Contribution ID: **99** Type: **Parallel talk**

Recent Developments Regarding the MiniBooNE Anomaly

Wednesday 30 August 2023 16:30 (15 minutes)

The 4.8σ low-energy excess (LEE) of electron-like events observed by MiniBooNE is one of the longest-standing anomalies in particle physics. As the MiniBooNE reconstruction relied on the identification of Cherenkov rings, the excess could come from extra electrons or photons in the detector. This talk covers new developments regarding each hypothesis. The MicroBooNE experiment has recently constrained the level to which excess ν_e interactions from the Booster Neutrino Beam can explain the LEE. We show that the MicroBooNE constraints are significantly alleviated if the LEE comes from $\overline{\nu}_e$ rather than ν_e interactions. This effect is due to a difference in the low-energy suppression of $\overline{\nu}_e$ and ν_e cross sections in carbon v.s. argon. Next, we discuss a model comprised of an eV-scale sterile neutrino and a heavy neutral lepton $\mathcal{N}$ with a transition magnetic moment coupling to active neutrinos, also known as a "neutrissimo". It is shown that the visible decay $\mathcal{N} \to \nu\gamma$ can explain the bulk of the energy and angular distributions of the LEE. New constraints on the neutrissimo model are also derived from MINERνA neutrino electron elastic scattering measurements. While they do not currently rule out the MiniBooNE solution, a dedicated MINERνA analysis would likely be sensitive to the MiniBooNE-preferred region of neutrissimo parameter space.

Submitted on behalf of a Collaboration?

No

Primary author: KAMP, Nicholas (Massachusetts Institute of Technology)

Co-authors: SCHNEIDER, Austin (Massachusetts Institute of Technology); ARGÜELLES-DELGADO, Carlos A. (Harvard University); CONRAD, Janet (MIT); HOSTERT, Matheus (Perimeter Institute); SHAEVITZ, Michael (Columbia University)

Presenter: KAMP, Nicholas (Massachusetts Institute of Technology)

Session Classification: Neutrino physics and astrophysics

Track Classification: Neutrino physics and astrophysics