Gamma jet balancing

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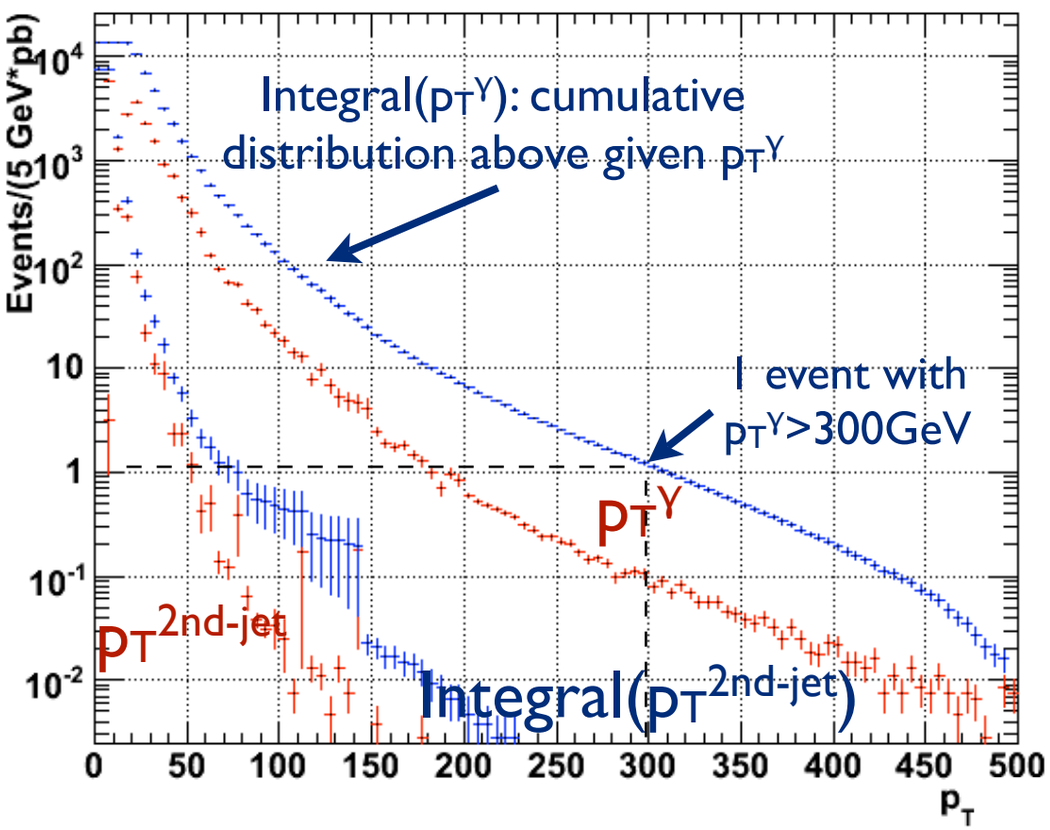
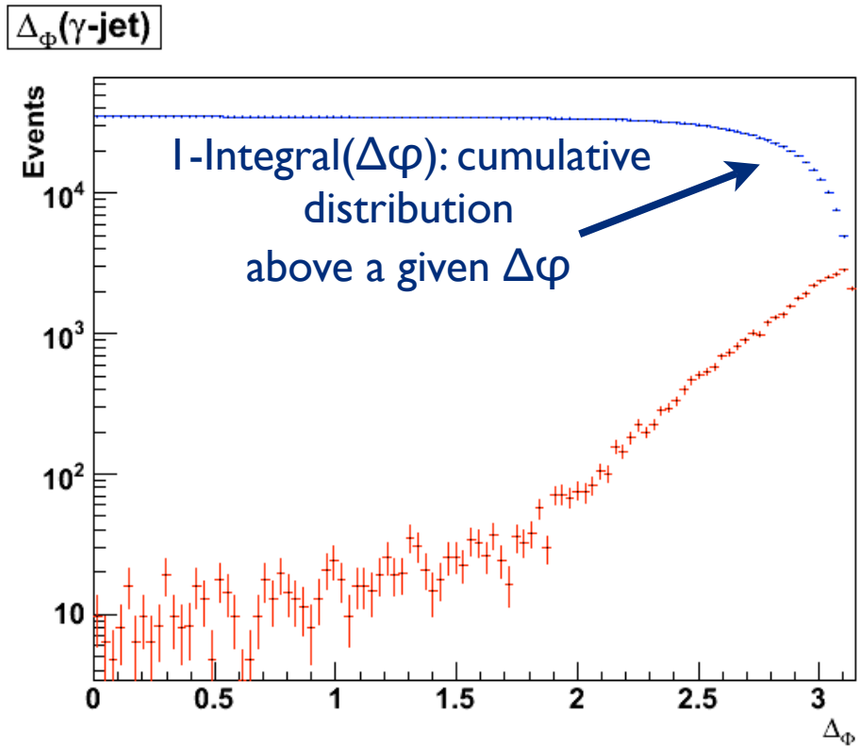
Outline

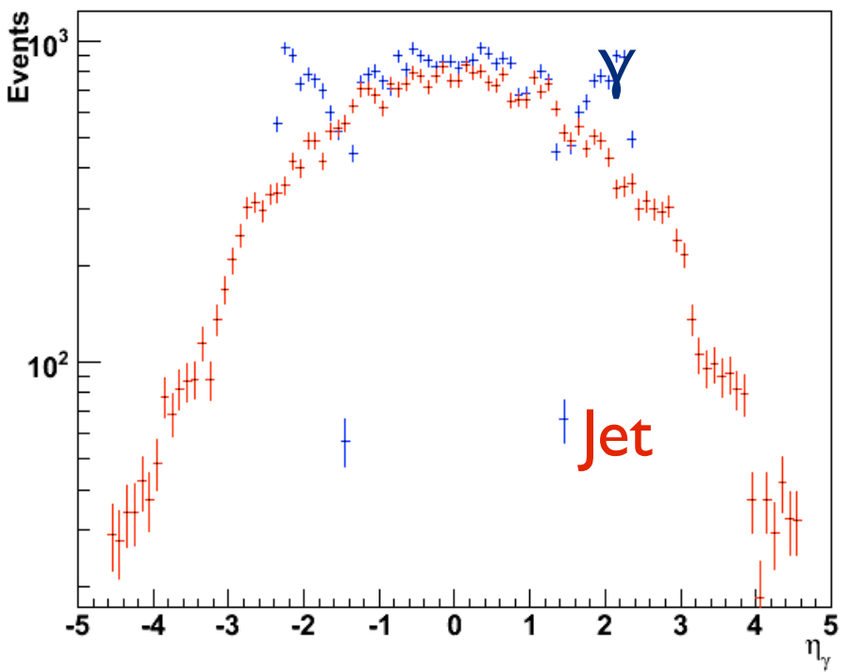
- characterization of the event sample
- balancing procedure
- Energy flow
- DPD skimming

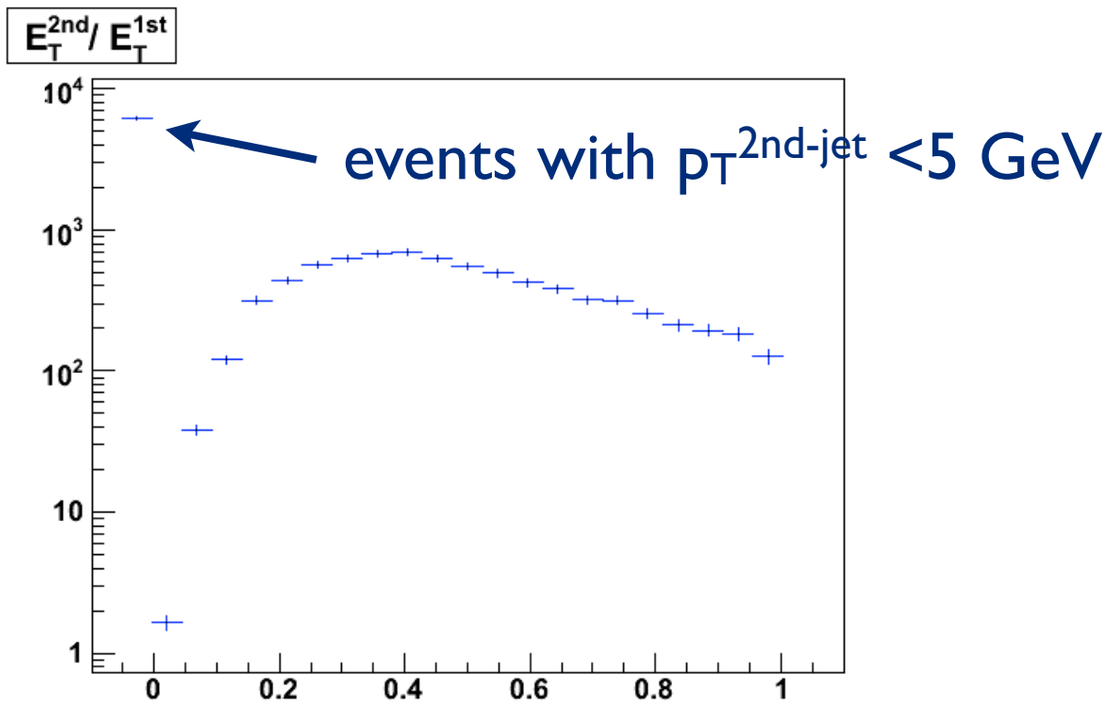
Event Sample

- `group08.PerfJets.mc08.10800x.PythiaPhotonJetX.recon.DPD_NOSKIM.e344_s456_r545_DPDMaker000157_p1 (X=1,4)`





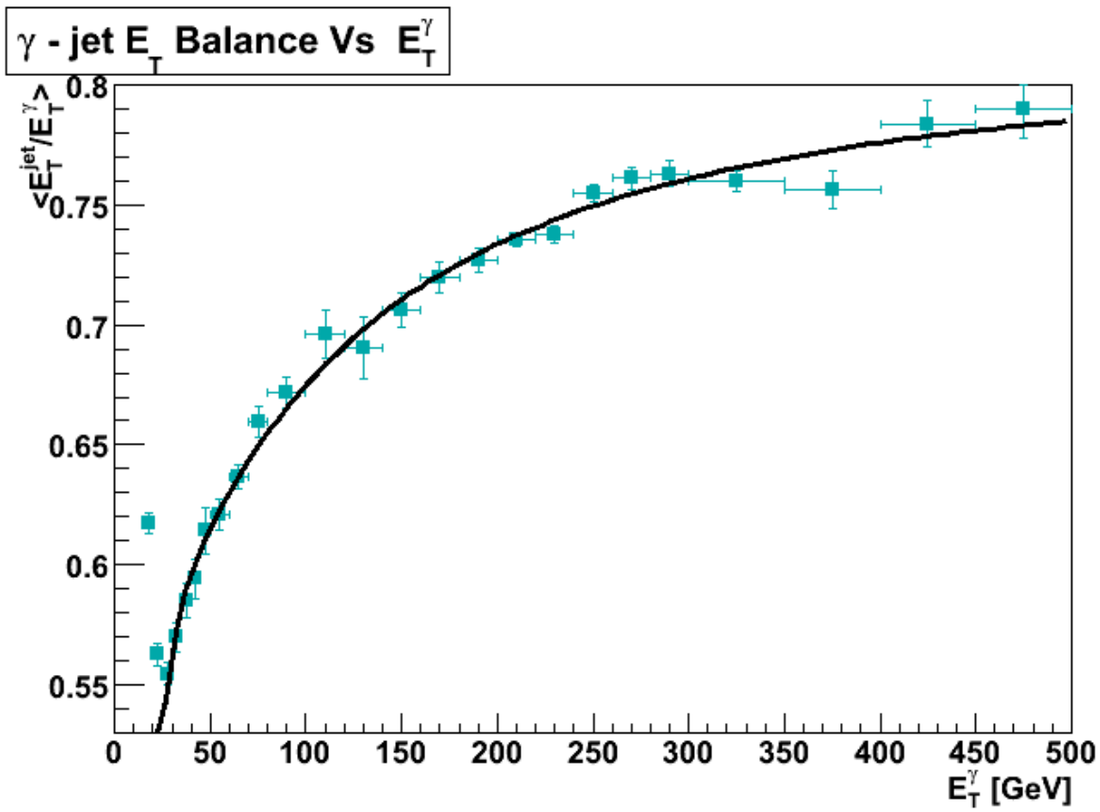


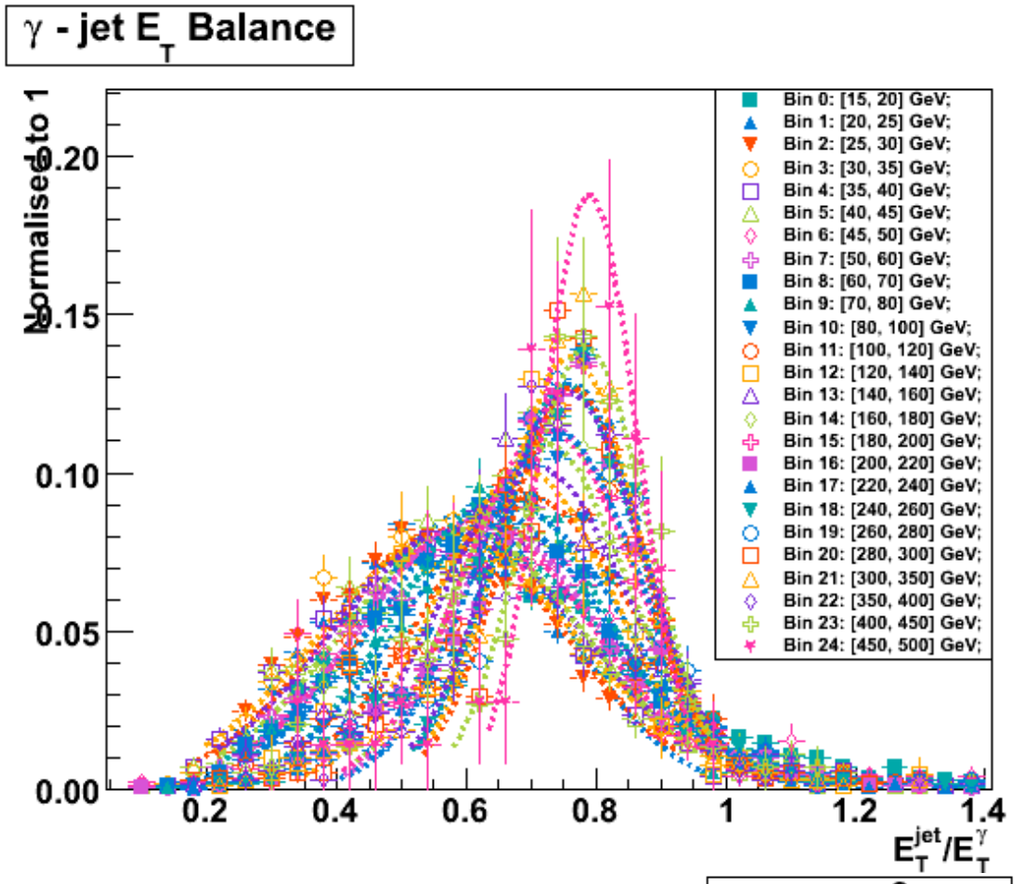


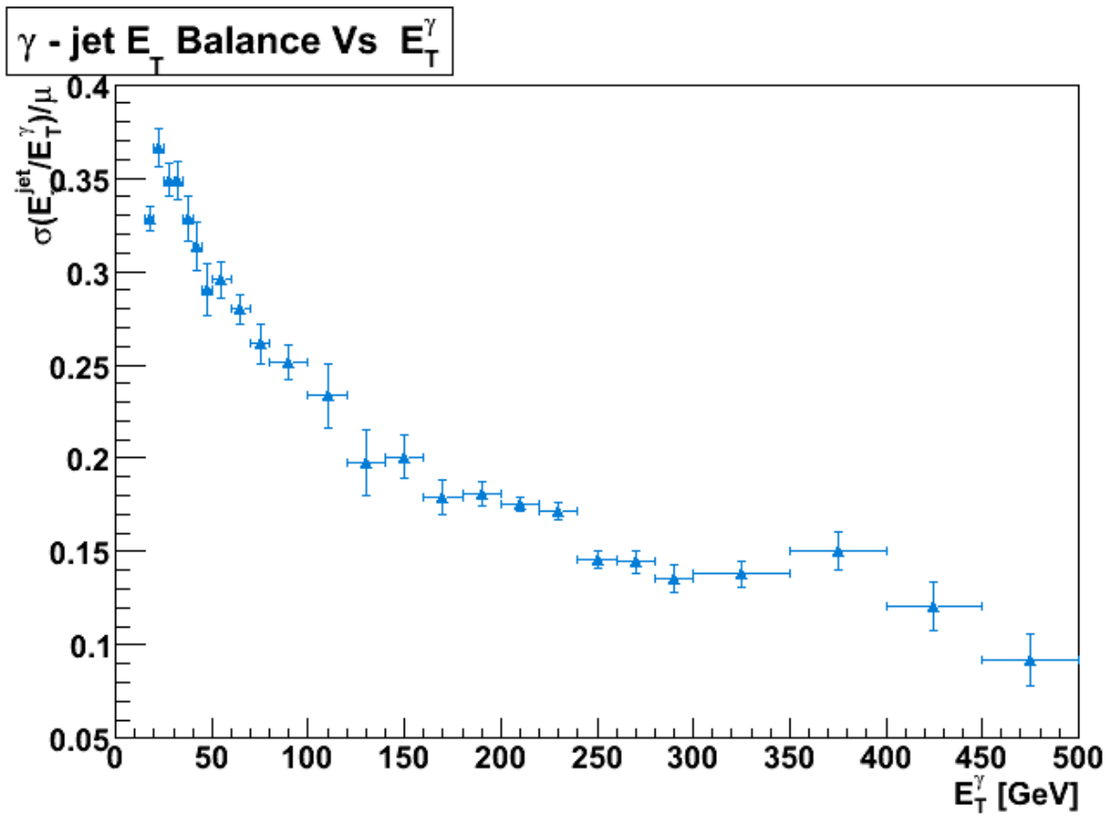
Balancing procedure

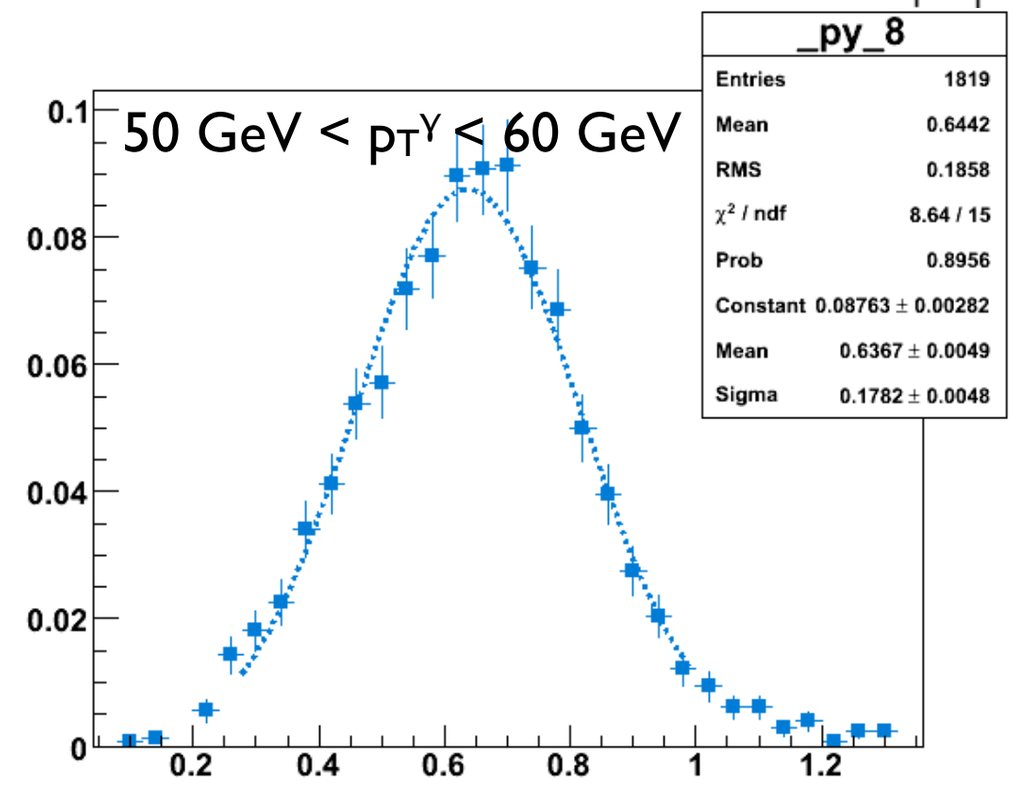
- AntiKt6; TopoCluster; EM scale
- $E_T(\gamma)$ >20GeV; $|\eta_{jet/\gamma}|$ <2.5; $\Delta\varphi_{jet\text{-}\gamma}$> 2.9
- $E_T^{Corr} = Corr(E_T^{Meas}) * E_T^{Meas}$
- $Corr(E_T) = \sum_{i=0,4} P_i/[Log(E_T)]^i$; with P_i fitted to $B(E_T)$
- $B(E_T^{\gamma}) = \langle E_T^{jet}/E_T^{\gamma}\rangle(E_T^{\gamma}) \Rightarrow B(E_T^{jet}) = B(E_T^{\gamma} * Corr(E_T^{\gamma}))$; (where "(x)" means function of x)
- $\langle x\rangle$ corresponds to the mean μ of gaussian fit of x in the region $\mu \mp 2\sigma$ => it is important that it does not have big tails

EM Scale balance

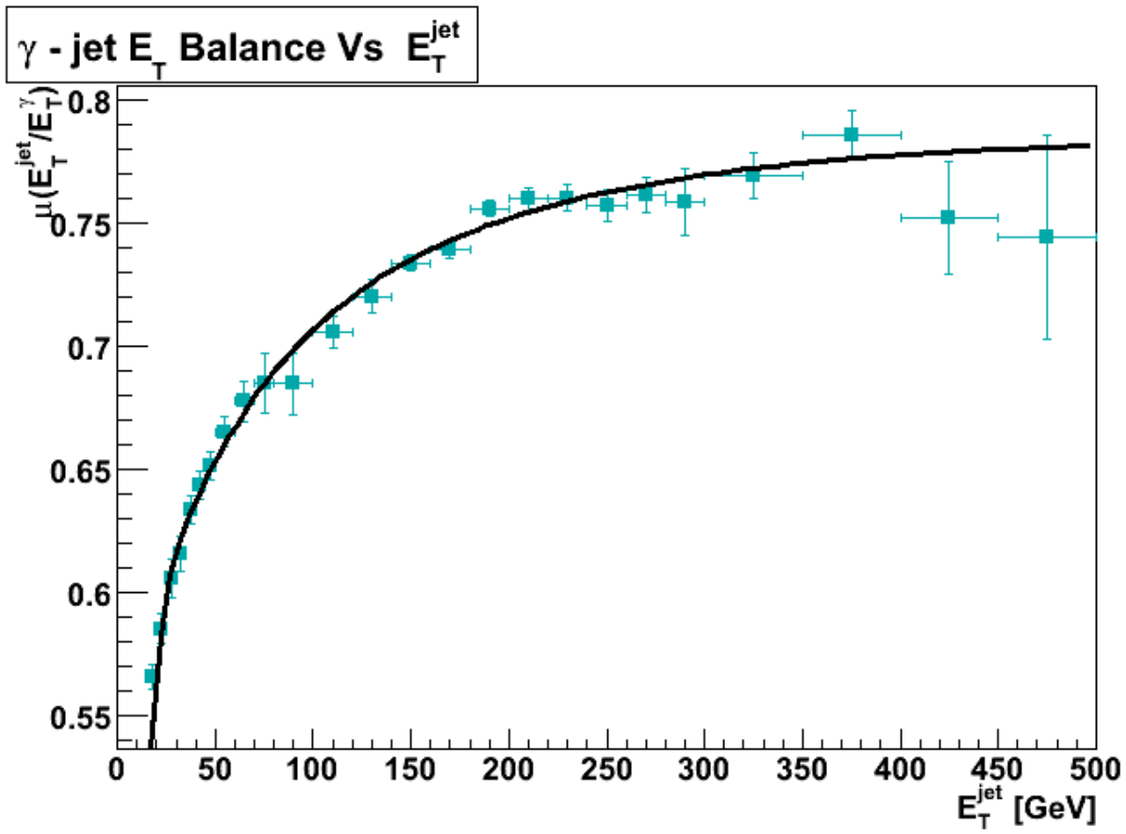


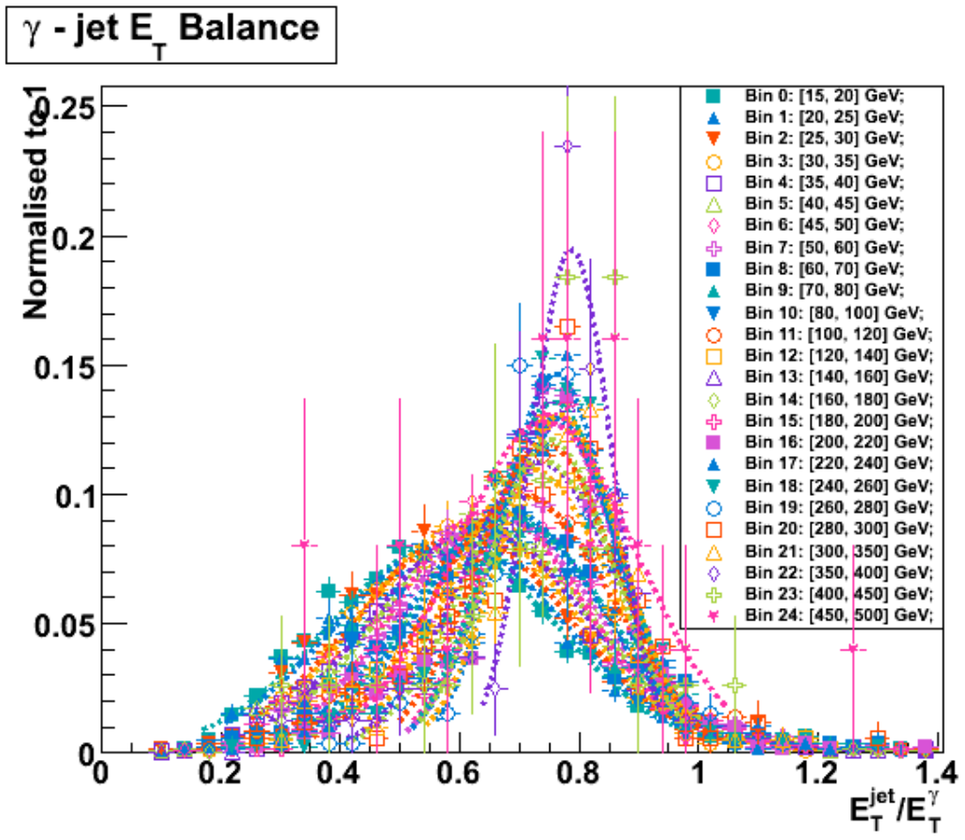


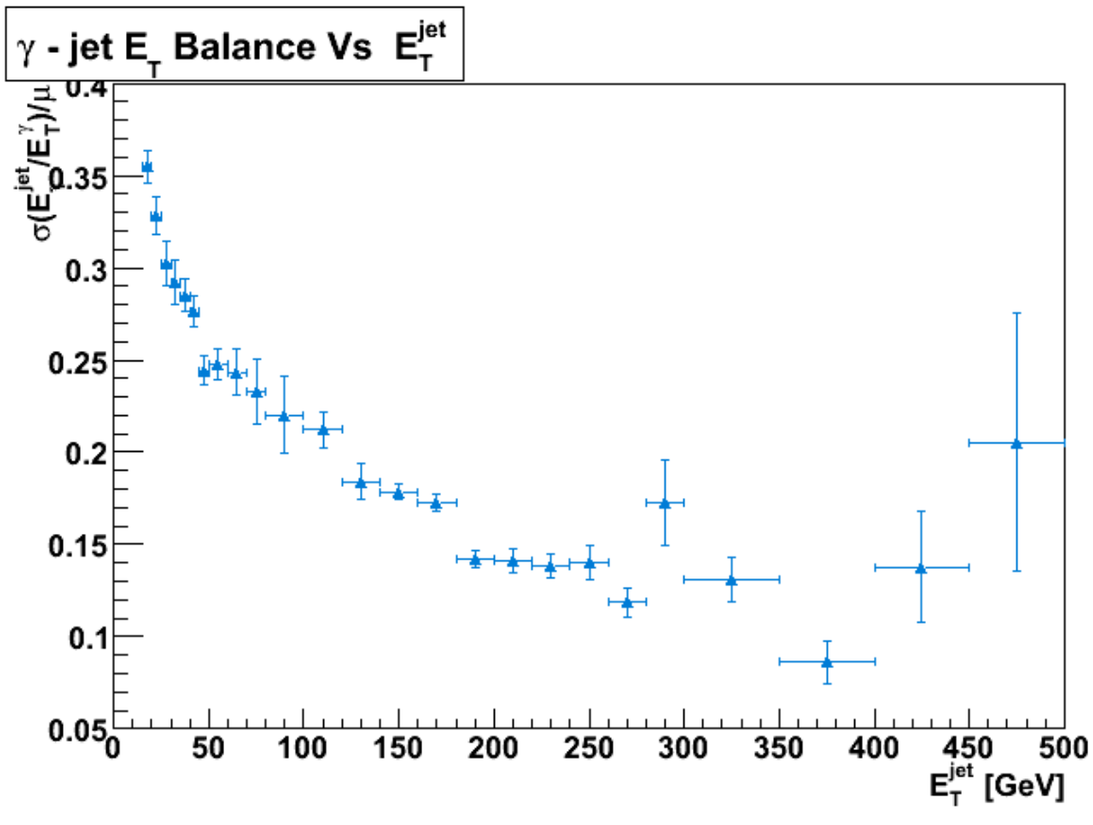


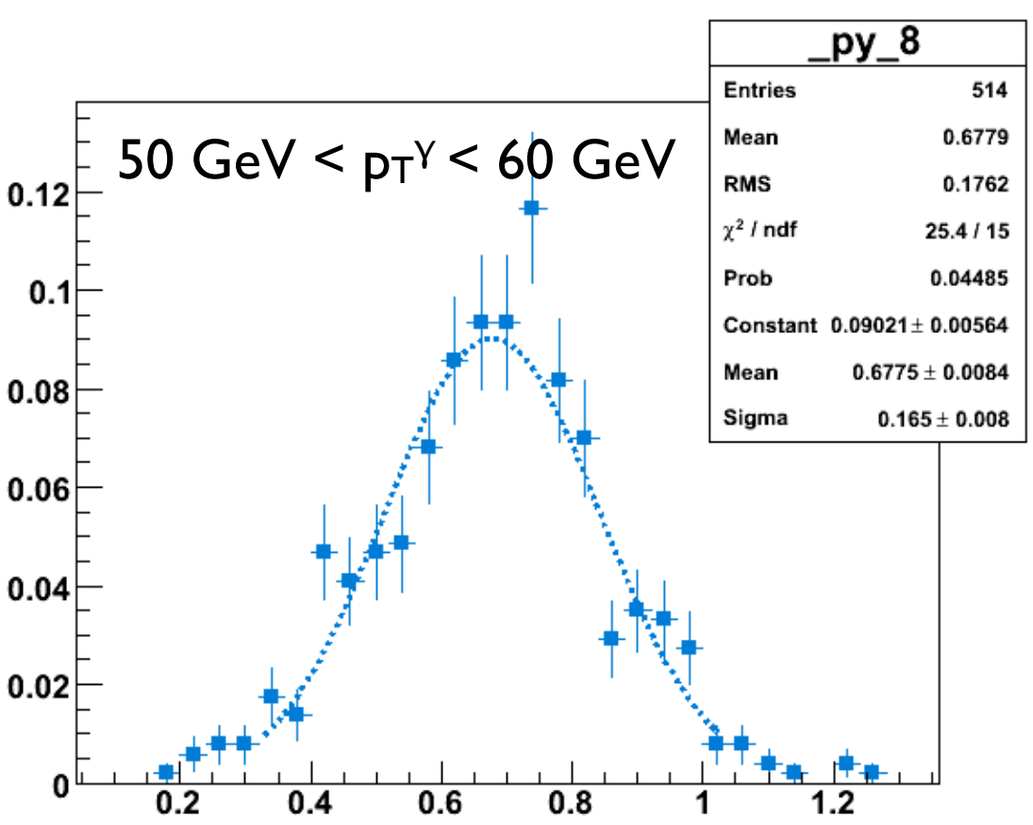


Numerical inversion

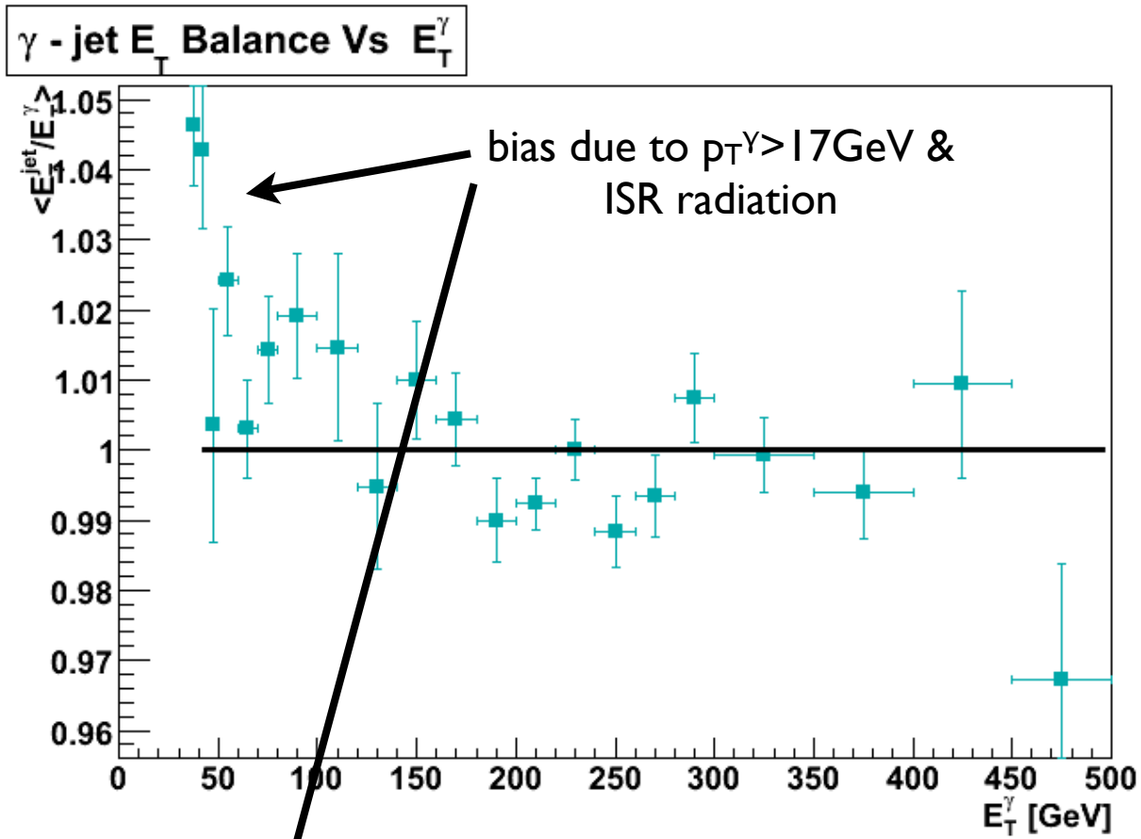


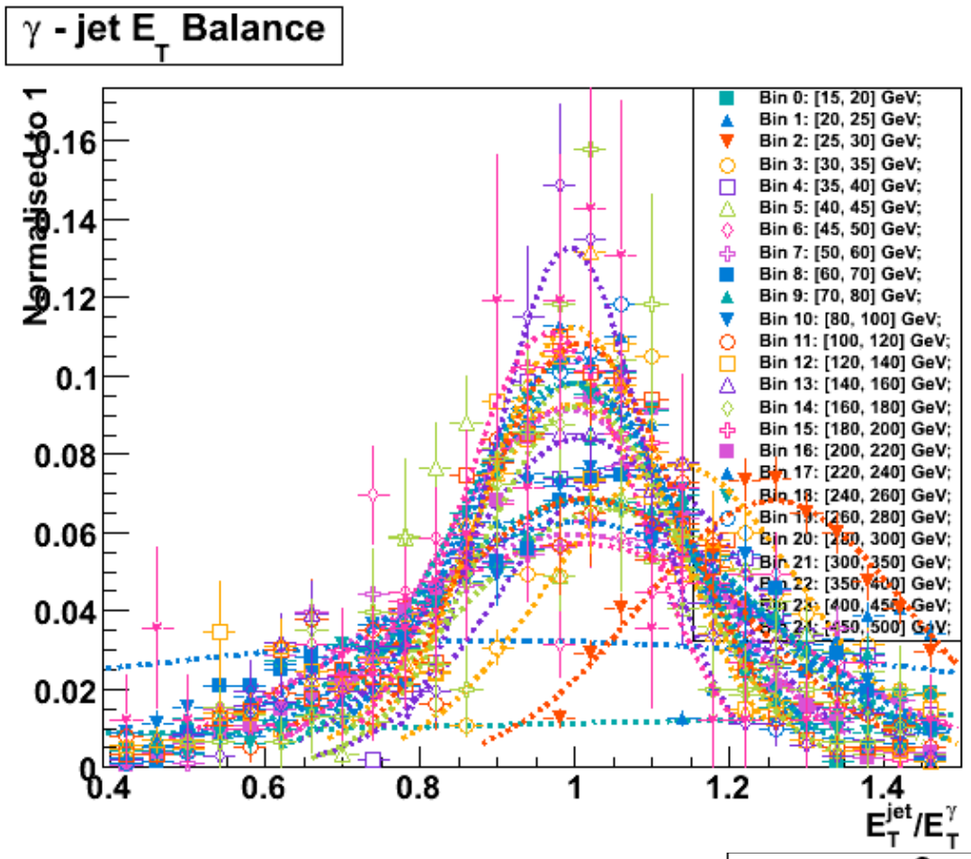


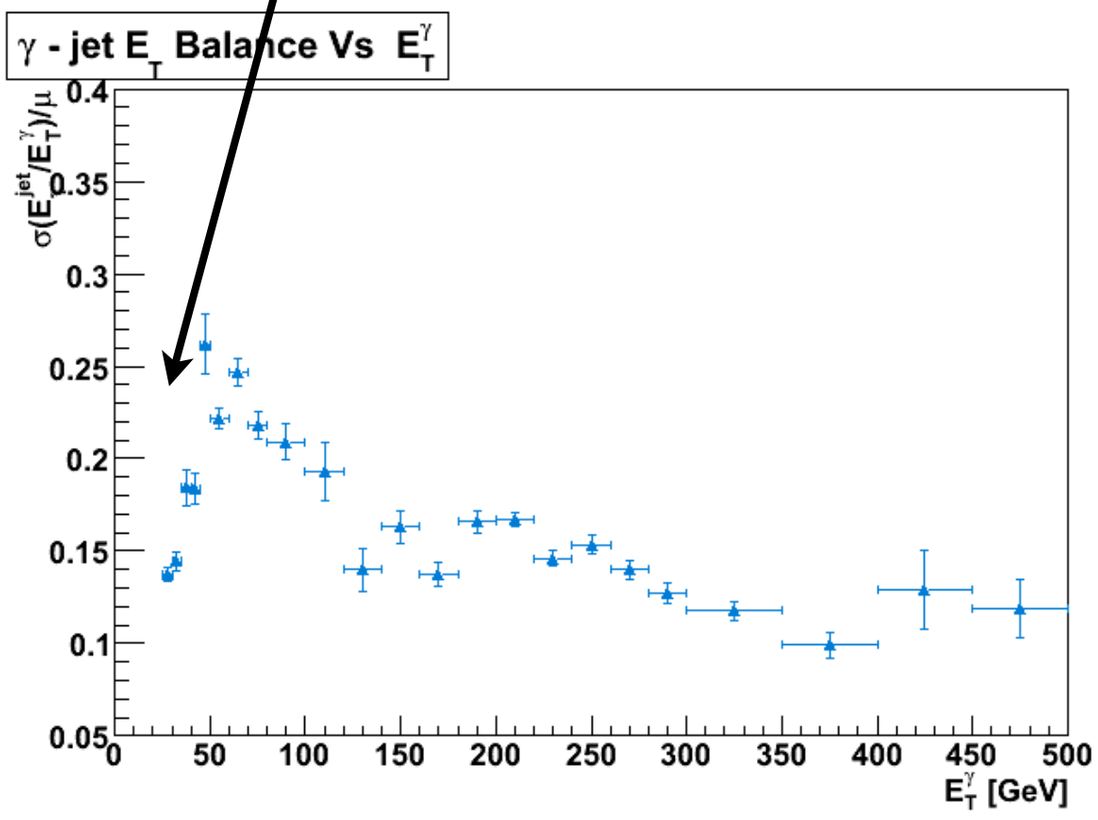


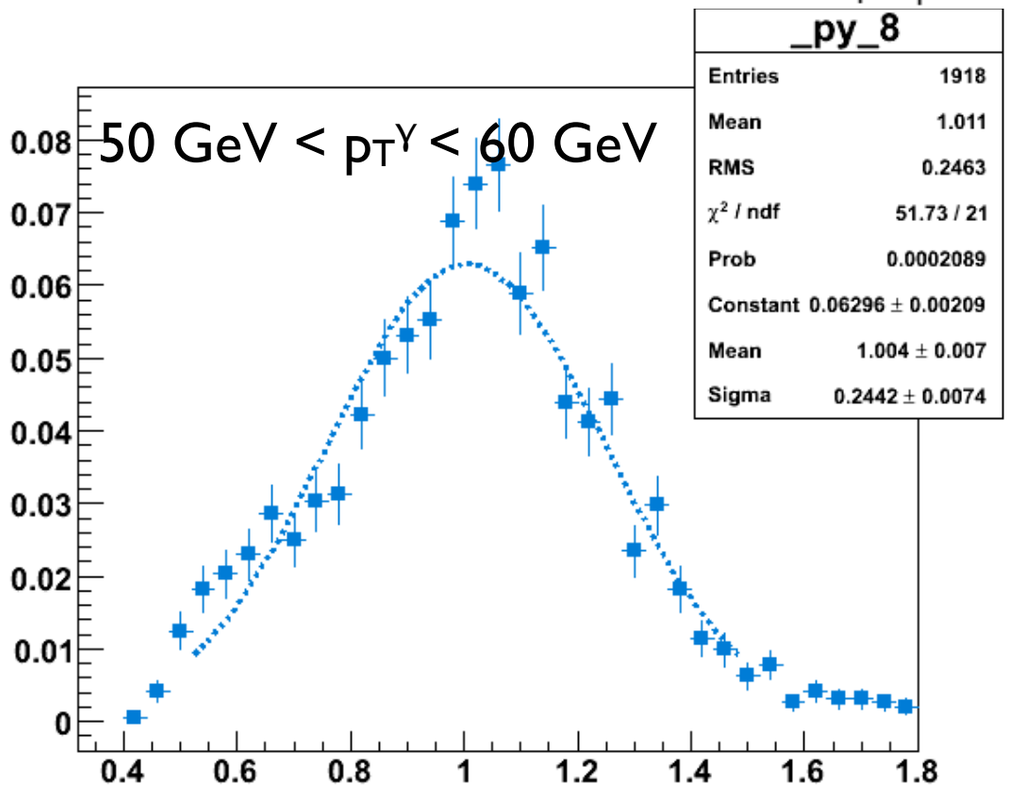


Corrected balance

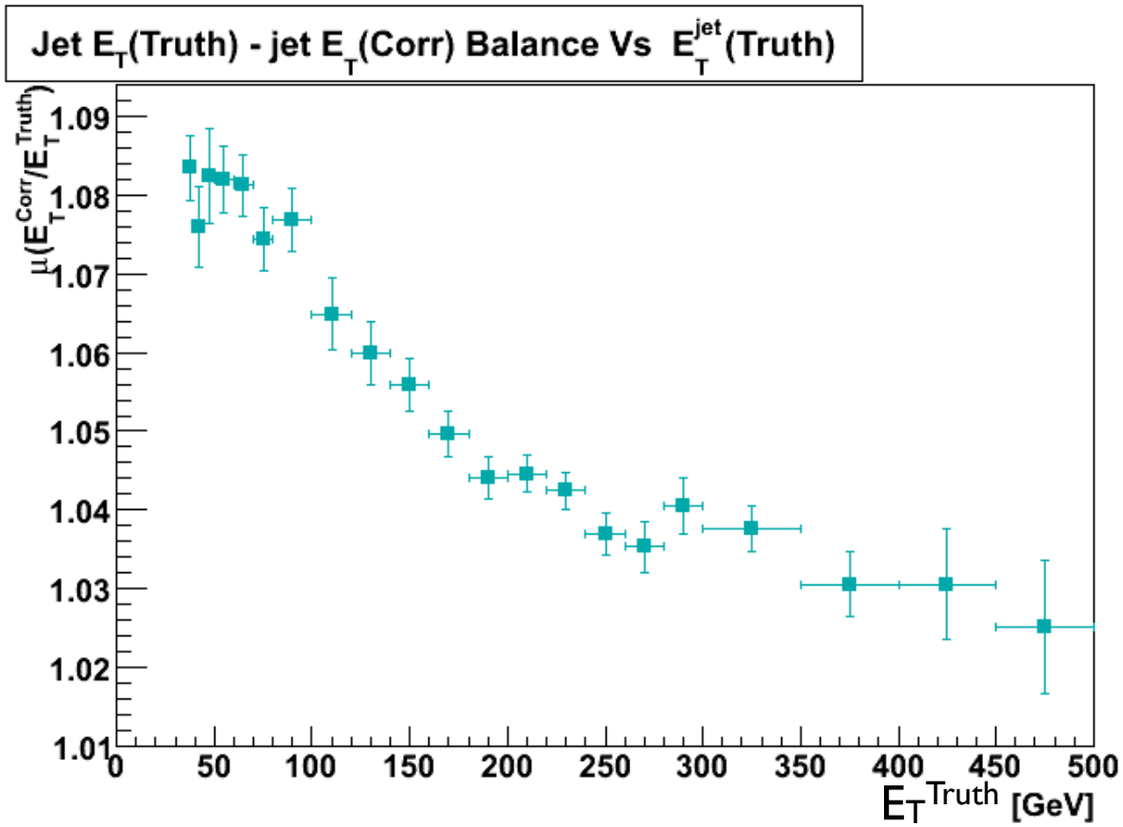


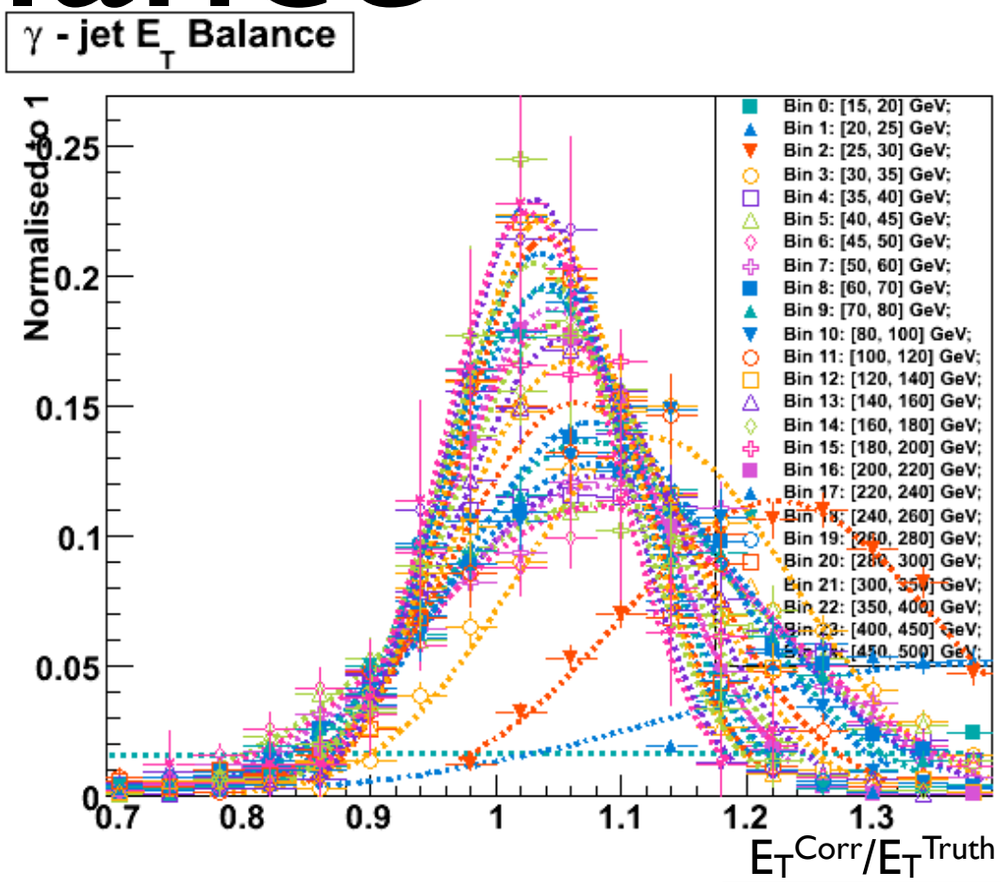


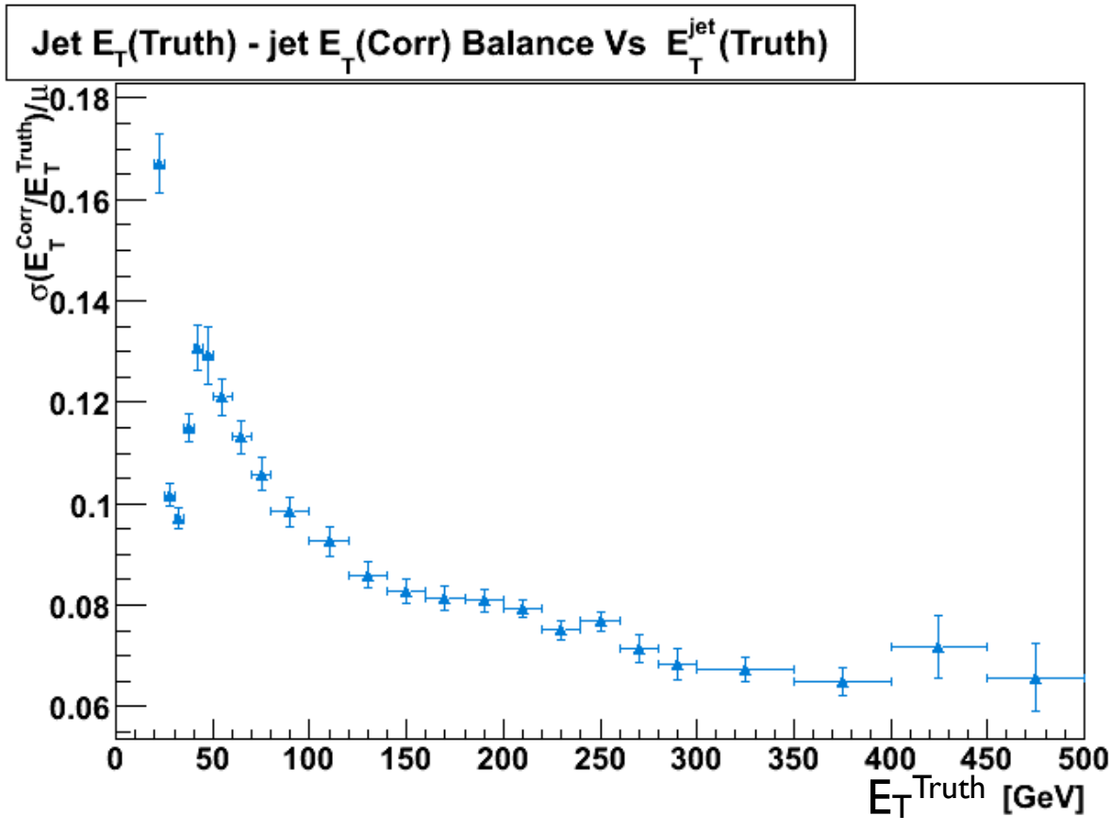


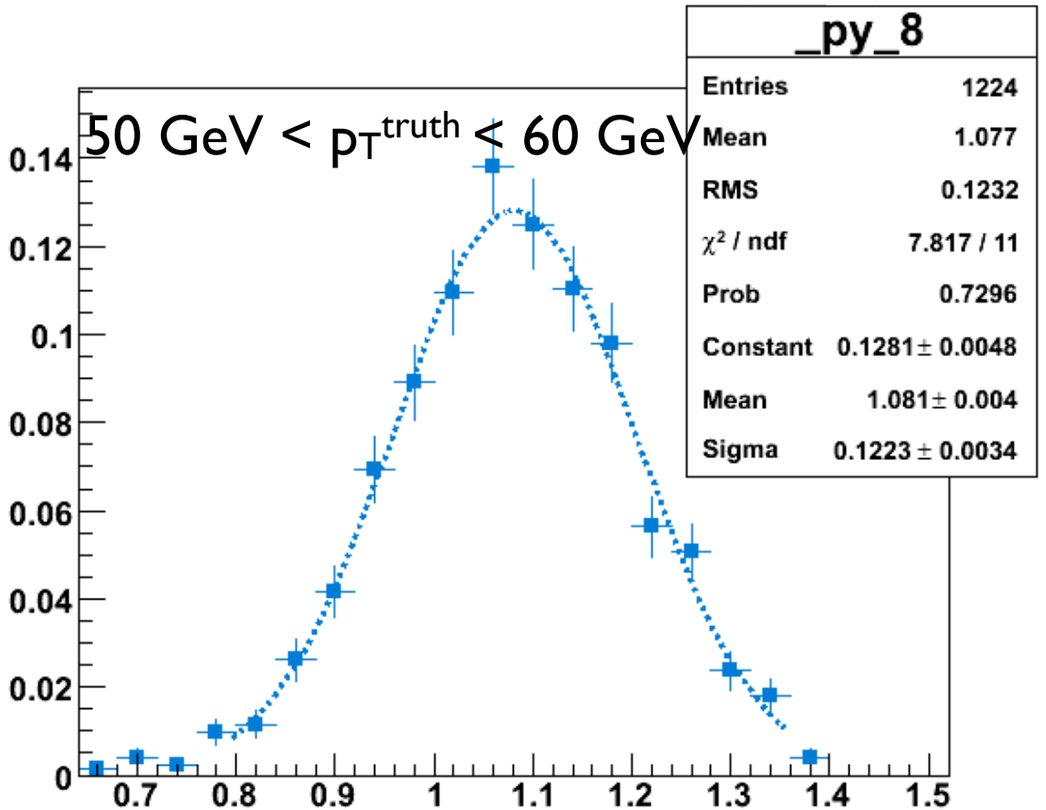


Truth balance





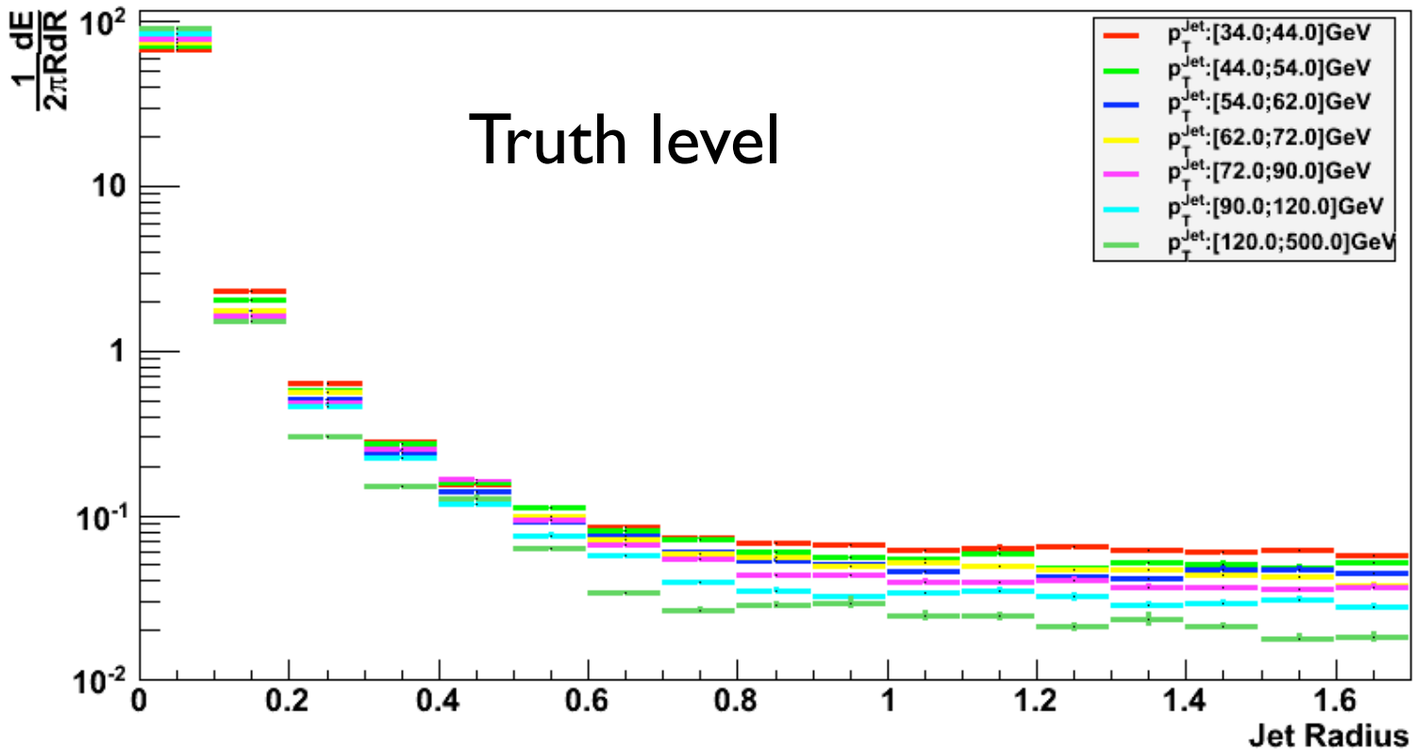


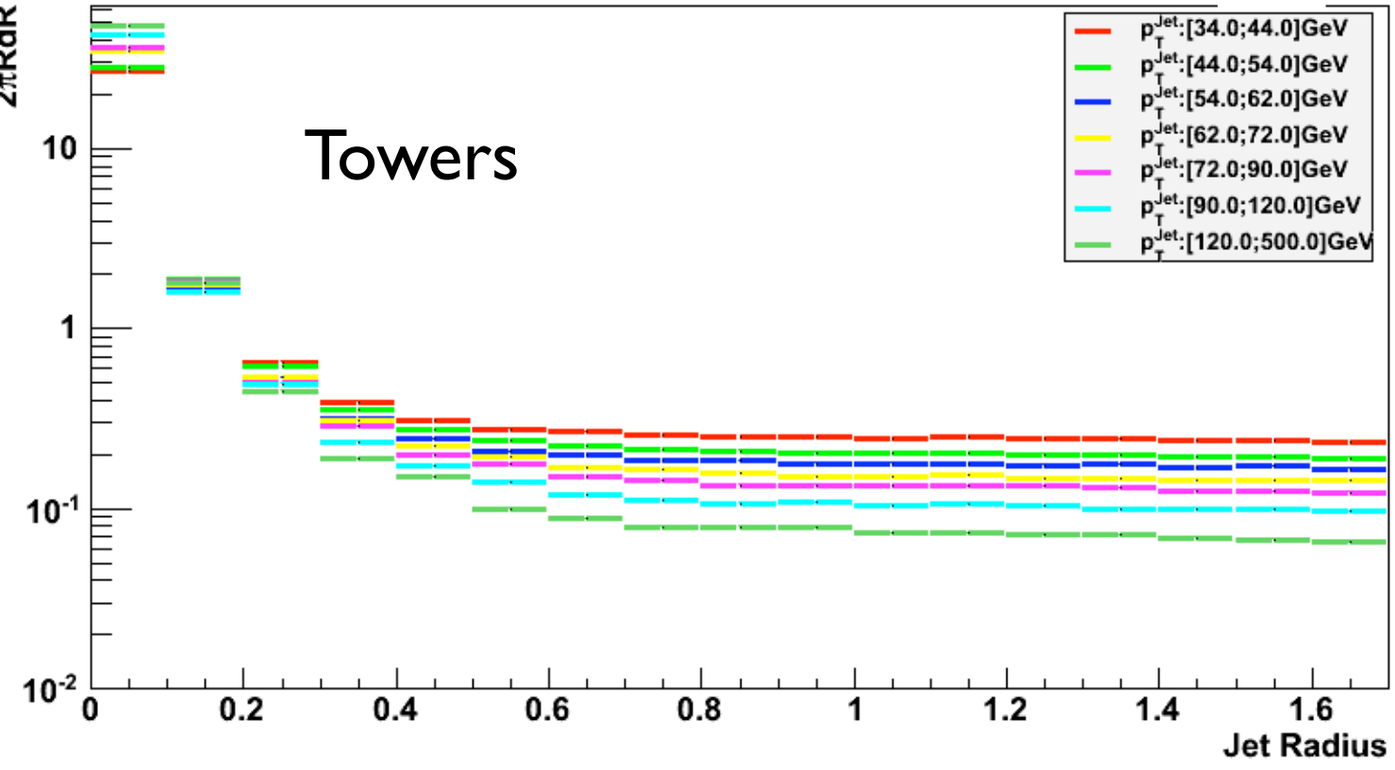


Energy density vs R

Energy density [GeV/(unit ηφ)] as a function of the radial distance from the jet axis

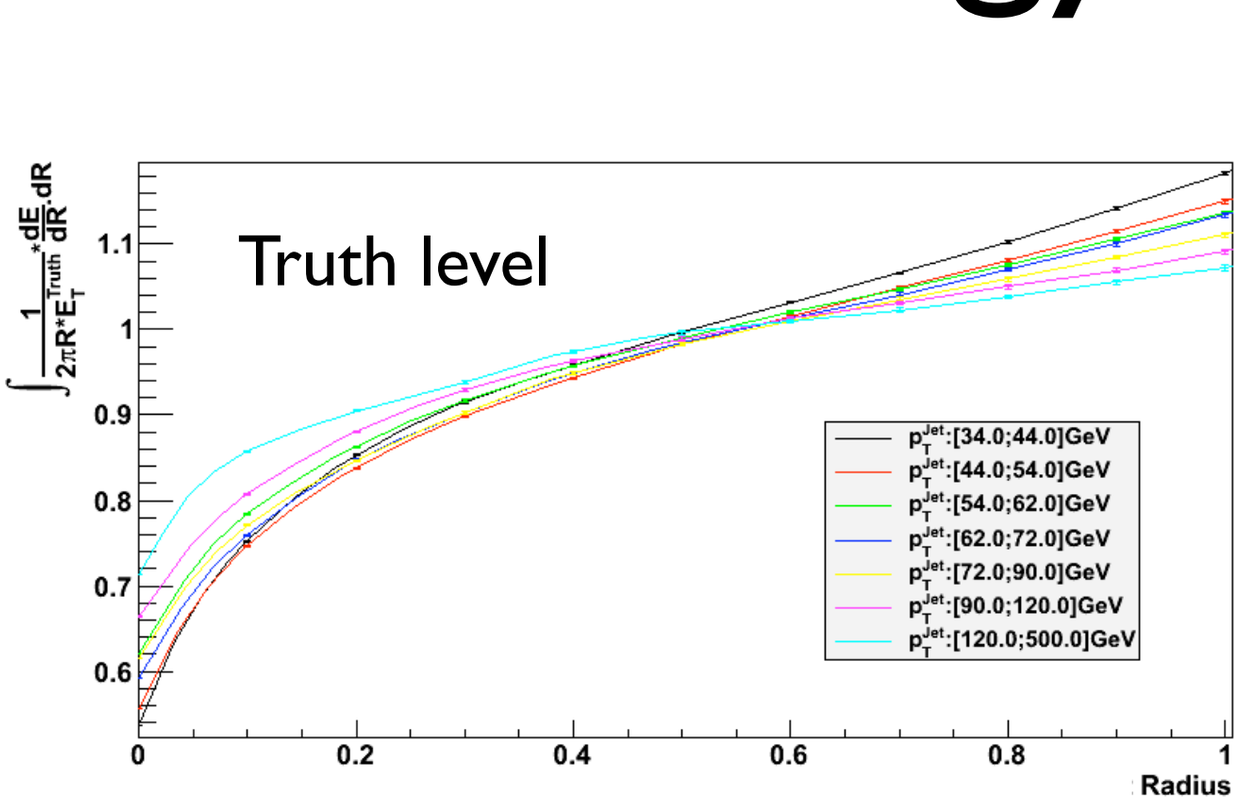
It is important to measure the detail of the energy distribution around the jet axis to have the soft-physics under control

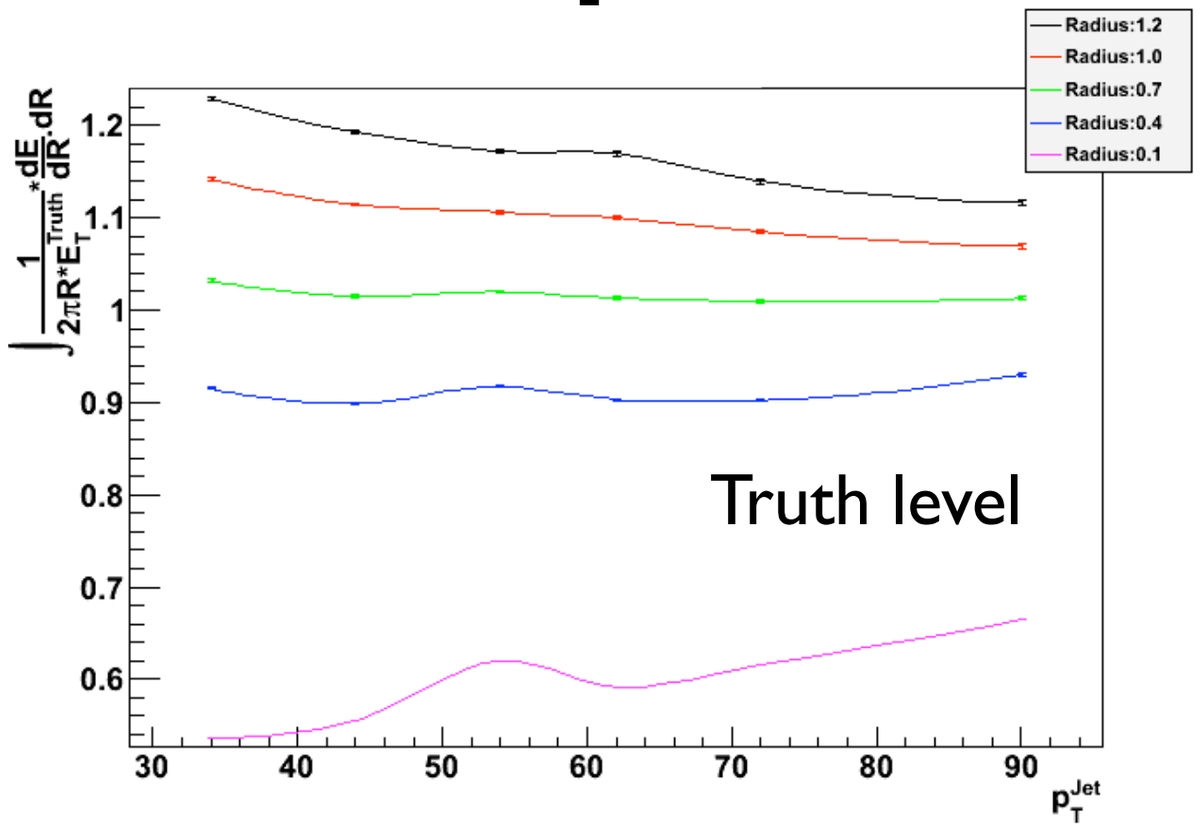


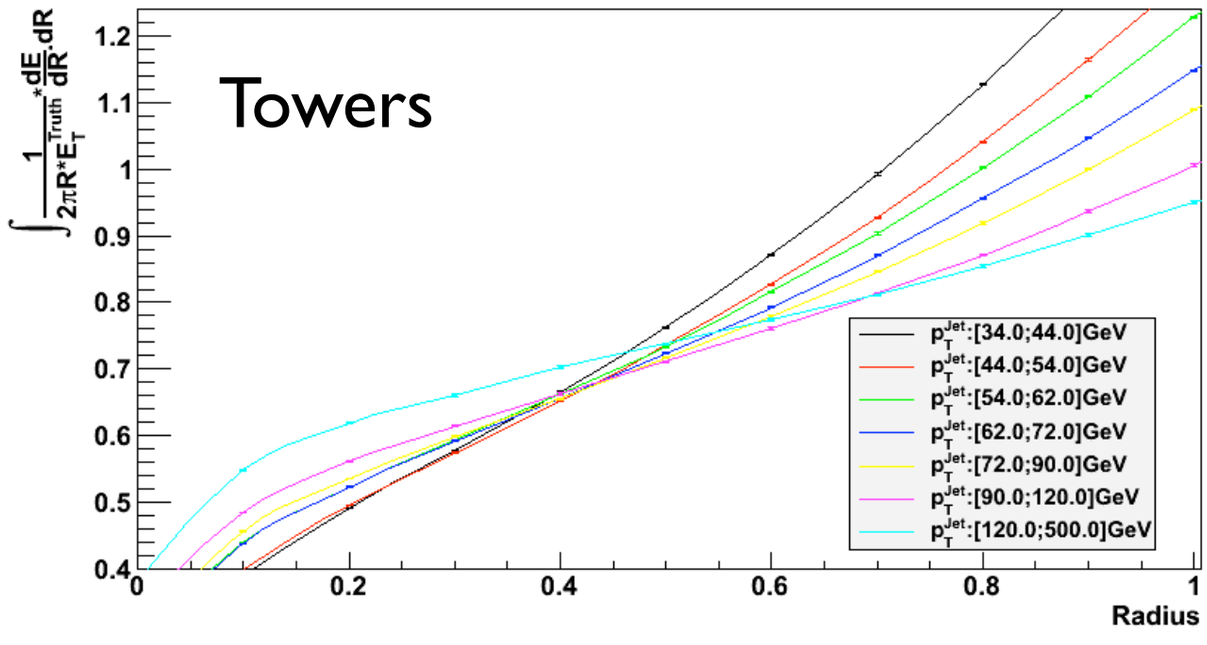


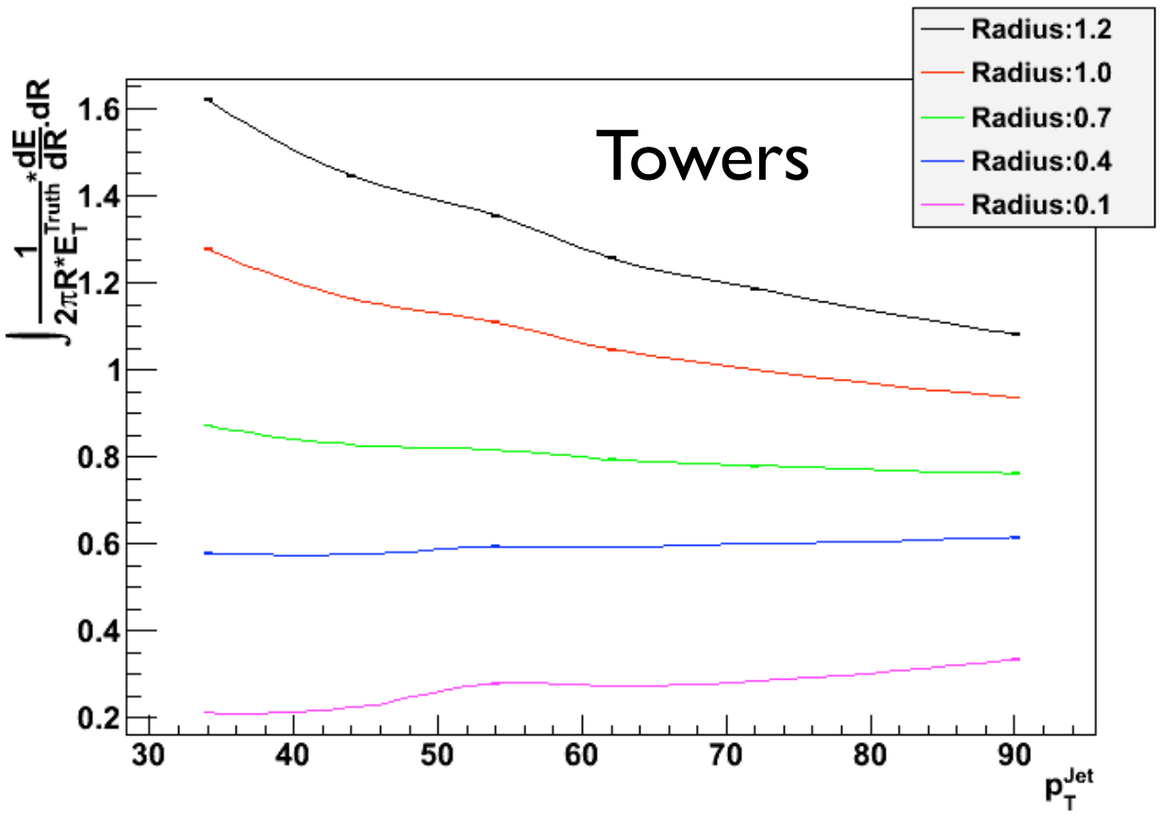
This variable can be used to check the MC description of data (systematics); and to derive a out of cone energy correction

Energy vs R & pT

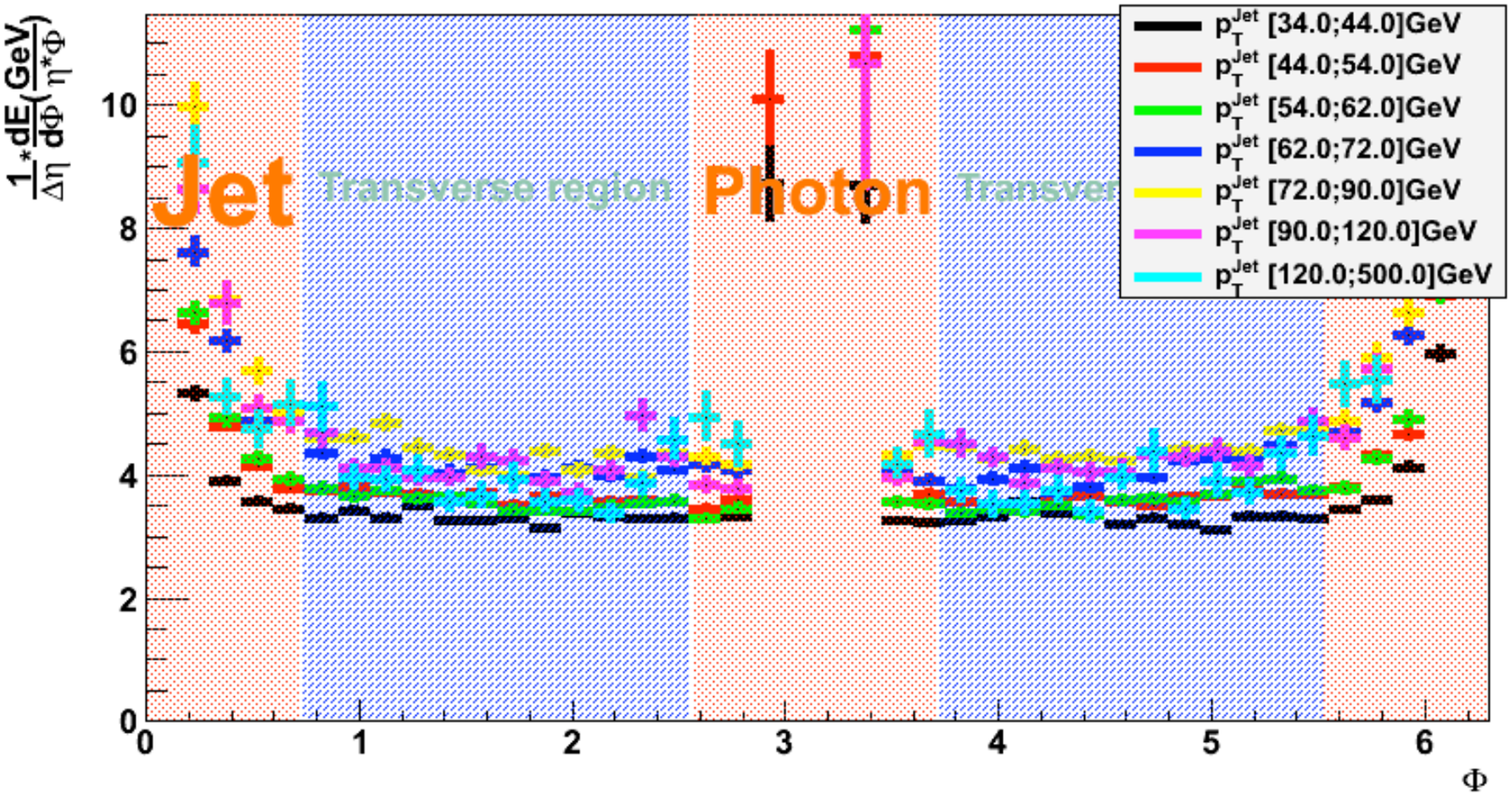






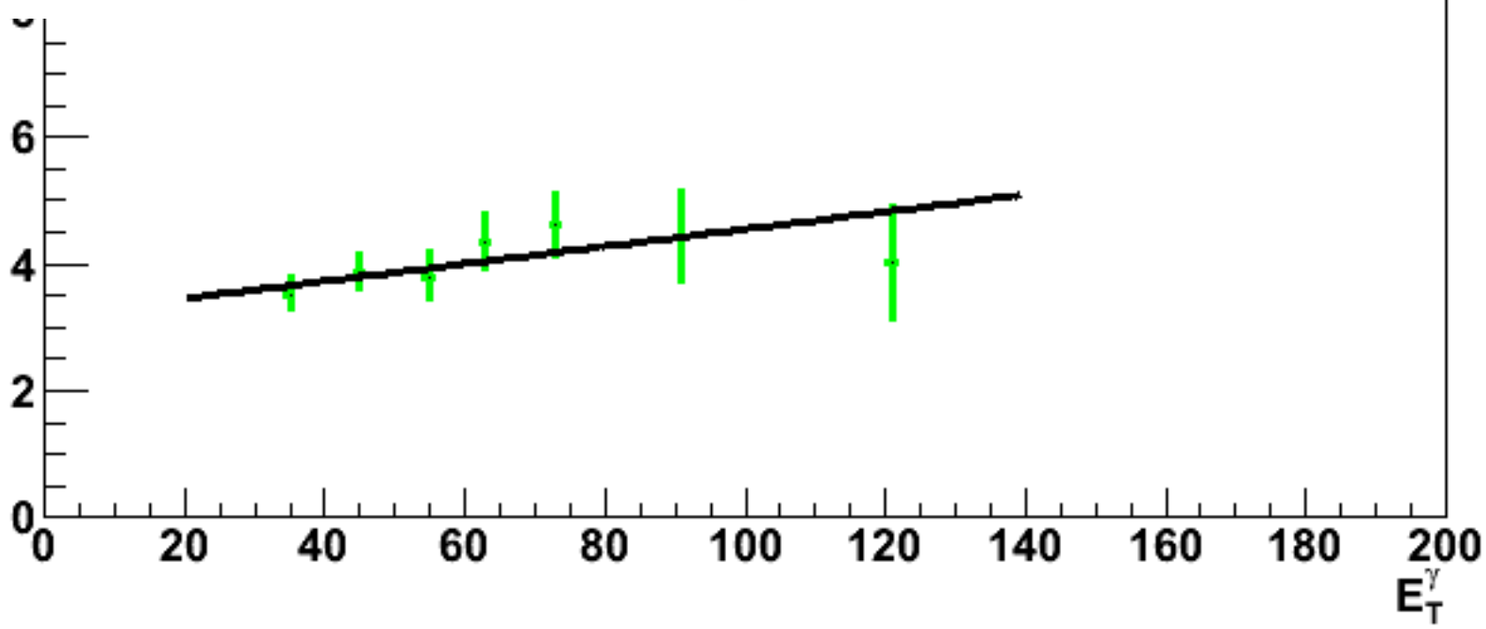


Energy density vs φ

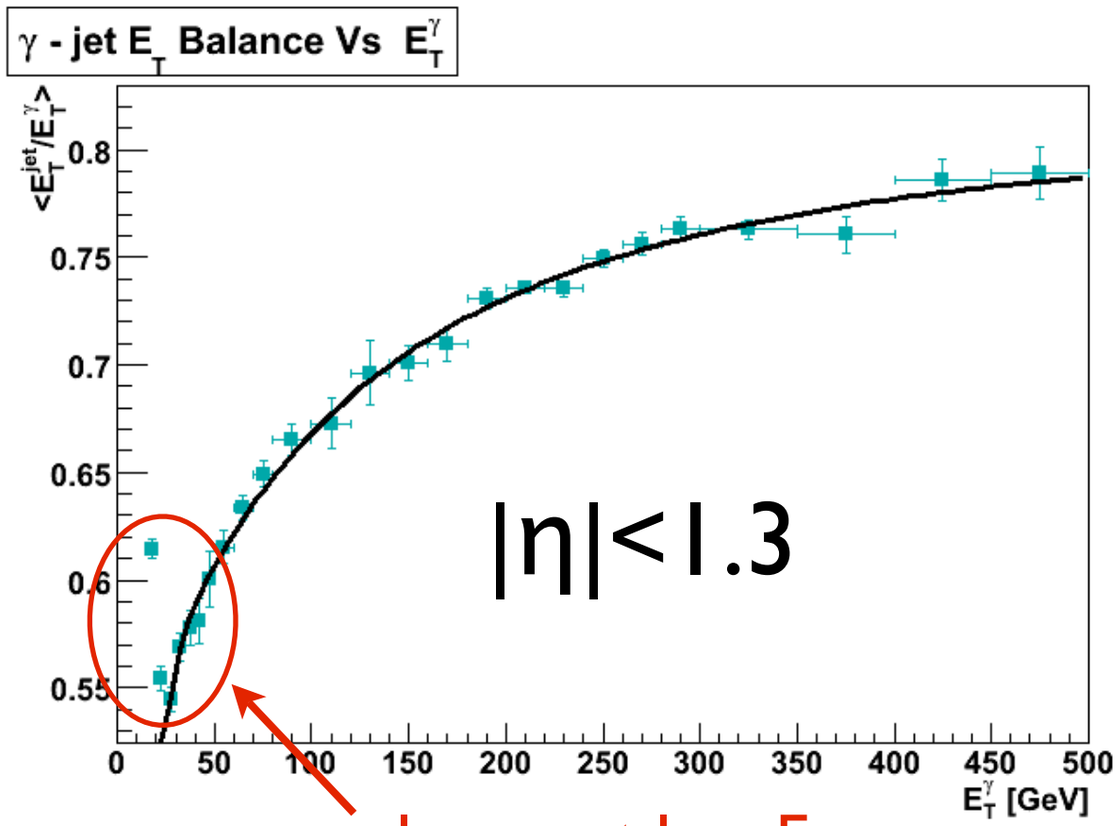


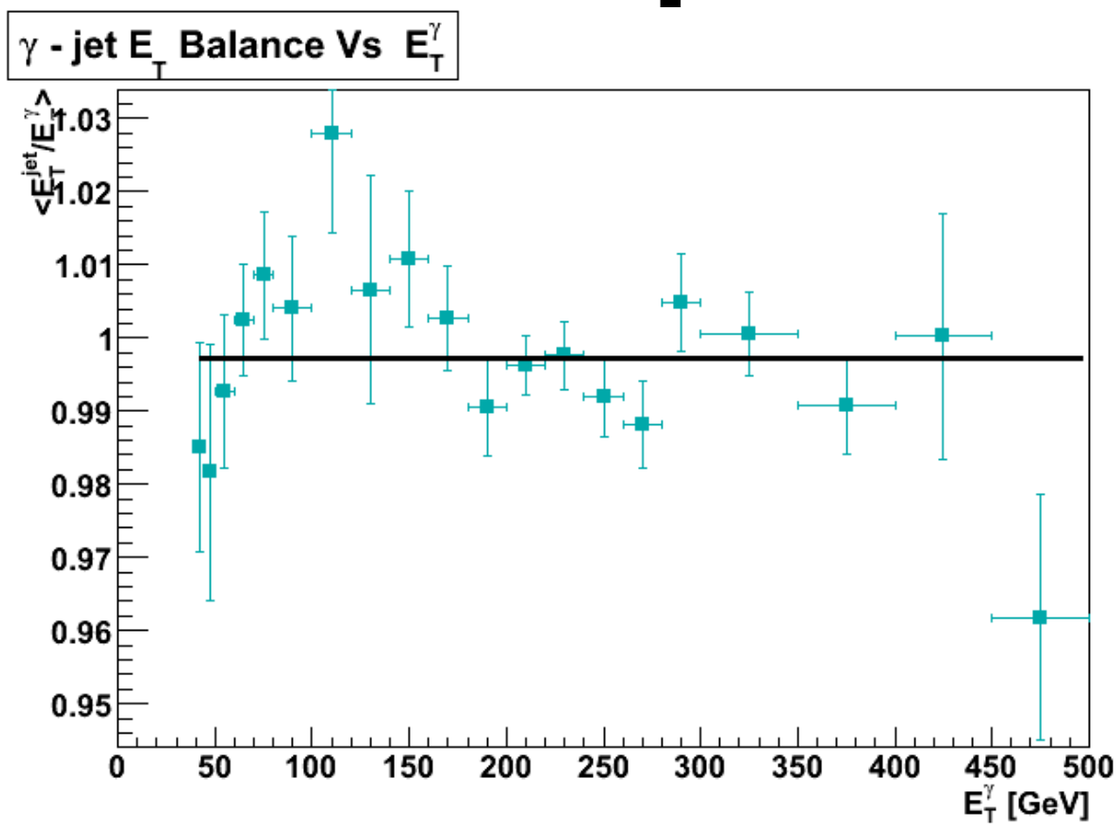
h3	
Entries	7
Mean	70.15
RMS	26.61
χ^2 / ndf	2.192 / 5
Prob	0.822
p0	3.184 ± 0.470
p1	0.01367 ± 0.00839

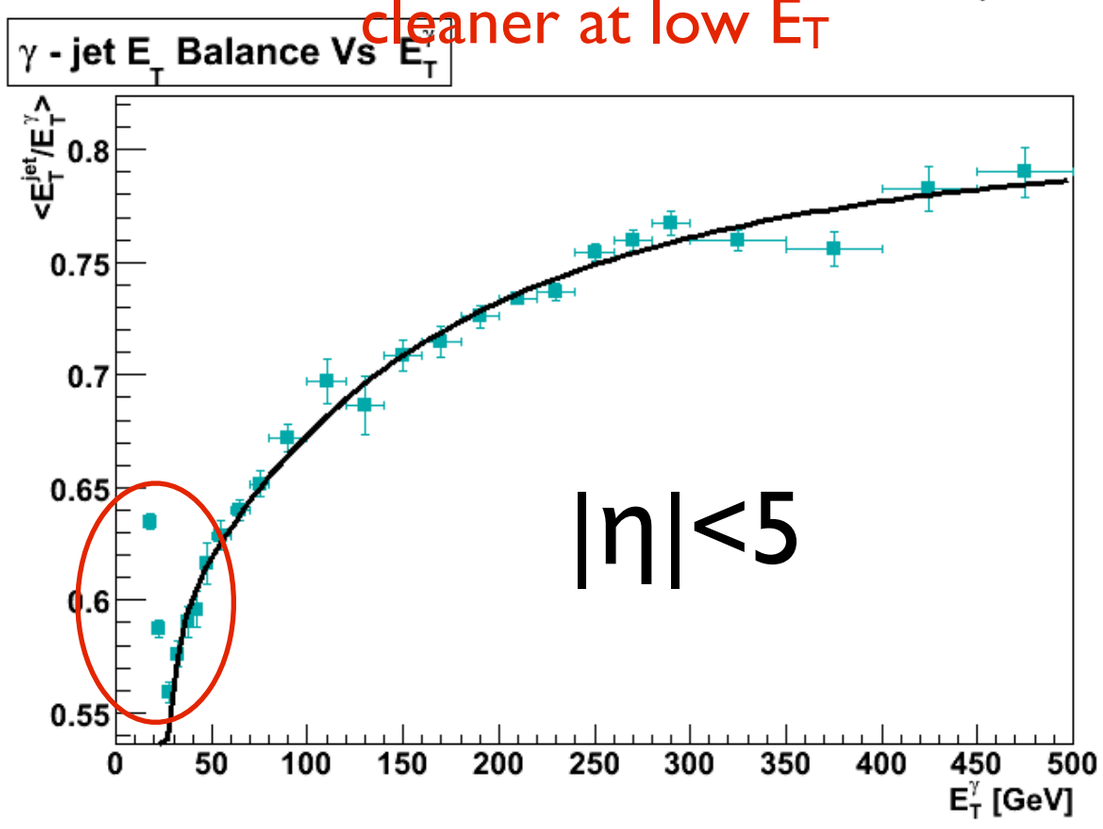
This variable can be used to check the MC description of data (systematics); and to estimate the contribution of the underlying event

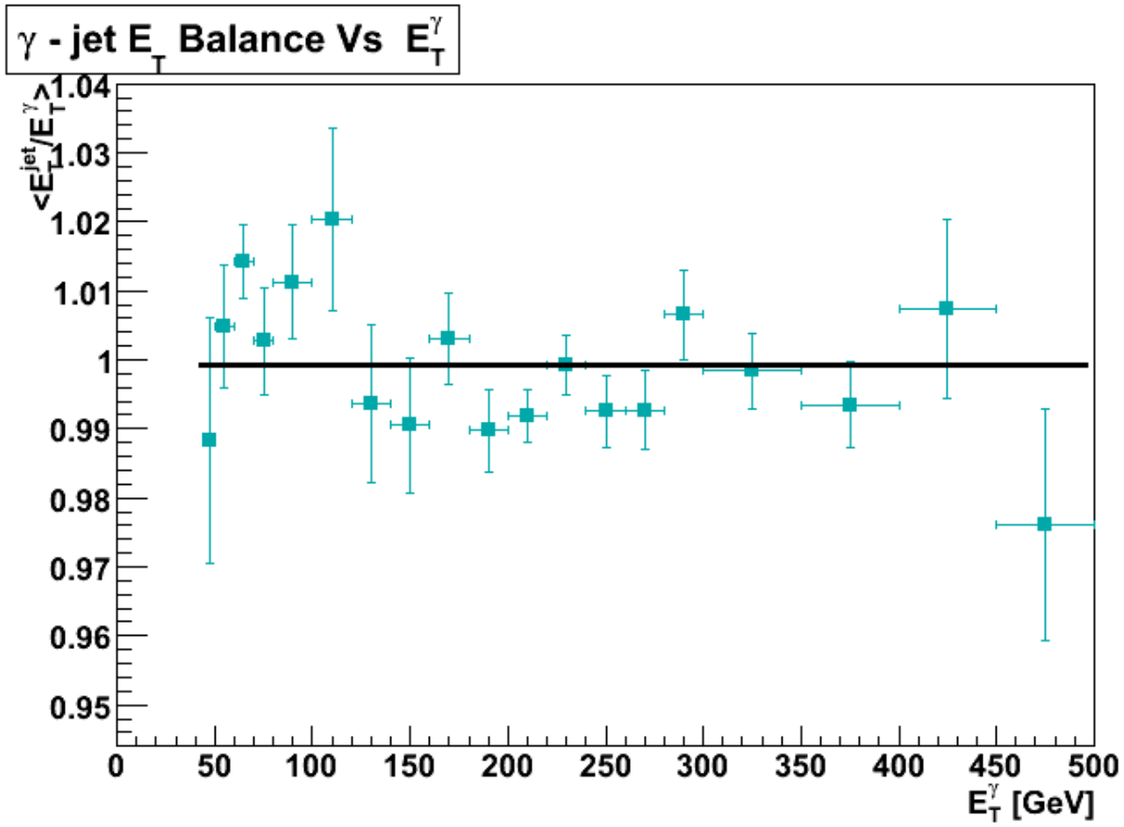


Balance versus η

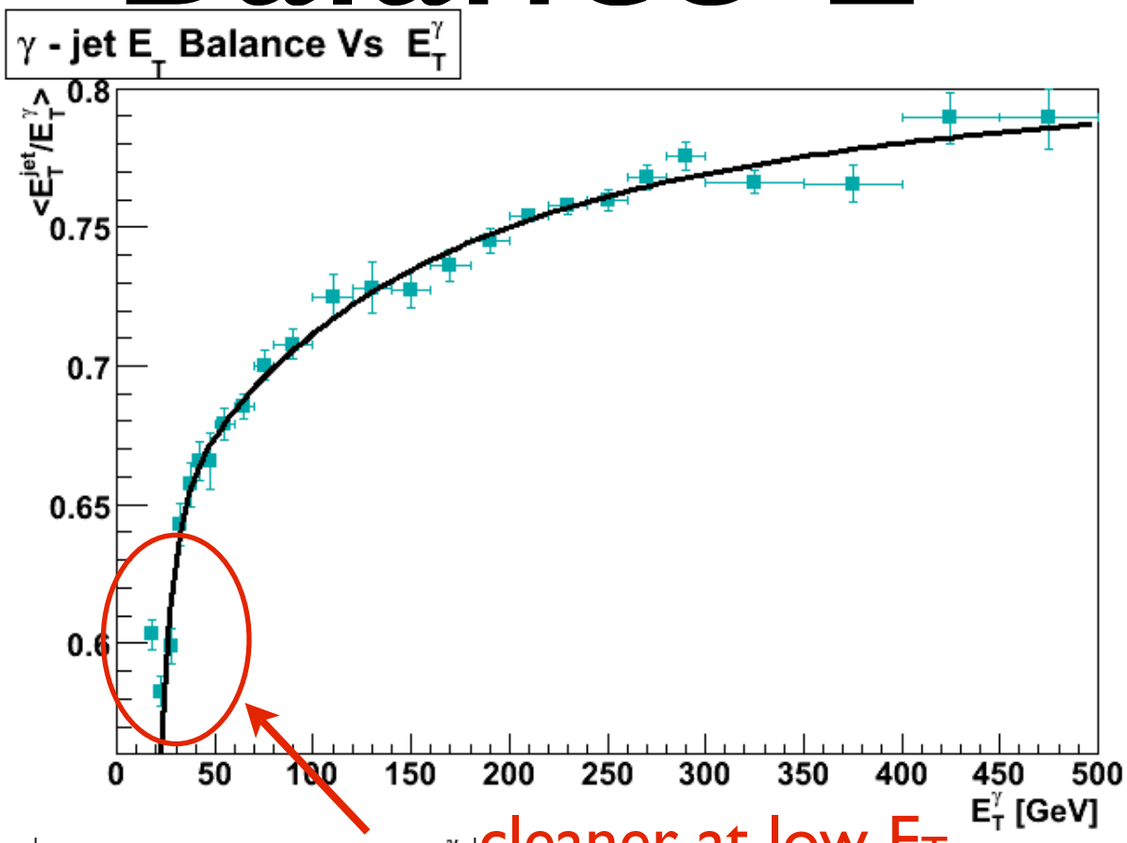




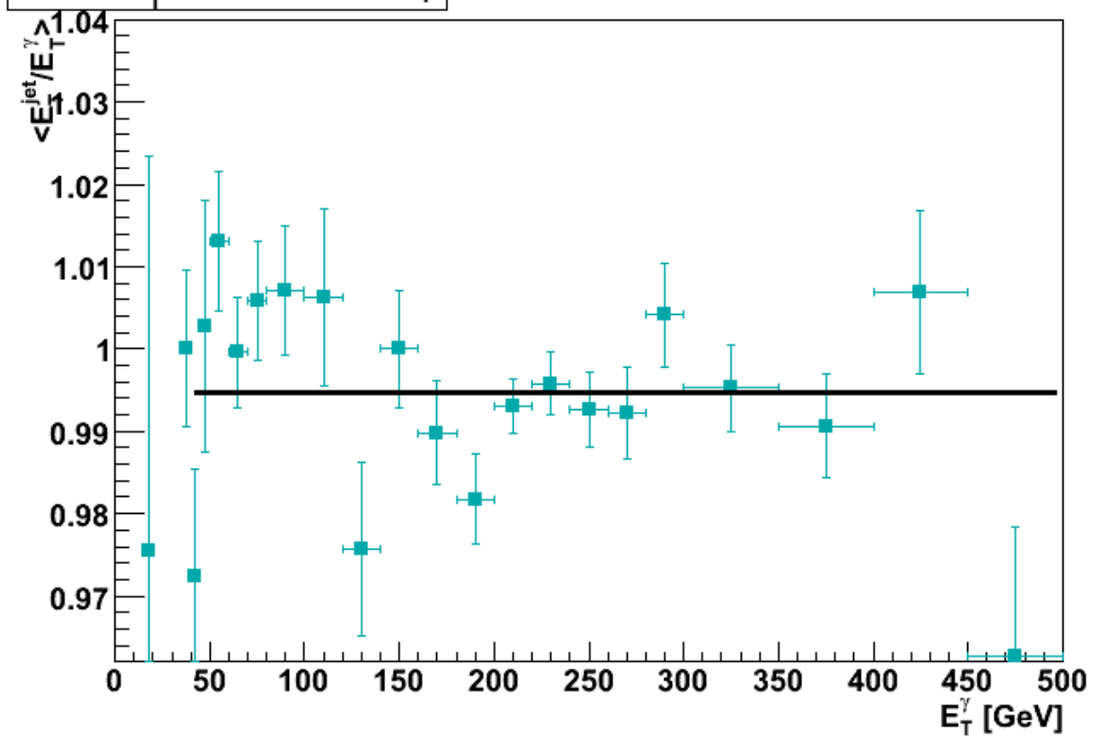


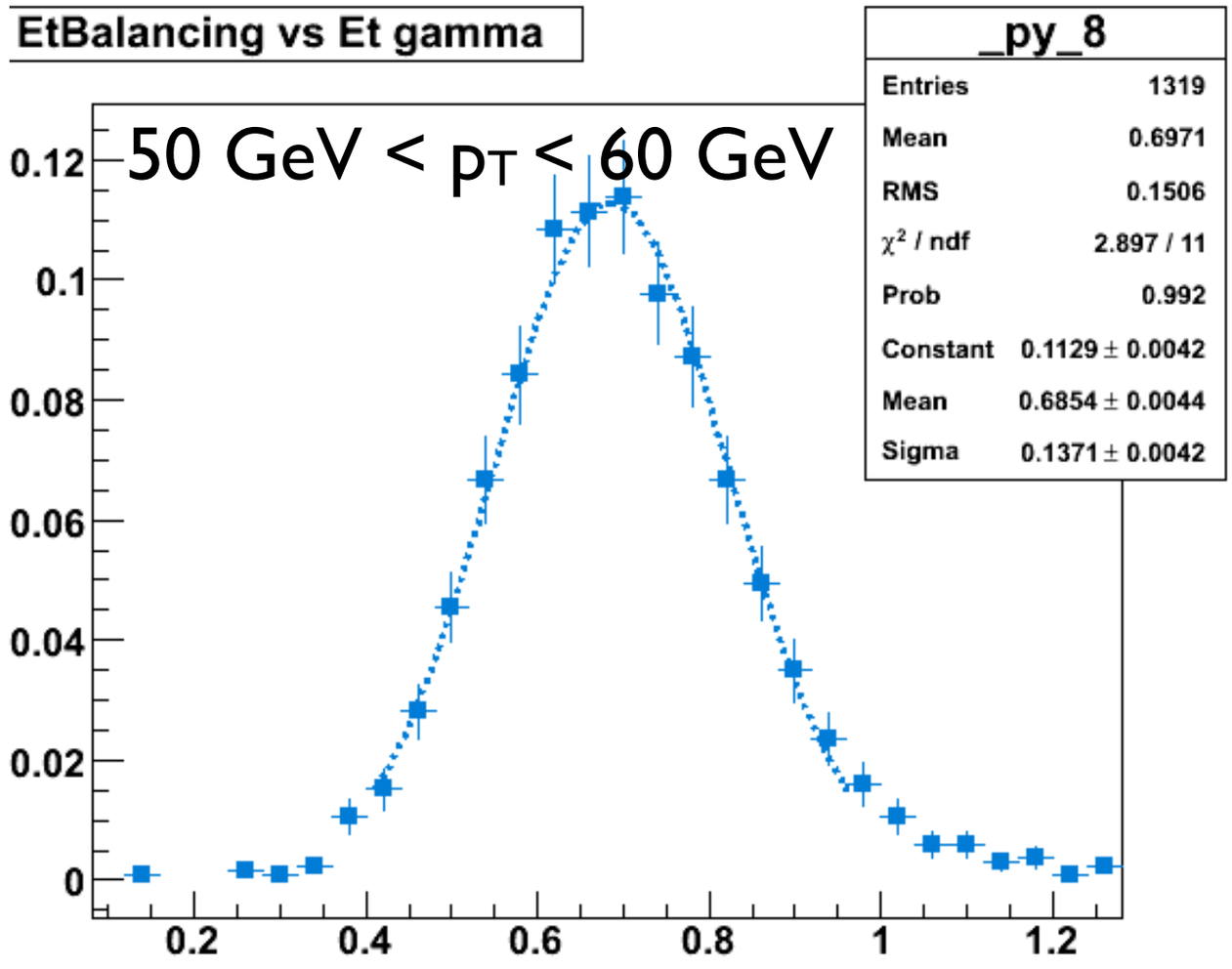


Balance E^{2nd}_T / E^{1nd}_T <30%



cleaner at low E_T

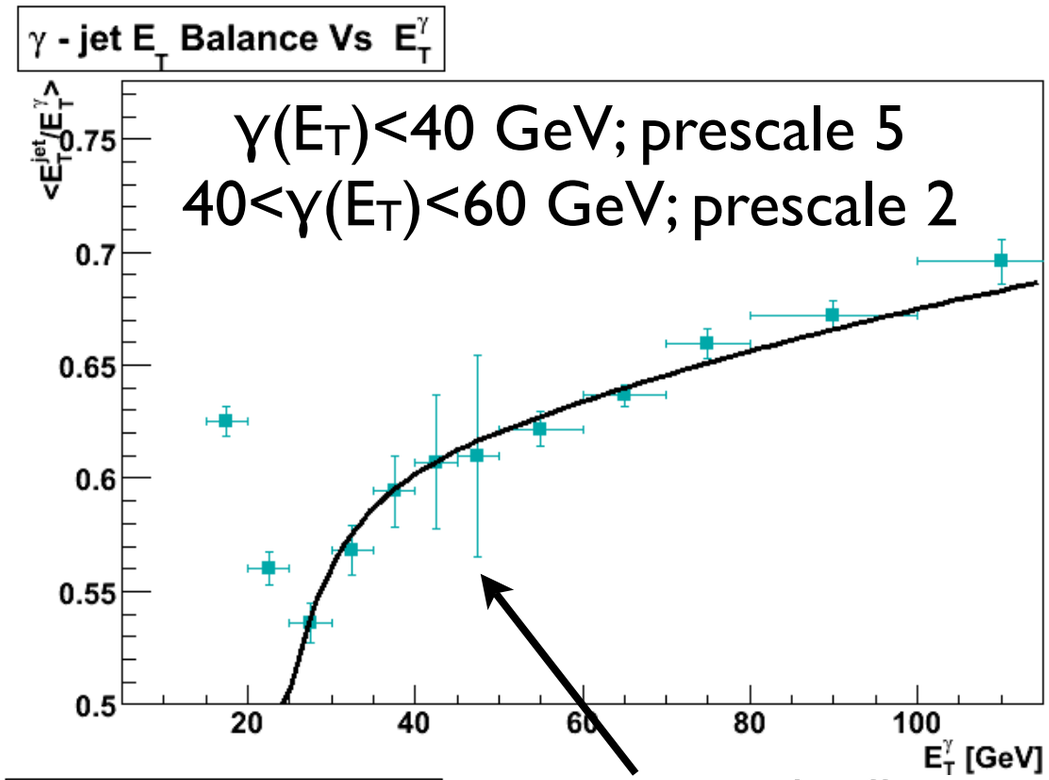


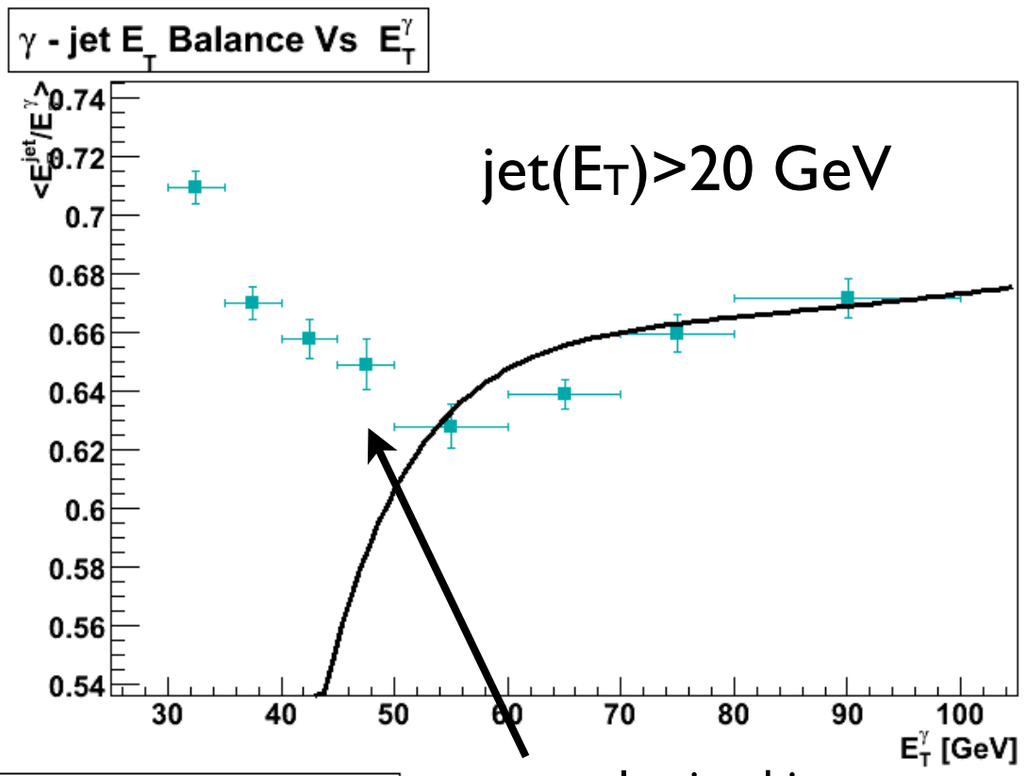


Conclusions

- balancing using the numerical inversion method gives a linear result as a function of p_T with a spread of few %
- it is preferable a D2PD skimming procedure based on prescales. Selecting on E_T jet is biasing the results
- The event selection in $|\eta|$ and p_T of the second jet is not critical, but helps having a better control at low E_T
- the "out-of-cone"/ "underlying-event" energy is at the level of 10% @ 30 GeV and 5% @ 200 GeV (for AntiKt6H1topo), we need to be able to model it
- tower's energy distribution as a function of ΔR and $\Delta\varphi$ gives a handle to correct for the soft physics

DPD skim strategy





prescale effect

selection bias