

Muon Beam Experiments to Probe the Dark Sector

Wednesday, 26 May 2021 11:15 (25 minutes)

A persistence of several anomalies in muon physics, such as the muon anomalous magnetic moment and the muonic hydrogen Lamb shift, hints at new light particles beyond the Standard Model. We address a subset of these models that have a new light scalar state with sizable couplings to muons and suppressed couplings to electrons. A novel way to search for such particles would be through muon beam-dump experiments by (1) missing momentum searches; (2) searches for decays with displaced vertices. The muon beams available at CERN and Fermilab present attractive opportunities for exploring the new scalar with a mass below the di-muon threshold, and potentially covering a range of relevant candidate models. For the models considered in this paper, both types of signals, muon missing momentum and anomalous energy deposition at a distance, can probe a substantial fraction of the unexplored parameter space of the new light scalar, including a region that can explain the muon anomalous magnetic moment discrepancy.

Presenter: ZHONG, Yiming (Boston University)