

CU Physics Department Particle Seminar

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“Test for Lorentz violation in the neutrino oscillation experiment”

The oscillation of neutrinos is a natural interferometer. It is sensitive to small space time properties without using the photon (QED), but the sensitivity is comparable with precision optical measurements

(<10E-19 GeV). Thus, neutrino oscillations may be seeing small space time effects, such as Lorentz and CPT violation. Lorentz and CPT violation has been shown to occur in some theories of Planck scale physics and actively studied mainly under the Standard Model Extension (SME) formalism, the minimum extension of the Standard Model with Particle Lorentz Violation.

Recently the MiniBooNE neutrino oscillation experiment published first results. We are seeing unexpected data excess at low energy region, and it cannot be understood with the standard three neutrino massive model.

However, this is a type of signal predicted by Lorentz violation. In particular, a specific neutrino oscillation model based on Lorentz violation predicted a low energy excess event in MiniBooNE.

In this talk, I will discuss the basic concept of Lorentz violation and the world effort to test Lorentz violation, then move into Lorentz violating neutrino oscillations. Finally I will discuss the possible interpretation of the MiniBooNE low energy excess with Lorentz violation.

