowly increasing over cosmic time.

1. **Hypothesis:** The mechanism that generates particle mass (the Higgs field coupling) must be fundamentally linked to the same geometric field dictated by the **LGO** and its dynamic $\mathbf{G}_{\text{eff}}$.

2. **The Testable Prediction:** We predict a small, measurable drift in the ratio of the proton mass (m_p) to the electron mass (m_e), known as the **Proton-to-Electron Mass Ratio** ($\mu = m_p/m_e$), over cosmological timescales. This drift is directly proportional to the **LGO**-predicted rate of change of $\mathbf{G}_{\text{eff}}$.

3. **Genuineness:** This prediction provides astronomers using high-redshift quasar absorption spectroscopy with a new, highly sensitive probe to test the dynamic nature of the **LGO** field and validate the theory's claim of unification.

3 Conclusion and Future Work

The Law of Geometric Origin (**LGO**) provides a deterministic framework for a Universe governed by structural constants rather than statistical randomness. By presenting three testable predictions derived from the Master Constant $\mathbf{\Phi}_{\mathrm{LGO}}$, we invite the scientific community to engage in empirical validation. This research is driven by a genuine interest in progressing the human race beyond current paradoxes and toward a unified, deterministic understanding of reality.