Update on Kinematic Fits

C. Sander

Susy Group Meeting – Hamburg – 6th October 09

Fit Probability

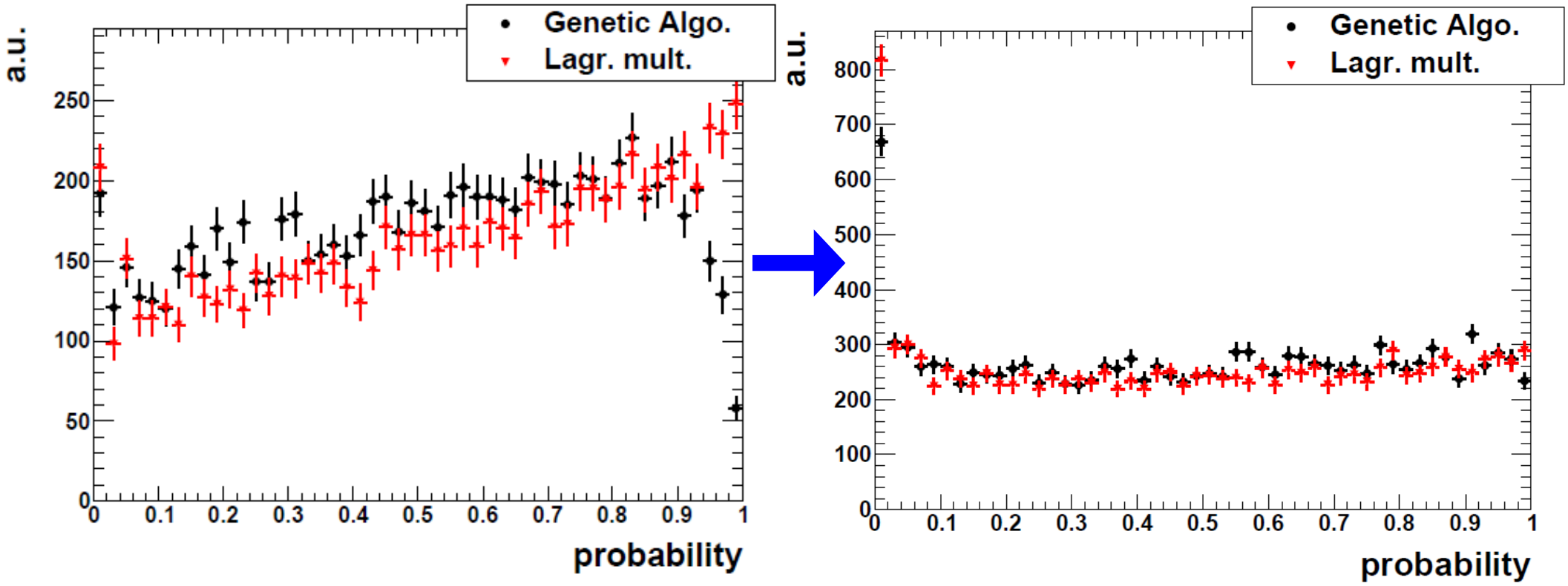


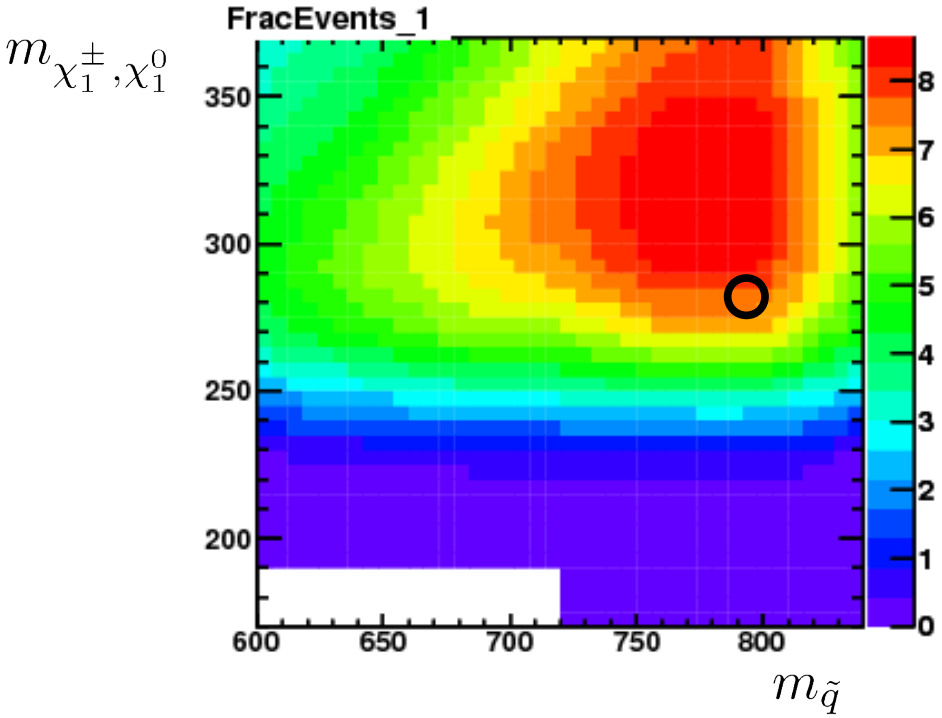
Figure 4: Fit probability for semileptonic $t\bar{t}$ events.

- Combinatorics: off
- Width of W (MC: 4.6 GeV ... PDG: 2.1 GeV) and top (MC: 4.0 GeV … PDG: ~1.5 GeV)
- More iterations and larger (and broader) starting population

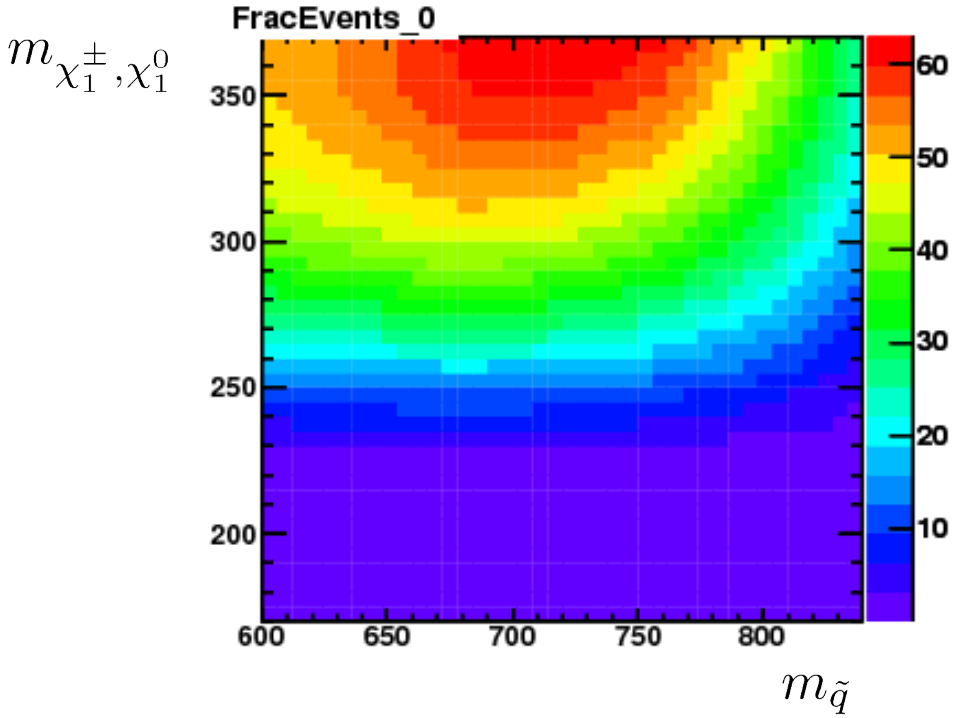
→ **Flat**; increase at low probabilities from non-Gaussian tails of Breit-Wigner

Systematics of Mass Scan I

Signal



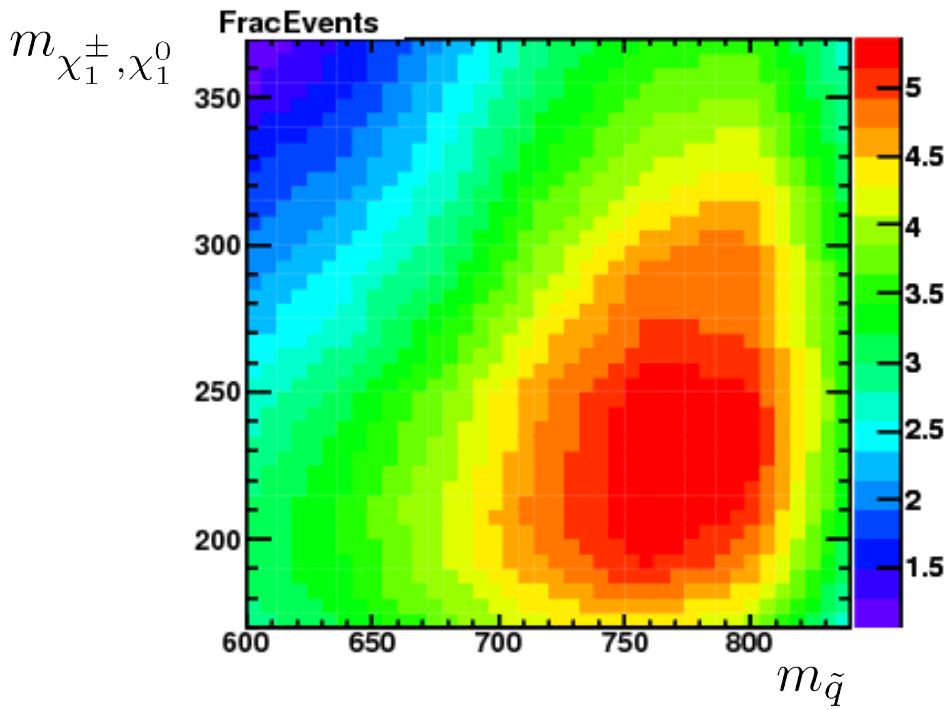
Background



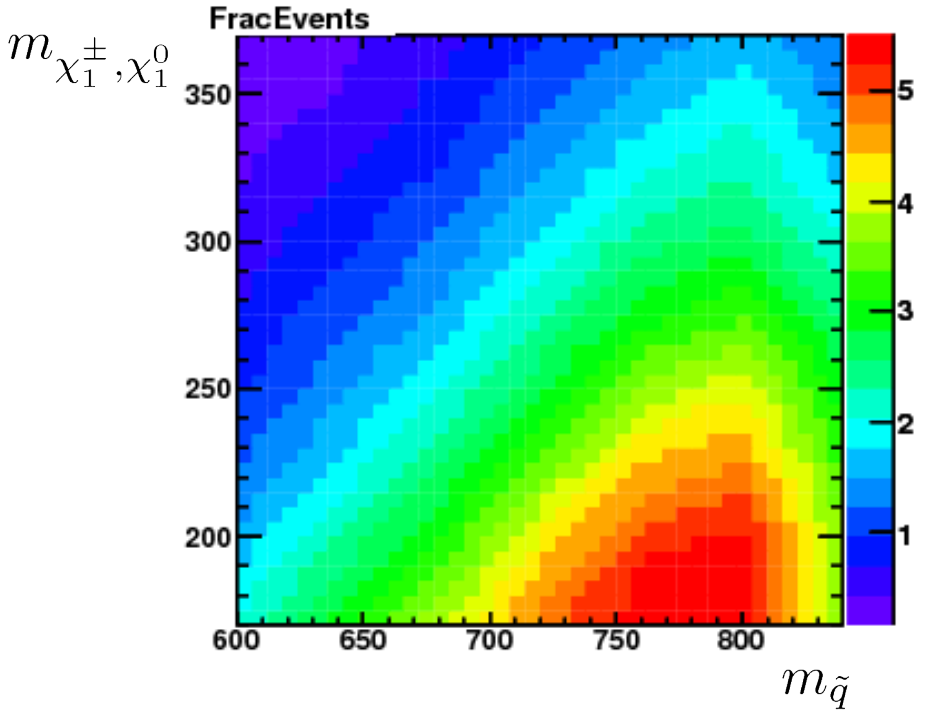
- Different distribution (weighted event count) for signal (including combinatorics) and background (no signal/similar branch in event)
- Is the shift towards larger masses (for background) ...
  - ... a generic feature of random combinations?
  - ... or a relic of high invariant masses in the event?

Systematics of Mass Scan II

QCD: pthat > 500 GeV



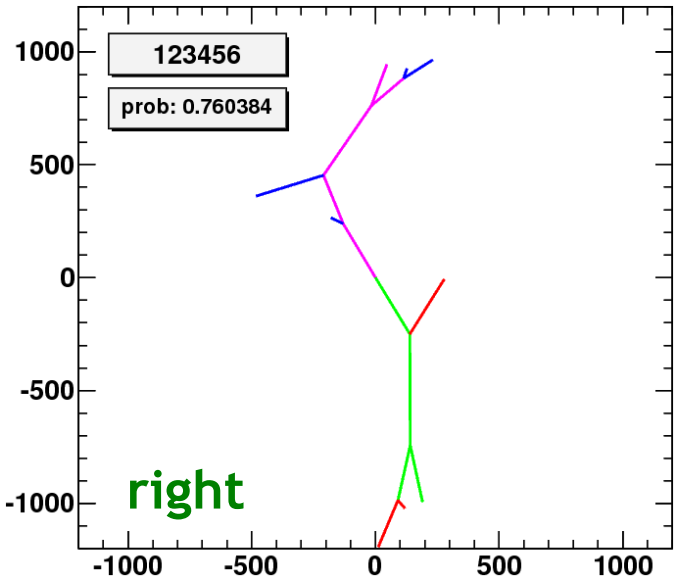
QCD: 1000 GeV< pthat < 1500 GeV

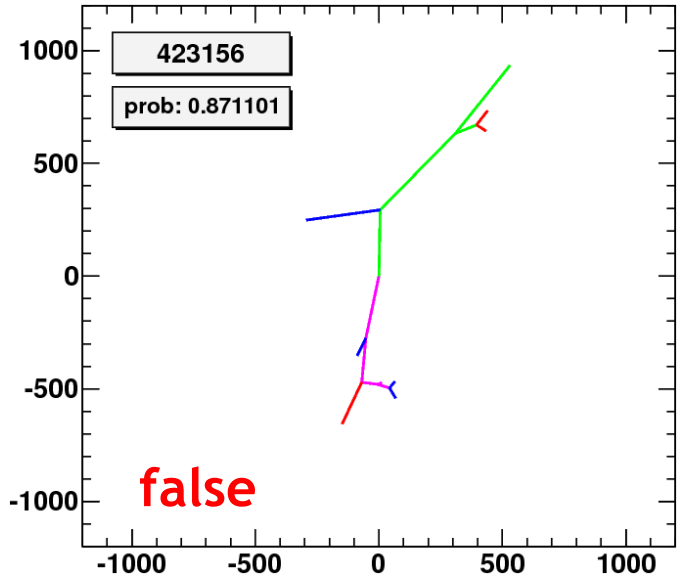


- Gluino and LSP masses are set to true masses (850 GeV and 150 GeV) → Upper limit on squark mass and lower limit on chargino mass
- Selection of QCD events (7 jets within acceptance)
- Lower pthat seems to favor higher chargino masses in comparison with higher pthat ???
- Very different shape in comparison with SUSY background

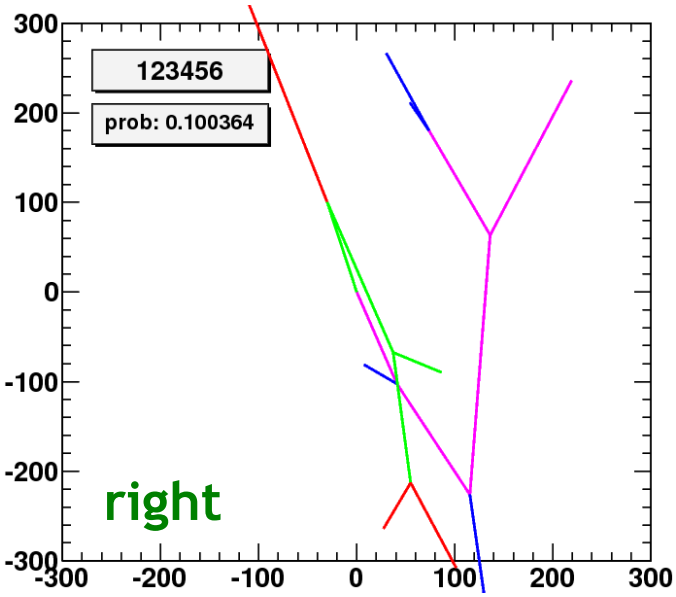
A Cascade Event Display

- Tool to display event hypothesis



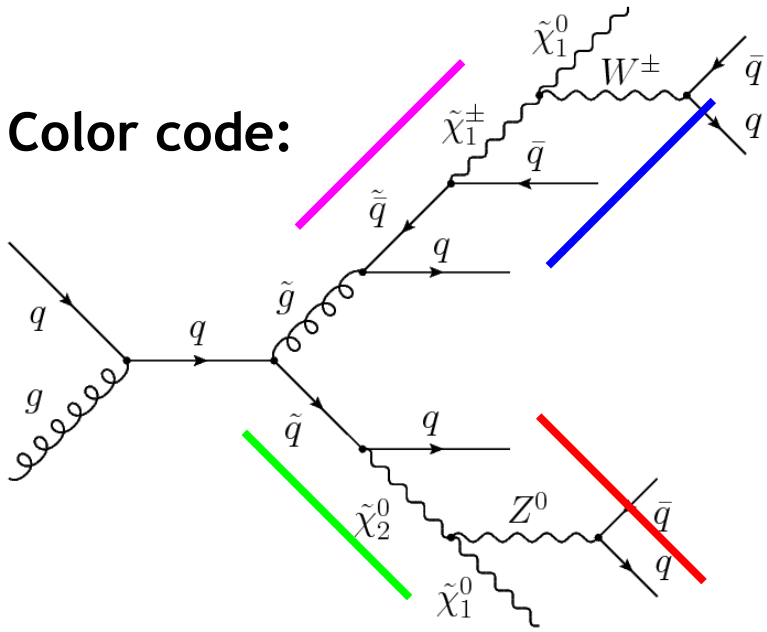


Idea: use tool to get a feeling for typical wrong combinations and accidentally good fitting QCD events



SUSY events can look complex

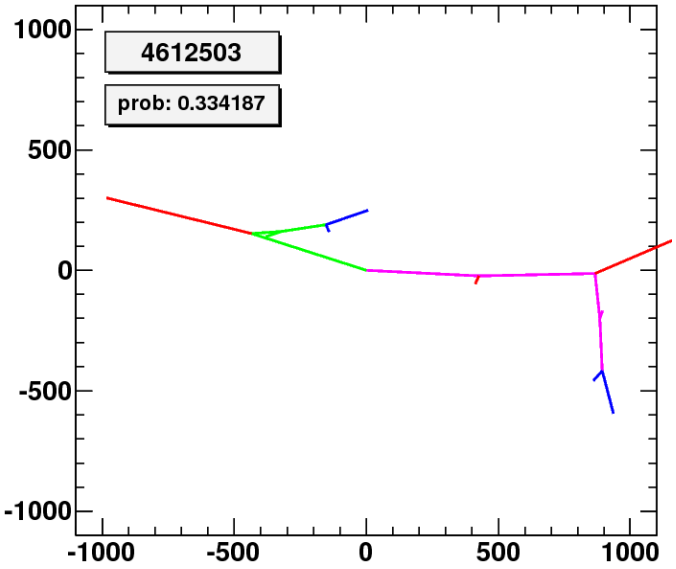
Color code:

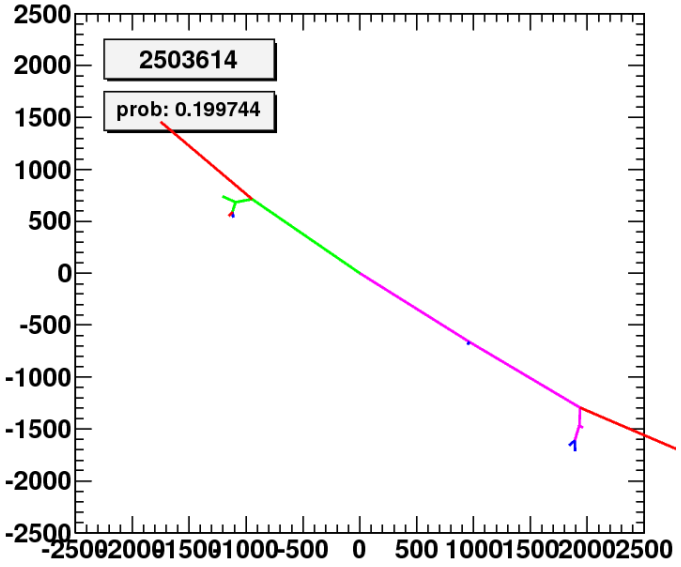


ACED for QCD Events

- Color coding of jets (so far) not meaningful
- High invariant masses by:
  - Free LSP momenta
  - Large angles between SUSY particle and jet (taken from other hemisphere)
- **But:** most of these events will not survive selection on detector level, since soft jets (even above pT threshold) are often collinear with leading jet

lower pthat





higher pthat