Contribution ID: **11** Type: **Poster contribution**

Revealing the origin of neutrino masses through the Type II and Type III Seesaw mechanism at high-energy muon colliders.

Saturday, 15 April 2023 17:30 (2h 30m)

Dear organizing committee,

I will be representing our group to introduce our recent progress in the form of a poster presentation. Our work is focused on revealing the origin of neutrino masses through the Type II and Type III Seesaw mechanism at high-energy muon colliders.Here are the related papers we published on this work

https://arxiv.org/abs/2301.07274 and https://arxiv.org/abs/2205.04214

abstract of this work

The future muon collider with high energy and high luminosity can be an ideal place to search for new physics. In this work, we study the search potential of the heavy charged Higgs in the Type II Seesaw mechanism and the heavy leptons in the Type III Seesaw mechanism at muon colliders. The impact of up-to-date neutrino oscillation results is taken into account for realizing the decay modes of the heavy charged Higgs bosons and heavy leptons.

In the study of the Type II Seesaw mechanism, the pair production of doubly charged Higgs is through direct positive and negative muon pair annihilation and vector boson scattering (VBS) processes at muon collider. The associated production of singly charged and doubly charged Higgs can only be induced by VBS processes. We simulate both the purely leptonic and bosonic signal channels of the charged Higgs. We show the required luminosity for the discovery of the charged Higgses and the reachable limits on the leptonic decay branching fractions. In the study of the Type III Seesaw mechanism, we consider the pair production of heavy charged leptons through both muons annihilation and VBS processes. The channel
\begin{equation}
E^+E^-\to ZZ\ell^+\ell^-
\end{equation}
can be further utilized to fully reconstruct the heavy leptons and distinguish neutrino mass patterns. The pair production of heavy neutral lepton and heavy charged lepton are only induced by VBS processes and lead to lepton-number-violating (LNV) signature. We also study the search potential of LNV processes at future high-energy muon collider with c.m. energy of 30 TeV.

Thank you for considering my submission. I look forward to the opportunity to present my work at the conference.

Sincerely,
Yuan Man

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