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Heavy Neutrinos at Future Linear e+e- Colliders

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Neutrinos are probably the most mysterious particles of the Standard Model. The mass hierarchy, oscillations and the nature of their antiparticles are currently being studied in many experiments. Moreover, in models of New Physics, baryon asymmetry or dark matter density are explained by introducing new species of neutrinos. Among others, heavy neutrinos of the Dirac or Majorana nature were proposed to solve problems persistent in the Standard Model. Such neutrinos could be produced at future e+e- colliders.

We studied the possibility of observing decays of heavy neutrinos in qql final state at future e+e- machines for a wide range of collision energy, starting from 250 GeV up to 3 TeV. The analysis is based on the WHIZARD event generation and fast detector simulation with DELPHES. Dirac and Majorana neutrinos with masses from 100 GeV to 3.2 TeV are considered. Estimated limits on the production cross section and on the neutrino-lepton coupling are compared with the current limits coming from the LHC running at 13 TeV and future hadron colliders. The obtained results are stricter than other estimates published so far. The potential of future colliders to discriminate between Dirac and Majorana nature of the new heavy lepton is also discussed.

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