

Probing neutrinophilic scalars with high-energy muon beams

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High-energy muon beams can generate intense and energetic muon neutrino fluxes through muon decays. The energy and intensity of the beam, as well as its well-known energy spectrum, provide a unique opportunity to study neutrino properties and interactions, potentially uncovering new physics beyond the Standard Model.

In this talk, I will discuss the prospects for detecting new scalar mediators that couple predominantly to neutrinos and have masses ranging from a few MeV to tens of GeV. These neutrinophilic scalars, which may mediate interactions between neutrinos and a hidden sector, are compelling candidates in the context of neutrino portal dark matter. A characteristic experimental signature involves neutrino charged current scattering events accompanied by positively charged muons and apparent lepton number violation.

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