

Bounds on heavy Majorana neutrinos in type-I seesaw and implications for collider searches

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The neutrino masses and flavor mixings, which are missing in the Standard Model (SM), can be naturally incorporated in the type-I seesaw extension of the SM with heavy Majorana neutrinos being singlet under the SM gauge group. If the heavy Majorana neutrinos are around the electroweak scale and their mixings with the SM neutrinos are sizable, they can be produced at high energy colliders, leaving characteristic signatures with lepton-number violations. Employing the general parametrization for the neutrino Dirac mass matrix in the minimal seesaw scenario, we perform a parameter scan and identify allowed regions to satisfy a variety of experimental constraints from the neutrino oscillation data, the electroweak precision measurements and the lepton-flavor violating processes. We find that the resultant mixing parameters between the heavy neutrinos and the SM neutrinos are more severely constrained than those obtained from the current search for heavy Majorana neutrinos at the LHC. Such parameter regions can be explored at the High-Luminosity LHC and a 100 TeV pp-collider in the future.

Summary

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