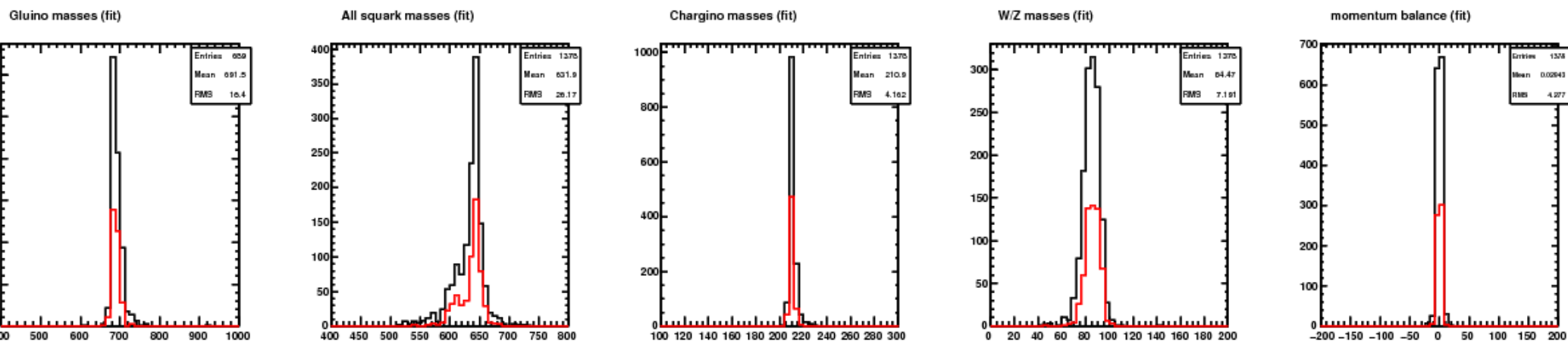


Update on Kinematic Fits

C. Sander

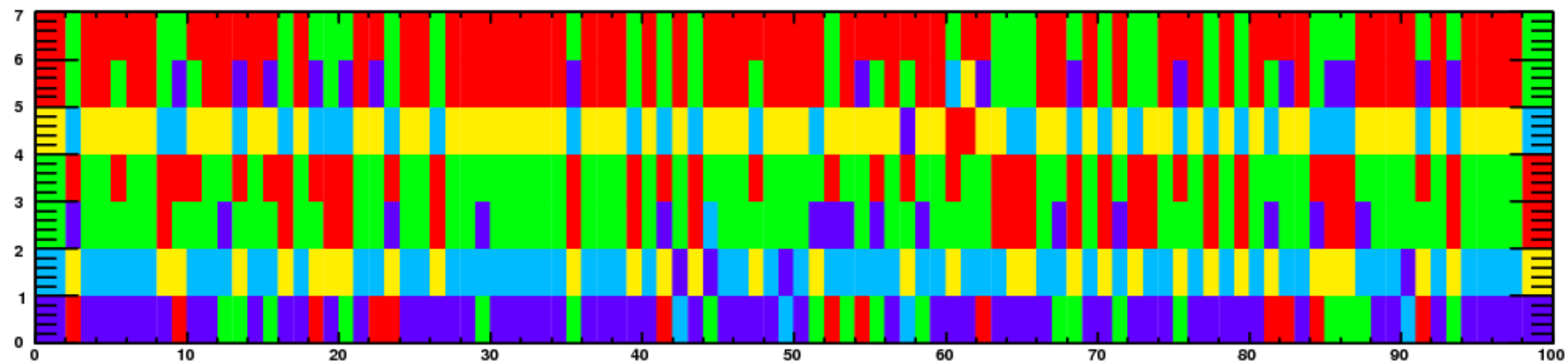
Uni HH - Susy Group Meeting - 20th May 09

- Why are some wrong combinations better than the right combination?



red: best combination is right combination

Combinatorics GA



~50% of best combinations is right combination

Improvements of KinFitter:

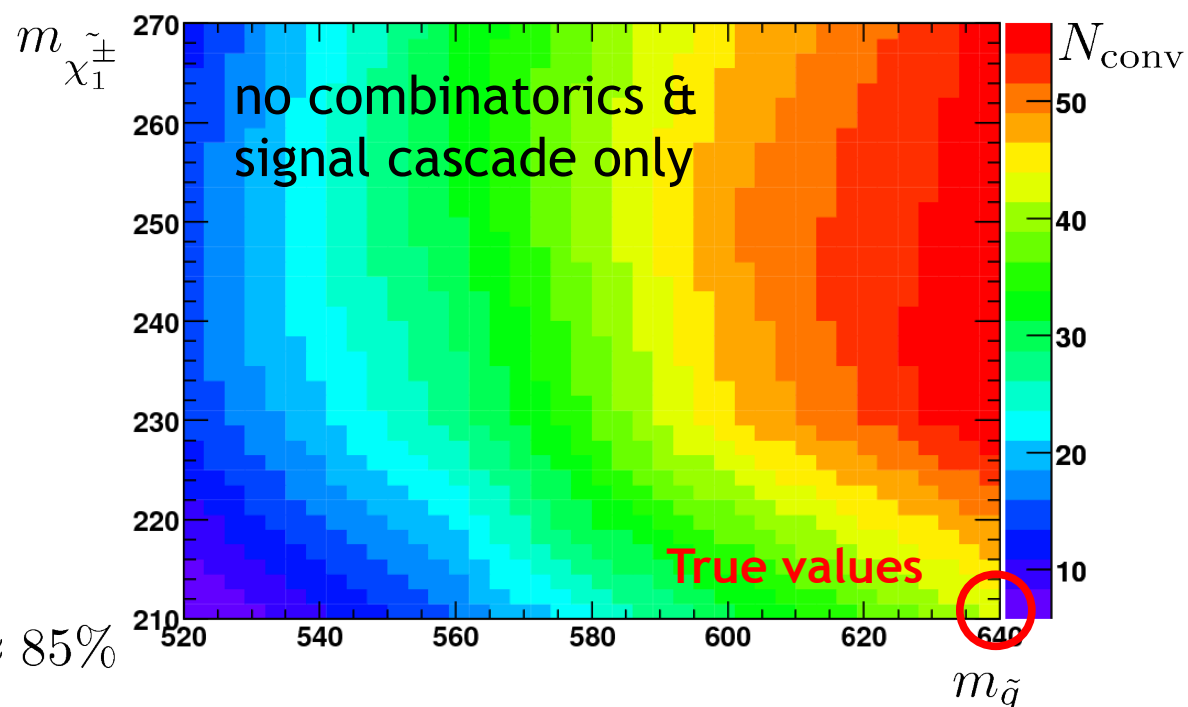
- Added line search (10 times $\times 0.5$): 61 converged from 111 signal cascades, right combination is best converged one: 26
- Without line search: 56 converged, 23 right combination
- Added scaling of constraints to reduce influence of heavy mass constraints
- Number of iteration increased from 50 to 100 (improvement in convergence $\sim 300\%$ (w and w/o line search))

General problem at LM4:

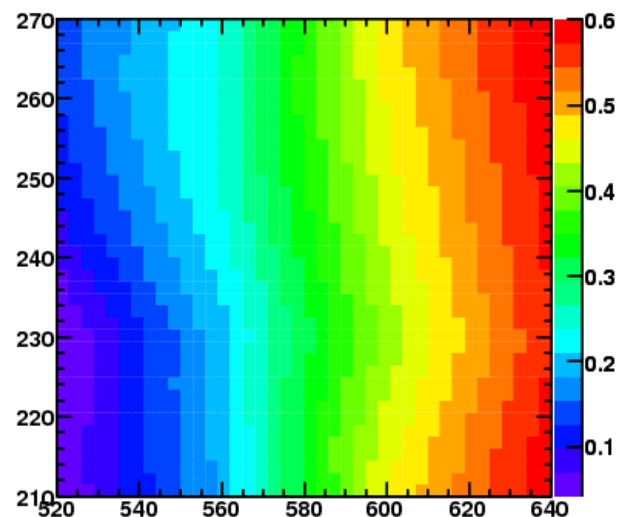
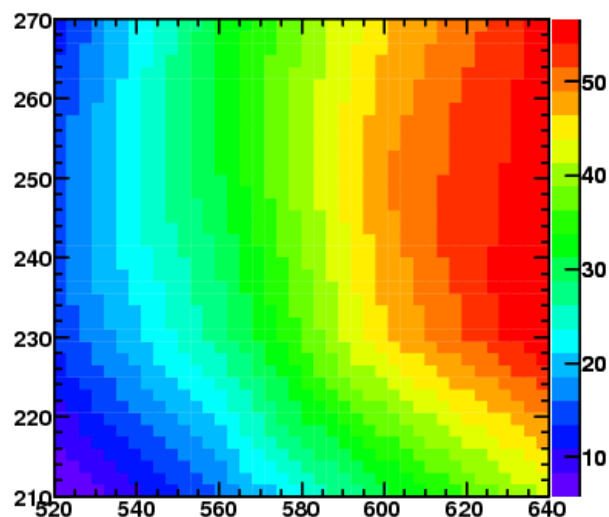
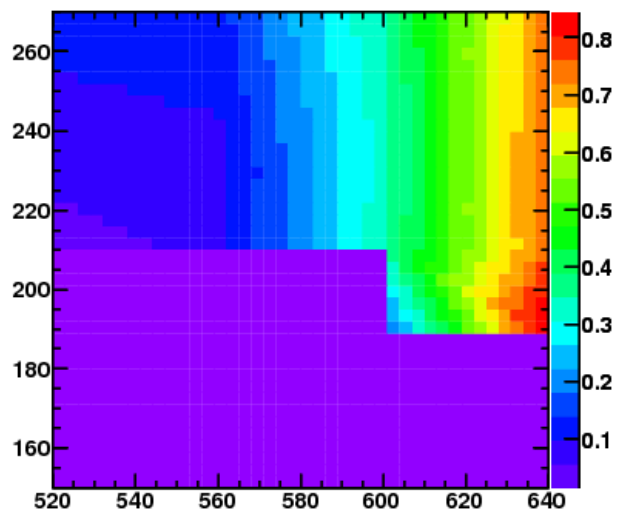
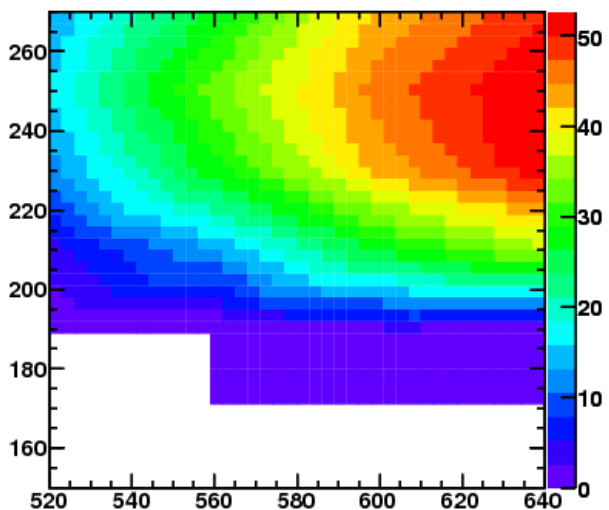
- Mass gap: $m_{\chi_1^\pm} - m_{\chi_1^0} \gtrsim m_W$
- Small phase space?
- Problem with 2D-scan?

Solution: LM5

- Higher masses, similar cascades
- but: a lot of h^0 $Br(\chi_2^0 \rightarrow h\chi_1^0) \approx 85\%$

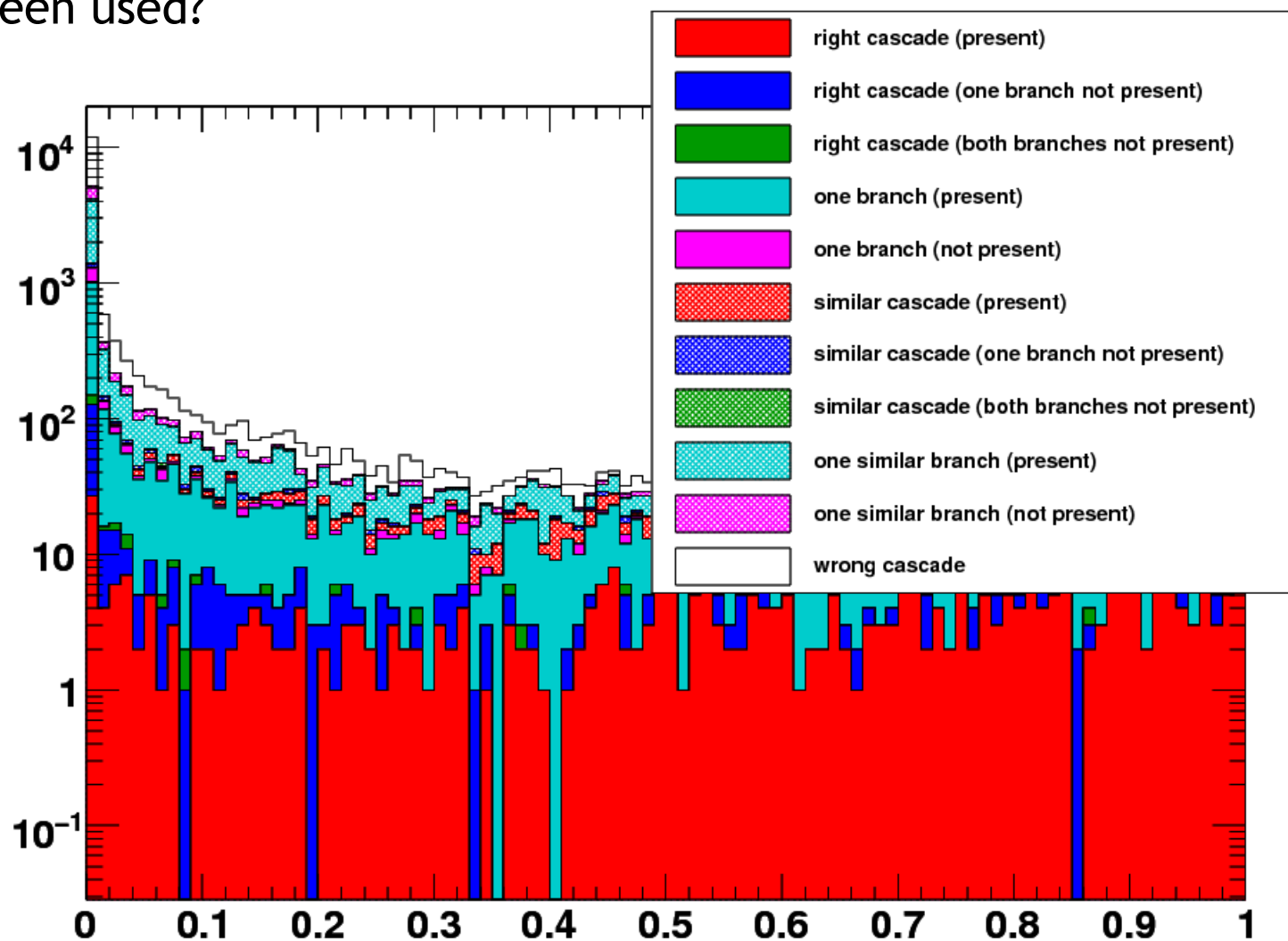


- Masses of W , Z and h are too different to force to one mass constraint
- Omit boson mass constraint (overall problem still over constrained)

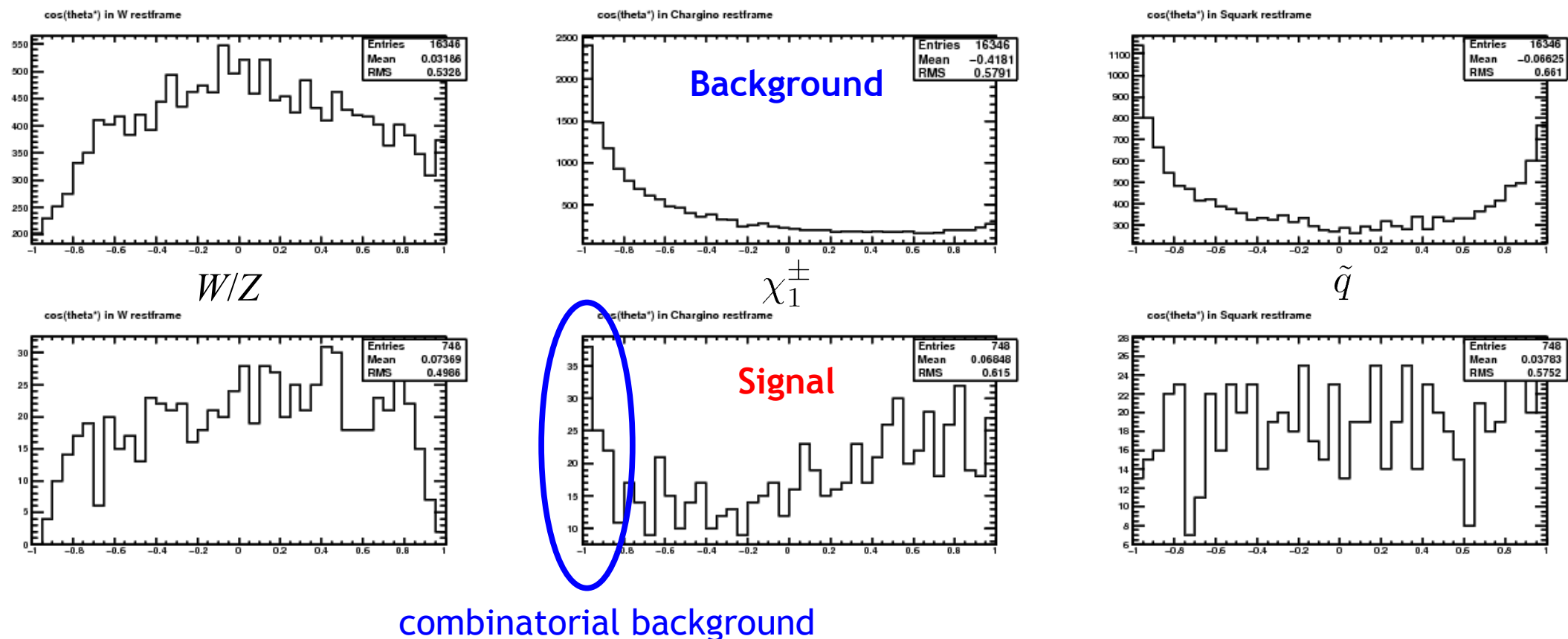
 N_{conv} $\langle \text{probability} \rangle$ with W/Z constraintw/o W/Z constraint

LM4

- It seems that there not unlikely some combinations for Susy background which fulfill the desired invariant mass and momentum constraints
- Are there other discriminating variables? Can the kinematic of the fitted event further been used?



- In first approximation the decay of the Susy particles is isotropic in their rest frame
- Calculate $\cos \theta^*$ which is the cosine of the angle of one of the decay products and the flight direction of the decaying particle
- There is a clear discriminative power in these variables (are there more?)



combinatorial background