## Phenomenology 2019 Symposium



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## Probing the seesaw mechanism at the 250 GeV ILC

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We consider a gauged U(1) B–L (Baryon-minus-Lepton number) extension of the Standard Model (SM), which is anomaly-free in the presence of three Right-Handed Neutrinos (RHNs). Associated with the U(1)B–L symmetry breaking the RHNs acquire their Majorana masses and then play the crucial role to generate the neutrino mass matrix by the seesaw mechanism. Towards the experimental confirmation of the seesaw mechanism, we investigate a RHN pair production through the U(1)B–L gauge boson (Z') at the 250 GeV International Linear Collider (ILC). The Z' gauge boson has been searched at the Large Hadron Collider (LHC) Run-2 and its production cross section is already severely constrained. The constraint will become more stringent by the future experiments with the High-Luminosity upgrade of the LHC (HL-LHC). We find a possibility that even after a null Z' boson search result at the HL-LHC, the 250 GeV ILC can search for the RHN pair production through the final state with same-sign dileptons plus jets, which is a 'smoking-gun' signature from the Majorana nature of RHNs. In addition, some of RHNs are long-lived and leave a clean signature with a displaced vertex. Therefore, the 250 GeV ILC can operate as not only a Higgs Factory but also a RHN discovery machine to explore the origin of the Majorana neutrino mass generation, namely the seesaw mechanism.

## **Summary**

ILC study for right-handed neutrino productions

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