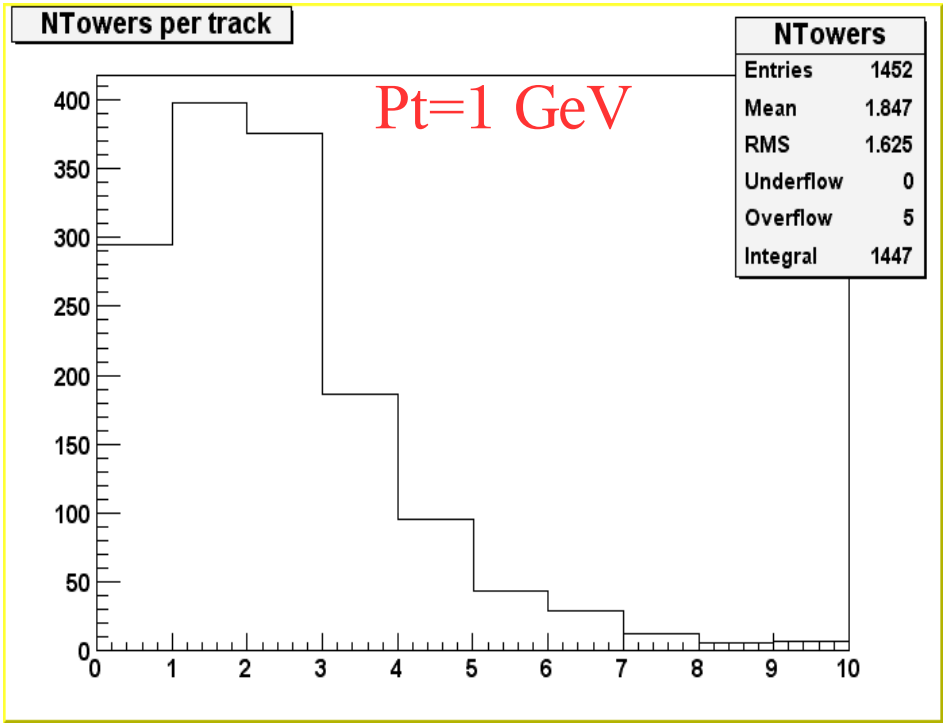
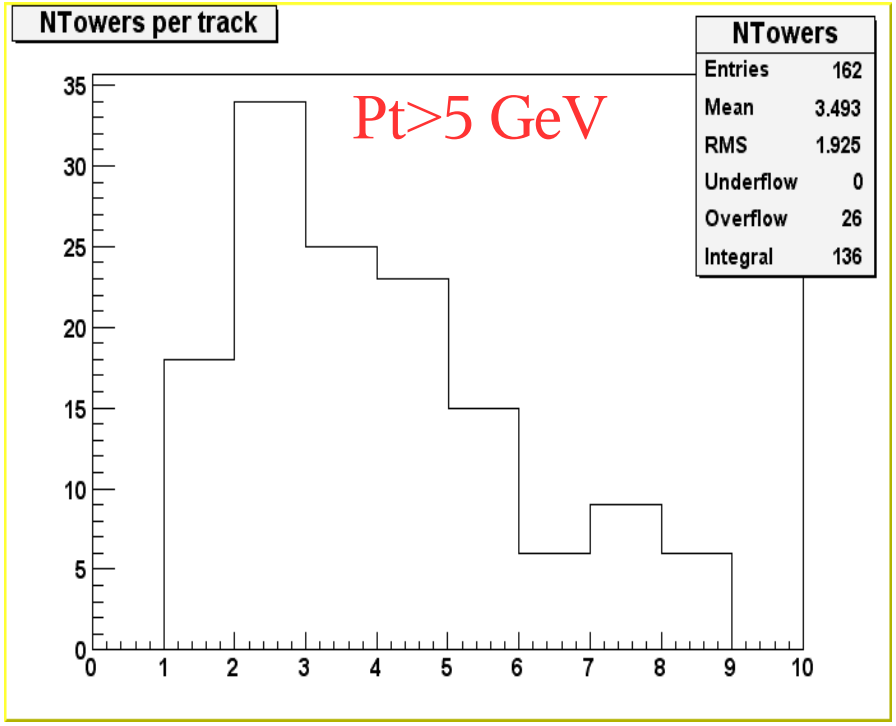
Improved version of H1 Algorithm

A. Mehta
Liverpool University

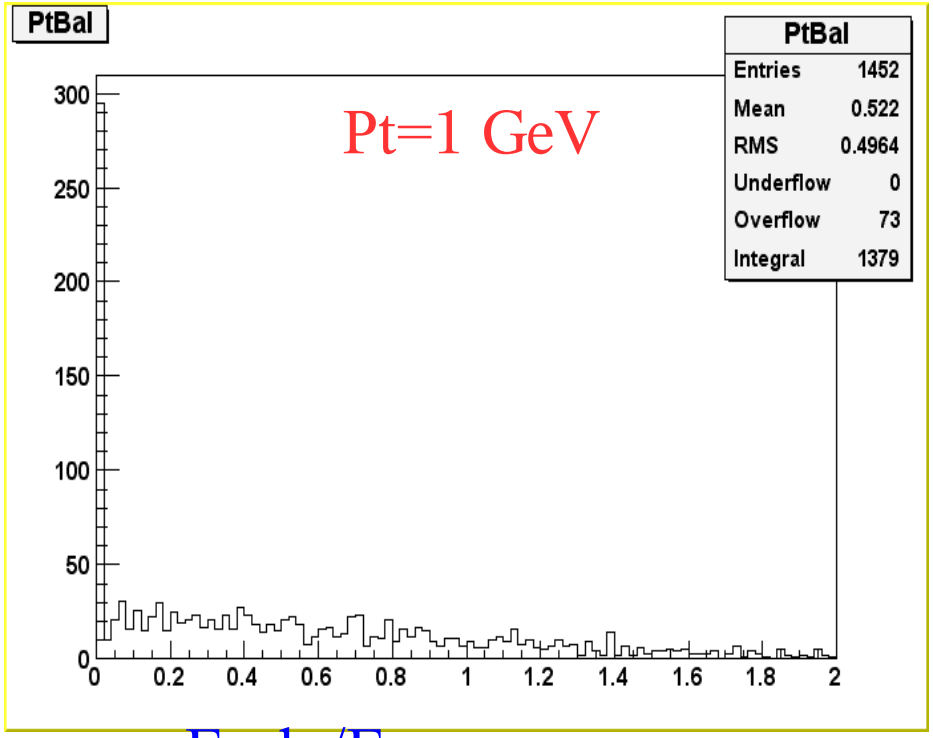
Studies with Single $\pi^{\pm}$ MC



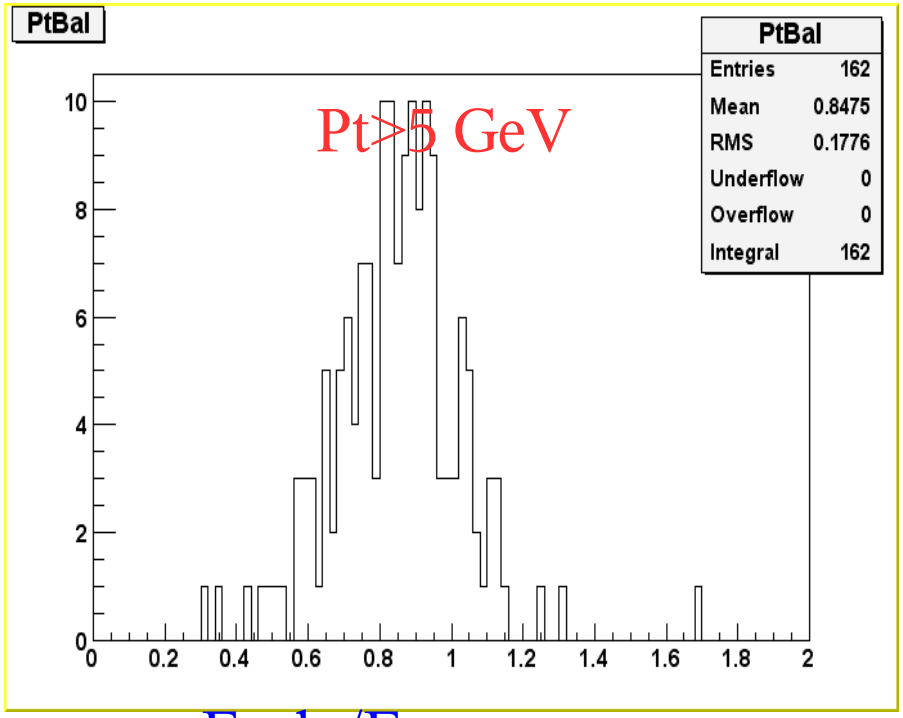


Almost 2 towers per track hit on average. We must take additional towers into account

Studies with Single $\pi^{\pm}$ MC



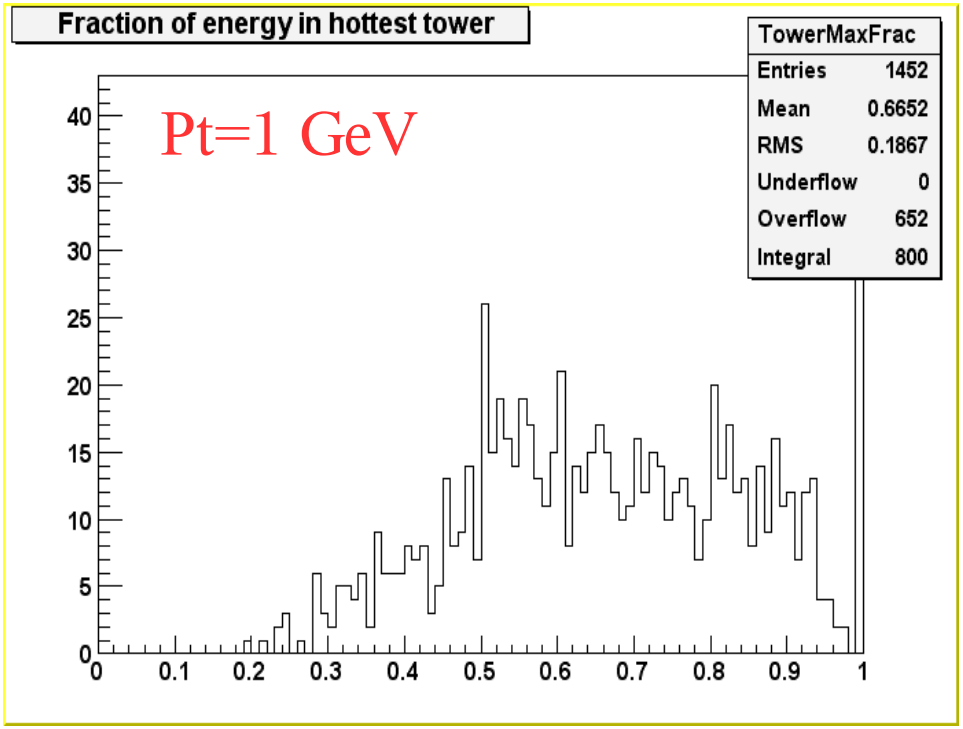
Ecalo/Egen

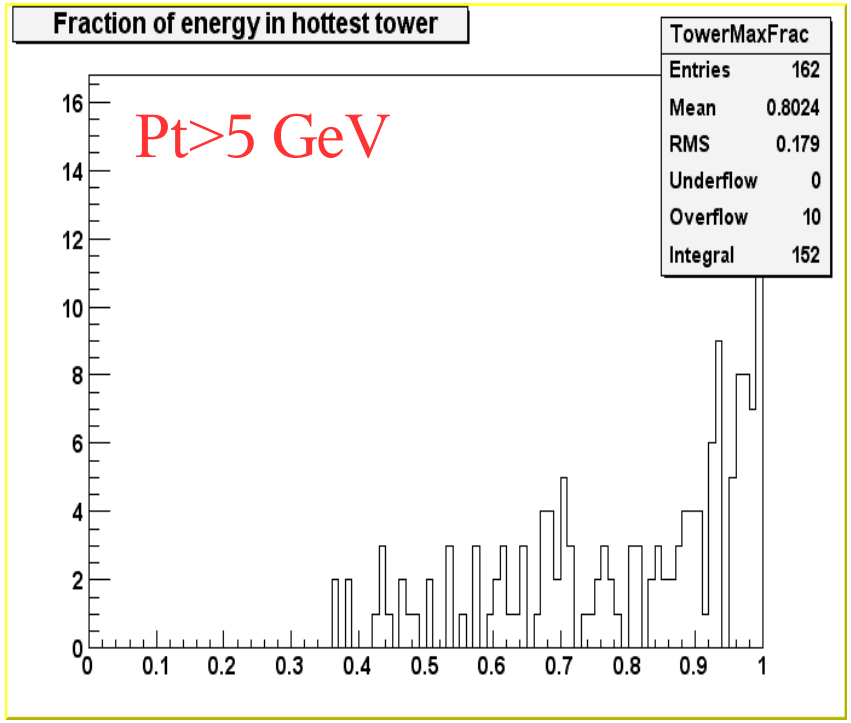


Ecalo/Egen

Lousy energy reconstruction at low Pt. Good at high

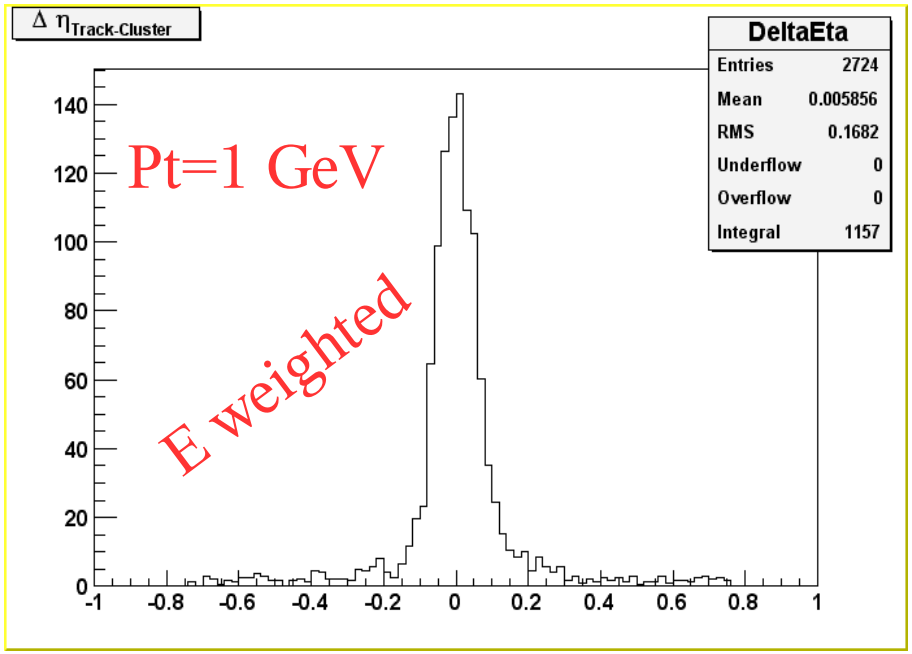
Studies with Single $\pi^{\pm}$ MC

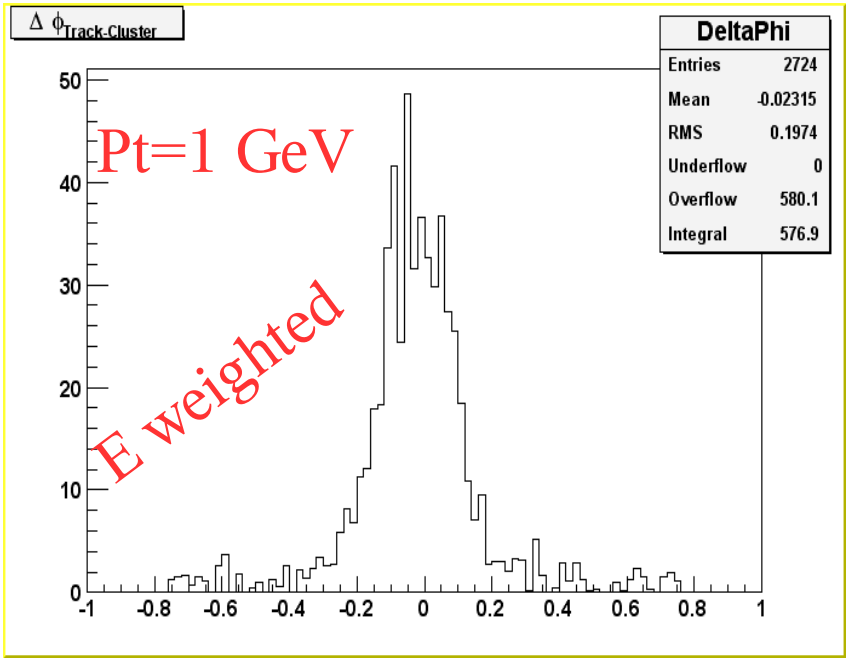




Most energy contained in hottest tower but substantial ammount outside

Studies with Single $\pi^{\pm}$ MC



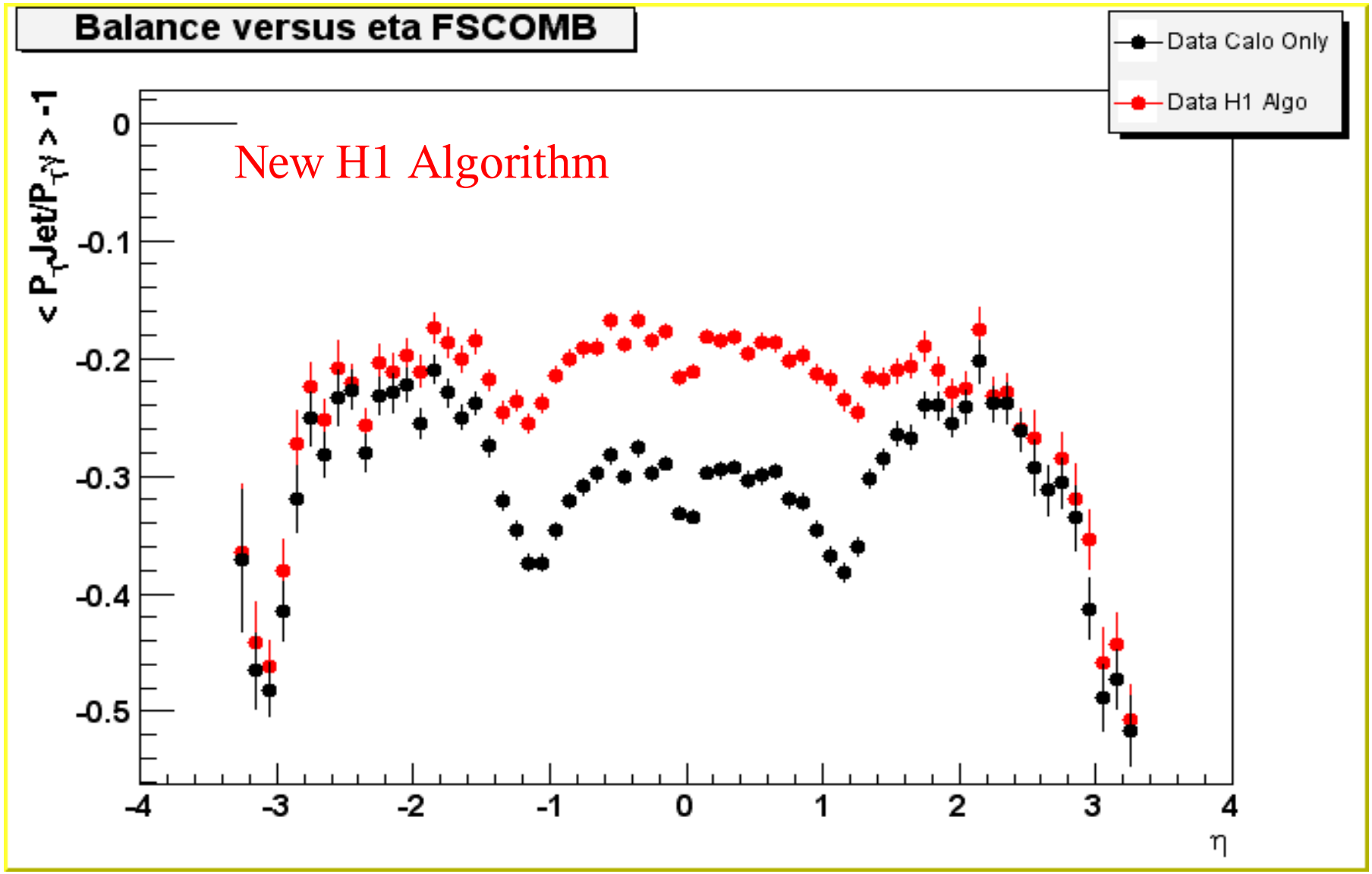


Energy is, however, contained within a rather narrow cone

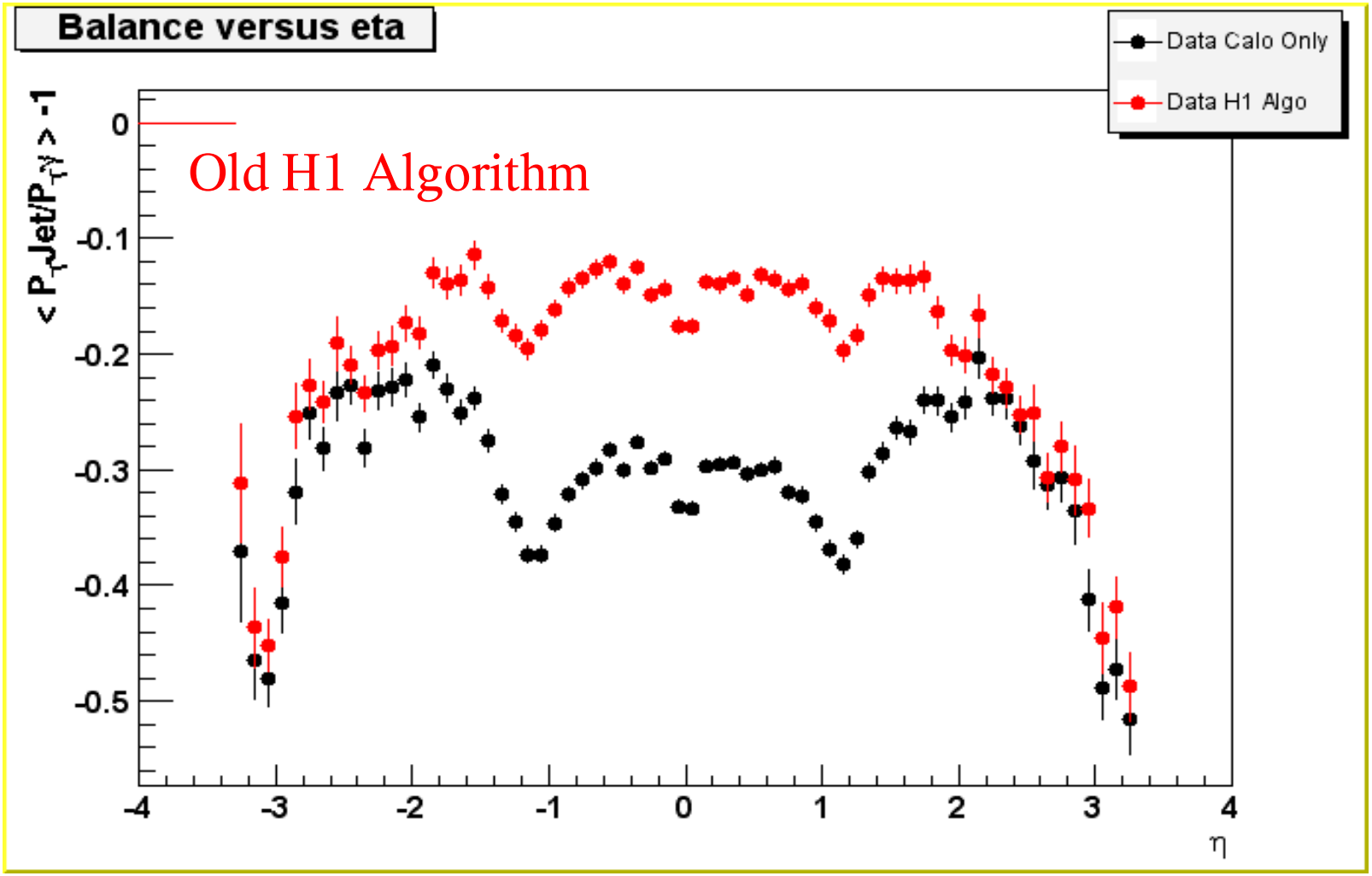
Improved H1 Algorithm

- Keep all good quality tracks
- Extrapolate tracks to calo
- Search for energy in a box ($\Delta\eta \pm 0.1$, $\Delta\phi \pm 0.2$) about track or nearest tower
- Sort towers within box wrt $\eta\phi$ distance to track
- Loop over towers :
  - Kill successive towers so that $\sum$Ekilled<=Etrack
  - If $\sum$Ecalo>Etrack rescale last tower so that $\sum$Ekilled=Etrack

- Now takes into account energy in other towers
- With perfect calo there is no double counting
- Energy of jets with high particle density will tend towards calo energy

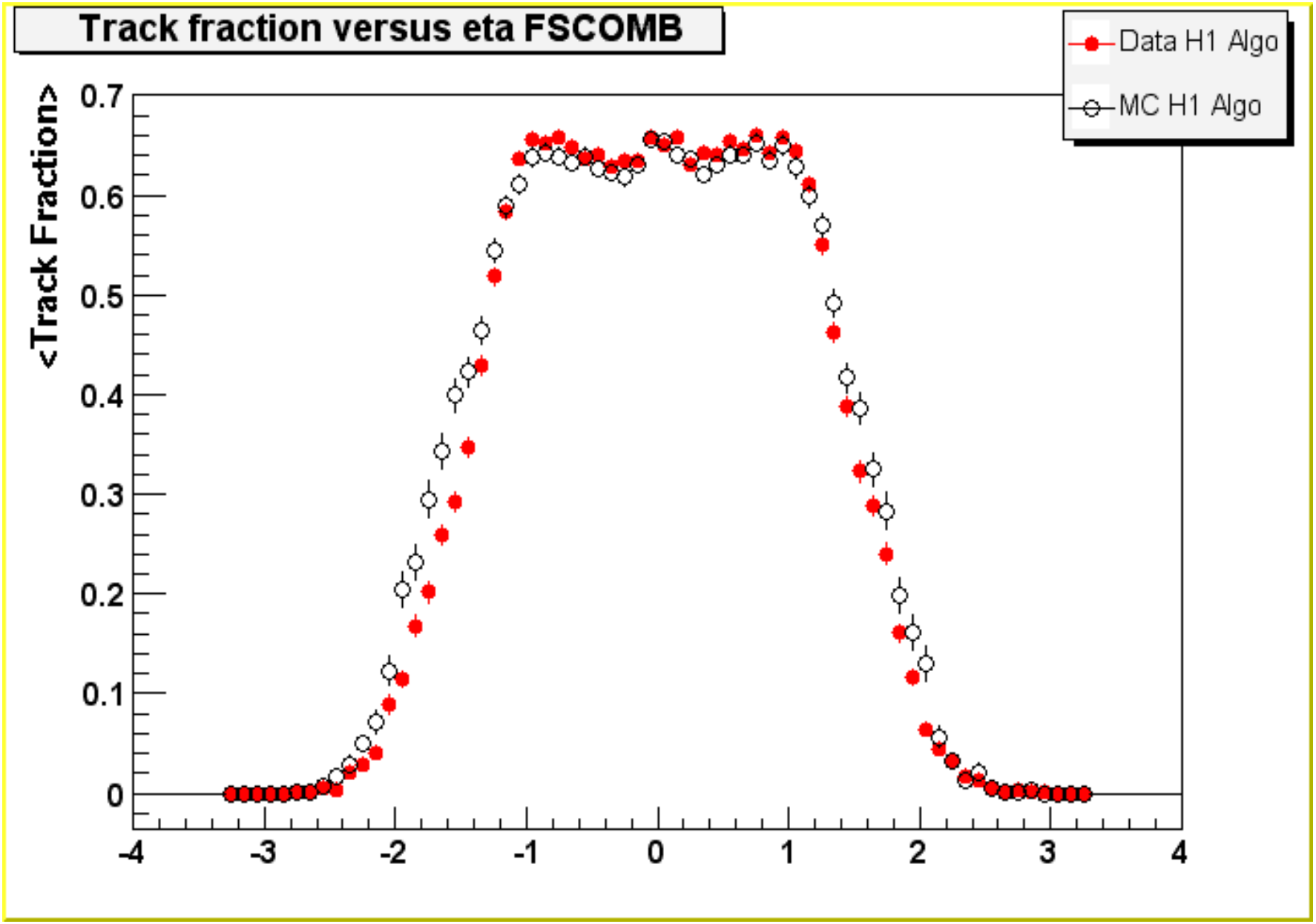


Without double counting jet energy scale improves by 10%

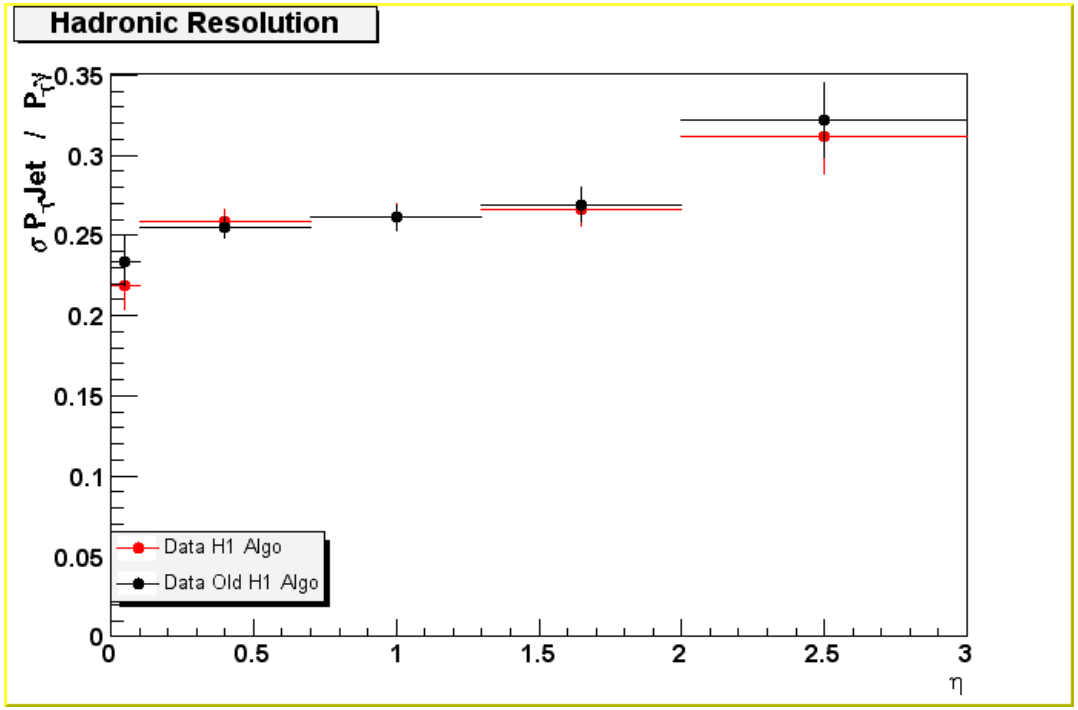


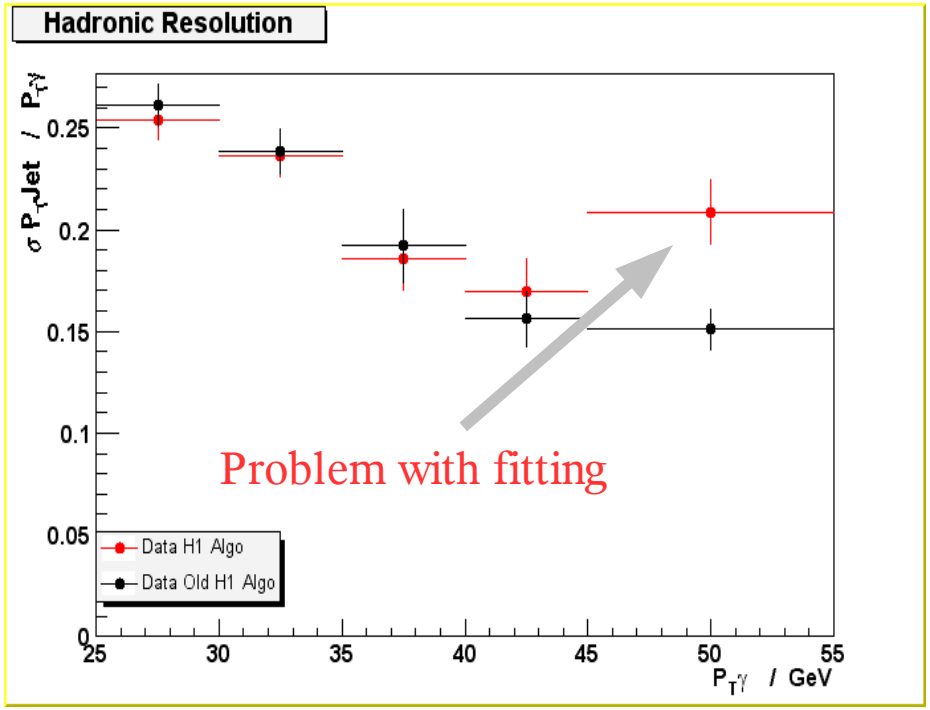
Old H1 algorithm jet energy scale improves by 15%

Fraction of jet energy carried by tracks



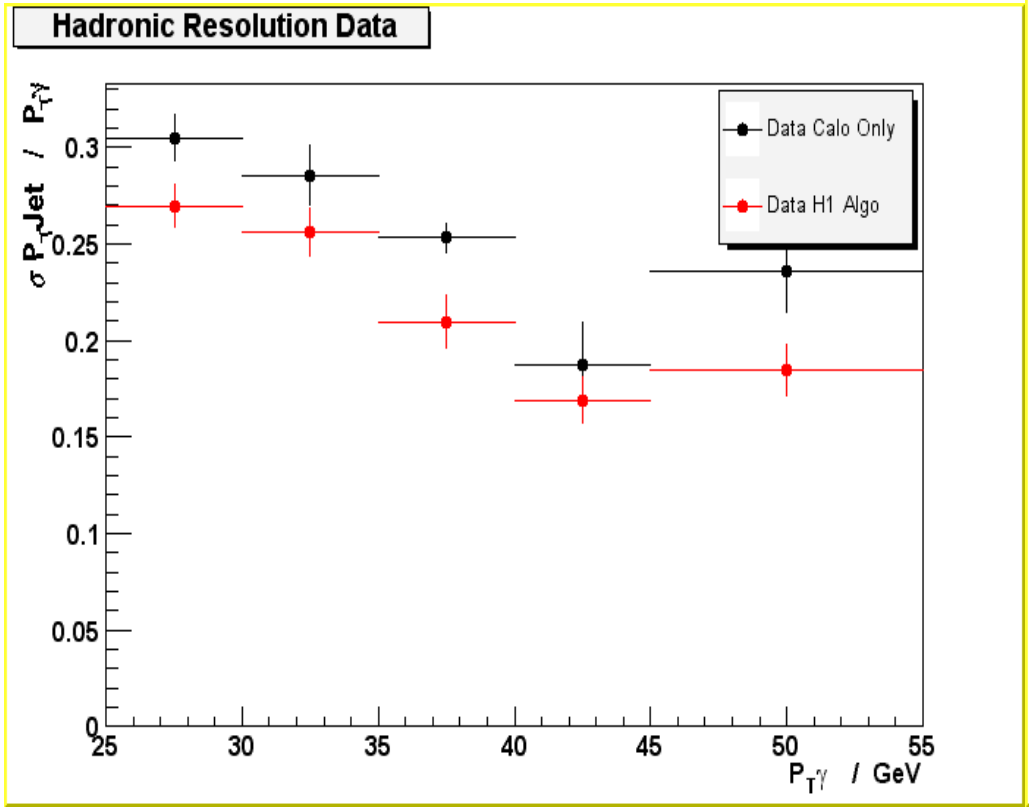
Good description by MC but not at 50% ⇒some π^0 s still lost?

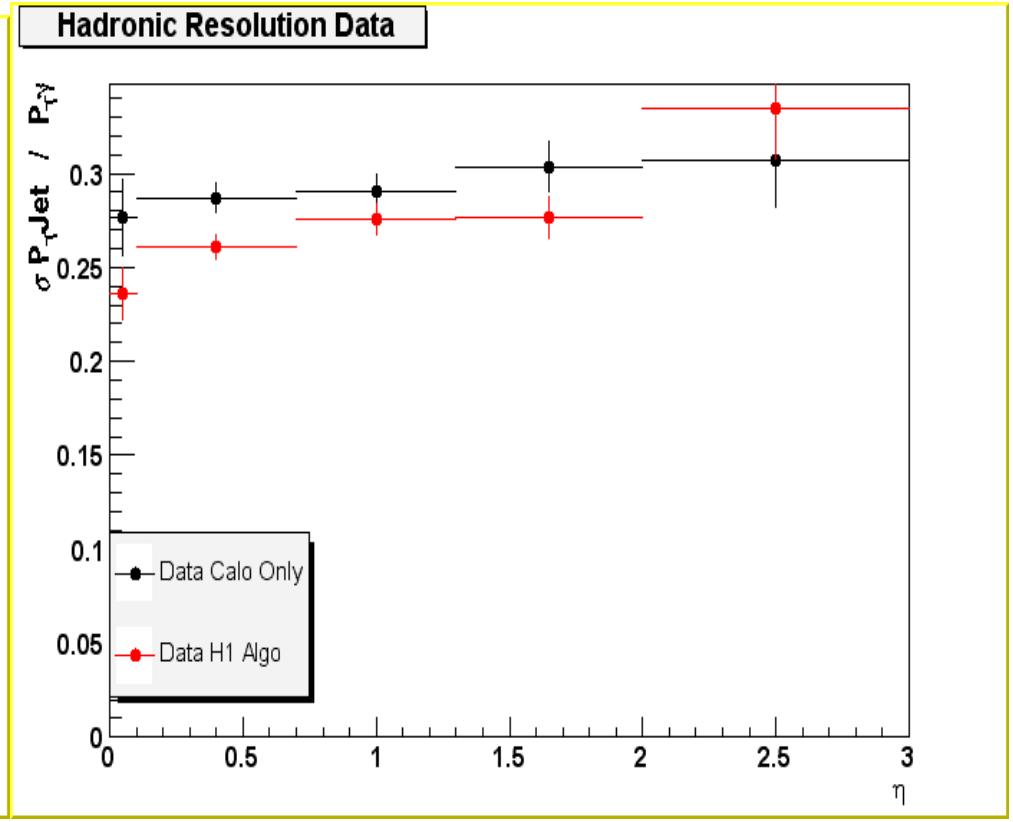




Resolution of new H1 algorithm compared to old not improved (but not made worse either!)

Comparison to calo only (no jet corrections applied)





Summary

- Single pion studies show energy is generally not contained in a single tower
- Energy mainly contained in a box of $\Delta\eta = 0.1$, $\Delta\phi = 0.2$
- H1 algorithm adjusted so there is no explicit double counting
- No improvement is resolution, but not worse either
- Code available as an Stntuple module
- Probably needs to be rewritten as a reconstruction module