

Neutrinophilic scalar detection prospects at a future muon collider

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In the upcoming muon collider, high-energy collisions between muons and antimuons will reach center-of-mass energies up to 10 TeV. Decays of these muons in the beam pipe will produce a high-energy muon neutrino beam. 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 mediators that couple predominantly to neutrinos with masses in the 1 MeV to 100 GeV range with low coupling strengths. Such a neutrinophilic mediator, which could couple to the dark sector, is a well-motivated candidate for opening new avenues in the search for neutrino portal dark matter. The corresponding signature would include neutrino charged-current scattering events associated with positively charged muons.

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