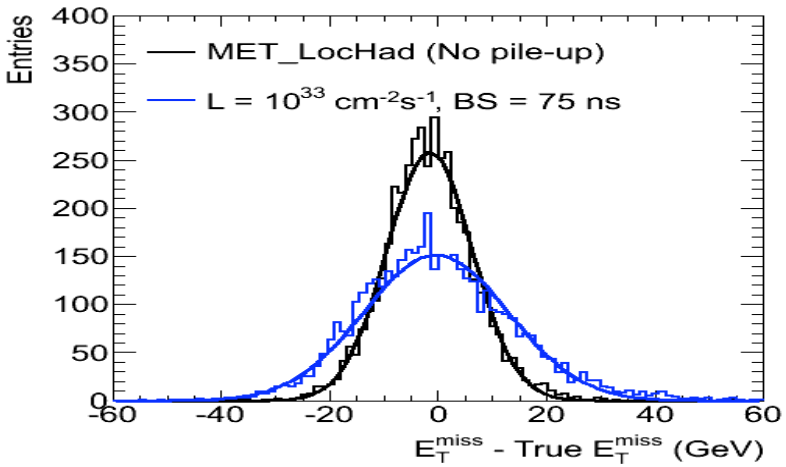
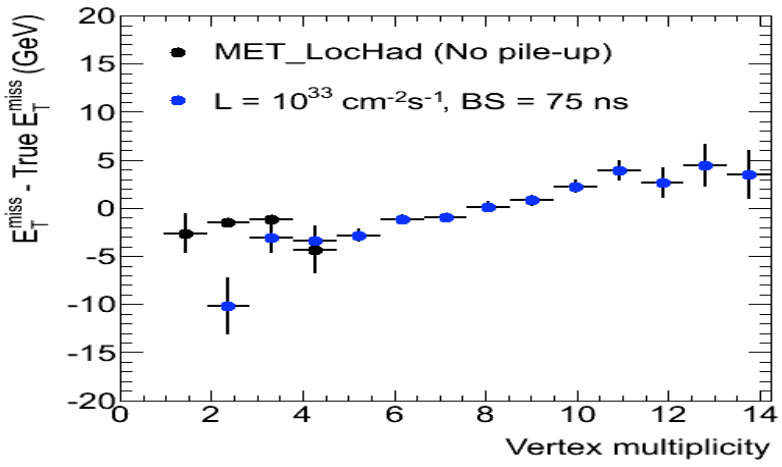
MET with pile-up





- Effect of pile-up on Missing Et
  - Twice as much energy in the calorimeter
  - Out-of-coverage effect grows as √Nevents

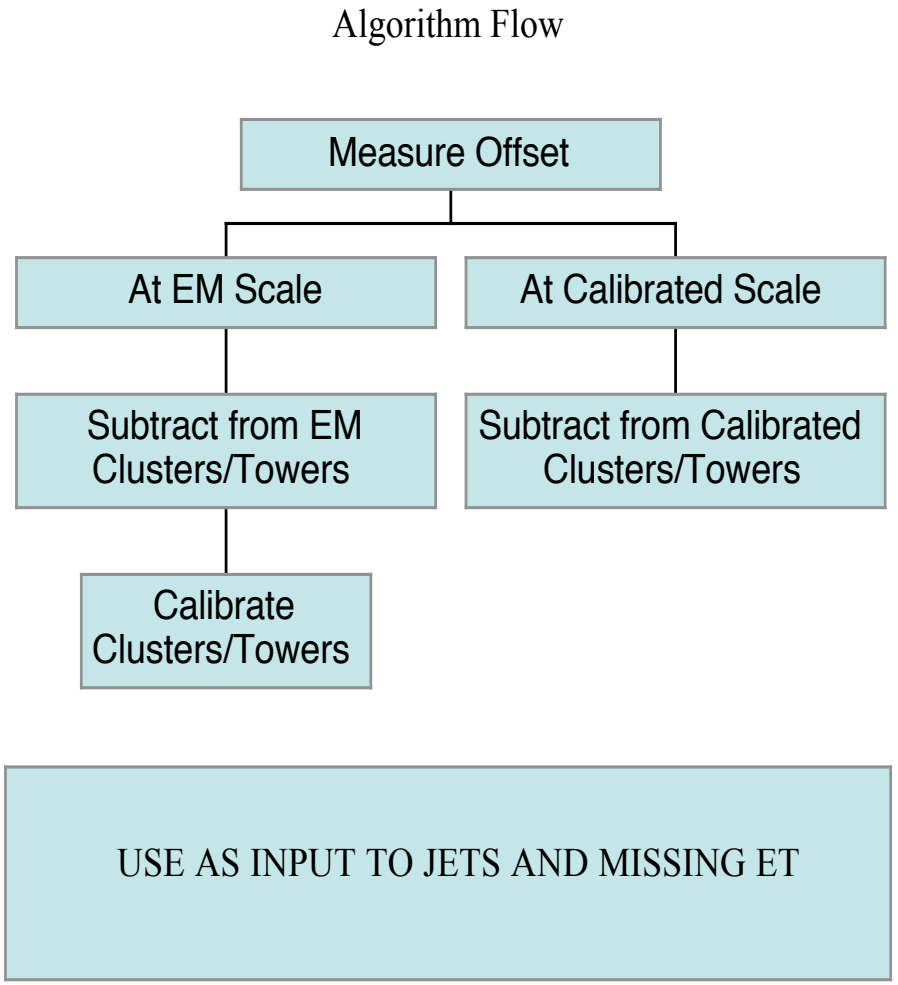
$$\sigma_{\text{no pile-up}} \sim \sigma_{\text{interacting}} \oplus \sigma_{\text{out-of-coverage}} \sim 7 \text{ GeV}$$

$$\sigma_{\text{pile-up}} \sim \sigma_{\text{interacting}}\sqrt{2} \oplus \sigma_{\text{out-of-coverage}}\sqrt{6.9} \sim 13 \text{ GeV}$$

- Bias increases with vertex multiplicity
- Leptonic-filtered Z→ττ (#105188) with True MET > 20 GeV

Offset subtraction

- Measure offset
  - As function of Eta, N_{VTX}, L
  - From soft part in the same event
  - From minimum bias
- Subtract offset from all clusters/towers
  - Remove energies that fall below zero!
- Recompute MET



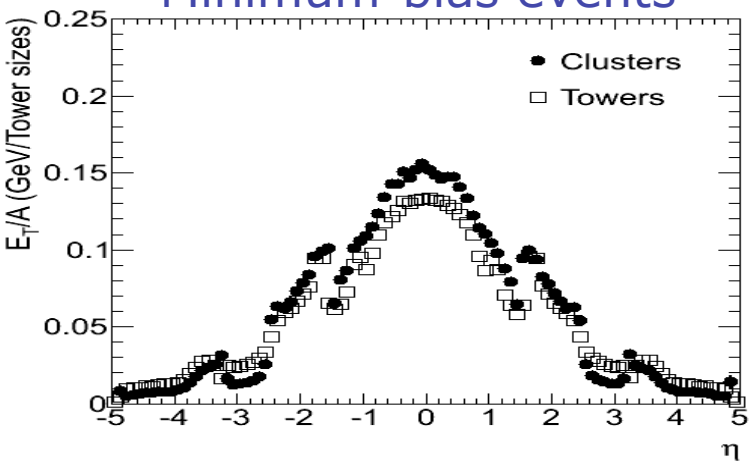
Tower-based subtraction

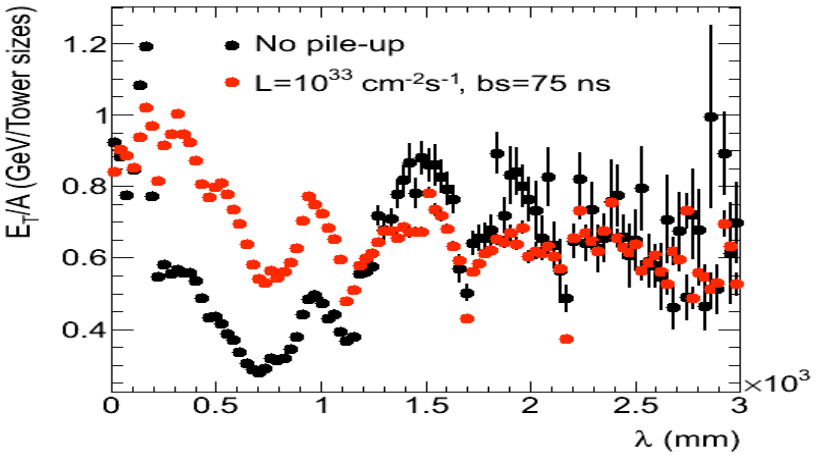
- Use TopoTowers:
  - Fixed area
  - Noise suppressed
- Implementation in MissingET package is ready
- Possible only from ESD!
  - After so much effort to have MET from AOD…
- Implemented also a general tower based MET calculation
  - To converge with possible jet calibration schemes

Cluster-based subtraction

- Use TopoClusters:
  - AOD-based
  - Need a reasonable area definition
  - Need to deal with overlapping clusters
- Cluster radius = $\sqrt{<r^2>}$
  - Energy-weighted RMS of distance from the centre
  - Derive ΔEta and ΔPhi
  - Compare to tower energy density
- Parametrize also as function of cluster depth (Lambda)

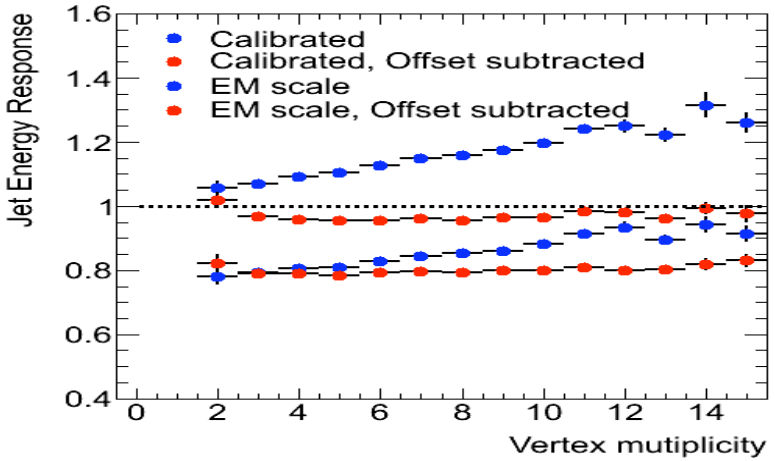
Minimum-bias events

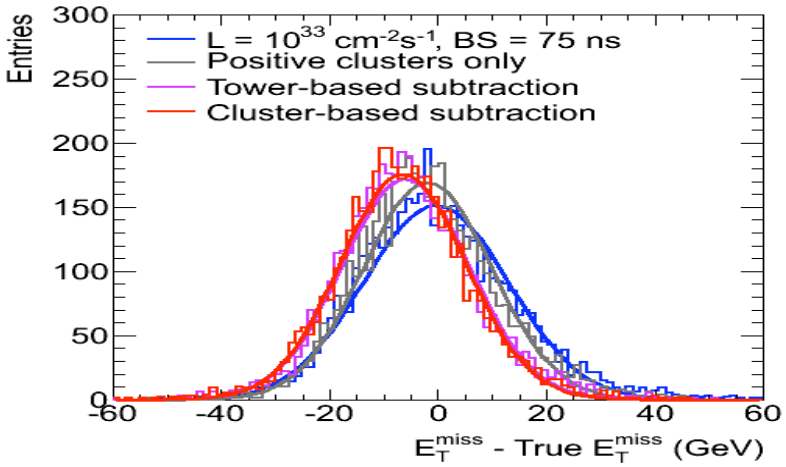


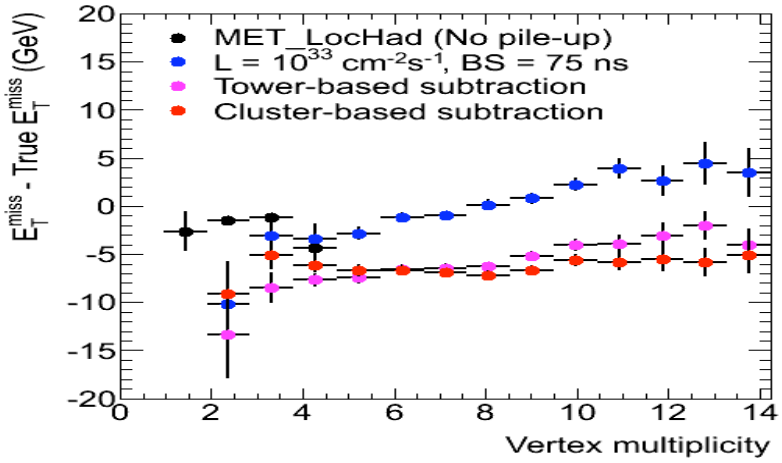


Summary of the results

- ~1 GeV resolution improv.
  - (Mostly due to negative energy suppression)
- Flat jet and MET response as function of N_{VTX}
- Negative bias
  - Recoverable after jet scale calibration?

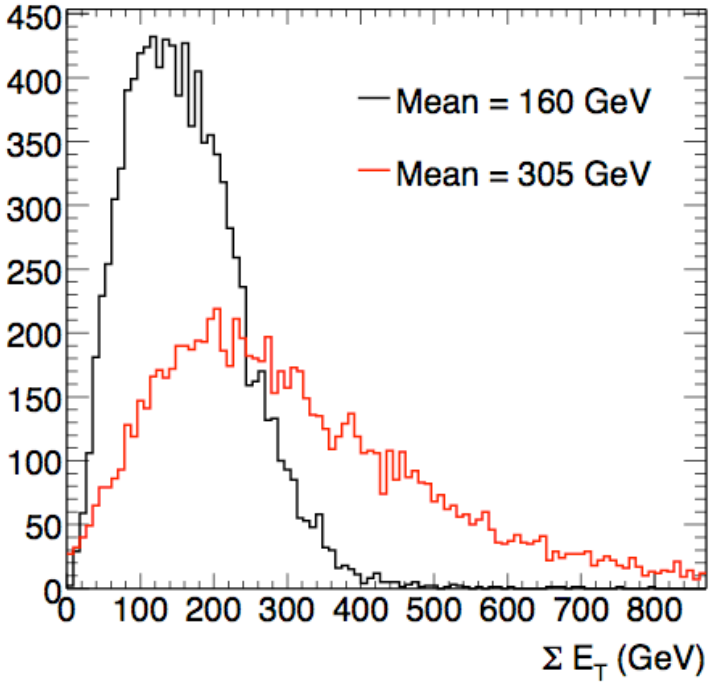


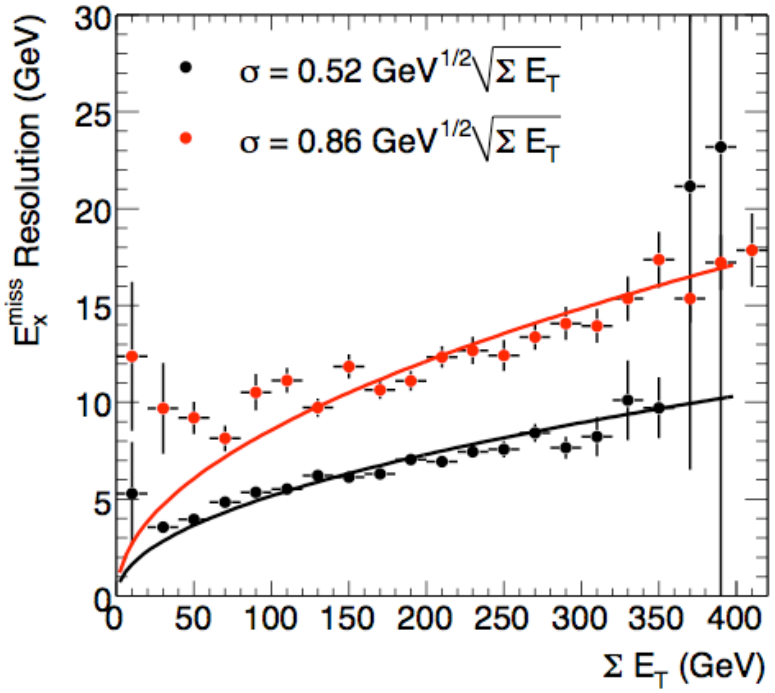




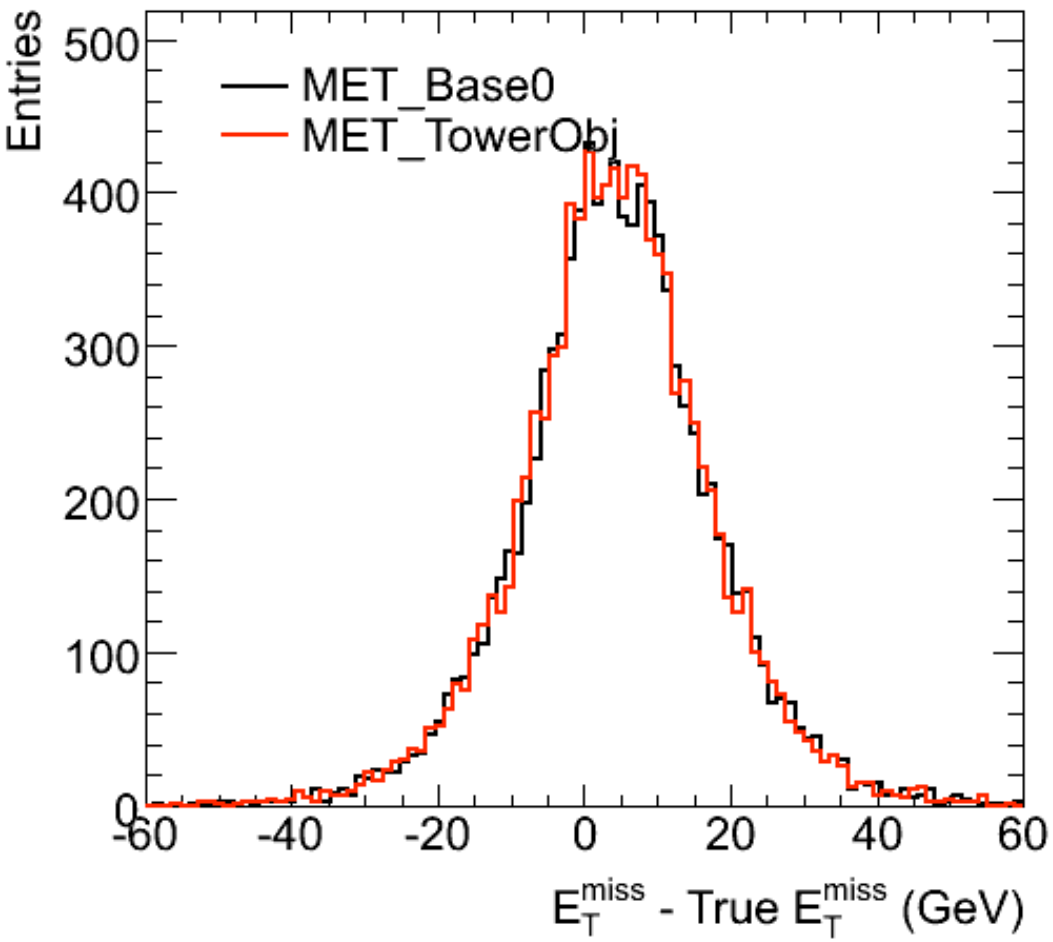
Back-up material

MET with pile-up





MET from CmbTowers



CellOut after subtraction