

Probing Left-handed Heavy Neutral Leptons on the Massive Vector Doublet Model

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Introduction

We consider an extension to the standard model composed by a Massive Vector Doublet under $SU(2)_L$, $V_\mu \sim (1, 2, 1/2)$ and a Left-handed Heavy Neutral Lepton, $N_L \sim (1, 1, 0)$. This model is well motivated because it is capable of solving some problems with the standard model, such as dark matter [2], the origin of neutrino masses [1] and the muon anomalous magnetic moment [3].

In this work, We perform a phenomenological study for the production of these exotic leptons at the large hadron collider, where the final state is composed by a same flavor opposite sign lepton pair, jets and missing energy. We consider previous searches for new physics in this final state to define bounds in the parameter space. Additionally, we propose new cuts for the search of these leptons based on the kinematical features of the production mechanism. These optimized cuts allow to make predictions that can be confronted in the near future, finding that these leptons can be discovered in the sensitivity range expected for the high luminosity large hadron collider.

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References

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