

Phenomenology: Testing Planck-scale in-vacuo dispersion with GRB neutrinos

Tuesday, September 5, 2023 4:00 PM (15 minutes)

GRB (gamma-ray-burst) neutrinos are excellent probes for testing quantum-gravity-induced in-vacuo dispersion. In this scenario, inspired by quantum gravity research and associated with Lorentz Invariance Violation (LIV), empty quantum spacetime behaves like a dispersive medium affecting the propagation of ultrarelativistic particles, whose speed is affected by energy-dependent Planck-scale corrections.

In a recent study (*Nature Astronomy* (2023)) we investigated the hypothesis that some astrophysical neutrinos detected by the IceCube observatory might be GRB neutrinos, with their travel times affected by energy-dependent speed. Our findings provide intriguing indications that these neutrinos might indeed experience a delay relative to the detection time of the GRB, proportional to the neutrino's energy.

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Session Classification: Parallel Sessions