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Sterile Neutrino and Dipole Portal Explanations of the MiniBooNE Excess

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This talk discusses recent developments concerning the MiniBooNE anomaly—an excess of low energy electronlike events in Fermilab’s Booster Neutrino Beam. The latest results from the MicroBooNE collaboration disfavor an enhancement of low-energy electron neutrino interactions as the entire source of the MiniBooNE excess. However, a joint fit by the MiniBooNE collaboration, presented here, suggests that there are still regions of sterile neutrino parameter space consistent with both experiments. Similar conclusions have been reached by other studies. That being said, the vanilla 3+1 sterile neutrino model is unable to explain the MiniBooNE excess at the lowest energies and scattering angles. This motivates the consideration of more exotic models that can explain the entirety of the excess. In this talk, we explore a model introducing a MeV-scale dipole-coupled neutral lepton alongside the typical eV-scale mixing-coupled sterile neutrino. The preferred regions of dipole parameter space with respect to the MiniBooNE excess are discussed, as well as constraints from existing MINERvA results.

In-person participation

Yes

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