

# SUSY Channel Analysis

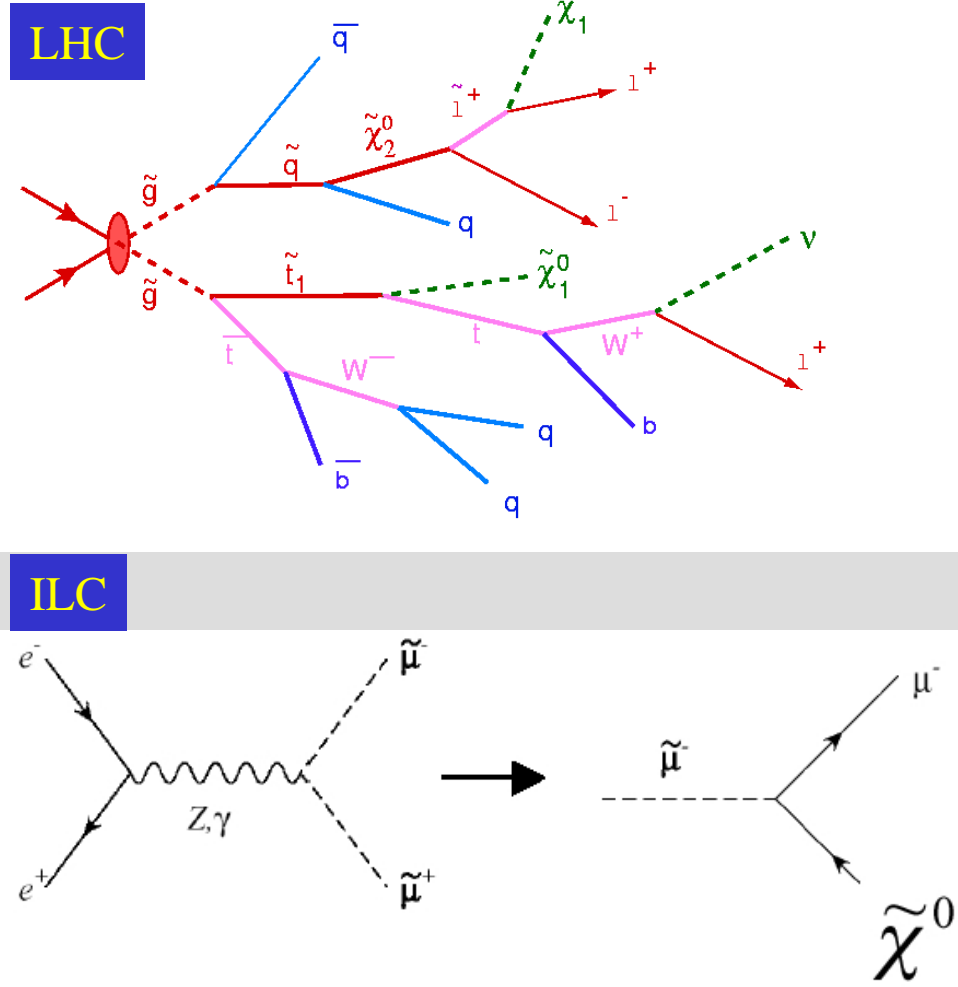
ILD Workshop @ DESY, Zeuthen  
Jan 16<sup>th</sup>, 2008

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# Introduction

- LHC would discover SUSY or missing-energy phenomena.
- SUSY Study @ ILC  
Precise measurements of the sparticle properties can be done.
- ILC + LHC  
Determine underlying **SUSY model** and **SUSY breaking mechanism**.

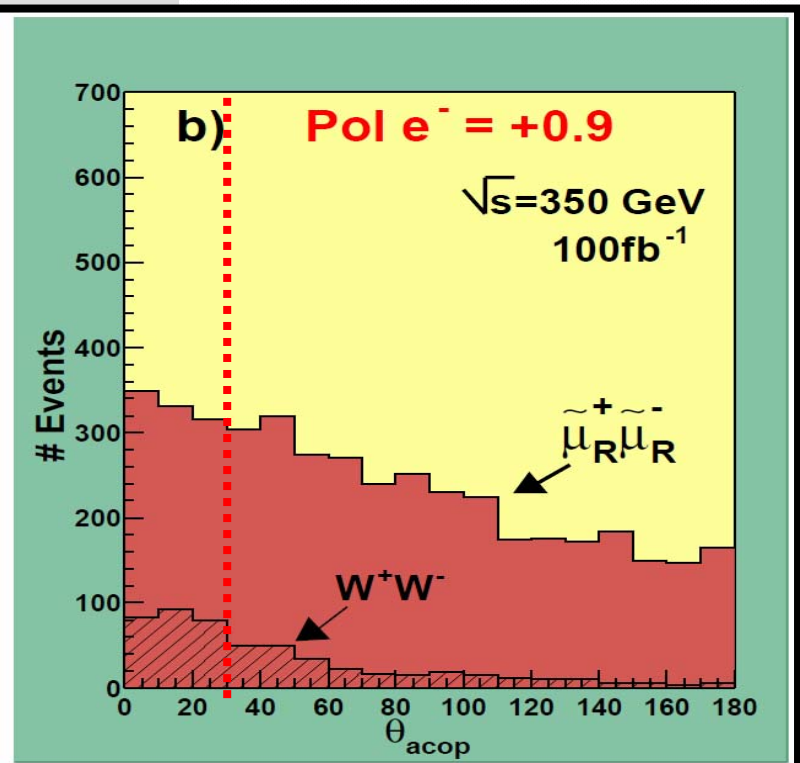
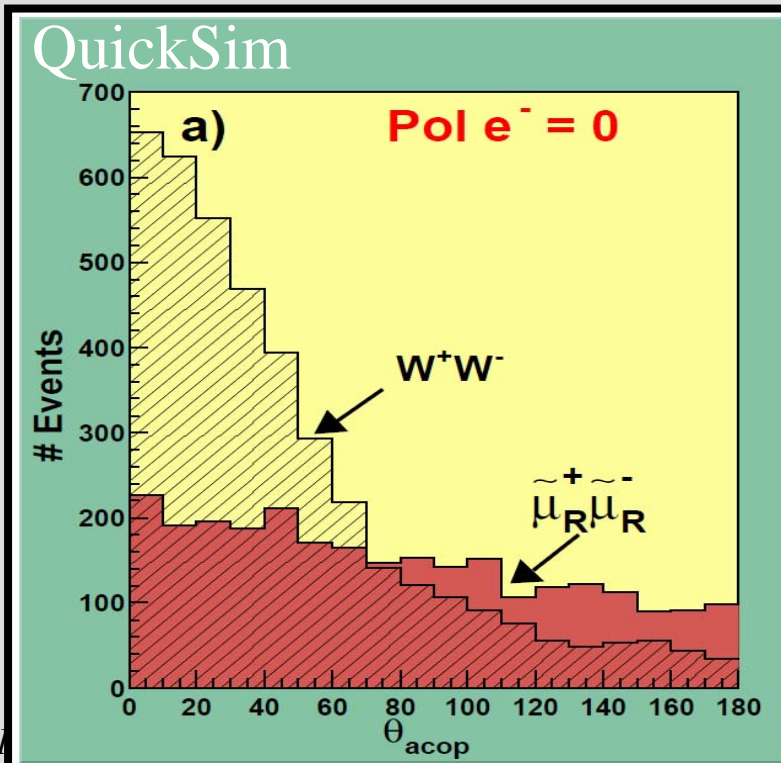
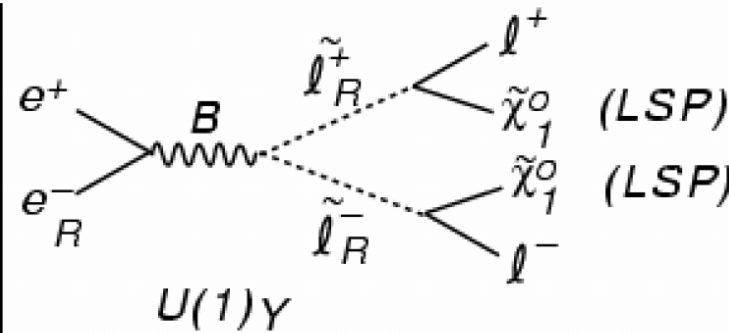


# *SUSY Study @ ILC*

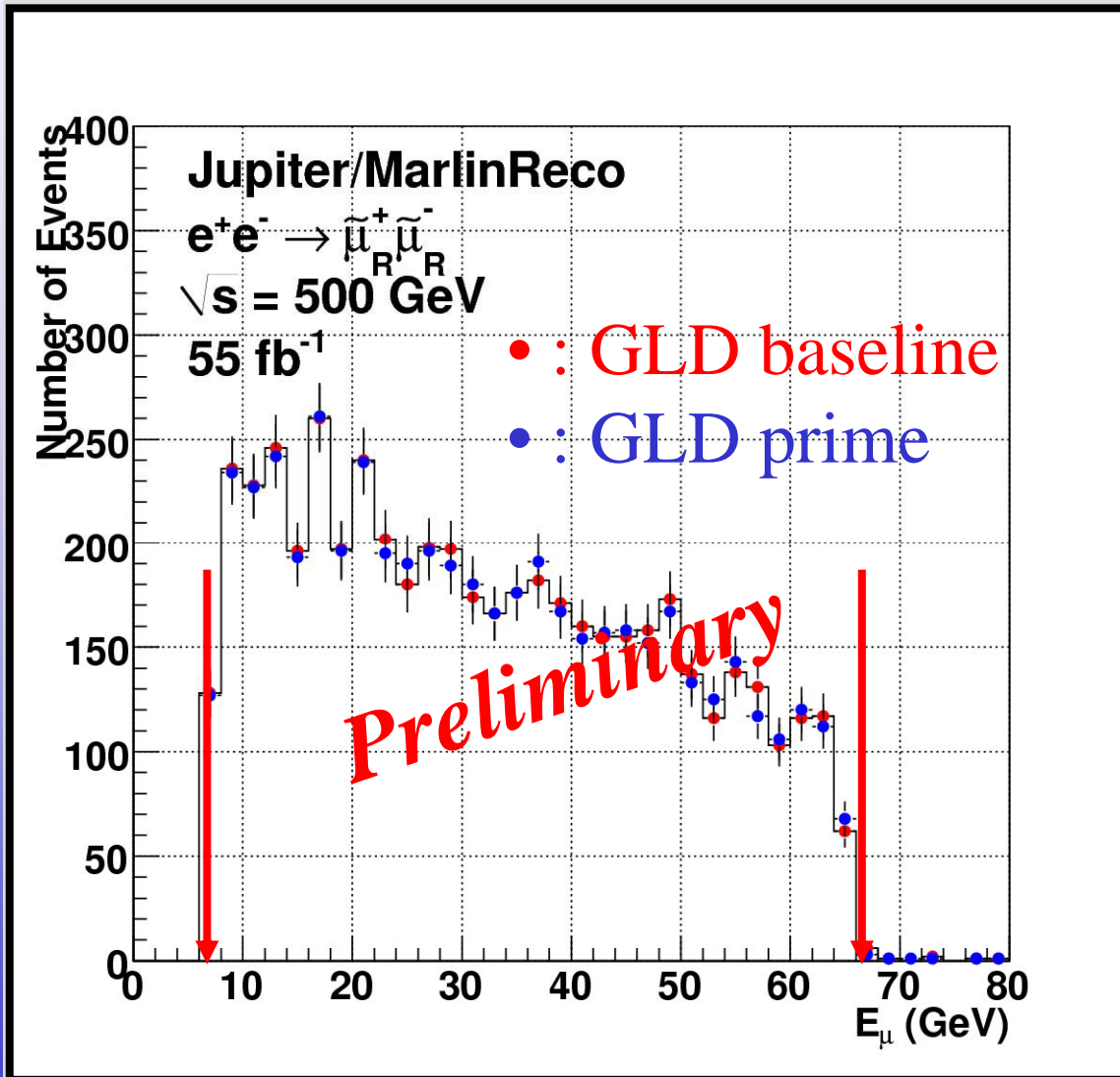
- $e^+e^- \rightarrow \tilde{\mu}_R^+ \tilde{\mu}_R^- @ 500\text{GeV}$ 
  - $(M0, \mu, M1/2, \tan\beta) = (70, 389, 250, 10)$
  - Test of tracker momentum resolution
- $e^+e^- \rightarrow \tilde{\chi}_1^+ \tilde{\chi}_1^- / \tilde{\chi}_2^0 \tilde{\chi}_2^0 @ 500\text{ GeV}$ 
  - $(M0, \mu, M1/2, \tan\beta) = (206, 375, 243, 10)$
  - Test of Particle Flow
- Reconstructed Jupiter LCIO data by MarlinReco/PandoraPFA.  
Note : These studies based on Pandora v01, not the latest version.
- Analyzed by physsim code.
- No background
- Detector Model: GLD baseline and GLD prime.

# $\tilde{\ell}_R$ Search

- Signal signature : 2lepton + Pt missing.
- Polarized electron beam is effective.
  - Signal x 2
  - Background (WW)  $\sim 0$  after  $\theta_{\text{acp}}$  cut

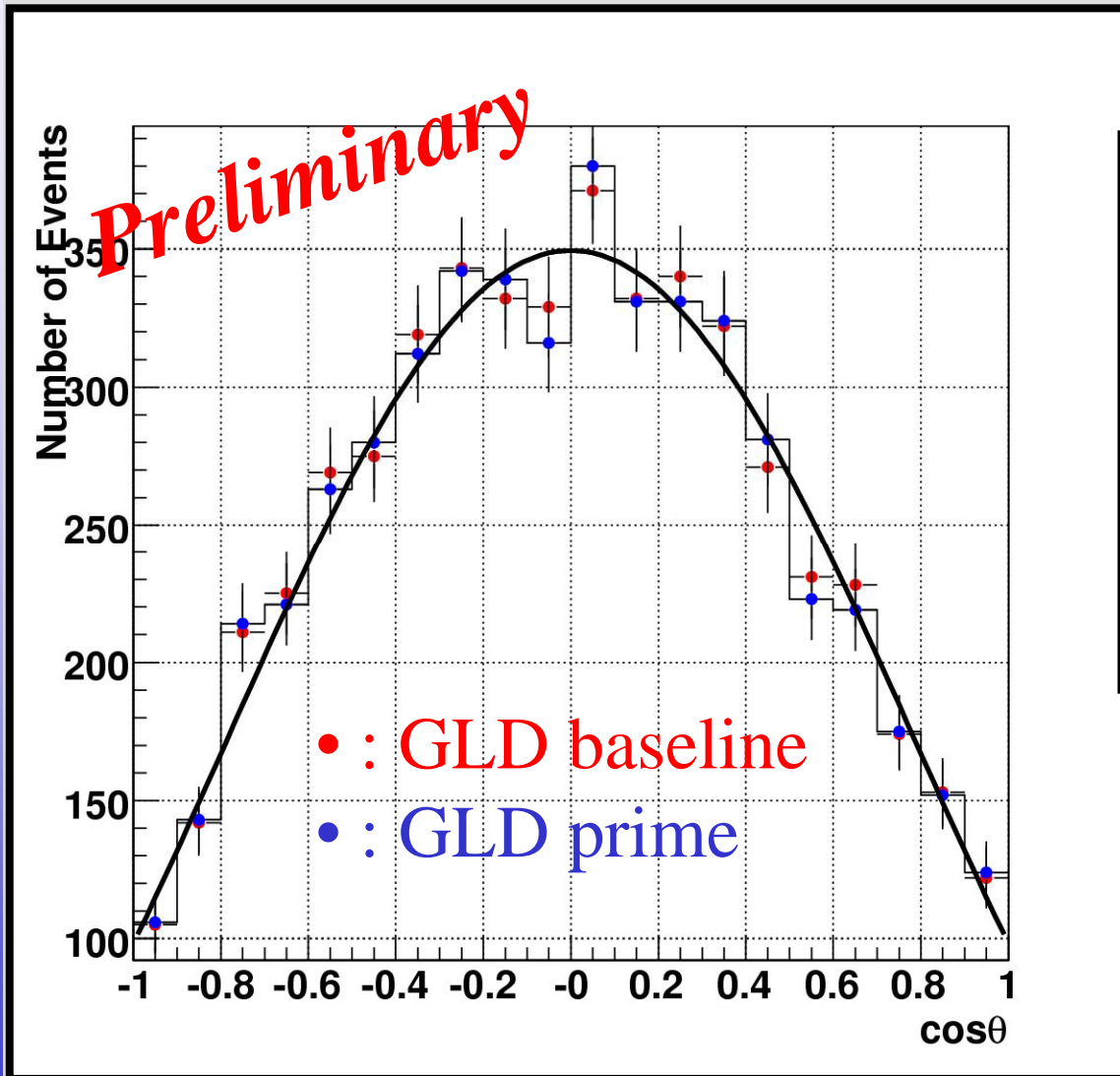


# $\tilde{\ell}_R, \tilde{\chi}_1^0$ Mass



- Slepton and neutralino mass can be determined by fitting  $E_\mu$  distribution. (Red line: kinematic endpoint by analytic calculation).
- GLD baseline and GLD prime are consistent.

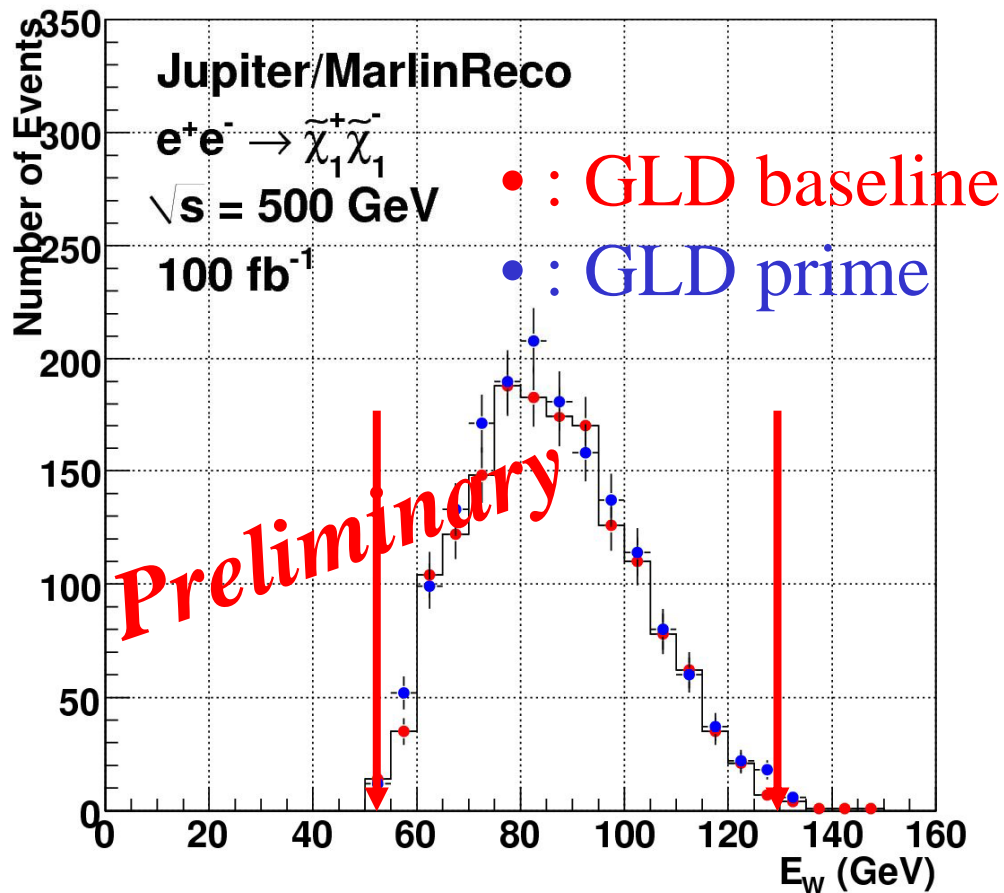
# Angular Distribution



- If slepton and neutralino masses are determined, slepton production angle can be reconstructed.
- GLD baseline and GLD prime are consistent.

# $\tilde{\chi}_1^\pm$ Mass

- $e^+e^- \rightarrow \tilde{\chi}_1^+ \tilde{\chi}_1^- \rightarrow (W^+ \tilde{\chi}_1^0)(W^- \tilde{\chi}_1^0)$  process can be used.
- Signal signature : 4-jet + Pt missing.



- Chargino mass can be Determined by fitting  $E_{\omega}$  distribution. (Red line: kinematic endpoint by analytic calculation).
- Angular distribution can be reconstructed.
- GLD baseline and GLD prime are consistent.
- Analysis of NLSP pair is also on-going.

# Summary

- Study of SUSY channels (slepton, chargino and NLSP pair) has been started.
  - Analysis path : Jupiter → MarlinReco/PandoraPFA → PhysSim
- Next step :
  - Include background.
  - Evaluate physics quantity (slepton mass etc.).
  - Try the latest MarlinReco/PandoraPFA.
  - Try LDC like detector model (data already exist)