

Probing Neutrino Dirac Mass in Left-Right Symmetric Models at the LHC and Next Generation Colliders

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Abstract:

We assess the sensitivity of the LHC, its high energy upgrade, and a prospective 100 TeV hadronic collider to the Dirac Yukawa coupling of the heavy neutrinos in left-right symmetric models (LRSMs). We focus specifically on the trilepton final state in regions of parameter space yielding prompt decays of the right-handed gauge bosons (WR) and neutrinos (NR). In the minimal LRSM, the Dirac Yukawa couplings are completely fixed in terms of the mass matrices for the heavy and light neutrinos. In this case, the trilepton signal provides a direct probe of the Dirac mass term for a fixed WR and NR mass. We find that while it is possible to discover the WR at the LHC, probing the Dirac Yukawa couplings will require a 100 TeV pp collider. We also show that the observation of the trilepton signal at the LHC would indicate the presence of a non-minimal LRSM scenario.

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