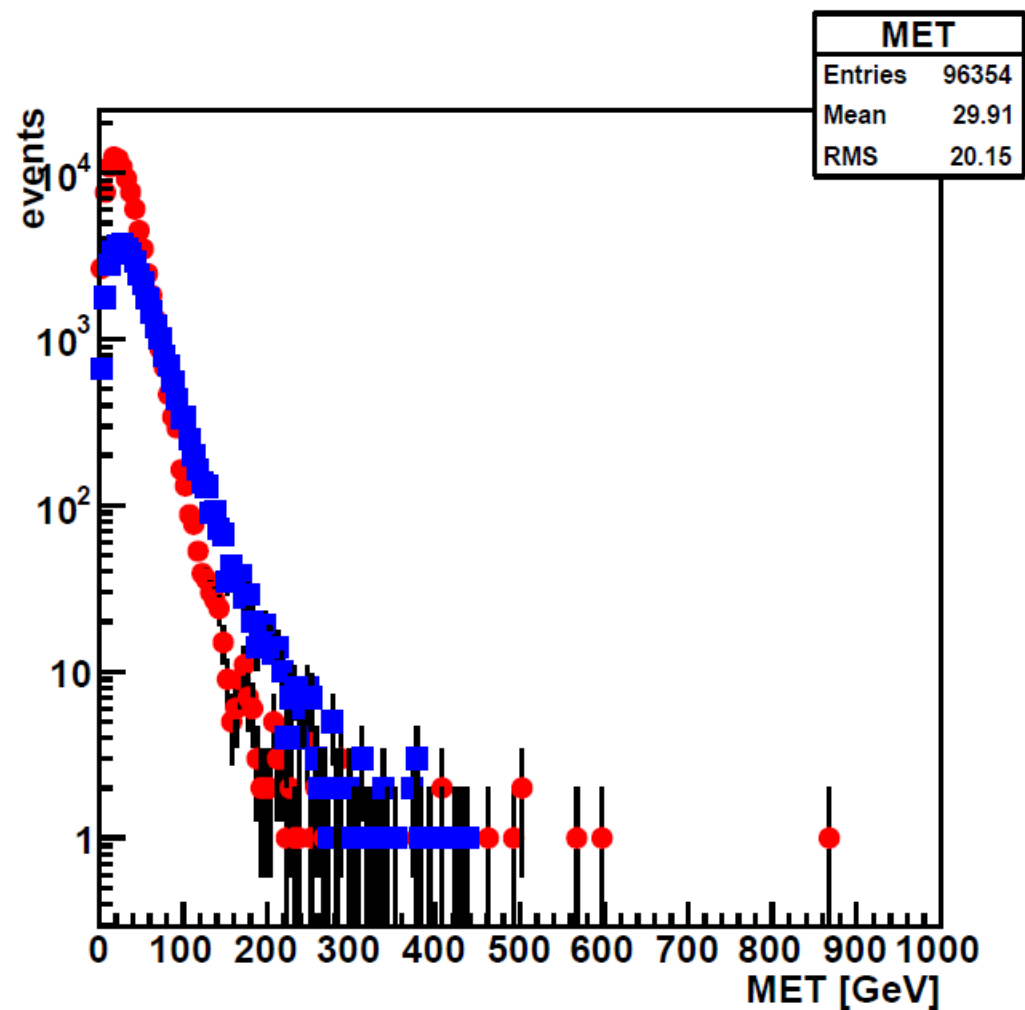
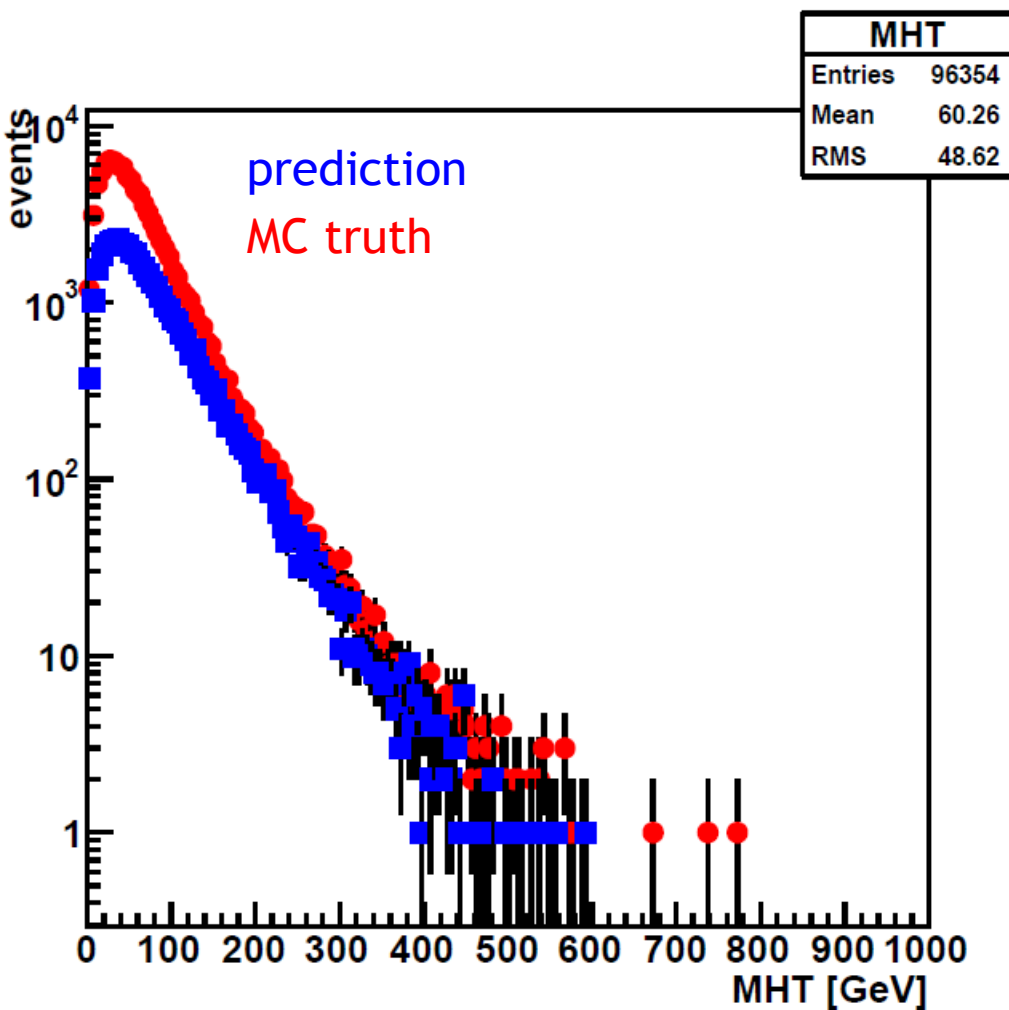


QCD Event Rebalancing

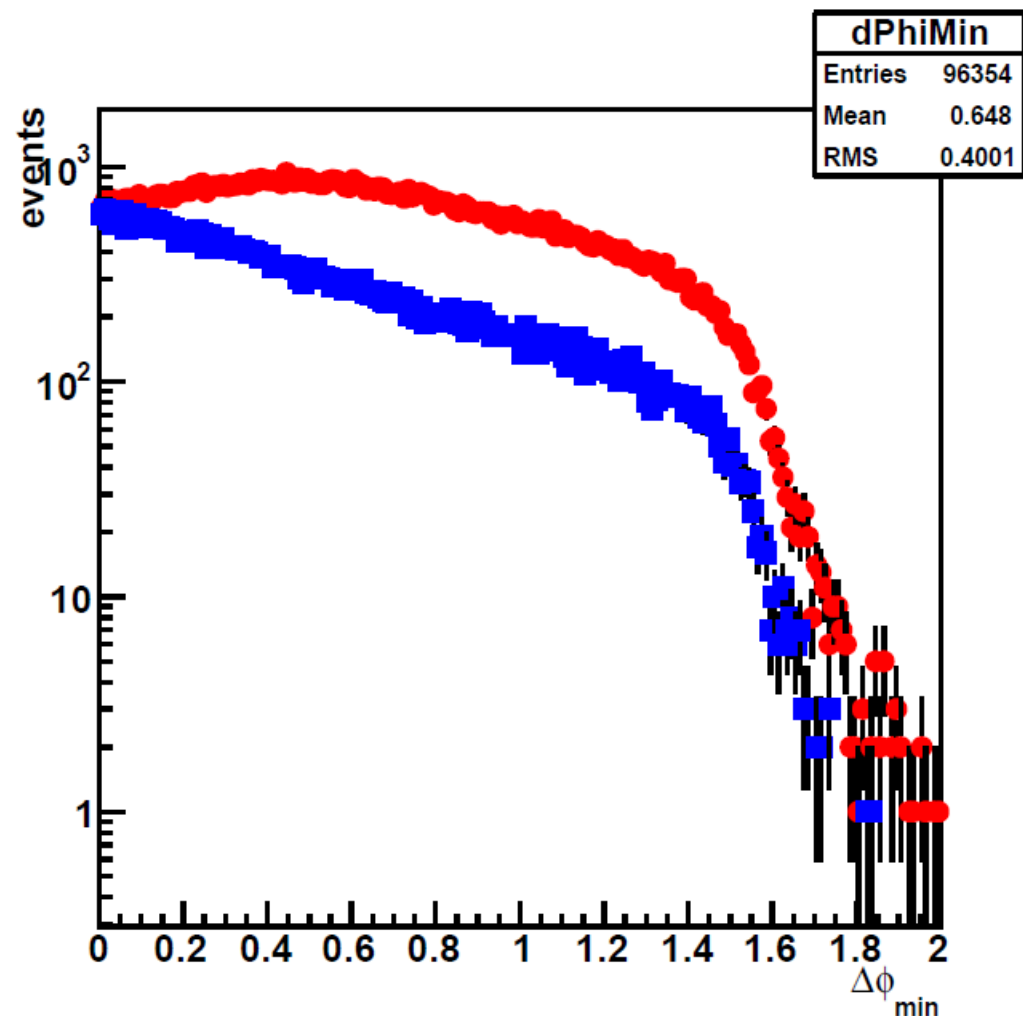
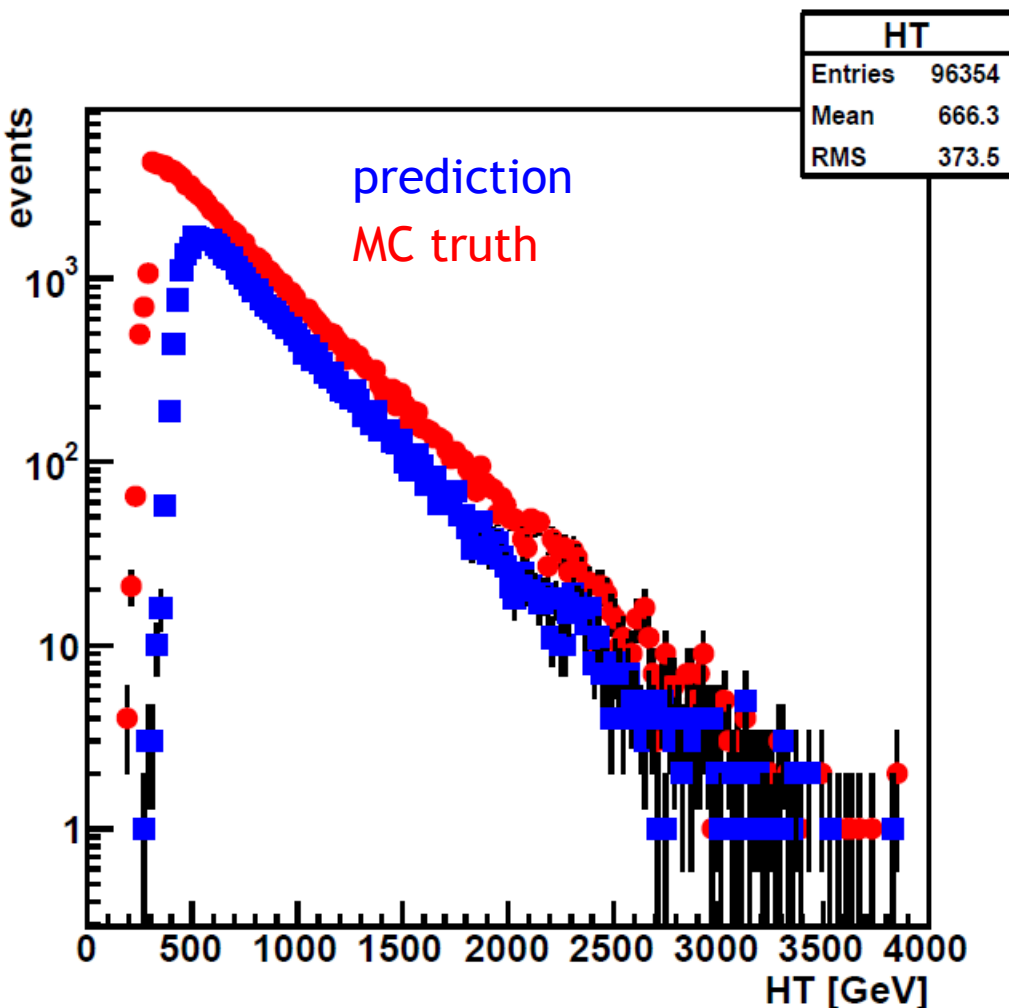
C. Sander, *Hamburg University*

SUSY group meeting – 28th April 10

- Determination of p_T response function using γ -jet and/or dijet events
 - Binning in E and η : binning in natural quantity for response parametrization \leftarrow here
 - Or binning in p_T and η : binning in quantity used for balance
 - p_T resolution or E resolution?
- Select events with small MET/MHT as seed event (well measured QCD events)
- Direct application of response simulation (“smearing”) may cause problems due to double smearing \rightarrow rebalancing of seed events
- Rebalancing methods:
 - Replace one of the jets by transverse vector sum of remaining jets
 - Use kinematic fit (with assumed approximated resolutions) \leftarrow here
- General problem: What has to be rebalanced?
 - MHT of all jets
 - MHT of jets above a p_T threshold \leftarrow here
 - MET



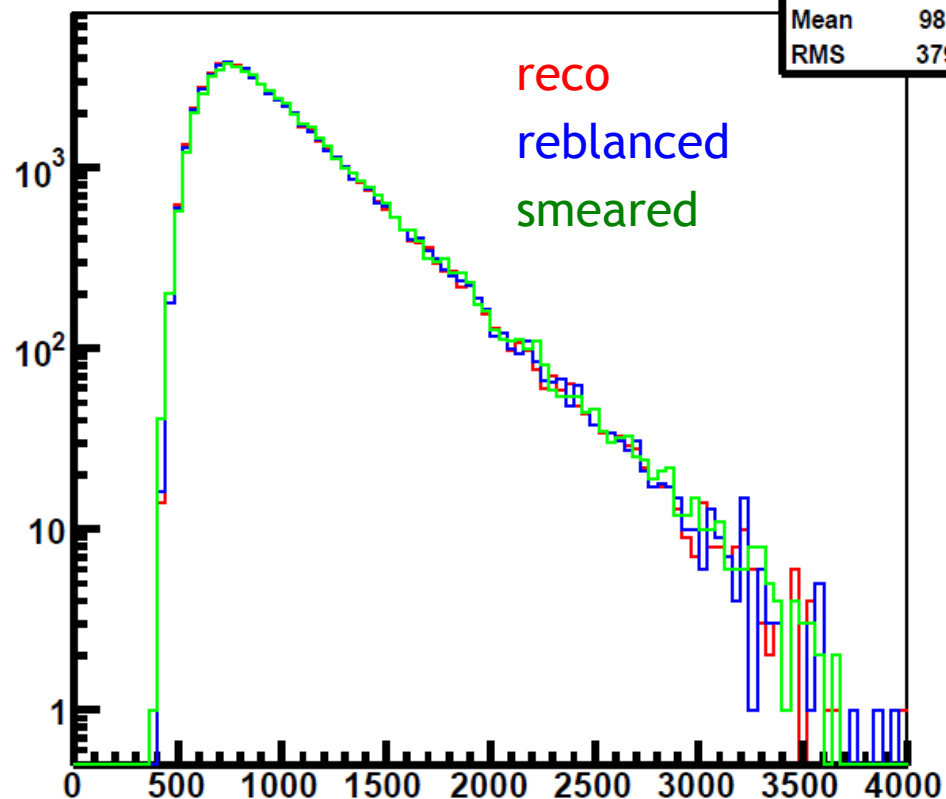
- For a first shot not that bad. But: clear deviation in small *MHT*/*MET* region
- Prediction has to be corrected by $\#(\text{MET} < 50 \text{ GeV}) / \#(\text{total})$
- Is weight procucer working correctly? Most likely not!



- After full event selection distributions have significant deviations
- **Possible reasons:** response function (not fitted nor smoothed histos), binning of response function, problems with rebalancing ...

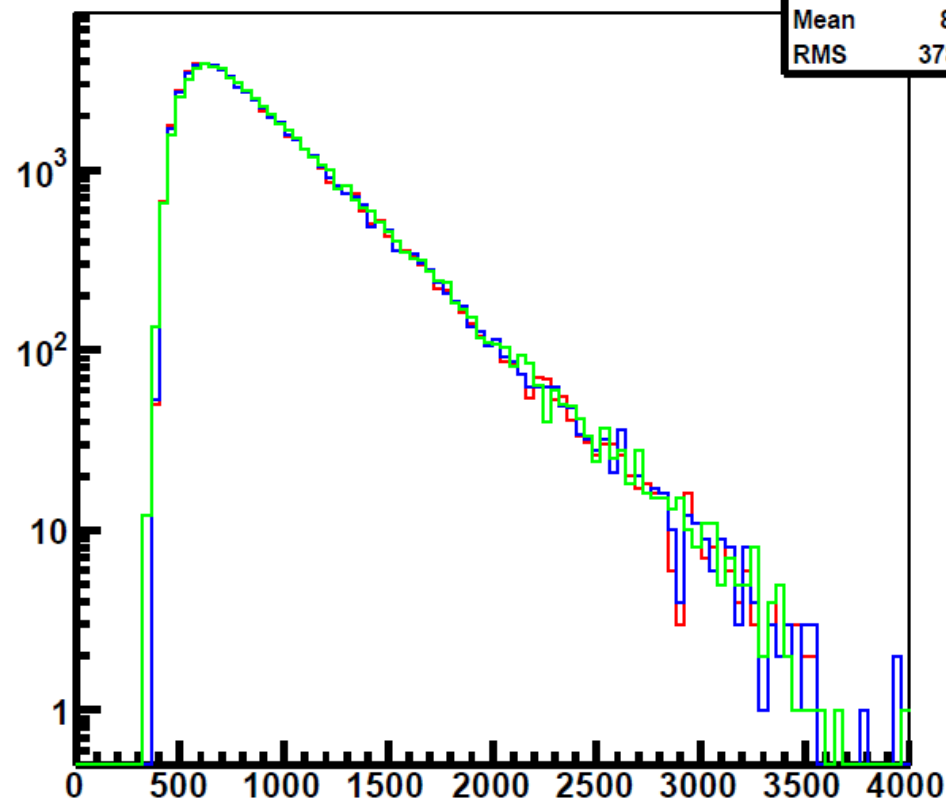
HTall_rec

All jets



HTall_rec	
Entries	56885
Mean	984.1
RMS	379.6

HThigh_rec

Jets $p_T > 20$ GeV

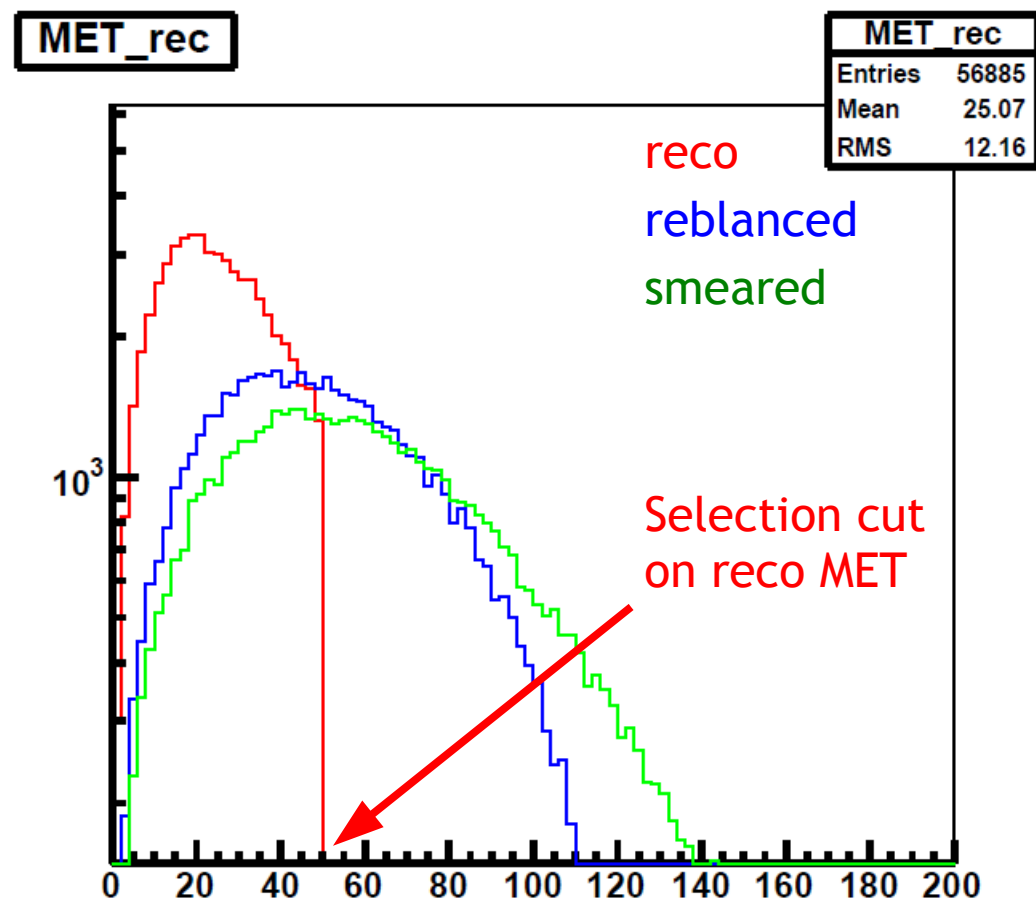
HThigh_rec	
Entries	56885
Mean	880
RMS	378.7

- HT distribution ok!

$\text{MET}_{\text{low}} = \text{corrMET} - \text{MHThigh}(p_T > 20\text{GeV})$

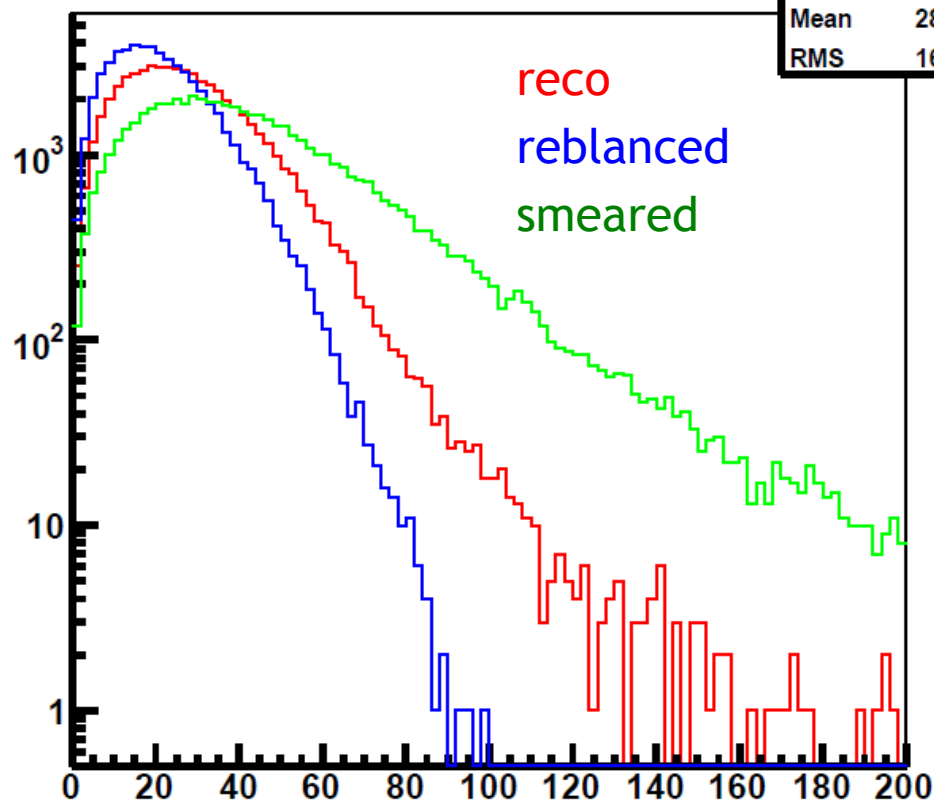
Rebalance MHThigh with KinFitter

$\text{MET}_{\text{reb}} = \text{MET}_{\text{low}}$

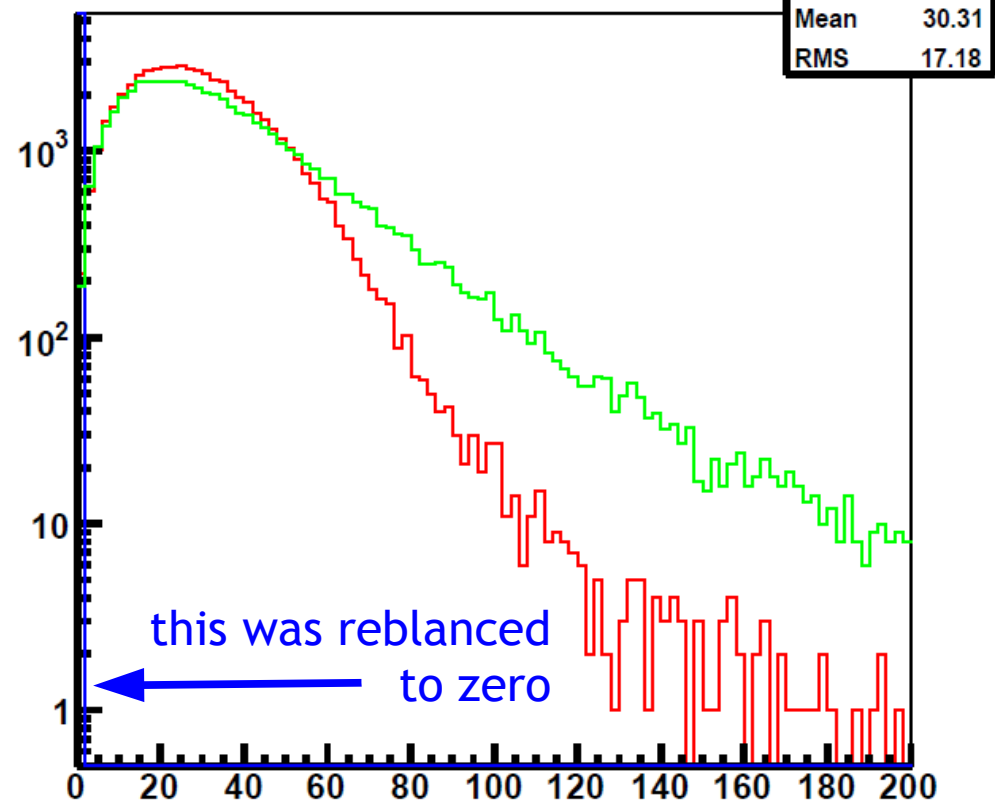


Problem: Why is MET_{reb} larger than before? Bug in my Code or are MHT and MET than much uncorrelated?

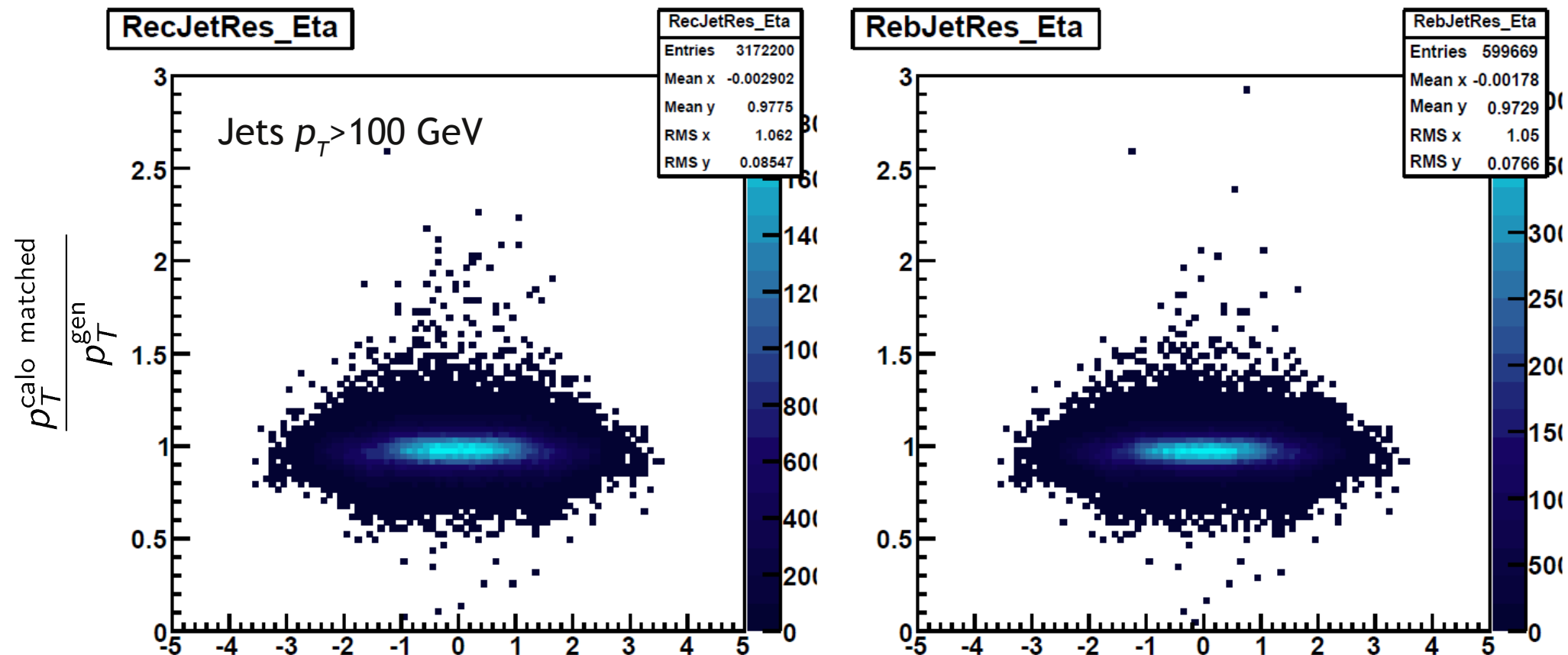
MHTall_rec



MHThigh_rec



- $MHTall_reb = MHTlow (pT < 20\text{GeV}) + 0 (=MHThigh_reb)$
- Rebalanced MHTall is smaller than MHTall_reco (as expected), but still rather large ?!



- Resolution of fitted high energetic jets improves by ~10%

- Fix weights
- Perform systematic study of rebalancing
- Derive high quality set of response function in different binnings from generator data for further tests
- ...