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Could quantum gravity slow down neutrinos?

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In addition to its implications for astrophysics, the hunt for neutrinos from Gamma-Ray Bursts (GRBs) could also be significant in quantum-gravity research, since they are excellent probes of the microscopic fabric of spacetime. Over the last few years one of the most studied candidate effects of quantum gravity has been in-vacuo dispersion, a phenomenon suggesting an energy-dependent speed variation for ultrarelativistic particles, also associated with Lorentz Invariance Violation (LIV). In this study, we investigated the hypothesis that some 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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