

# Searching for heavy neutral leptons through exotic Higgs decays at the ILC

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In this study we investigate the feasibility of detecting heavy neutral leptons ( $N_d$ ) through exotic Higgs decays at the proposed International Linear Collider (ILC), specifically in the channel of  $e^+e^- \rightarrow qq H$  with  $H \rightarrow \nu N_d \rightarrow \nu l W \rightarrow \nu l qq$ . Analyses based on full detector simulations of the ILC are performed at the center-of-mass energy of 250 GeV for two different beam polarization schemes with a total integrated luminosity of  $2 \text{ ab}^{-1}$ . A range of heavy neutral lepton masses between the Z boson and Higgs boson masses are studied. The  $2\sigma$  significance reach for the joint branching ratio of  $BR(H \rightarrow \nu N_d)BR(N_d \rightarrow lW)$  is about 0.1%, nearly independent of the mass, while the  $5\sigma$  discovery is possible at a branching ratio of 0.3%. Interpreting these results in terms of constraints on the mixing parameters  $|\epsilon_{id}|^2$  between SM neutrinos and the heavy neutral lepton, it is expected to have a factor of 10 improvement from current constraints.

## Alternate track

1. Beyond the Standard Model

## I read the instructions above

Yes

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