Measuring Gaugino Properties in the Fully Hadronic Decay Mode at the ILC

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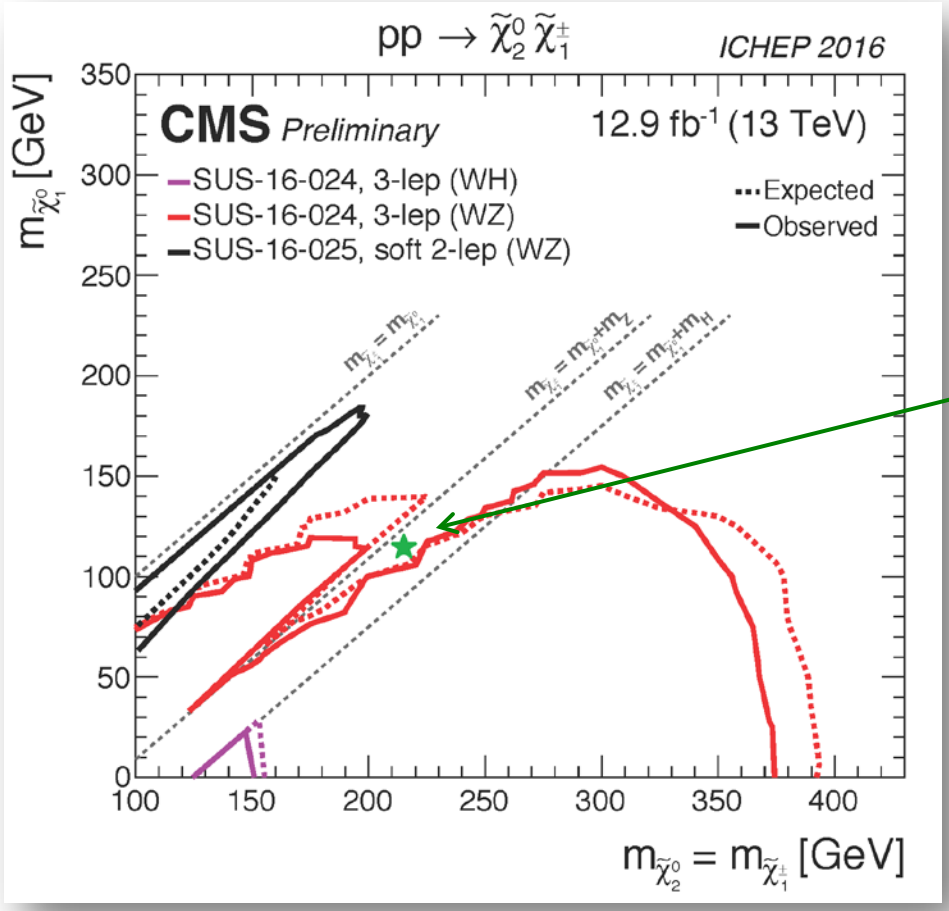
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Particles, Strings, and the Early Universe
Collaborative Research Center SFB 676

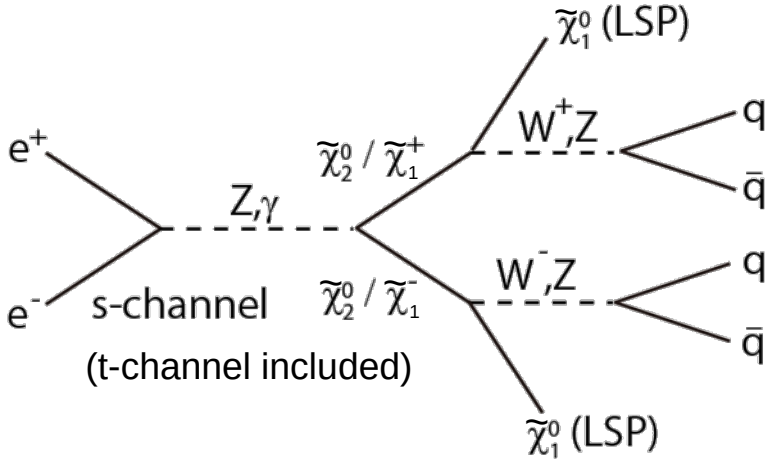
Study case: $\tilde{\chi}_1^{\pm}$ and $\tilde{\chi}_2^0$ Pair Production at the ILC

"Point 5" benchmark : gaugino pair production at ILC

http://arxiv.org/pdf/1006.3396.pdf (ILD LoI)
http://arxiv.org/pdf/0911.0006v1.pdf (SiD LoI)



Particle	Mass [GeV]
$\tilde{\chi}_1^0$	115.7
$\tilde{\chi}_1^{\pm}$	216.5
$\tilde{\chi}_2^0$	216.7
$\tilde{\chi}_3^0$	380

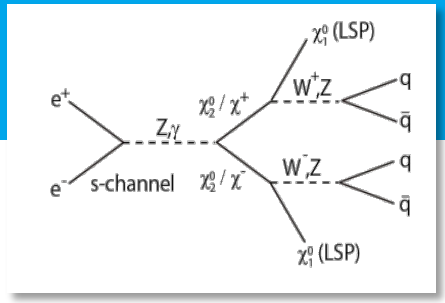


(t-channel included)

$$\tilde{\chi}_1^{\pm} \rightarrow \tilde{\chi}_1^0 W^{\pm} \qquad BR = 99.4\%$$

$$\tilde{\chi}_2^0 \rightarrow \tilde{\chi}_1^0 Z^0 \qquad BR = 96.4\%$$

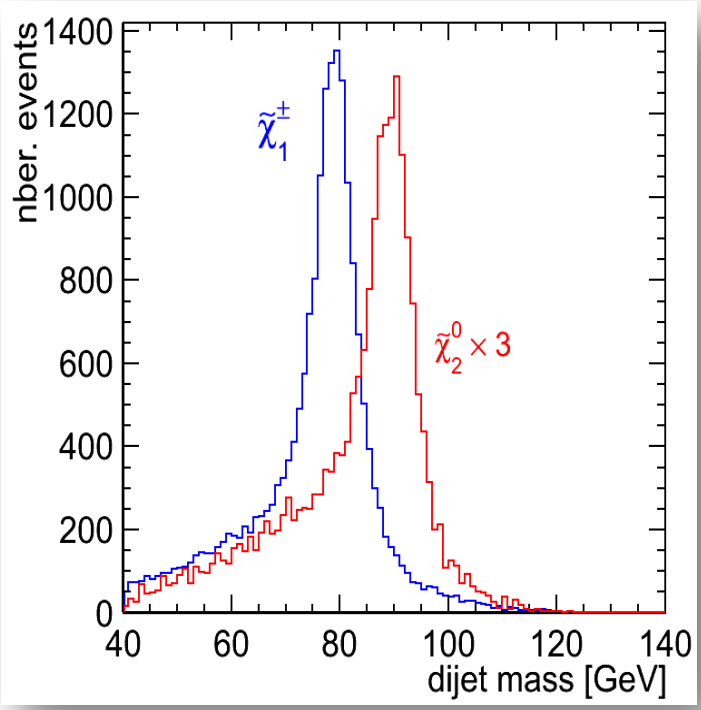
Study case - motivation



- Signal topology:
  - Four jets and missing energy (due to LSP)
  - Hadronic decay modes of gauge bosons chosen as signal
  - Both decay channels treated as signal in turn

$$\tilde{\chi}_1^{\pm} \to \tilde{\chi}_1^0 W^{\pm} \quad \text{and} \quad \tilde{\chi}_2^0 \to \tilde{\chi}_1^0 Z^0$$

- $\tilde{\chi}_1^{\pm}$ and $\tilde{\chi}_2^0$ sample separation: essentially distinguish between W and Z pair events
- Good case for studying the detector and particle flow performance



Analysis Status

- "Point 5" benchmark first studied for the LoI
- Analysis **was redone** with DBD samples:
  - Improvements and additions:

  → adapted the $\gamma\gamma$-low P_T removal procedure

  → refined the event preselection

  → implemented a new method of (energy spectrum) edge extraction (with S. Caiazza)

  → performed a mass calibration procedure
- Results of the DBD analysis + comparison to LoI were presented at LCWS15
- **Presently**:
- investigating the impact of JER further: re-running the analysis on SGV (rev. 86) samples with & w/out confusion
- **FINALISING THESIS**