

Update on resolution fit

UHH CMS SUSY Meeting

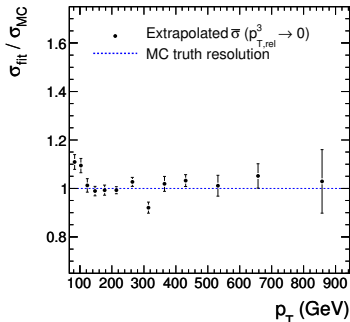
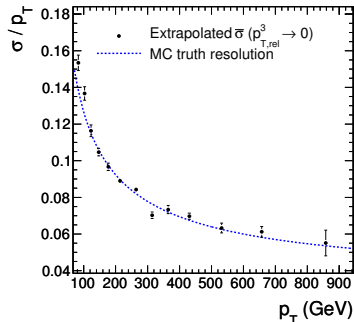
Matthias Schröder

June 16th, 2010



Excess of fitted resolution at low p_T

- Seen in dijet asymmetry method¹
- Effect of incorrect jet ordering



¹CMS PAS JME-09-007, *Measurement of the Jet Energy Resolutions and Jet Reconstruction Efficiency at CMS*

Jet ordering

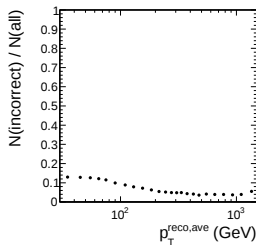
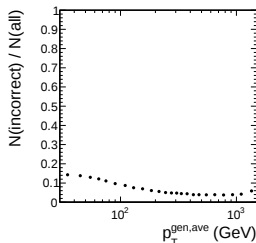
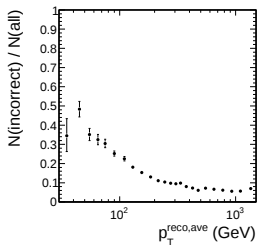
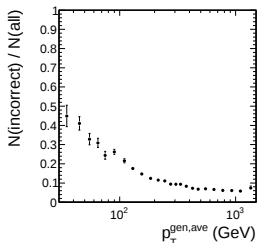
$$p_{T,3}^{\text{rel}} < 0.1, N(\text{all}) = 51\,916$$

$$\text{No } p_{T,3}^{\text{rel}} \text{ cut, } N(\text{all}) = 285\,115$$

- For how many events is the jet ordering incorrect?

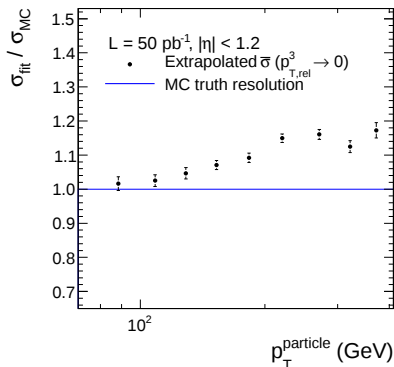
- ▶ Selection of first 3 CaloJets
- ▶ Ordered incorrectly if

$$\begin{aligned} & p_{T,3}^{\text{gen}} > p_{T,1}^{\text{gen}} \\ \text{||} & p_{T,3}^{\text{gen}} > p_{T,2}^{\text{gen}} \end{aligned}$$

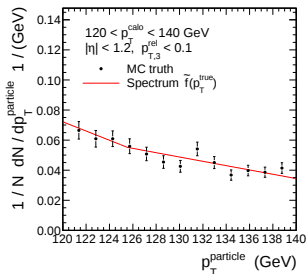
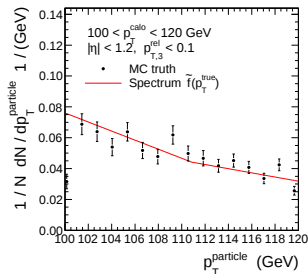
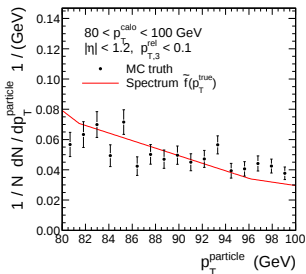
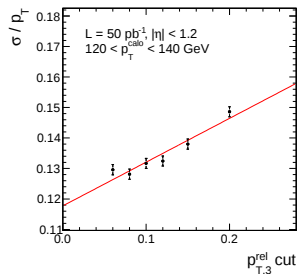
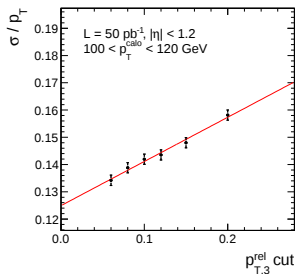
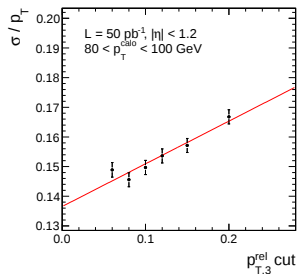


Effect of incorrect jet ordering?

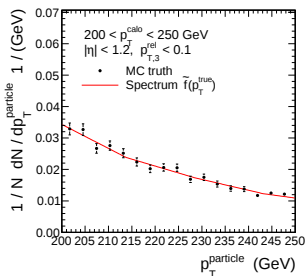
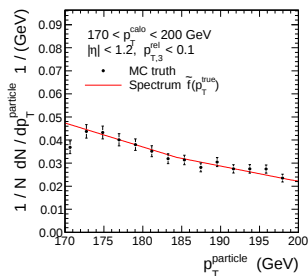
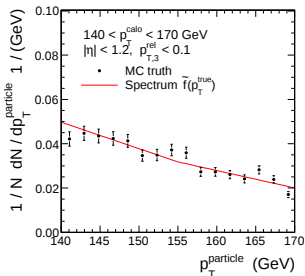
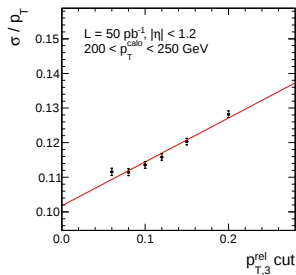
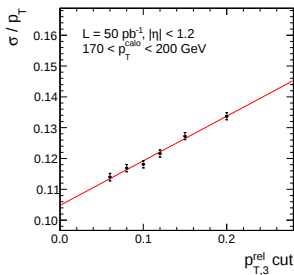
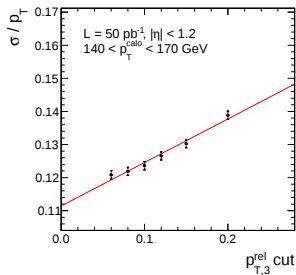
- Detailed study: measurement (fit, extrapolation) using GenJet ordered jets
- Dijet selection on GenJets
 - ▶ 2 leading GenJets
 - ▶ $p_{T,1}^{\text{gen}}$ binning
 - ▶ $|\eta| < 1.2$ for both jets
 - ▶ $p_{T,3}^{\text{rel}}(\text{gen}) < x$ with x variable
 - ▶ $f_{\text{em}} > 0.01$ for both jets
- Resolution $\approx 10\%$ too large
 - ▶ Bug?
 - ▶ Real effect, cancelling out with a different effect when using CaloJet ordered jets?



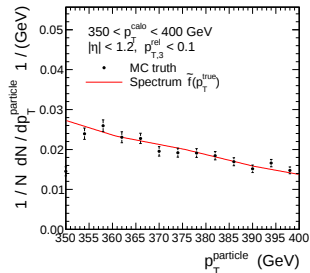
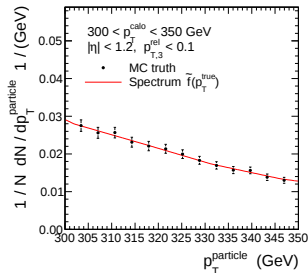
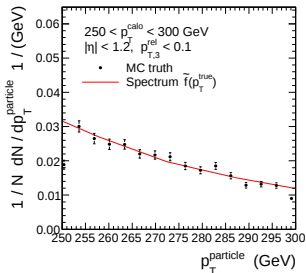
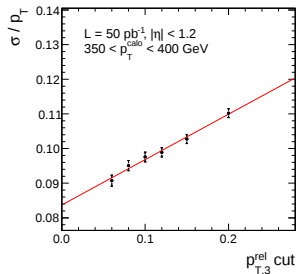
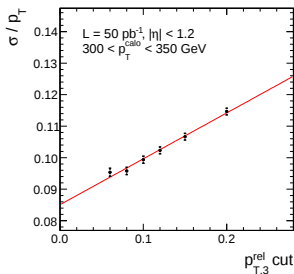
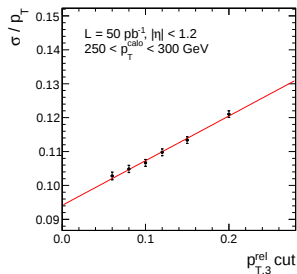
Fit results in various p_T bins (0/3)



Fit results in various p_T bins (1/3)



Fit results in various p_T bins (2/3)

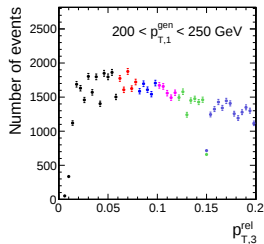
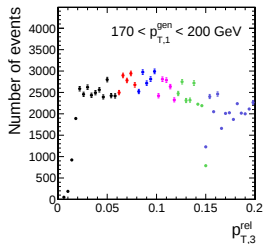
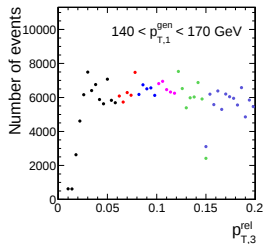
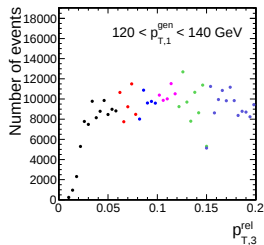
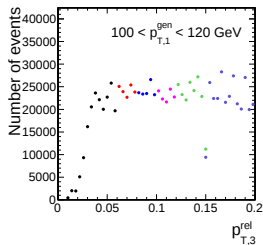
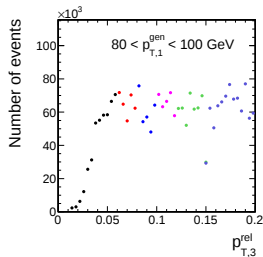


(14/06/2010) Exclusive $p_{T,3}^{\text{rel}}$ bins (1/4)

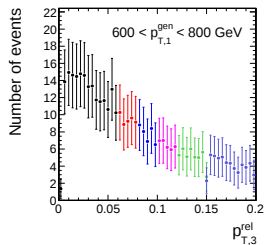
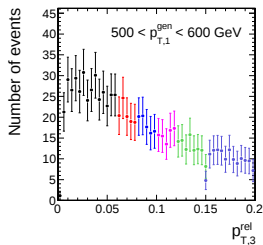
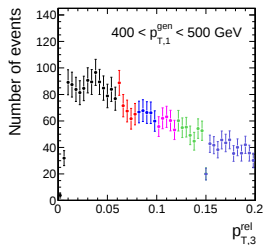
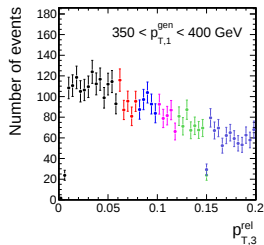
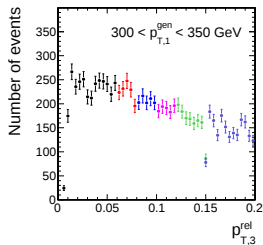
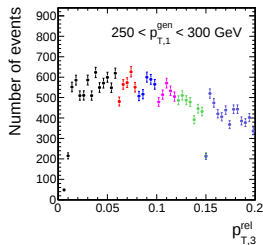
- $\bar{\sigma}$ for different $p_{T,3}^{\text{rel}}$ cuts correlated
 - 1 Fit in bins of $p_{T,3}^{\text{rel}}$
 - 2 Extrapolate $\bar{\sigma}$ for $p_{T,3}^{\text{rel}} \rightarrow 0$
- Here: $p_{T,3}^{\text{rel}}$ mean of corresponding $p_{T,3}^{\text{rel}}$ bin

$p_{T,3}^{\text{rel}}(\text{min})$	$p_{T,3}^{\text{rel}}(\text{max})$	$\langle p_{T,3}^{\text{rel}} \rangle$
0.00	0.06	0.03544 ± 0.00008
0.06	0.08	0.07000 ± 0.00006
0.08	0.10	0.08991 ± 0.00006
0.10	0.12	0.10989 ± 0.00006
0.12	0.15	0.13468 ± 0.00008
0.15	0.20	0.17426 ± 0.00011

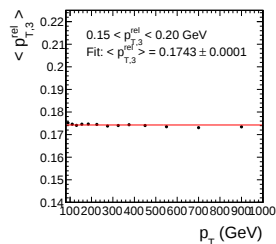
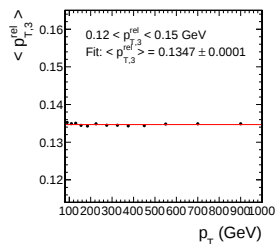
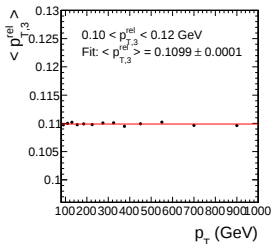
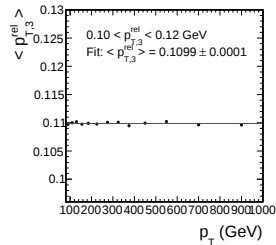
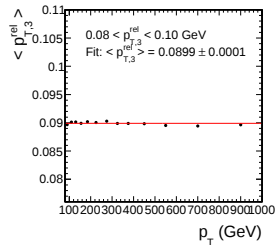
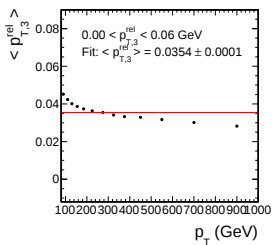
(14/06/2010) Exclusive $p_{T,3}^{\text{rel}}$ bins (2/4)



(14/06/2010) Exclusive $p_{T,3}^{\text{rel}}$ bins (3/4)

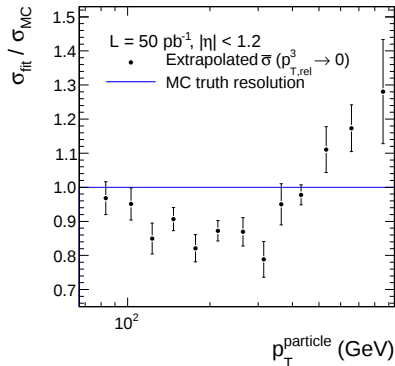


(14/06/2010) Exclusive $p_{T,3}^{\text{rel}}$ bins (4/4)

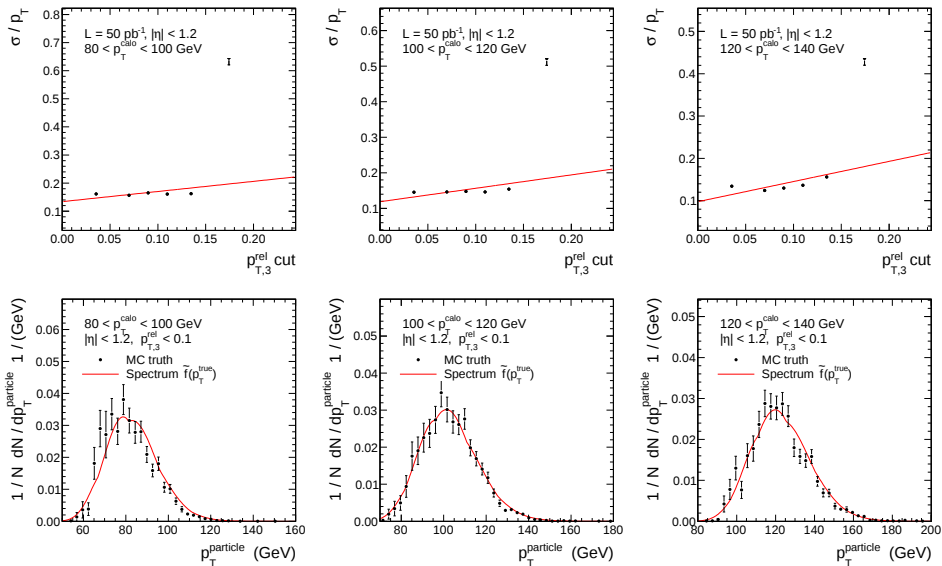


Results for Results for $0 < p_{T,3}^{\text{rel}} < 0.2$

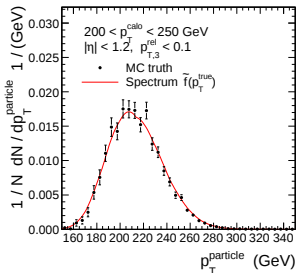
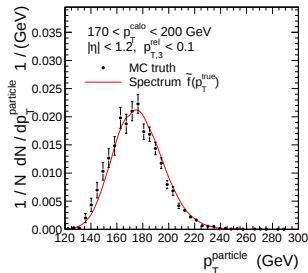
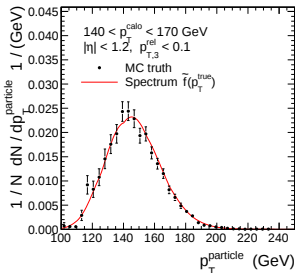
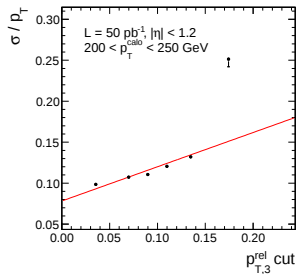
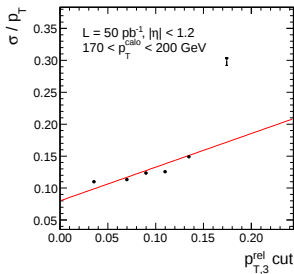
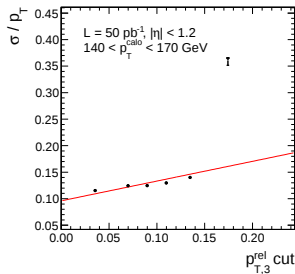
- Data driven dijet selection
- 2 leading jets in a certain p_T bin
- $|\eta| < 1.2$ for both jets
- $p_{T,3}^{\text{rel}} < x$ with x variable
- $f_{\text{em}} > 0.01$ for both jets



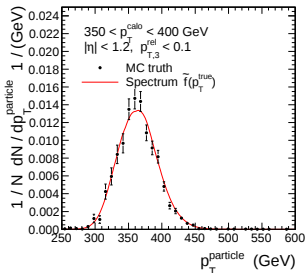
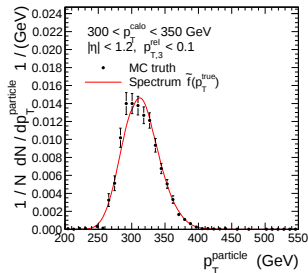
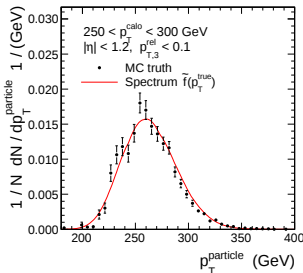
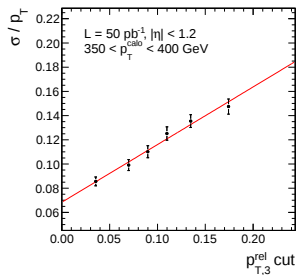
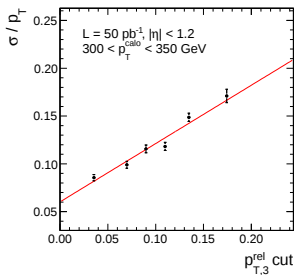
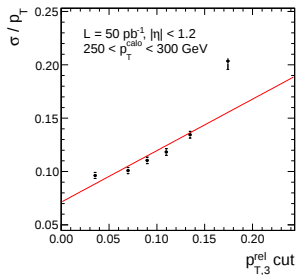
Fit results in various p_T bins (0/5)



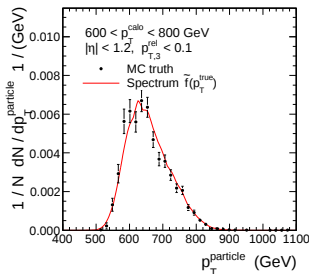
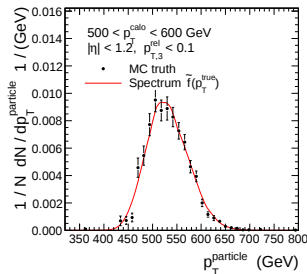
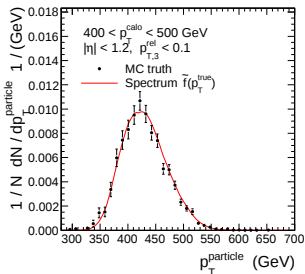
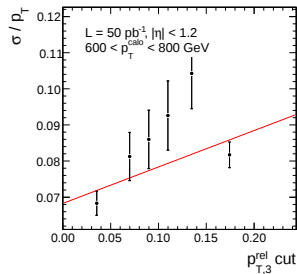
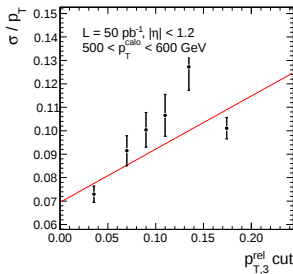
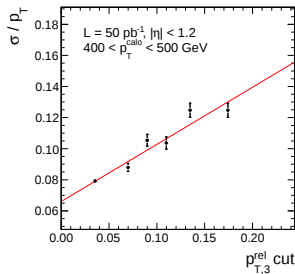
Fit results in various p_T bins (1/5)



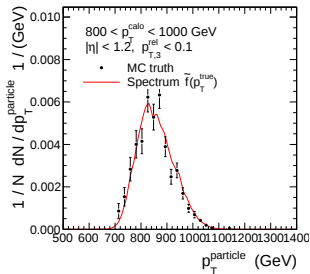
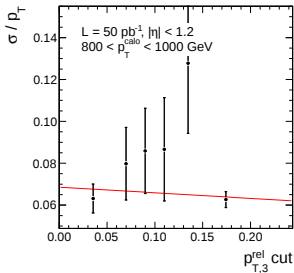
Fit results in various p_T bins (2/5)



Fit results in various p_T bins (3/5)

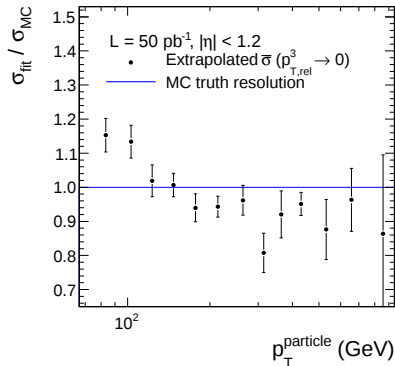


Fit results in various p_T bins (4/5)

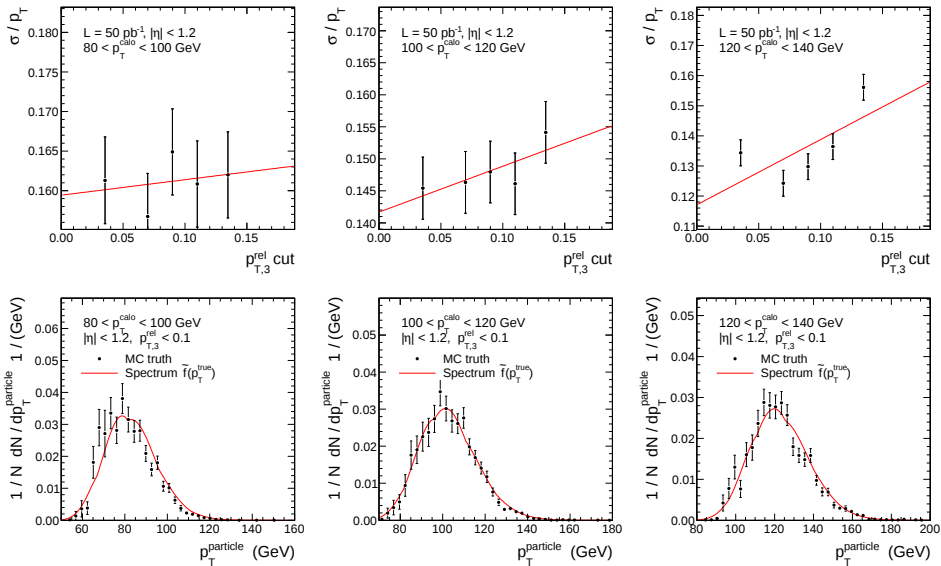


Results for Results for $0 < p_{T,3}^{\text{rel}} < 0.15$

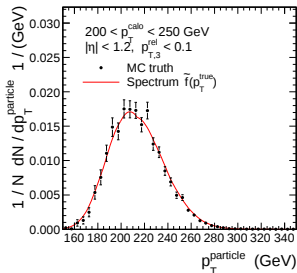
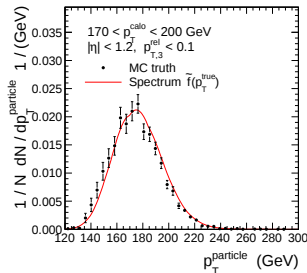
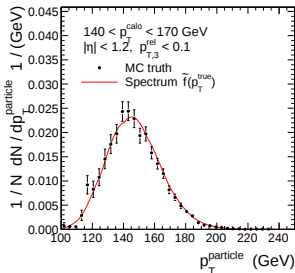
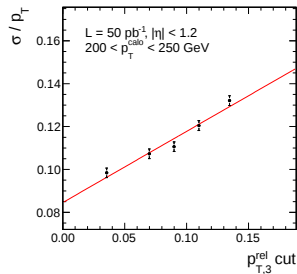
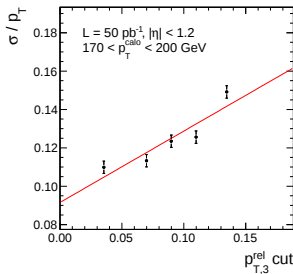
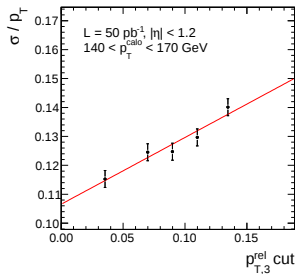
- Data driven dijet selection
- 2 leading jets in a certain p_T bin
- $|\eta| < 1.2$ for both jets
- $p_{T,3}^{\text{rel}} < x$ with x variable
- $f_{\text{em}} > 0.01$ for both jets



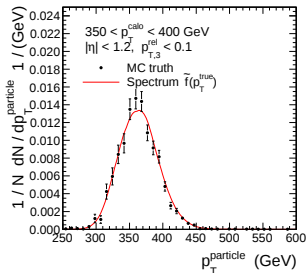
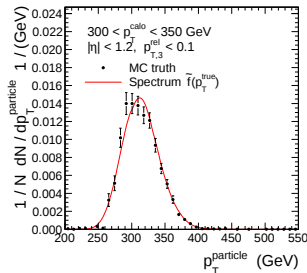
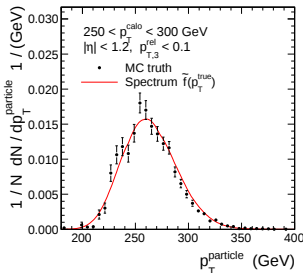
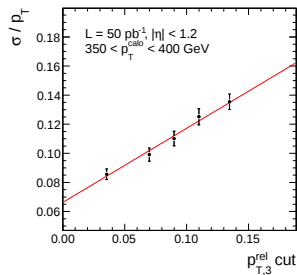
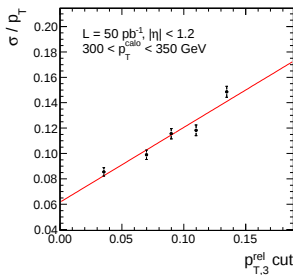
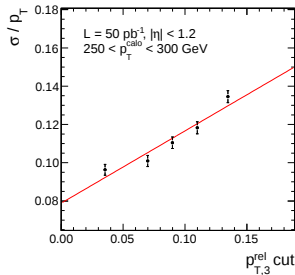
Fit results in various p_T bins (0/5)



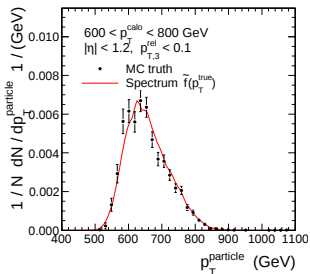
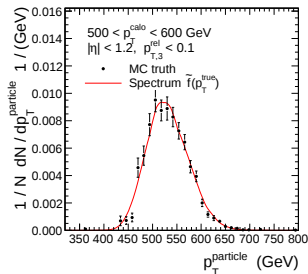
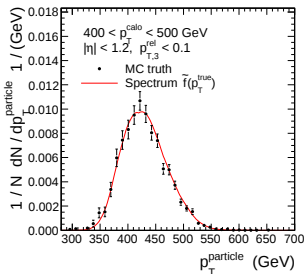
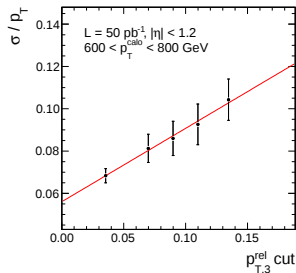
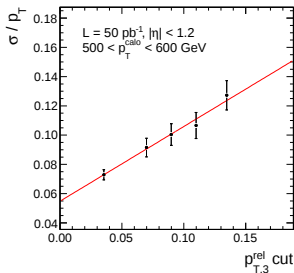
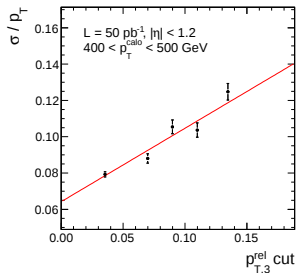
Fit results in various p_T bins (1/5)



Fit results in various p_T bins (2/5)



Fit results in various p_T bins (3/5)



Fit results in various p_T bins (4/5)

