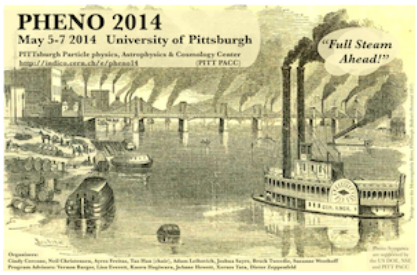

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Higgs Assisted Stop Search

Monday, 5 May 2014 14:00 (15 minutes)

The discovery of the Standard Model (SM)-like Higgs boson is a great success of particle physics over the past 50 years. The existence of a light Higgs boson provides strong indications for new physics beyond the SM. In this project, we study the supersymmetric partner of the top quark, namely stop, which is the most relevant supersymmetric particles to the Higgs sector given its strong Yukawa coupling. We study the pair production of stops at the 14 TeV Large Hadron Collider (LHC): $pp \to \tilde{t}_1 \tilde{t}_1^*$ followed by the decays of one stop via $b\tilde{\chi}_1^+ \to bW^+\tilde{\chi}_1^0$ and the other stop via $t\tilde{\chi}_2^0 \to th\tilde{\chi}_1^0$. The final states include exact one lepton (e or μ), $\geq$ 2 b-jets, $\geq$ 2 light flavor jets, and large missing energy. We find that with 100 fb^{-1} luminosity, a 5 σ reach of the stop mass up to 690 GeV could be obtained for a massless LSP, and the upper limit of the stop mass can reach up to about 850 GeV for $M_{\tilde{\chi}_1^0} \sim 250$ GeV. If no stop signal is found, the stop masses between 330 GeV and 810 GeV is excluded for a massless LSP, and stop mass up to 960 GeV is excluded for $m_{\tilde{\chi}_1^0} \sim 200$ GeV at 95% confidence level.

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