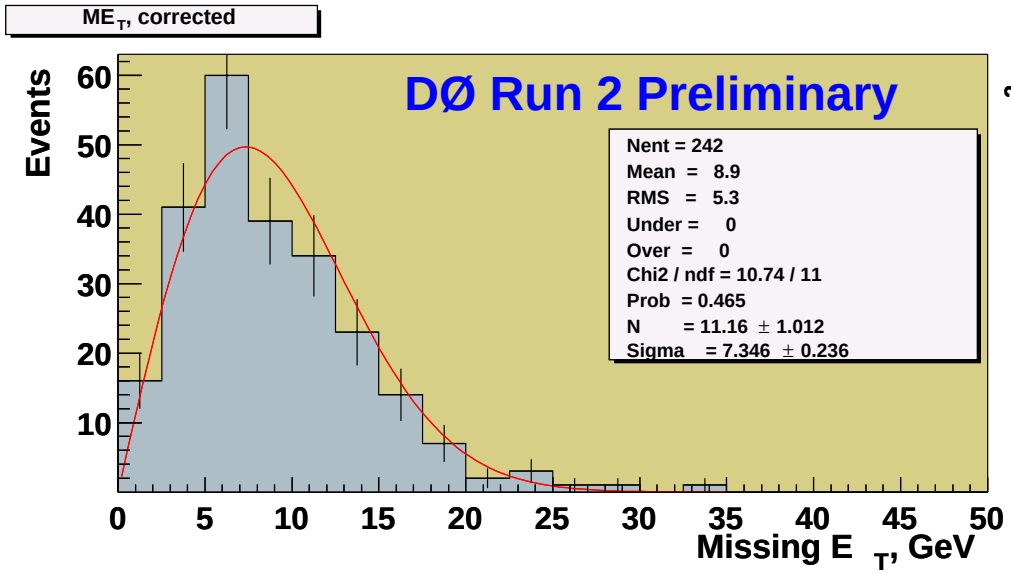
DIS2002
May 1st 2002

SUSY searches at TeVatron: latest run I results, prospects for run II

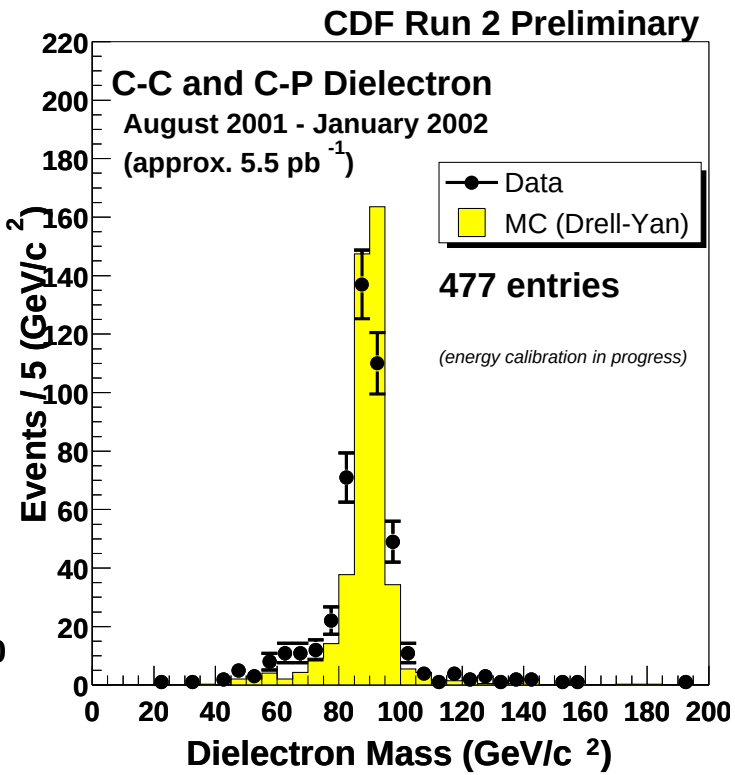
Ströhmer
LMU München
for the CDF and DØ Collaborations

Run II detector performance

Missing E_T resolution from di−electron sample with at least one track match

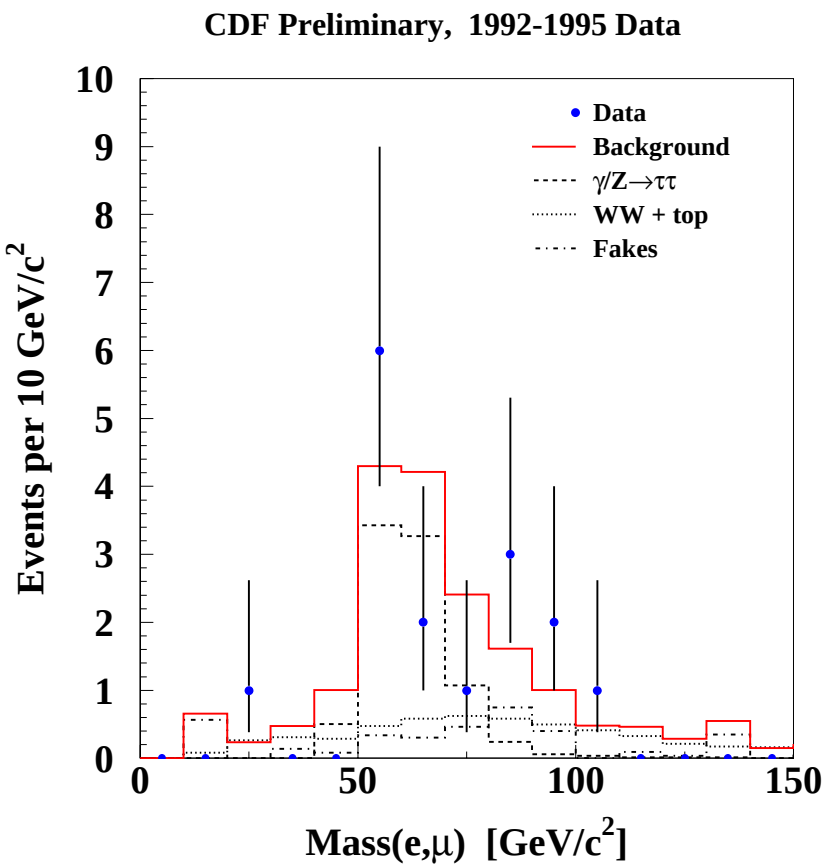


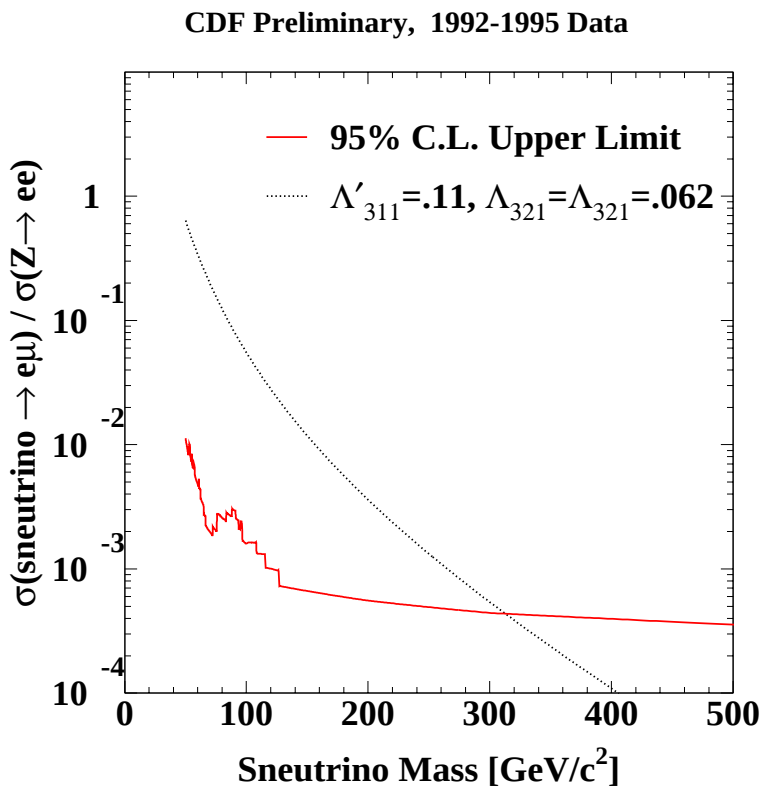
Di−electron invariant mass



Search for Heavy Particles Decaying to eμ

R−parity violation (RPV) allows decay $\tilde{\nu} \rightarrow e\mu$





LEP2 limit for exactly one Λ

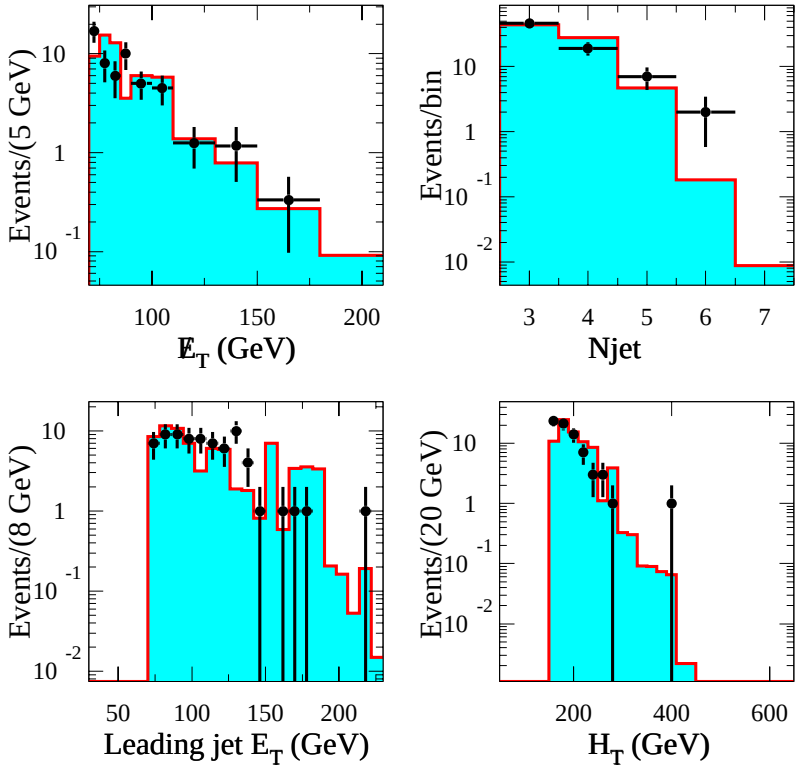
$m_{\tilde{\nu}} < 86$ GeV/c^2 excluded

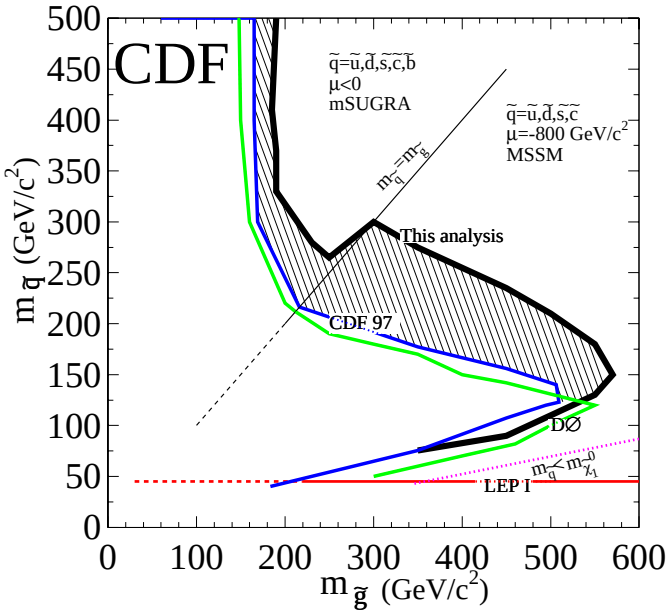
Search for Gluinos and Scalar Quarks using Missing Energy plus Multijets Signature

Jets not close to missing E_T

No isolated tracks

$H_T = E_T(2) + E_T(3) + ME_T$





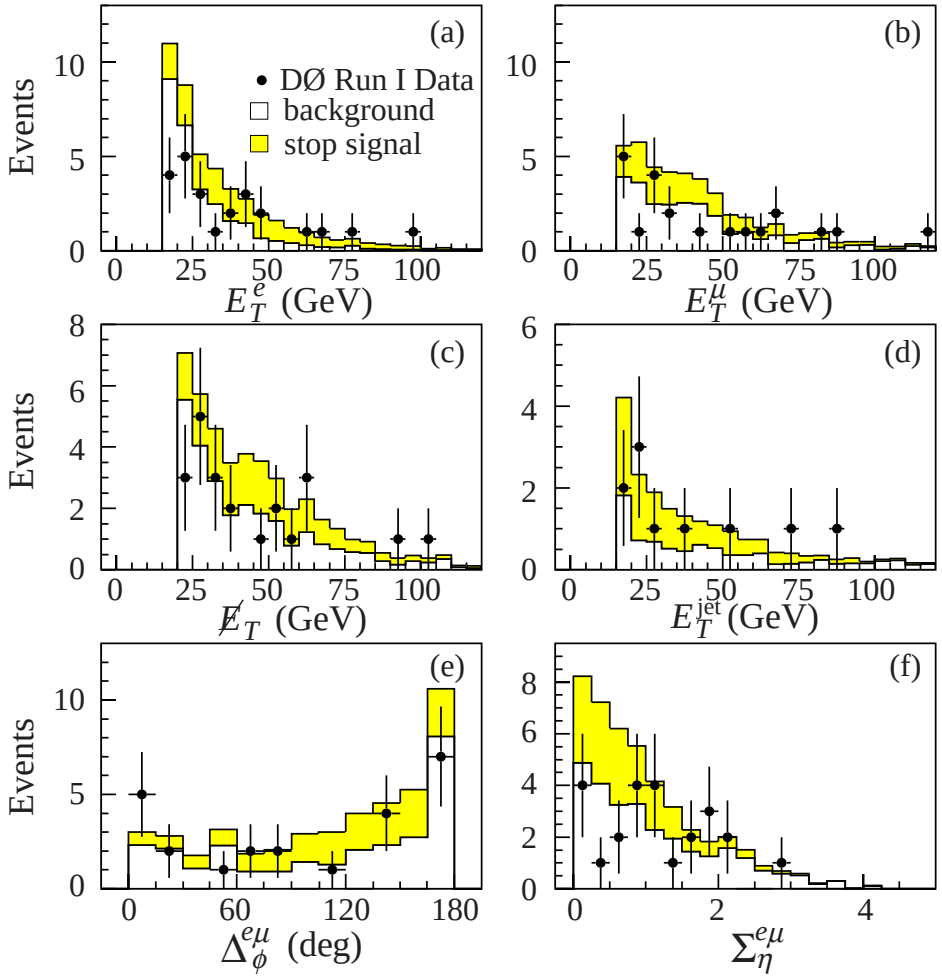
74 events observed

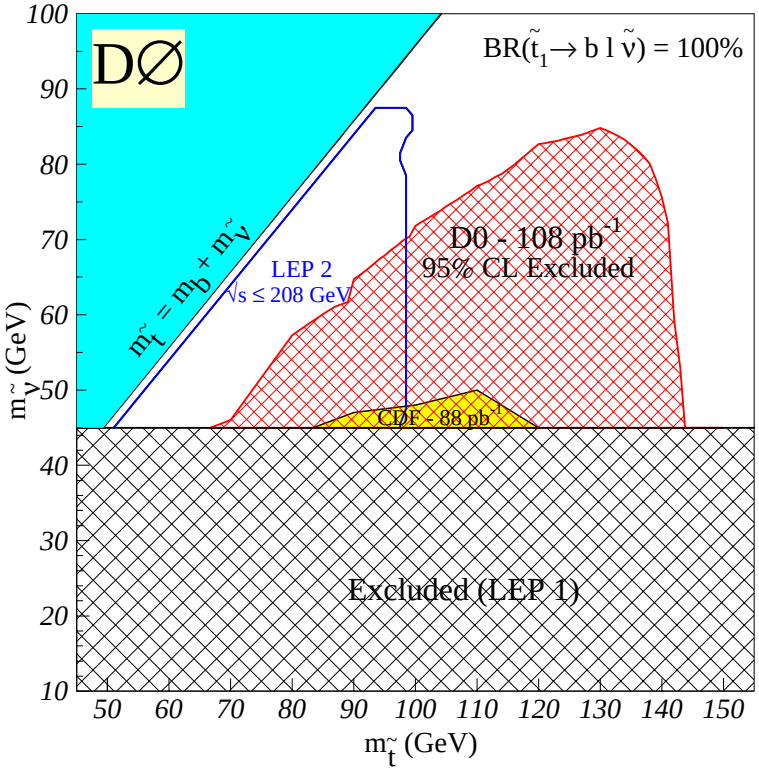
76 ±15 expected

(41 QCD, 35 electroweak)

Run II: expected limit for Gluinos about 400 GeV

Search for R−parity conserving $\tilde{t} \to b l \tilde{\nu}$ deacys





10 events observed
13.2 ±2.3 expected

Search for RPV decays of scalar top into a τ lepton and a b quark

Signal: 2 Jets,1 electron (from τ),
1 hadronic τ

Selection:

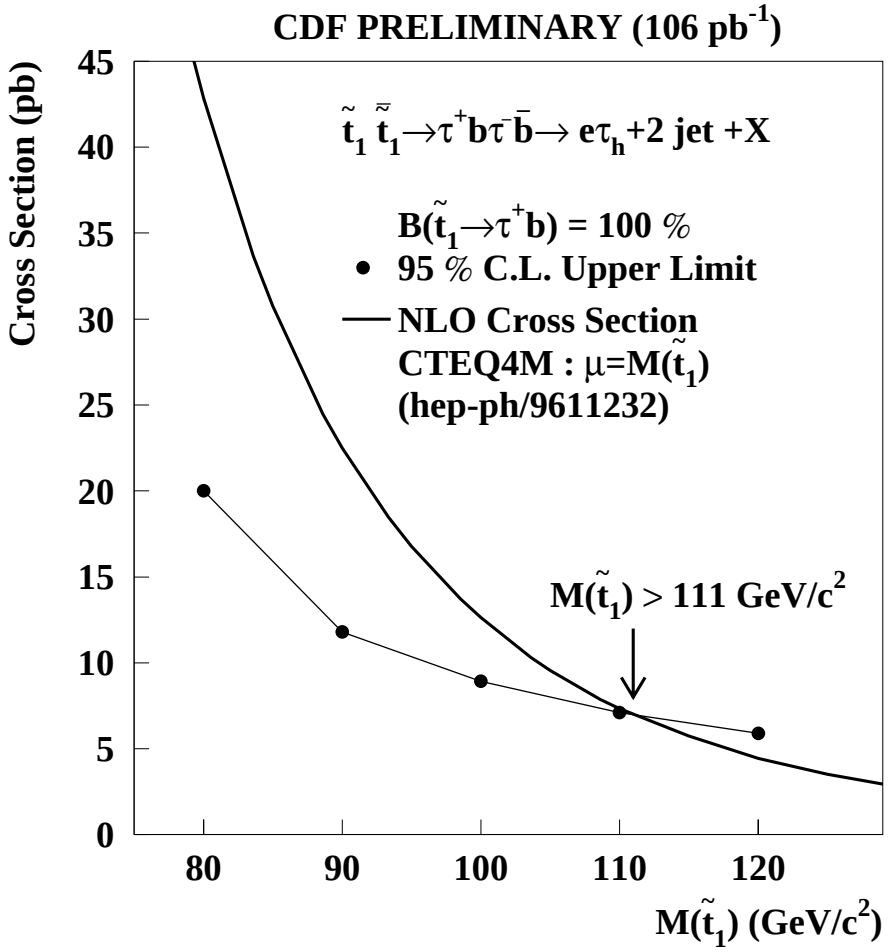
Transverse mass $(e, ME_T) < 35$ GeV

$H_T = E_{T(e)} + ME_T + P_T(\tau) > 75$ GeV

$N_{jet} \geq 2$

no event survived the selection

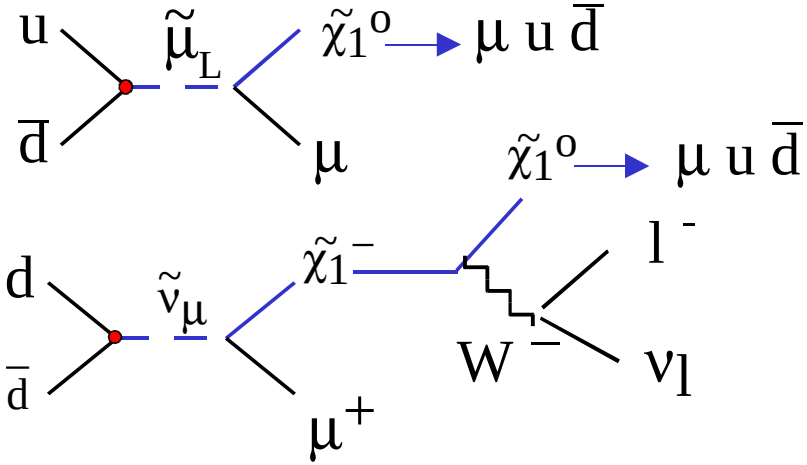
expected background 1.91±0.11±0.15



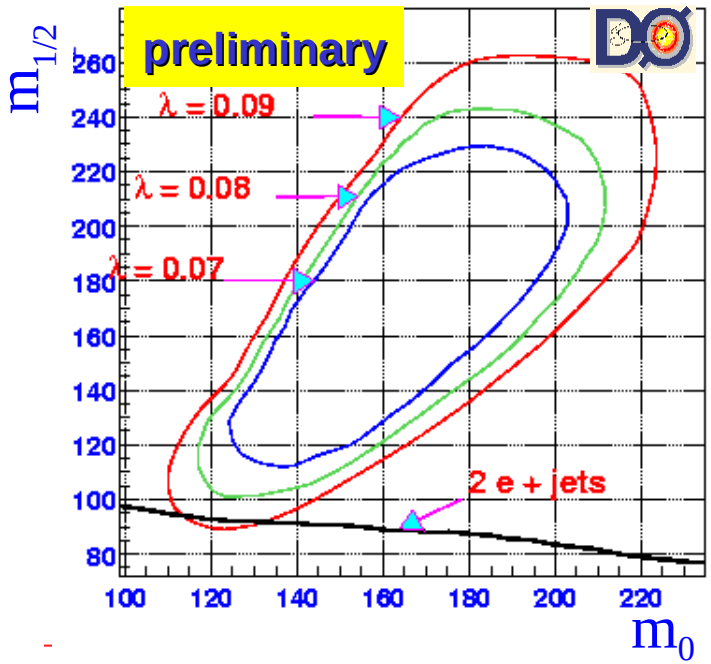
Search for resonant RPV production with di−muons

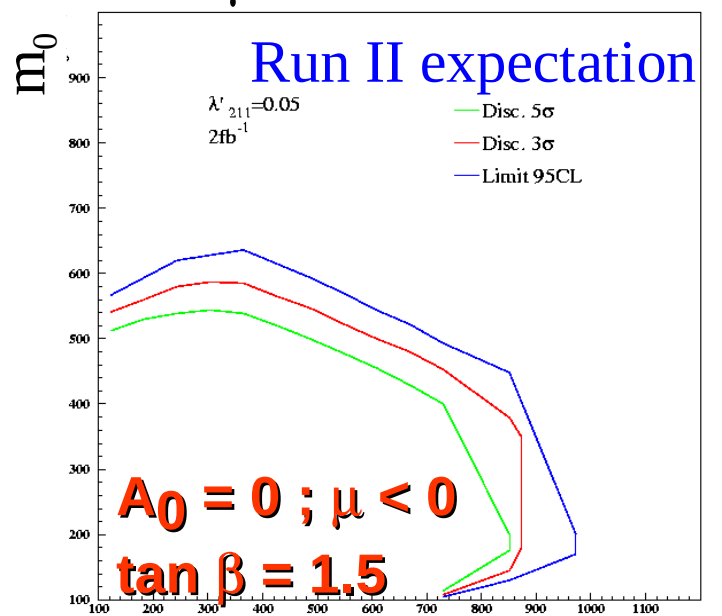
Signal: 2 μ and 2 jets

Background: Drell−Yan ,tt
Z+Jet, WW+Jet



$A_0 = 0$; $\mu < 0$; $\tan\beta = 2$

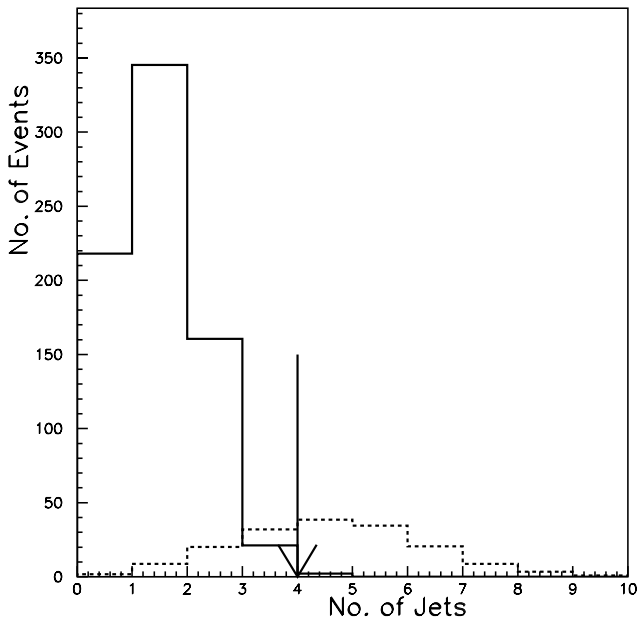


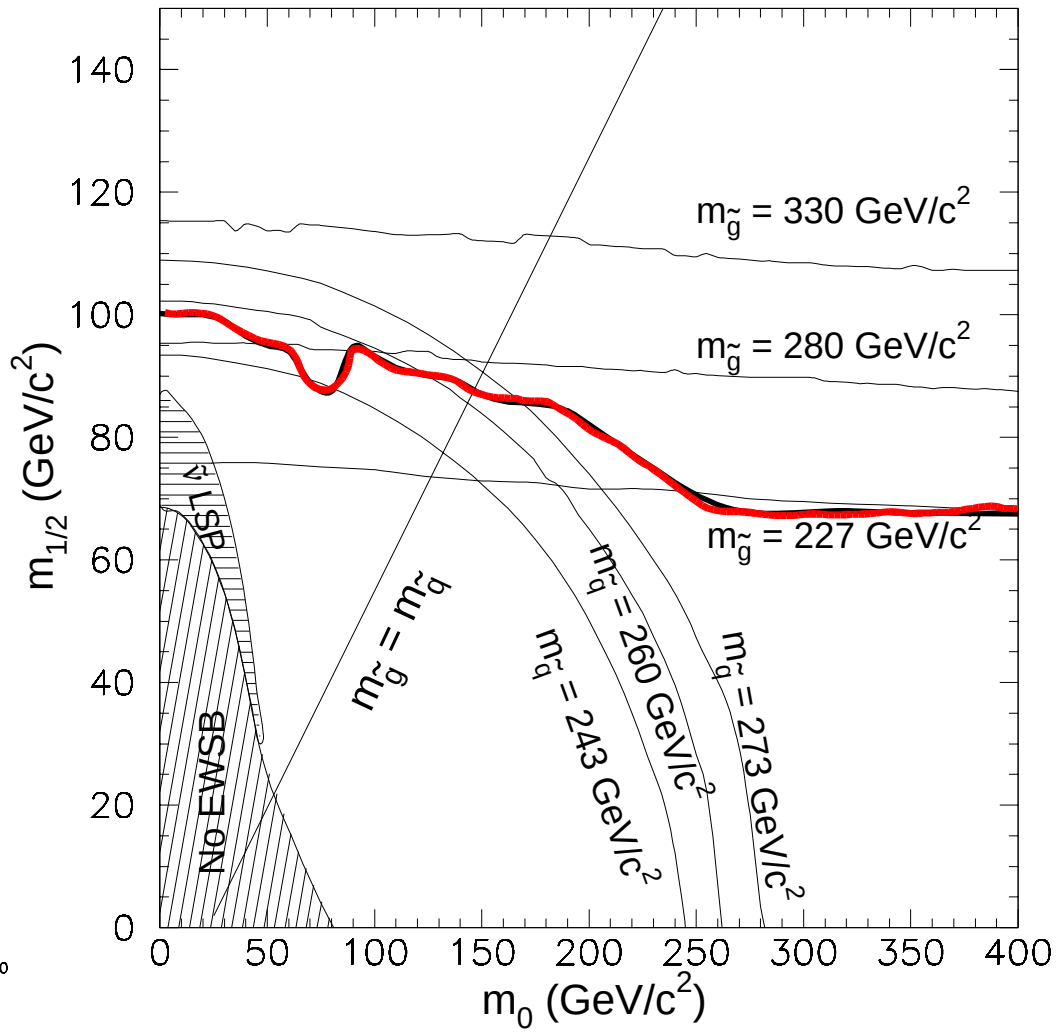


Search for RPV in Dimuon and four Jets

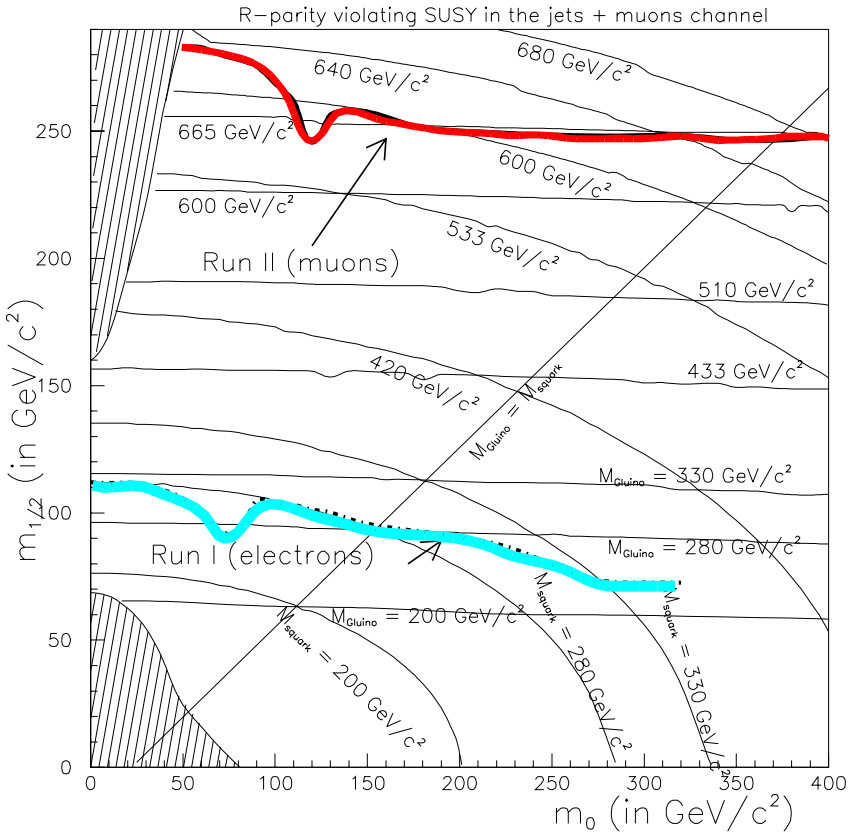
RPV decay of LSP into lepton and two quarks

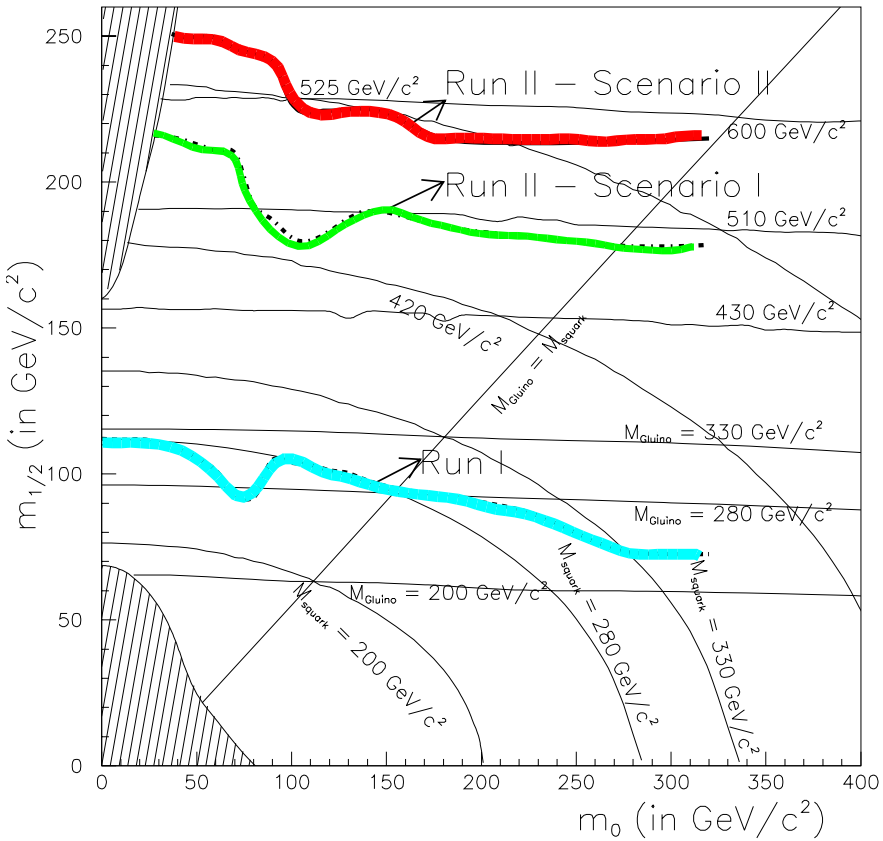
no missing Energy but clear signature





Expectation for Run II





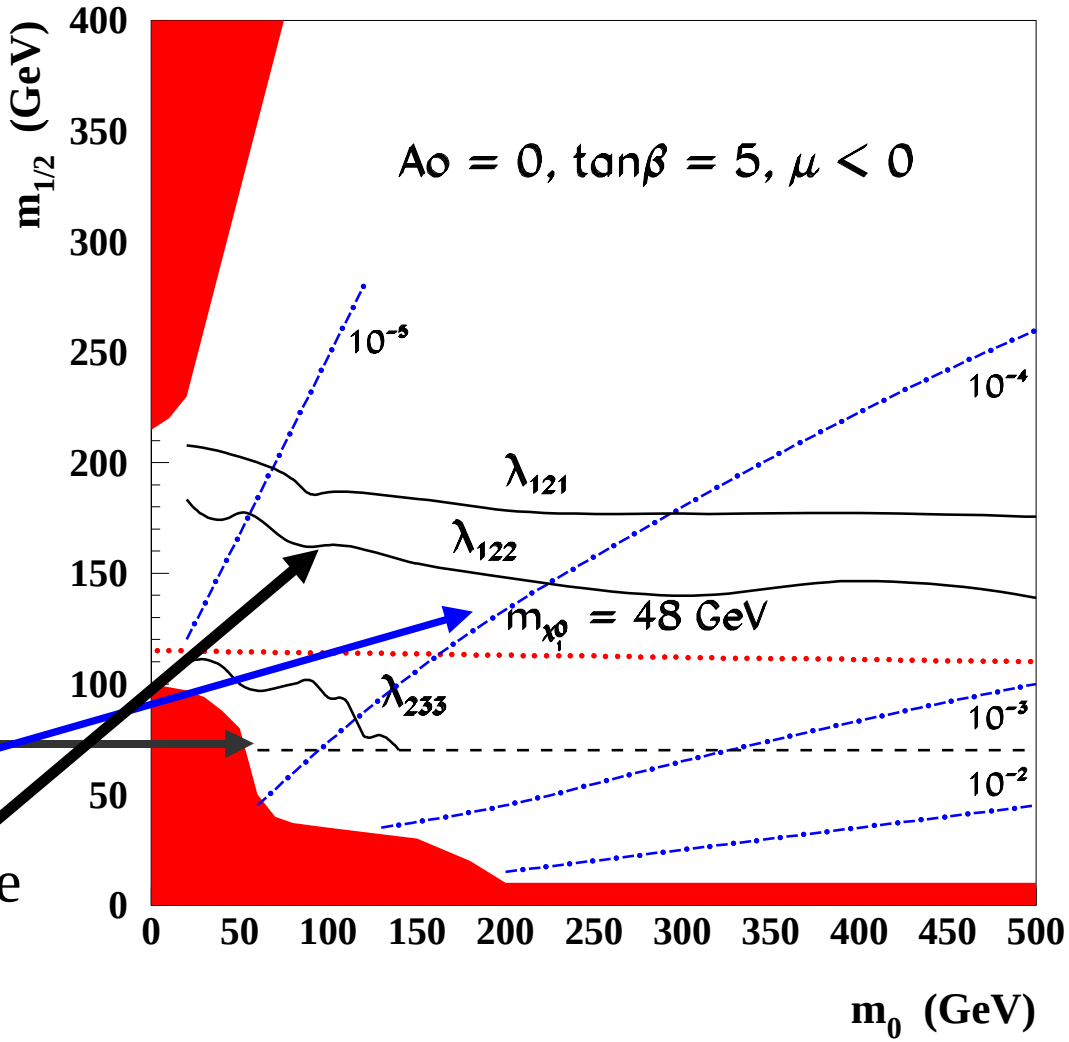
Search for RPV in trilepton channel

Consider LSP decaying into 2 leptons and 1 neutrino

Channel: eee,eeμ,eμμ,μμμ

Selection as in standard trilepton analysis but different interpretation

Events above dashed and dash−doted line and below the solid line are excluded for $\lambda > 10^x$



Trilepton channel in Run II

Main source in Run II

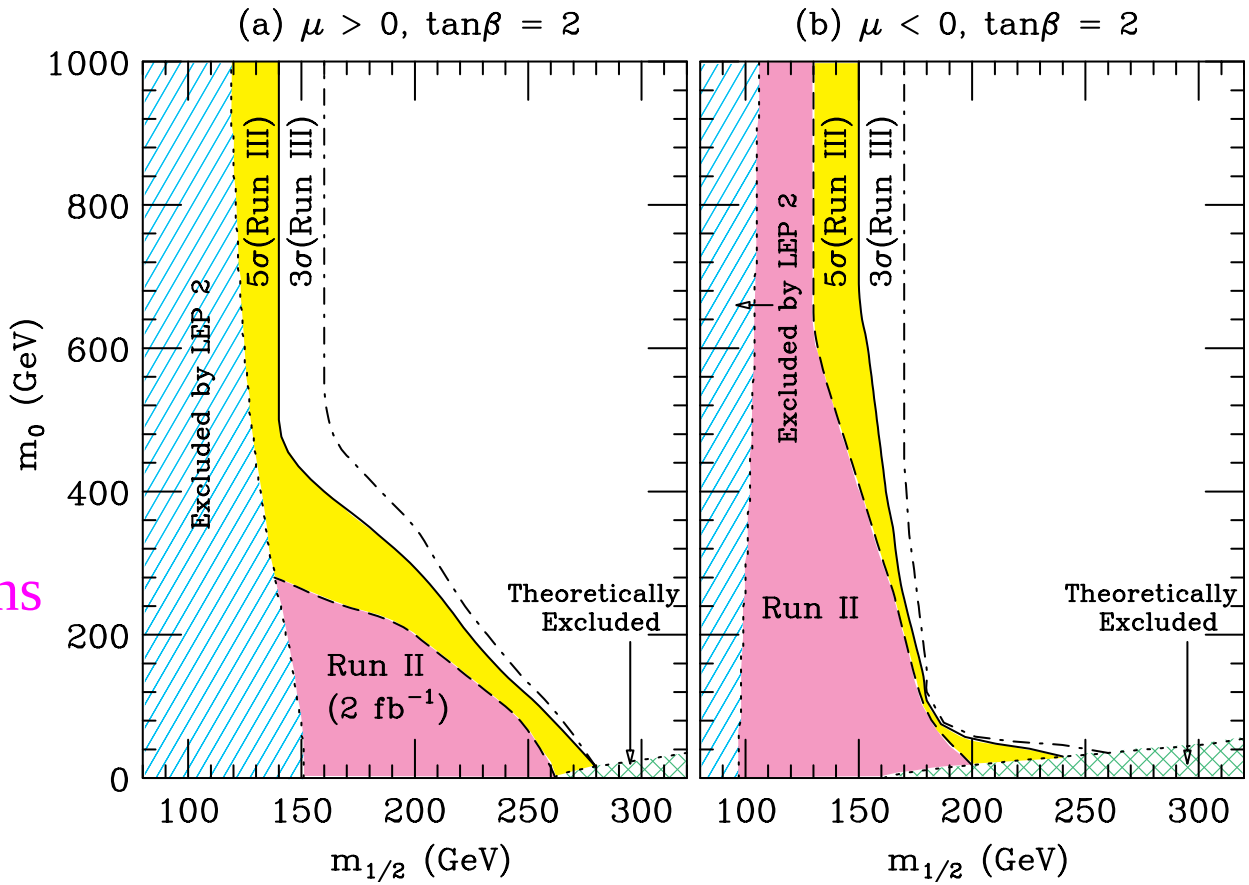
$$p\bar{p} \rightarrow \tilde{\chi}_1^{\pm}\ \tilde{\chi}_2^0$$

$$\tilde{\chi}_2^0 \rightarrow l^+l^-\ \tilde{\chi}_1^0$$

$$\tilde{\chi}_1^{\pm} \rightarrow l^{\pm}\nu\ \tilde{\chi}_1^0$$

First Run II analysis will look for 2 same sign letons

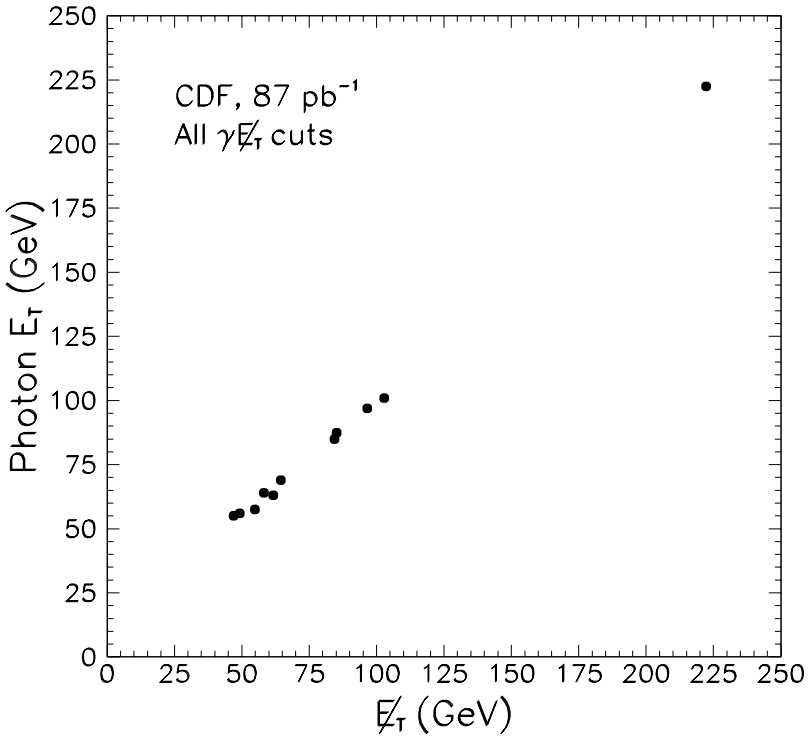
Higher efficiency and higher background

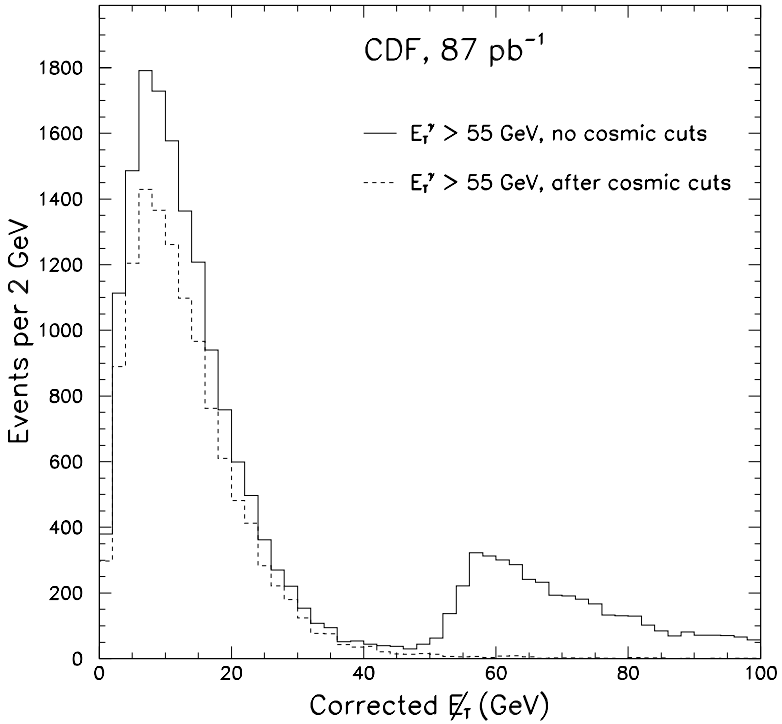


Search for new Physics in Photon plus missing Energy

Limits on Large extra Dimensions and on Superlight Gravitinos ($qq \rightarrow \tilde{G}\tilde{G}\gamma$)

$\sqrt{F} \geq 221$ GeV (model of Brignole et. al.)



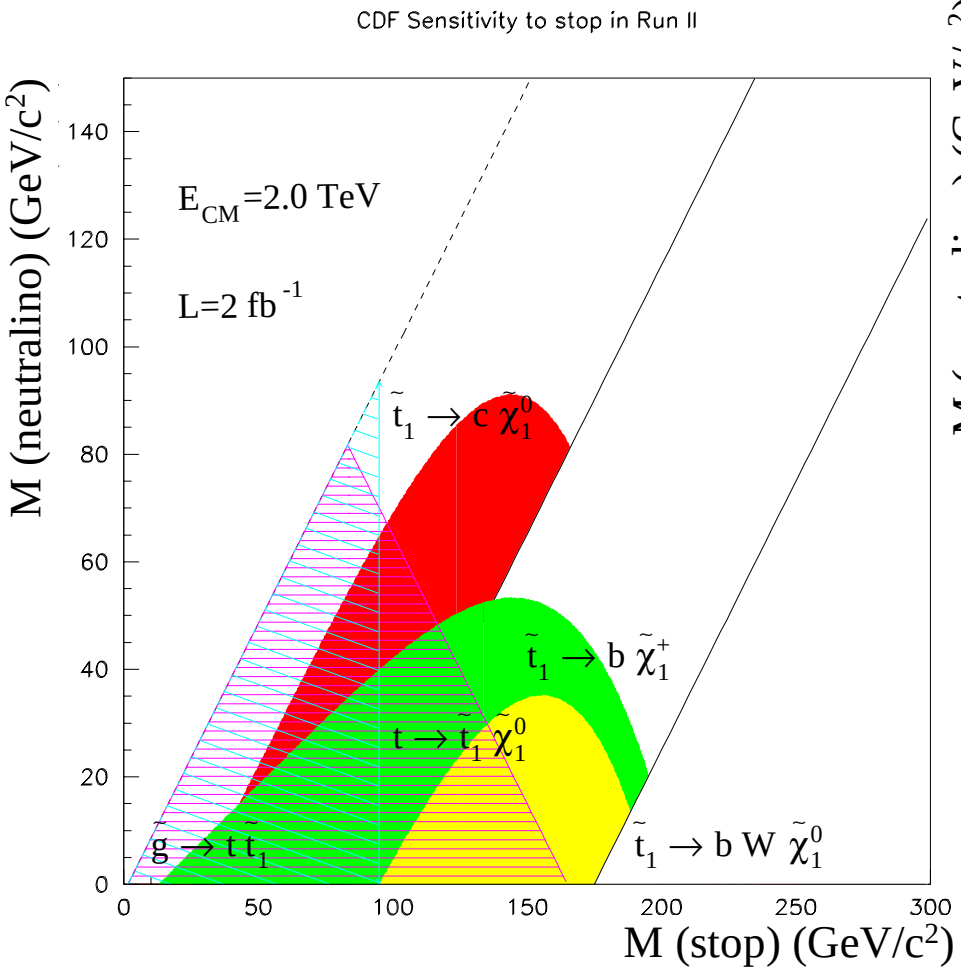


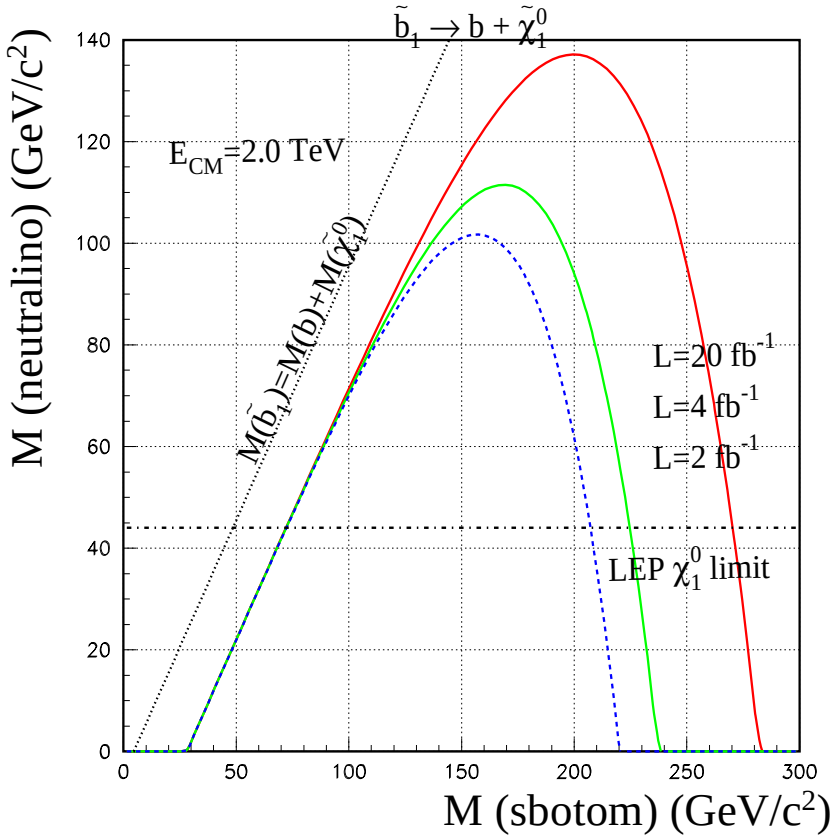
11 events observed and 11.0 ± 2.2 expected

Main Background: Cosmic ray 6.3±2.0

$Z\gamma \rightarrow \nu\bar{\nu}\gamma$ 3.2±1.0

Run II scalar tops and scalar bottom



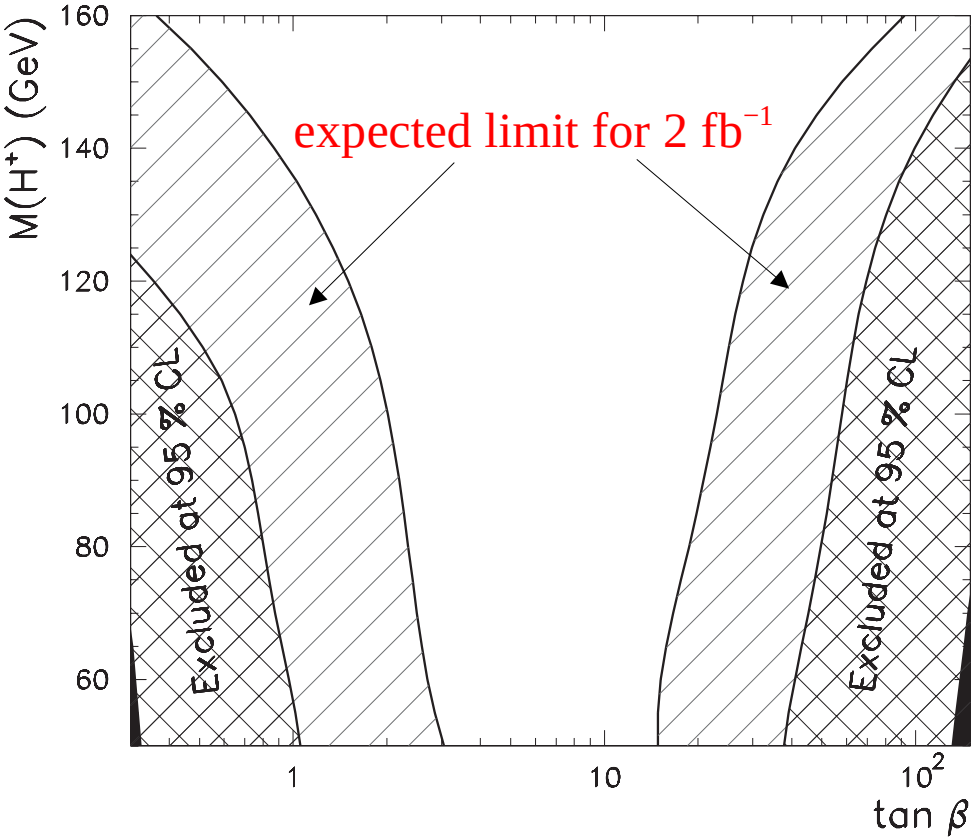


- Stop mass reach up to ~175GeV/c^2
- Sbottom sensitivity up to 250GeV/c^2

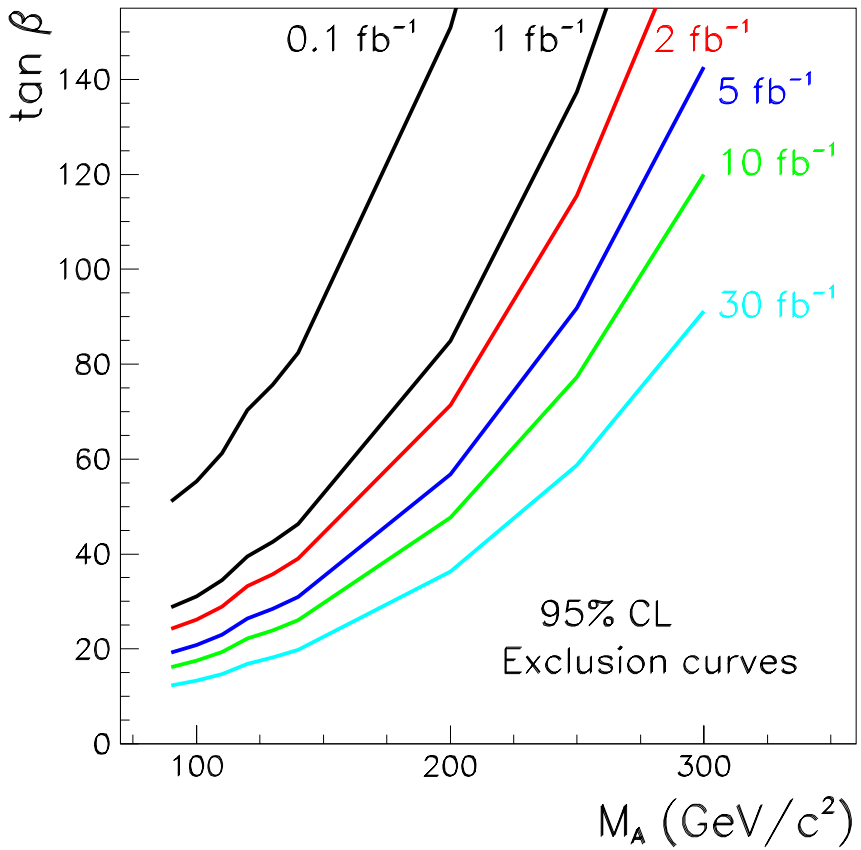
Implication of Higgs searches for MSSM

MSSM parameters can be constraint by Higgs search

Charged Higgs



neutral Higgs



Conclusions

- Run 1 analysis nearly finalized
- SUSY limits will greatly improve in Run II
  - 20 times the statistic in Run II a
  - 10% more energy
  - Improved Detectors