

Millicharged Particles in Neutrino Experiments

Thursday, 21 June 2018 14:00 (45 minutes)

We set constraints on millicharged particles (mCPs) based on electron scattering data from MiniBooNE and the Liquid Scintillator Neutrino Detector (LSND). Both experiments are found to provide new (and leading) constraints in certain mCP mass windows: 5 - 35 MeV for LSND and 100 - 180 MeV for MiniBooNE. Furthermore, we provide projections for the ongoing SBN program, the Deep Underground Neutrino Experiment (DUNE), and the proposed Search for Hidden Particles (SHiP) experiment. Both DUNE and SHiP are capable of probing parameter space for mCP masses ranging from 5 MeV - 10 GeV that is significantly beyond the reach of existing bounds, including those from collider searches and SLAC's mQ experiment, and even better than the proposed MilliQan experiment probing up to ~ 5 GeV mCP particles. Our analysis also reveals that the sensitivities from LSND, SBND, SHiP, and DUNE can explore previously unprobed regions of parameter space that allows mCP dark matter as an explanation for the EDGES 21 cm anomaly.

Presenter: TSAI, Yu-Dai (Cornell University)