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Heavy Majorana neutrino pair productions at the LHC in minimal U(1) extended Standard Model

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Heavy Majorana neutrino pair productions at the LHC in minimal U(1) extended Standard Model 2017 In our recent paper [1], we explored a prospect of discovering the heavy Majorana right-handed neutrinos (RHNs) at the future LHC in the context of the minimal non-exotic U(1) extended Standard Model (SM), where a pair of RHNs are created via decay of resonantly produced massive U(1) gauge boson (Z'). We pointed out that this model can yield a significant enhancement of the branching ratio of the Z' boson to a pair of RHNs, which is crucial for discovering the RHNs under the very severe LHC Run-2 constraint from the search for the Z' boson with dilepton final states. In this paper, we perform a general parameter scan to evaluate the maximum production rate of the same-sign dilepton final states (smoking gun signature of Majorana RHNs production) at the LHC, while reproducing the neutrino oscillation data. We also consider the minimal non-exotic U(1) model with an alternative charge assignment. In this case, we find a further enhancement of the branching ratio of the Z' boson to a pair of RHNs compared to the conventional case, which opens up a possibility of discovering the RHNs even before the Z' boson at the future LHC experiment.

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