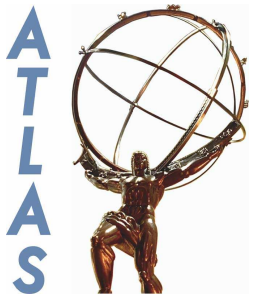
SUSY inclusive jets and QCD background ID



Ximo Poveda

TileCal Valencia Meeting
27-July-2007

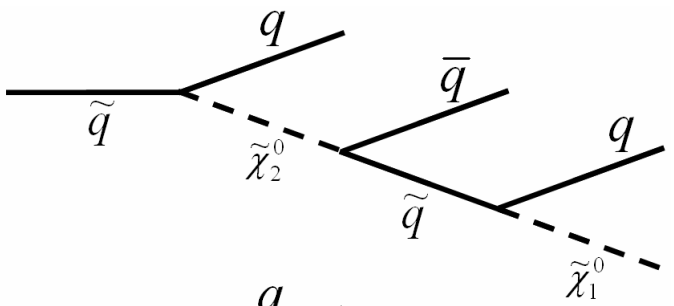
SUSY Inclusive 0-lepton

- Production:

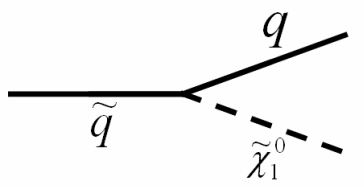
$$qg \to \tilde{q}\tilde{g} \qquad qq \to \tilde{q}\tilde{q}, \tilde{g}\tilde{g}$$
$$q\bar{q} \to \tilde{q}\bar{\tilde{q}} \qquad gg \to \tilde{g}\tilde{g}, \tilde{q}\bar{\tilde{q}}$$

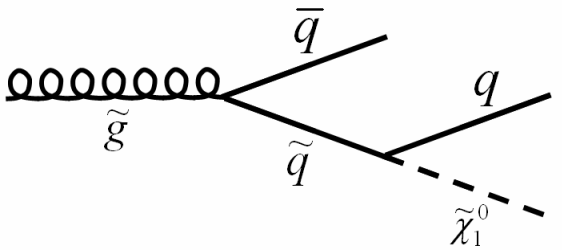
- Decay:

$$M_{\tilde{q}} > M_{\tilde{g}} : \begin{cases} \tilde{q} \to q q \bar{q} \tilde{\chi}_1^0 \\ \tilde{g} \to q \bar{q} \tilde{\chi}_1^0 \end{cases}$$



$$M_{\tilde{q}} < M_{\tilde{g}} : \begin{cases} \tilde{q} \to q \tilde{\chi}_1^0 \\ \tilde{g} \to q \bar{q} \tilde{\chi}_1^0 \end{cases}$$

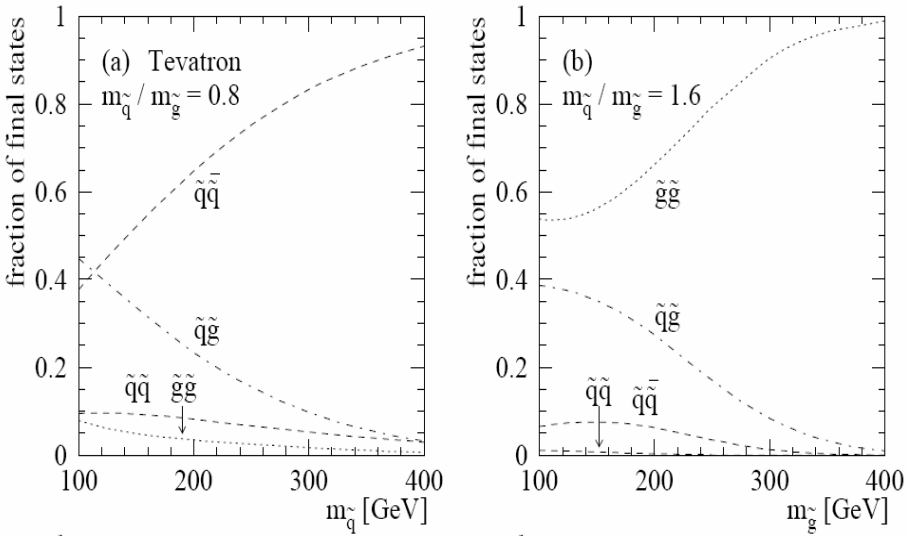




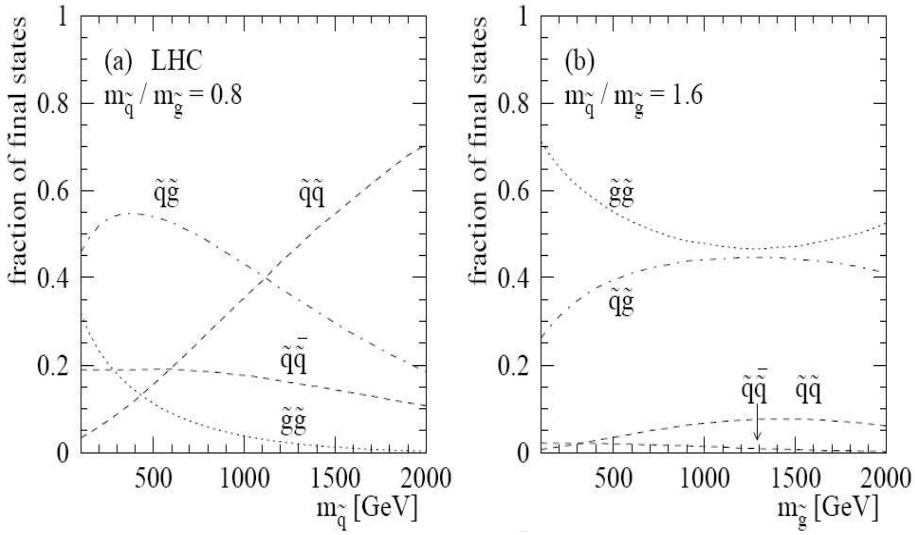
Channels at hadron colliders

W. Beenakker, R. Höpker, M. Spira and P.M. Zerwas,
Nucl. Phys. B **492** (1997)

TeVatron



LHC

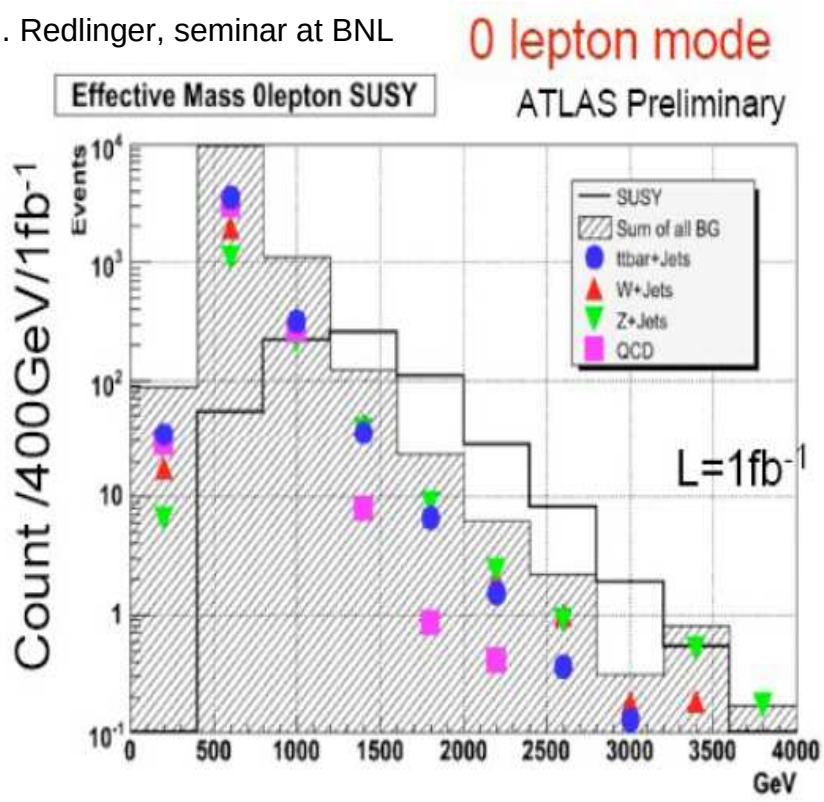


- Light gluino:
- $\tilde{q}\tilde{g}$: 3 jets + MET
- $\tilde{q}\tilde{q}$: 2 acoplanar jets + MET
- $\tilde{g}\tilde{g}$: 4 jets + MET

- Heavy gluino:
- $\tilde{g}\tilde{g}$: 4 jets + MET
- $\tilde{q}\tilde{g}$: 5 jets + MET

Backgrounds for 0-lepton

G. Redlinger, seminar at BNL



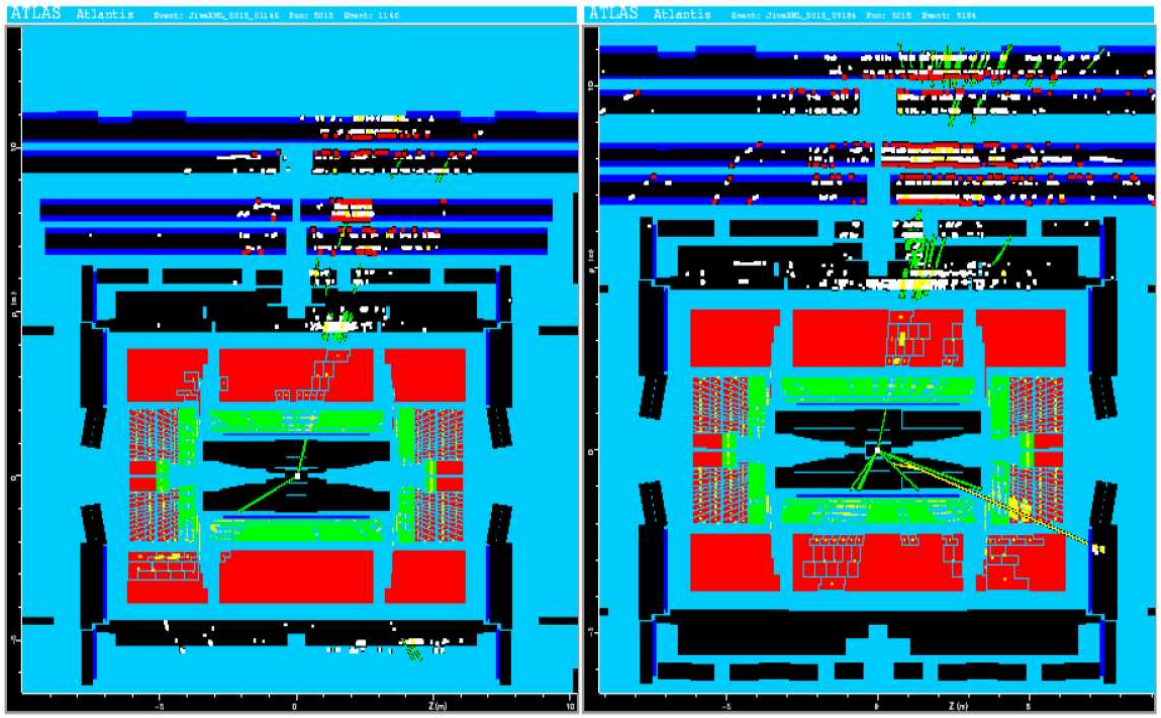
Roughly equal BG contributions from ttbar, W+jets, Z+jets

QCD multijet BG (with real or fake Etmiss) also significant; difficult to simulate

- One of the most important background in this analysis is QCD.
- Other backgrounds: ttbar, W+jets, Z+jets
- Working on tool to reduce fake MET tails produced by QCD jets due to jet leakage in calorimeters

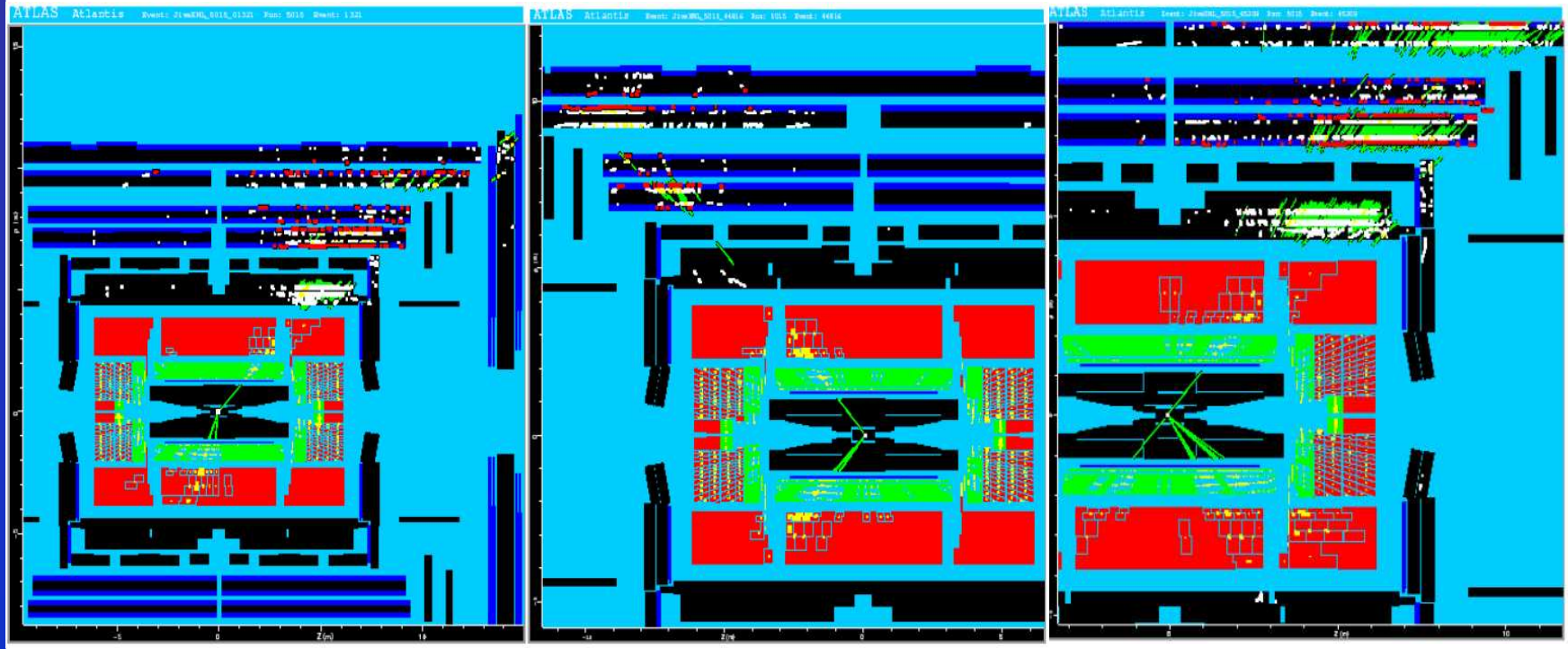
Jet leakage

- Muon Spectrometer as Hadronic Shower Tail Catcher? Frank Paige + Stephane Willocq
- Central region:



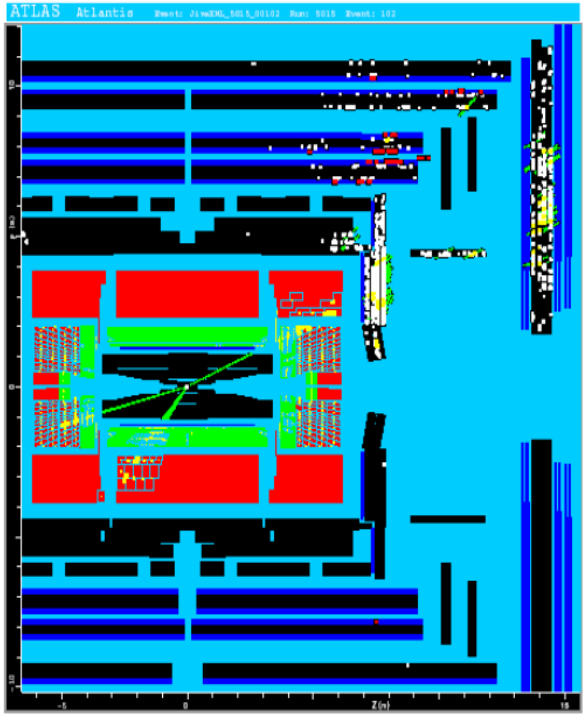
Jet leakage

- Muon Spectrometer as Hadronic Shower Tail Catcher? Frank Paige + Stephane Willocq
- Crack Tile LB/EB:



Jet leakage

- Muon Spectrometer as Hadronic Shower Tail Catcher? Frank Paige + Stephane Willocq
- Crack Tile/HEC



Status/Plans

- Develop a tool to identify and reject jets which potentially present this longitudinal leakage with only calorimeter information
- Next step: take into account MuonShowerObject to correct these potential loses.

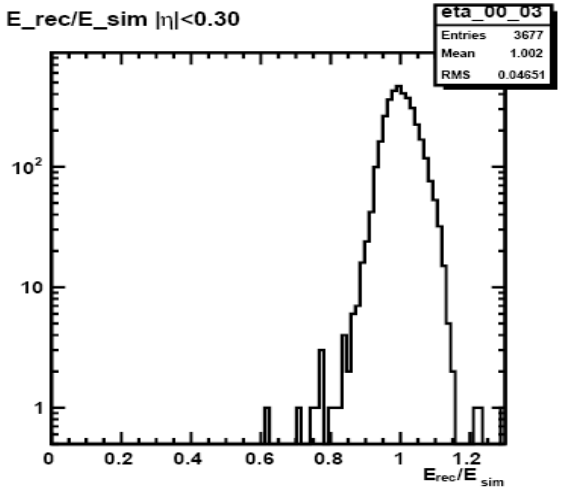
- 10 kEvts of signal RDO in valtical15 disk:
  misal1_csc11.005403.SU3_jimmy_susy.digit.RDO.v12003107
- Parameters: m_0 =100 GeV, $m_{1/2}$ = 300 GeV, A_0 = -300 GeV, tanβ = 6, sgn(μ) = +

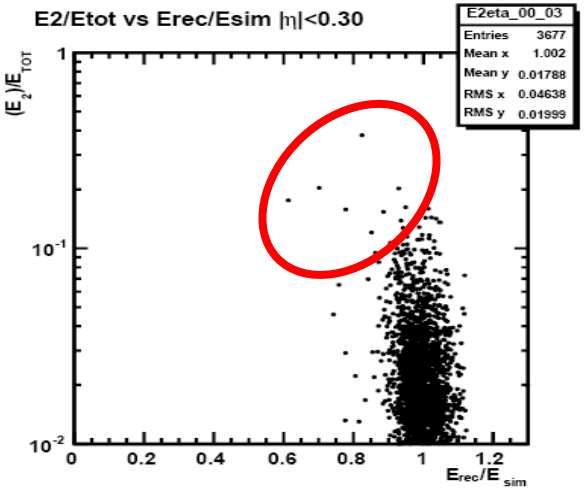
- Currently working on dijet samples (see next slide)

Dijet events

- Sample J7 (p_T: 1120-2240 GeV)
- X-axis: Reconstructed jet energy over truth jet energy

Central region:
|η|<0.3





Crack LB/EB:
0.6 < |η|<1.2