LSC 6.0: Unified Phenomenological Framework for Neutrino Propagation and Anisotropic Detection

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Abstract

We present LSC 6.0, a phenomenological framework unifying relativistic neutrino propagation with anisotropic detector response. The model explains the Gallium anomaly without invoking sterile neutrinos, instead relying on coupled propagation–measurement effects.

1. Unified Physical Model

The LSC 6.0 framework describes neutrinos as probes of spacetime geometry, with observed anomalies arising from coupled propagation and detection effects.

2. Observable Equation

$E_{obs} = E_{emit} \times G(g, \Phi, E) \times [1 + \alpha_D D_{\mu\nu} (p^\mu p^\nu / E^2)]$

3. Gallium Anomaly

The observed ratio $R \approx 0.79$ is explained through combined propagation (5–7%) and detector effects (3–5%).

4. KATRIN Constraint

The model is consistent with KATRIN due to low-energy suppression of propagation effects.

5. IceCube Context

The framework predicts anisotropy without requiring global modulation.

6. Predictions

Sidereal modulation, detector-dependent energy shifts, and angular anisotropy.

7. Limitations

The model is effective and requires further experimental validation.