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Testing in-vacuo dispersion with GRB neutrinos

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Some previous studies based on IceCube neutrinos had found intriguing preliminary evidence that some of them might be GRB neutrinos with travel times affected by quantum properties of spacetime delaying them proportionally to their energy, an effect often labeled as “quantum-spacetime-induced in-vacuo dispersion”. We introduce a novel approach to the search of quantum-spacetime-affected GRB neutrinos which restricts the analysis to GRBs of sharply known redshift. Our estimate of the magnitude of the in-vacuo-dispersion effects is fully consistent with what had been found using previous approaches and even if our findings are still inconclusive, since their significance is quantified by a p-value of little less than 0.01, they provide motivation for monitoring the accrual of neutrino observations by IceCube and KM3NeT. Finally, assuming in-vacuo dispersion, we contemplate the possibility that the recently announced ultra-high-energy neutrino KM3-230213A, with energy of ~220 PeV, might be a GRB neutrino.

Working Group

WG2 - High Energy QG Experiment

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