

Split-SUSY at LHC & ILC

Jin Min Yang

Institute of Theoretical Physics

Chinese Academy of Sciences

Outline

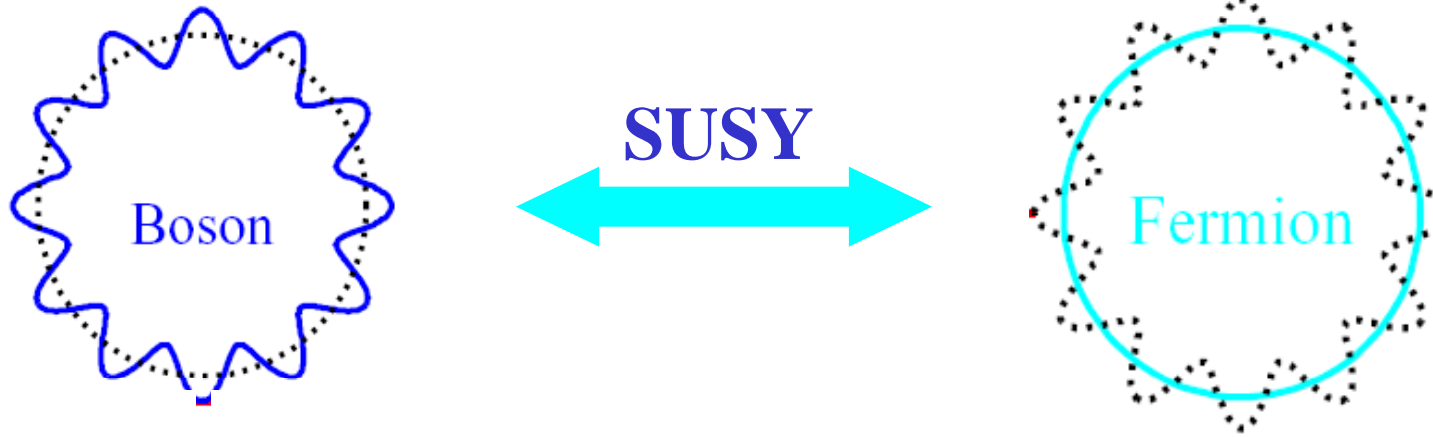
1. SUSY and Split-SUSY

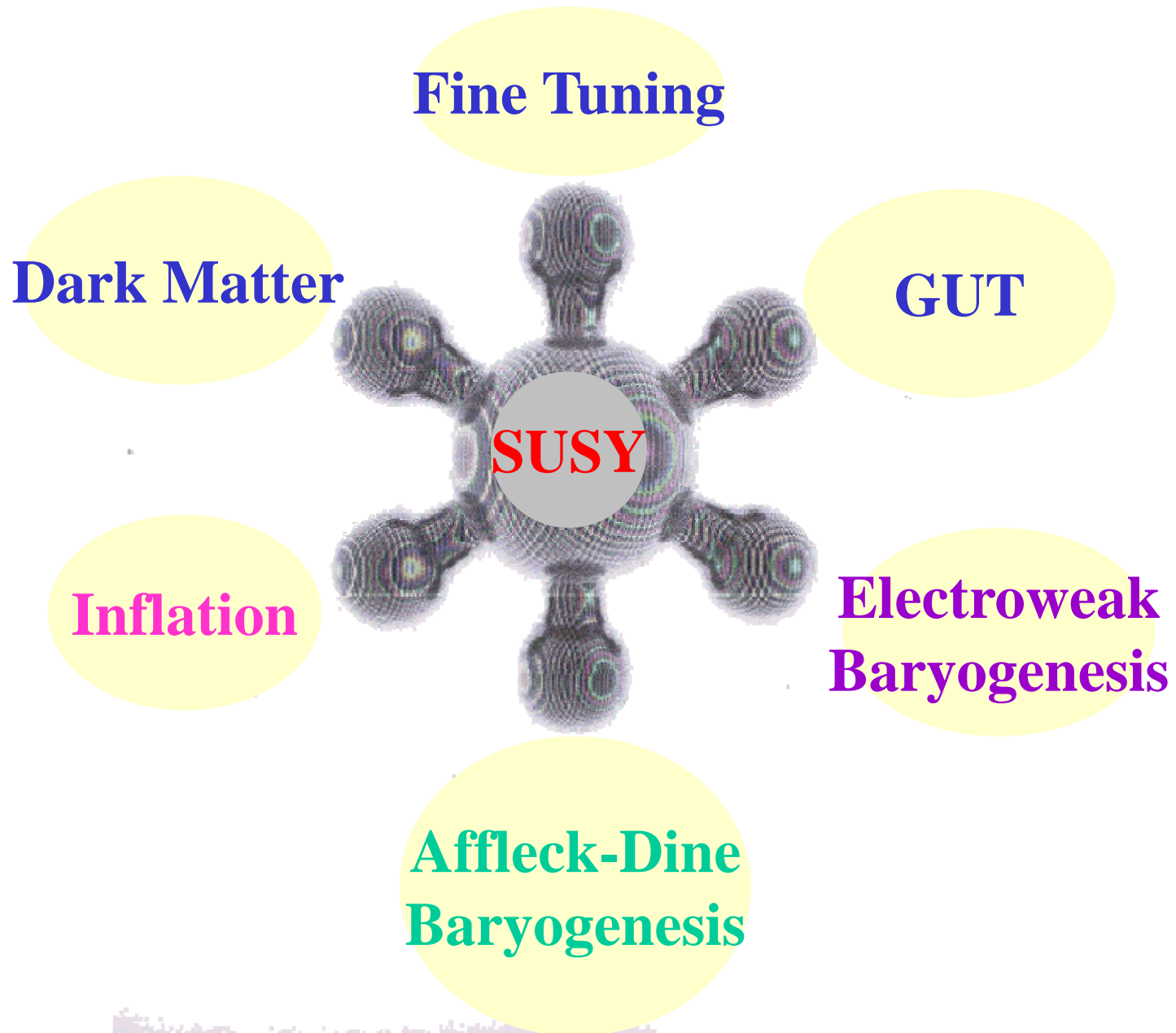
2. Split-SUSY at LHC & ILC

3. Conclusion



1. SUSY & Split-SUSY





TeV-Scale SUSY:

- **Fine-tuning** ✓
- **GUT** ✓
- **Dark Matter** ✓

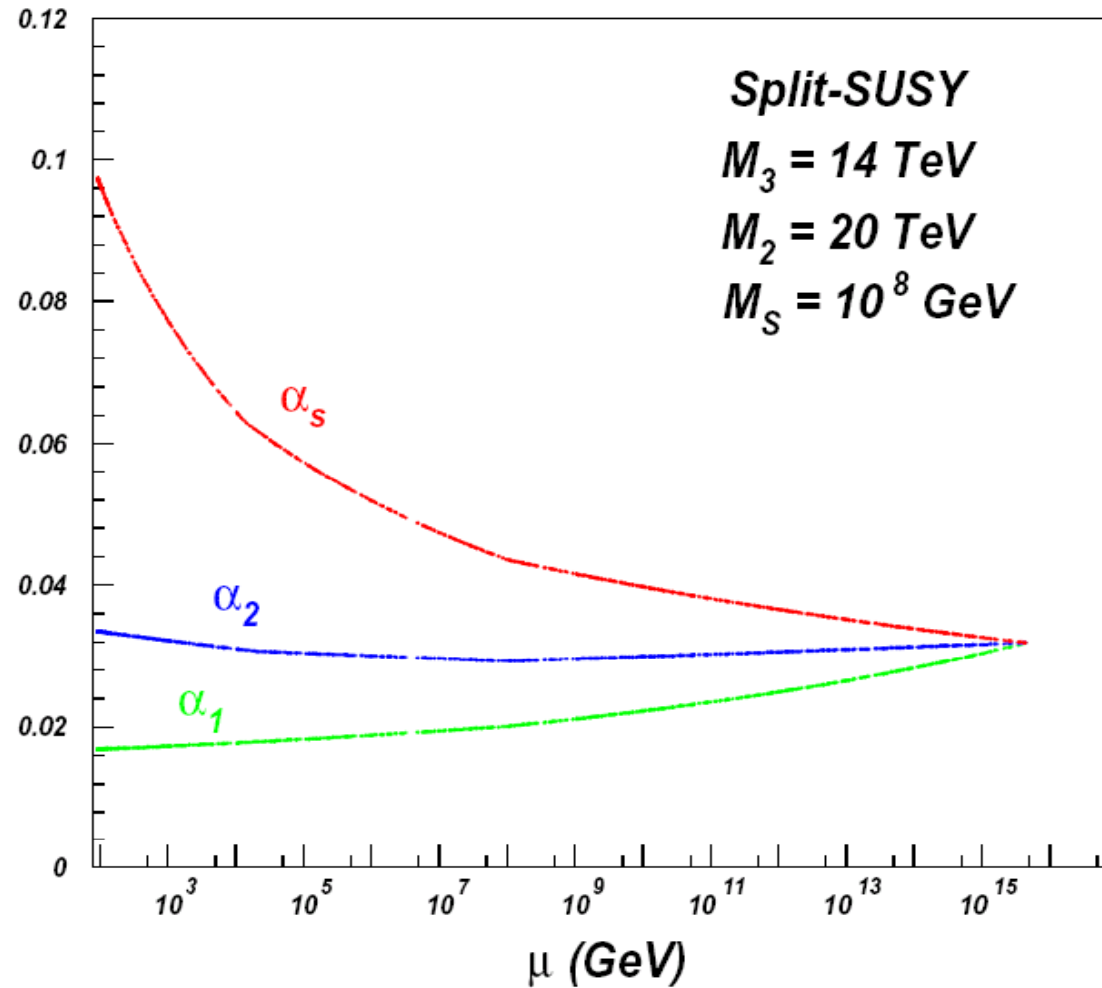
Split-SUSY:

- **Fine-tuning** ×
- **GUT** ✓
- **Dark Matter** ✓

Split-SUSY Spectrum:

- Higgs (h) $\lesssim 150$ GeV
- Higgs (H, A, H^\pm) \rightarrow very heavy
- Sfermion \rightarrow very heavy
- Gluino $\lesssim 18$ TeV
- Chargino/neutralino $\lesssim 1$ TeV

GUT: Gluino, Chargino, Neutralino $\lesssim 10$ TeV

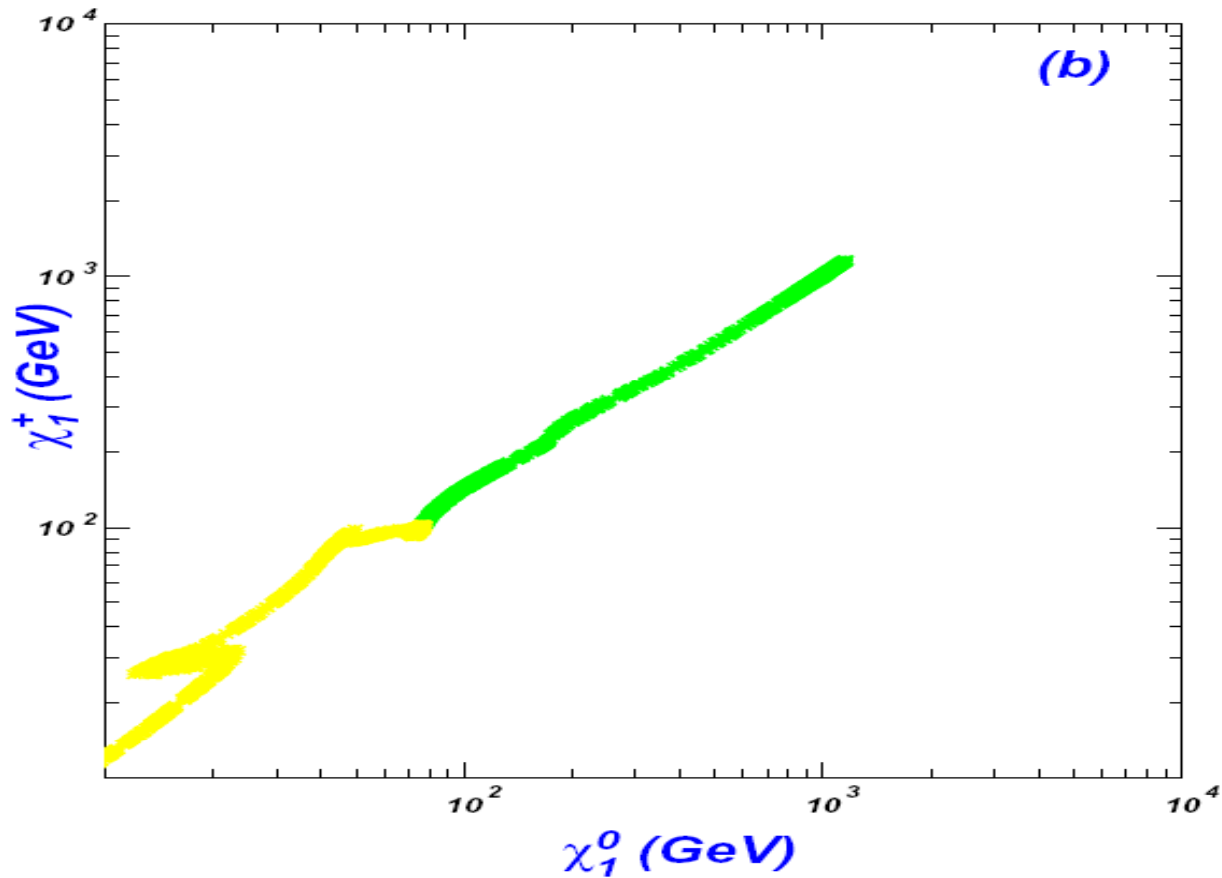


F.Wang, W.Wang, JMY, hep-ph/0507172

Dark Matter:

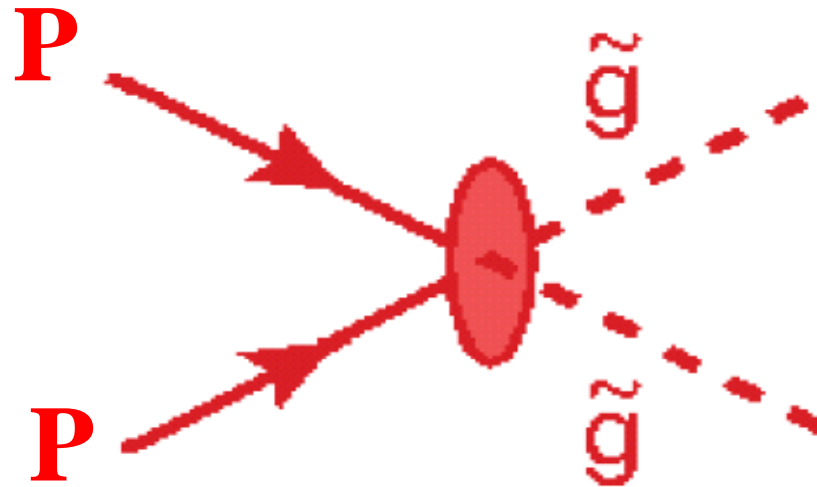
Gluino \rightarrow free

Chargino, Neutralino $\lesssim 1$ TeV

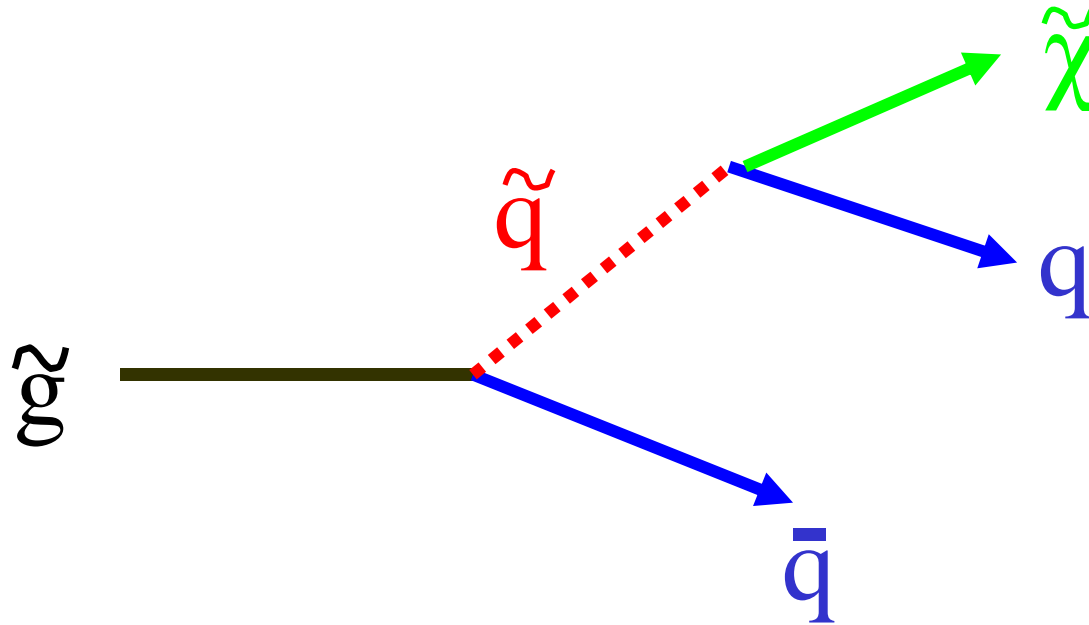


3. Split-SUSY at LHC & ILC

Glino production at LHC:



Long-life gluino:

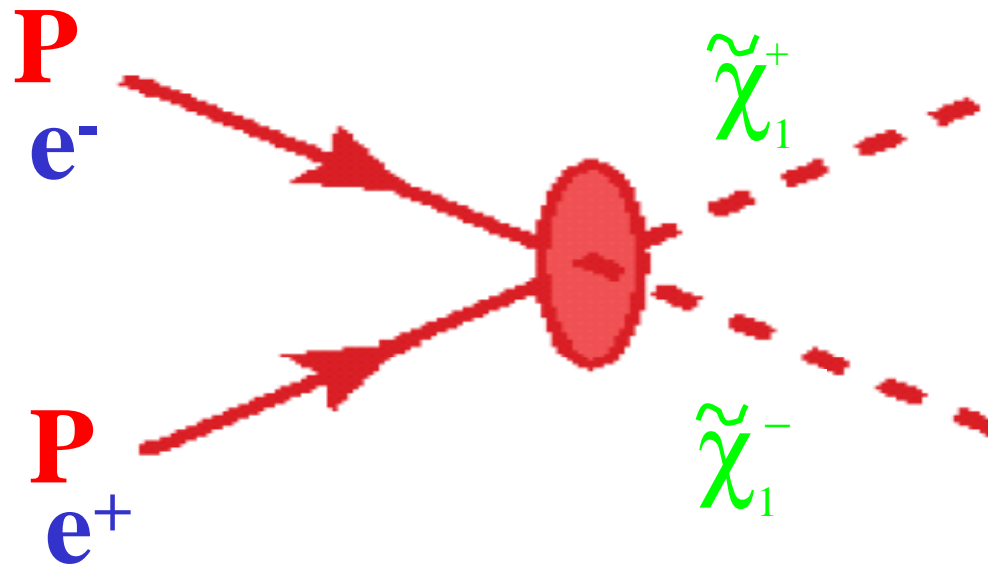


$$\tau = 3 \times 10^{-2} \text{sec} \left(\frac{M_S}{10^9 \text{GeV}} \right)^4 \left(\frac{1 \text{TeV}}{m_{\tilde{g}}} \right)^5$$

Gluonium:

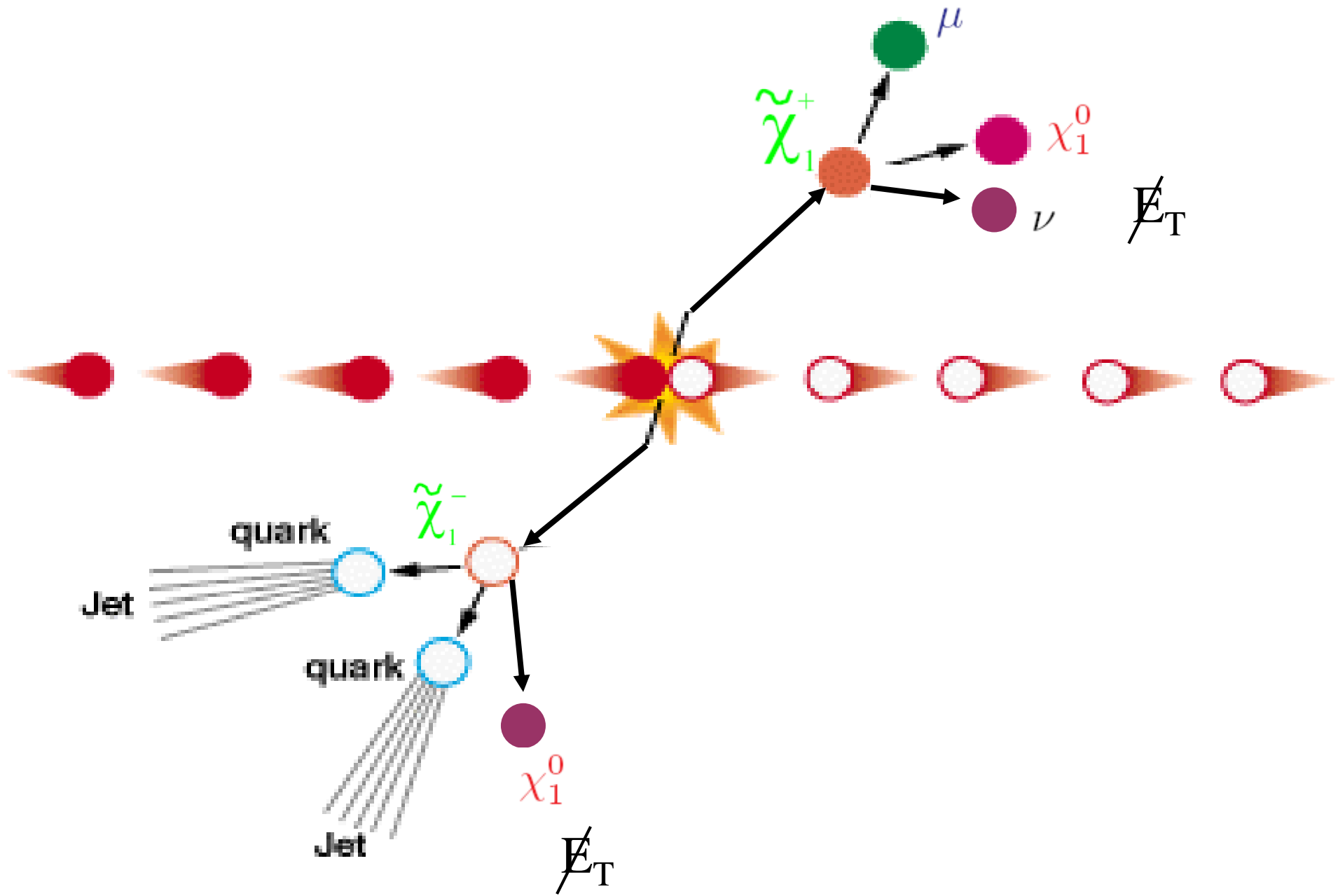
K. Cheung, W.Y.Keung, hep-ph/0408335

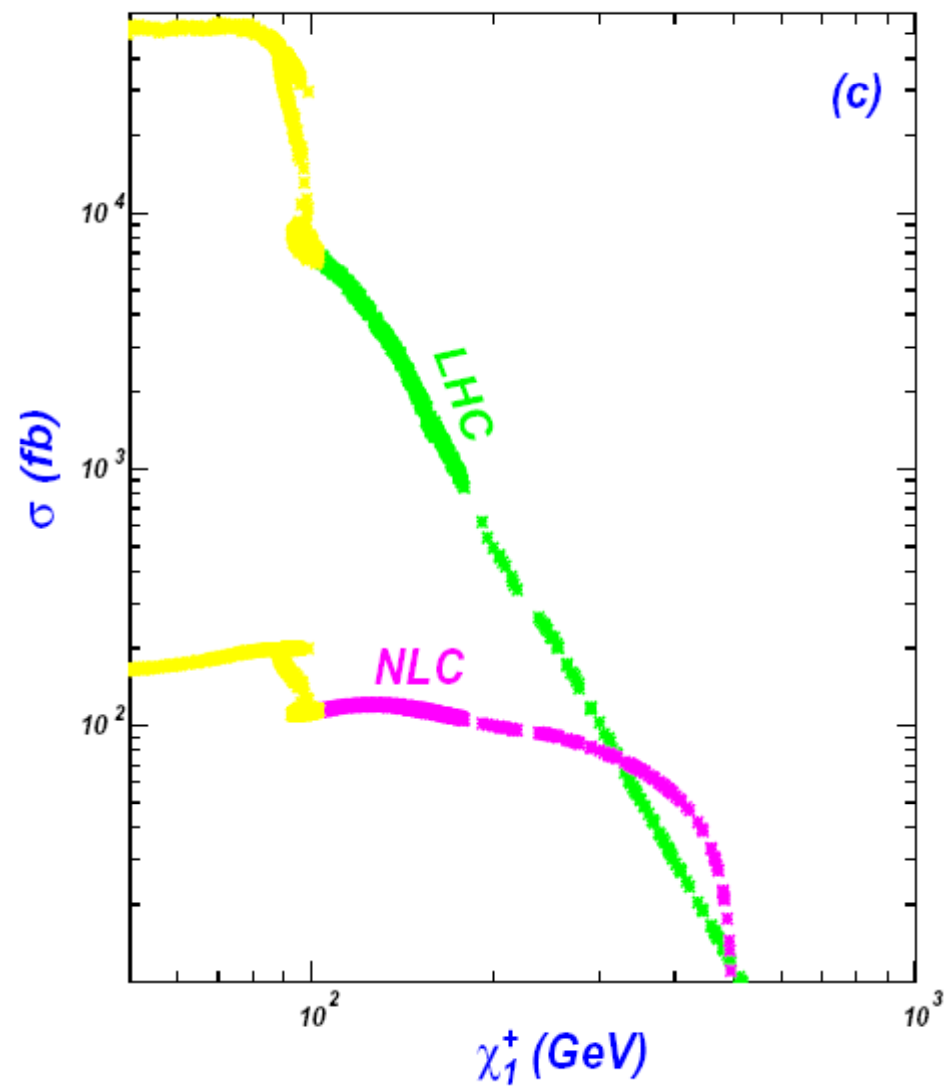
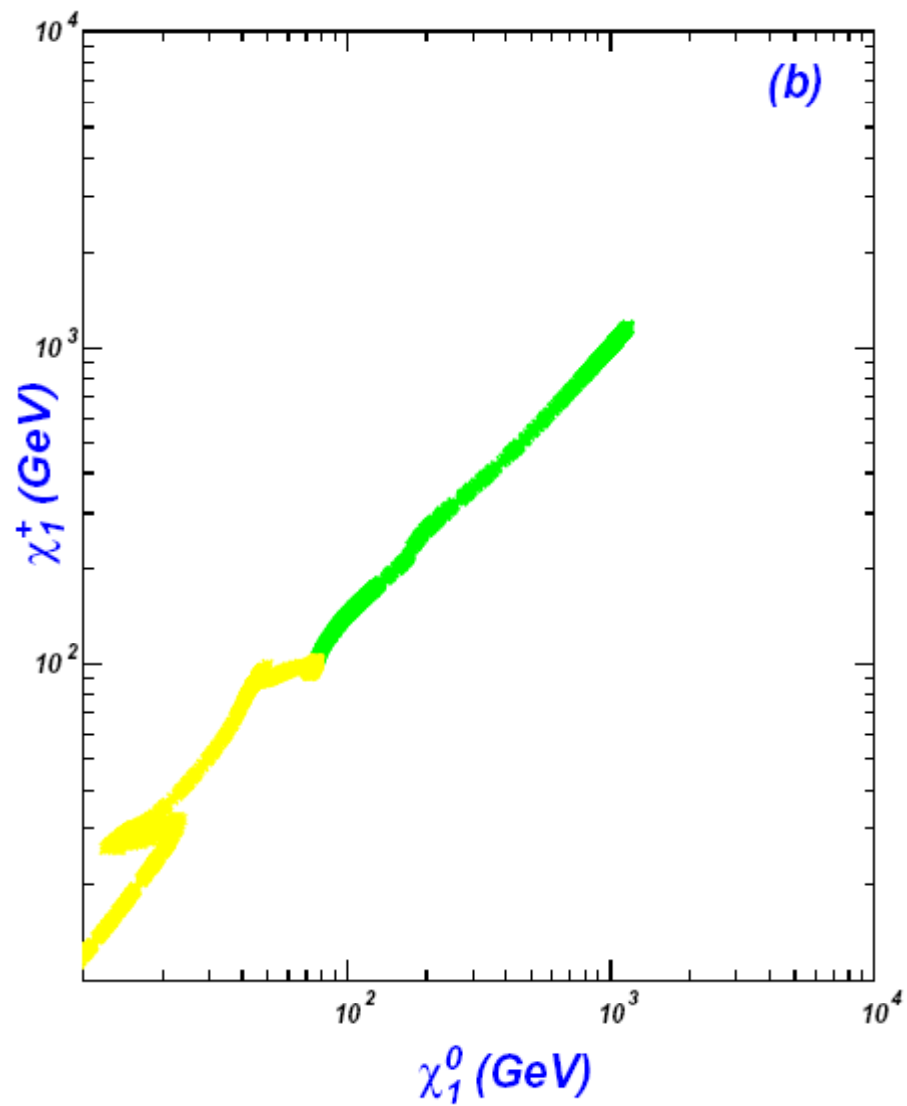
Chargino production at LHC & ILC:



S. H. Zhu, hep-ph/0407072

Kilian, Plehn, Richardson, Durham, Schmidt, hep-ph/0408088





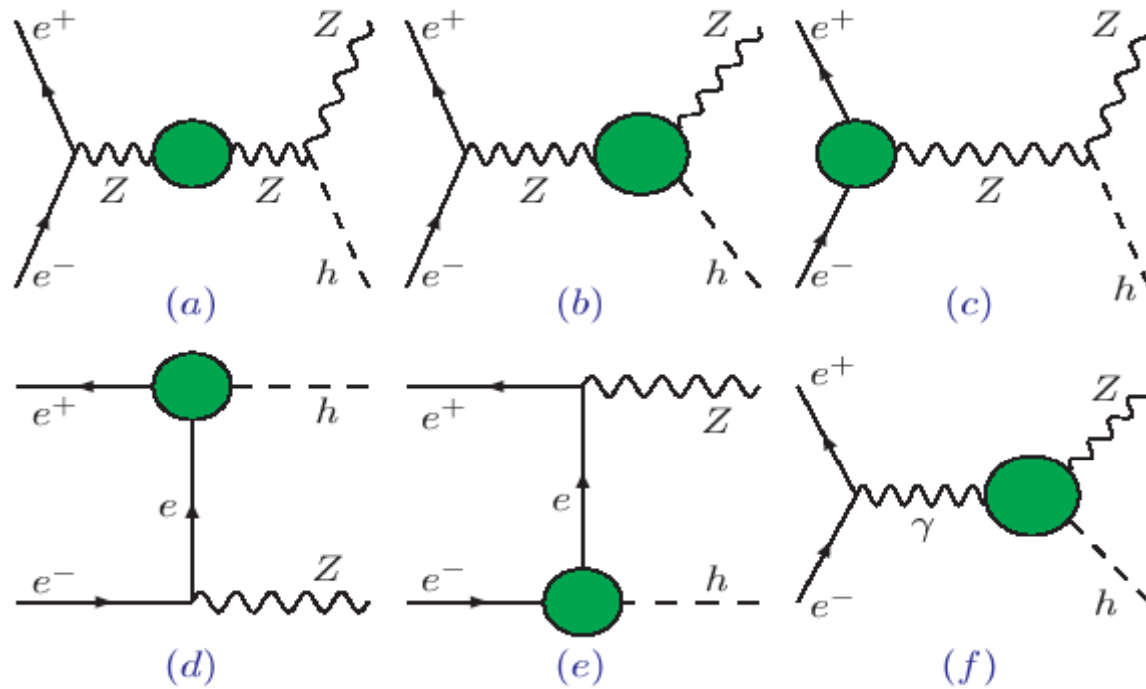
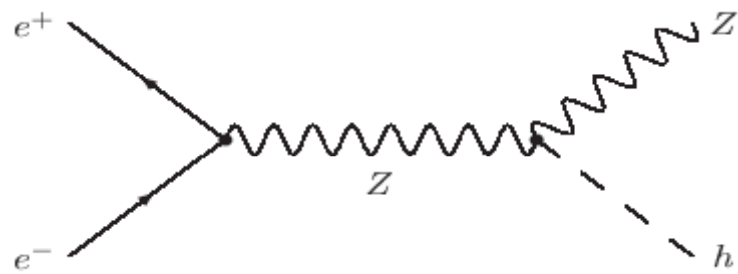
Through virtual effects :

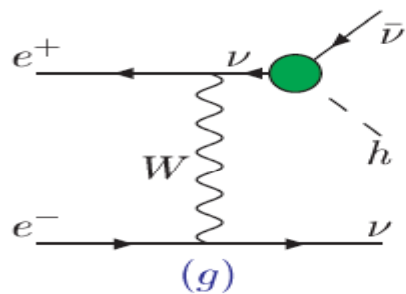
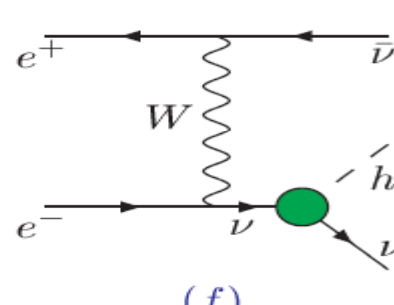
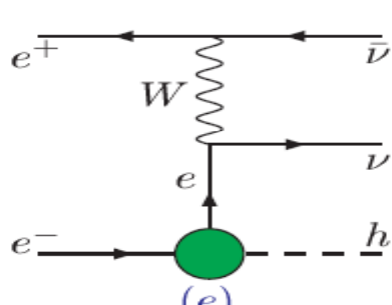
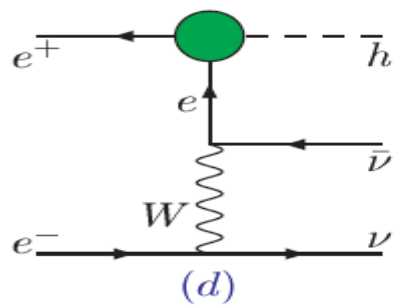
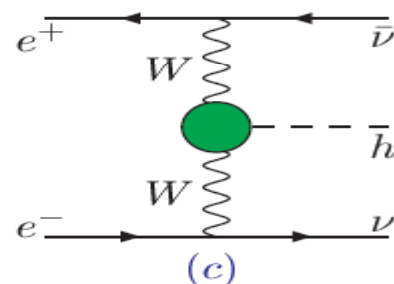
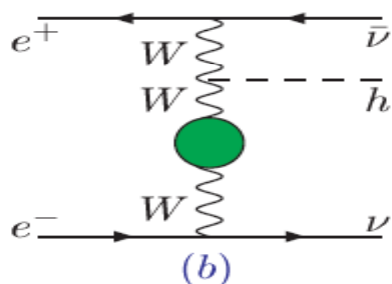
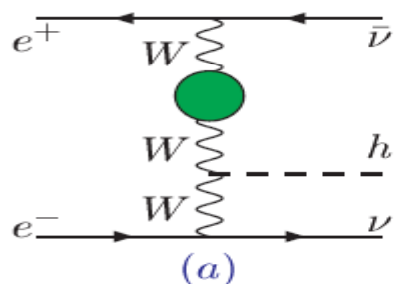
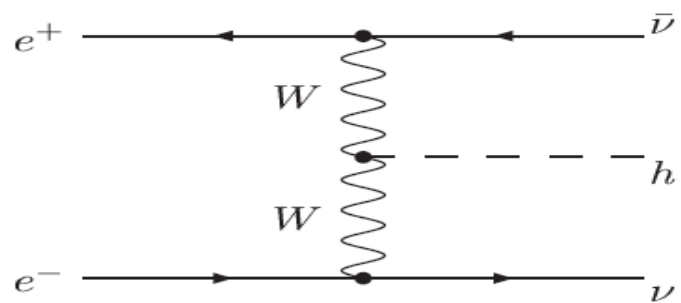
at ILC	✓
at LHC	✗

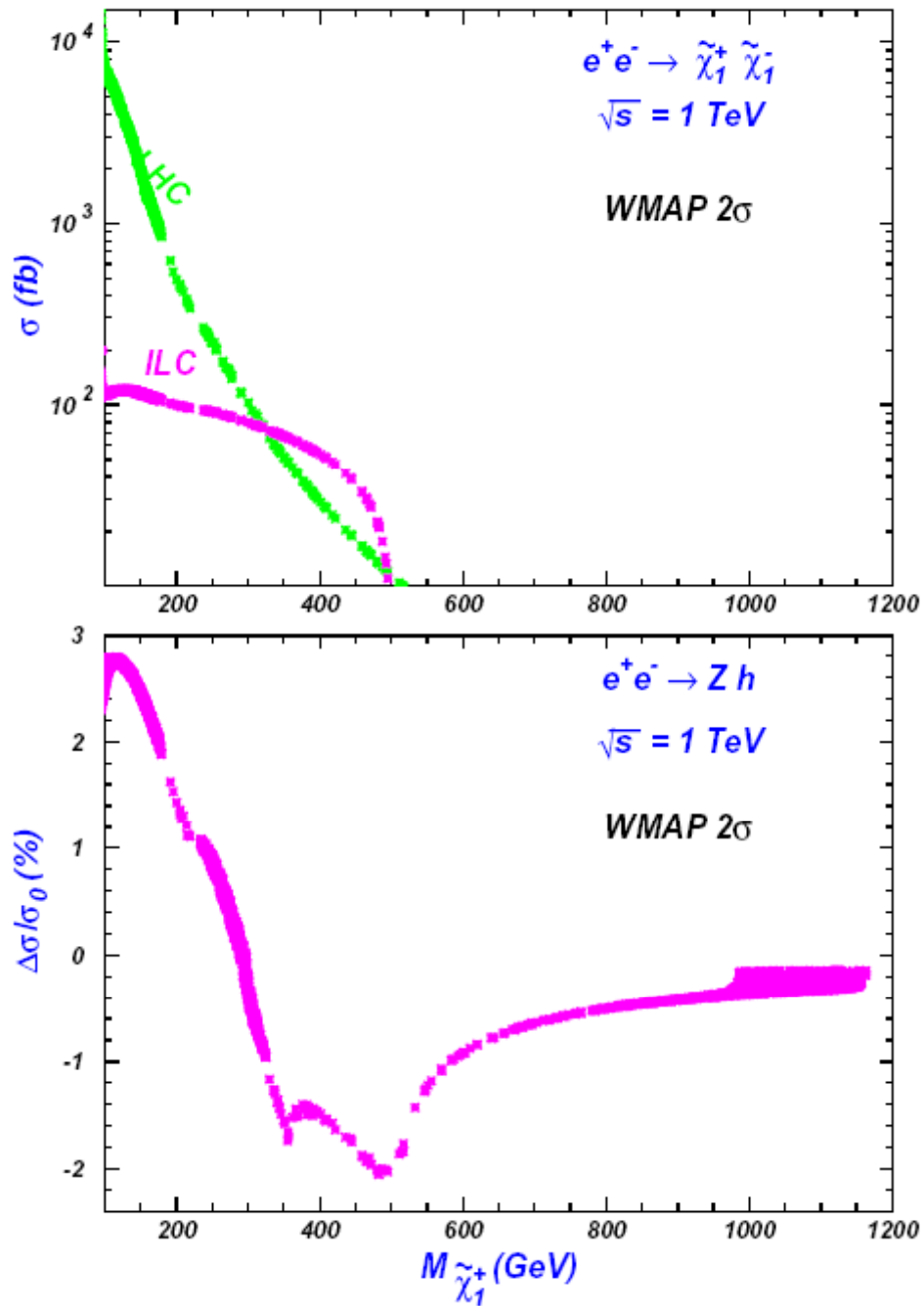
Top-quark processes ✗

Higgs boson processes ✓

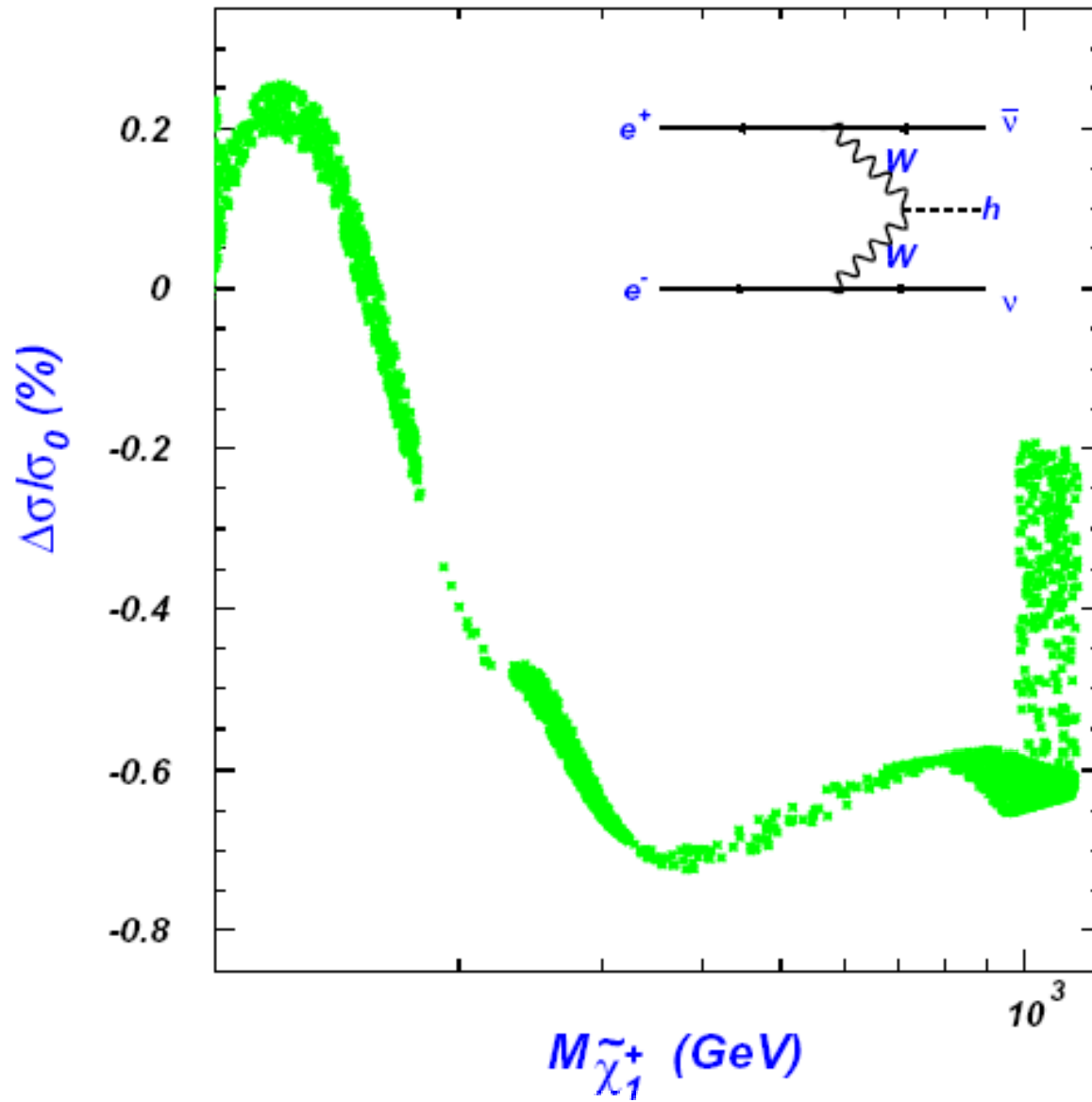
F. Wang, W. Wang, F. Xu, JMY, hep-ph/0612273







F. Wang, W. Wang,
 F. Xu, JMY, hep-ph/0612273



F. Wang, W. Wang, F. Xu, JMY, hep-ph/0612273

4. Conclusion

Split-SUSY at LHC & ILC:

- Higgs (h) $\lesssim 150$ GeV \checkmark
- Gluino $\lesssim 18$ TeV **?? (20%)**
- Chargino $\lesssim 1$ TeV **? (50%)**