

Searching for heavy neutral lepton and seesaw mechanisms at muon colliders

The future muon collider with high energy and high luminosity can be an ideal place to search for new physics. It can play as an emitter of electroweak gauge bosons and thus leads to substantial vector boson scattering (VBS) processes. In this series of works, we focus on heavy neutral lepton (HNL), Type-II and Type-III seesaw mechanisms, attempting to reveal the origin of neutrino masses through them at muon collider.

For searching HNL, we investigate the production of it and lepton number violation (LNV) signature through VBS at high-energy muon colliders. They provide clean and robust LNV signatures to tell the nature of Majorana HNLs and thus have more advantageous benefits than direct $\mu\mu$ annihilation. We analyze the potential of searching for Majorana HNL and obtain the exclusion limits on mixing $V_{\ell N}$.

In Type-II and Type-III seesaw mechanisms, through the pair production of charged Higgs (Type-II seesaw) and heavy fermions (Type-III seesaw), we investigate searching potential for the heavy particles at future high-energy muon collider.

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