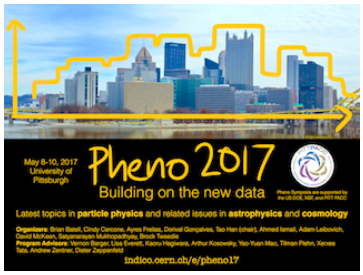

Contribution ID: **292** Type: **parallel talk**

Gluino reach and mass extraction at the LHC in radiatively-driven natural SUSY

Monday, 8 May 2017 15:00 (15 minutes)

Radiatively-driven natural SUSY (RNS) models enjoy electroweak naturalness at the 10\% level while respecting LHC sparticle and Higgs mass constraints. Gluino and top squark masses can range up to several TeV (with other squarks even heavier) but a set of light Higgsinos are required with mass not too far above $m_h \sim 125$ GeV. Within the RNS framework, gluinos dominantly decay via $\tilde{g} \to t\tilde{t}_1^*,\ \bar{t}\tilde{t}_1 \to t\bar{t}\widetilde{Z}_{1,2}$ or $t\bar{b}\widetilde{W}_1^- + c.c.$, where the decay products of the higgsino-like $\widetilde{W}_1$ and $\widetilde{Z}_2$ are very soft. Gluino pair production is, therefore, signalled by events with up to four hard b-jets and large $\not{E}_T$. We devise a set of cuts to isolate a relatively pure gluino sample at the (high luminosity) LHC and show that in the RNS model with very heavy squarks, the gluino signal will be accessible for $m_{\tilde{g}} < 2400\ (2800)$˜GeV for an integrated luminosity of 300 (3000)˜fb^{-1}. We also show that the measurement of the rate of gluino events in the clean sample mentioned above allows for a determination of $m_{\tilde{g}}$ with a statistical precision of 2-5% (depending on the integrated luminosity and the gluino mass) over the range of gluino masses where a 5σ discovery is possible at the LHC.

Summary

Prospects for gluino discovery and mass measurement at the high luminosity LHC in a class of SUSY models where stops are relatively heavy, but lighter than the relatively heavy (but still accessible) gluino.

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Session Classification: SUSY I