



Contribution ID: 33

Type: Poster

Search of the heavy neutral Higgs boson H of the $U(1)_{B-L}$ model at the future multi-TeV $\mu^+\mu^-$ collider

Wednesday 9 July 2025 18:52 (15 minutes)

The possible detection of a heavy neutral Higgs boson H predicted by the $U(1)_{B-L}$ model at the future multi-TeV muon collider for the center-of-mass energies of $\sqrt{s} = 3, 6, 10, 30, 50$ TeV with integrated luminosities of $calL_{con} = 1, 2, 3, 4, 10 \text{ ab}^{-1}$ and $calL_{opt} = 90, 250 \text{ ab}^{-1}$, is investigated. The following production and decay channels of the heavy Higgs boson through the Vector Boson Fusion (VBF) are considered: $\mu^+\mu^- \rightarrow \nu_\mu \bar{\nu}_\mu H \rightarrow \nu_\mu \bar{\nu}_\mu W^\pm W^\mp$ and $\mu^+\mu^- \rightarrow \mu^+\mu^- H \rightarrow \mu^+\mu^- W^\pm W^\mp$, with the subsequent decay of the Higgs boson H to pairs of $W^\pm W^\mp$ and ZZ bosons. We show that promising signals with good statistical significances can be obtained in di-vector bosons channel, with $\nu_\mu \bar{\nu}_\mu \nu_l \bar{\nu}_l l^\pm l^\mp$ final states. For completeness, we incorporate the Higgs-strahlung process $\mu^+\mu^- \rightarrow \mu^+\mu^- H$.

Secondary track

T08 - Higgs Physics

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Session Classification: Poster T09 (Beyond the Standard Model)

Track Classification: T09 - Beyond the Standard Model