

Note on the Absence of an E^{-4} Decoherence Trend in IceCube Data

Independent researcher

September 9, 2025

A possible check in high-energy neutrino data is the absence of a quartic energy dependence in decoherence:

$$\Gamma(E) \not\propto E^{-4}, \quad E \in (0.5\text{--}10 \text{ TeV}).$$

How it can be tested: Using atmospheric neutrinos at TeV energies, IceCube can extract effective decoherence parameters. A systematic search for E^{-4} scaling should yield null results within uncertainties.

Why it may be important: Excluding quartic scaling would constrain classes of exotic decoherence models and strengthen the case for long-range quantum coherence of neutrinos.