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# Search of Higgs exotic decays at the ILC

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One important class of models of dark matter as a light fermionic weakly interaction massive particle (WIMP) couples the WIMP to a new singlet scalar field that mixes with the Higgs doublet.

The mixing couples the Higgs boson to a new scalar particle called the mediator  $\phi$ . When the mixing angle is small, the mediator couples to the WIMP without any suppression while the coupling between the Higgs boson and WIMP is suppressed. In these models, the process  $h \rightarrow \phi\phi$  leads to invisible Higgs decays, but it also leads to new decay modes in which the mediator  $\phi$  is directly visible, for example, through its decay  $\phi \rightarrow b\bar{b}$ . A future lepton collider is expected to play an important role in the search for these new Higgs decay modes. In this talk we describe a full simulation study at the 250 GeV ILC based on the ILD detector concept. The signal production process is  $e^+e^- \rightarrow Zh$  followed by exotic Higgs decays through  $h \rightarrow \phi\phi$ . We will focus on the decay channel  $\phi \rightarrow b\bar{b}$  with a mediator mass from 15 GeV to 60 GeV and report the expected limit on the branching ratio of the exotic Higgs decay  $h \rightarrow 4b$ .

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