Jet Energy Resolution for the Dijet Balance Method

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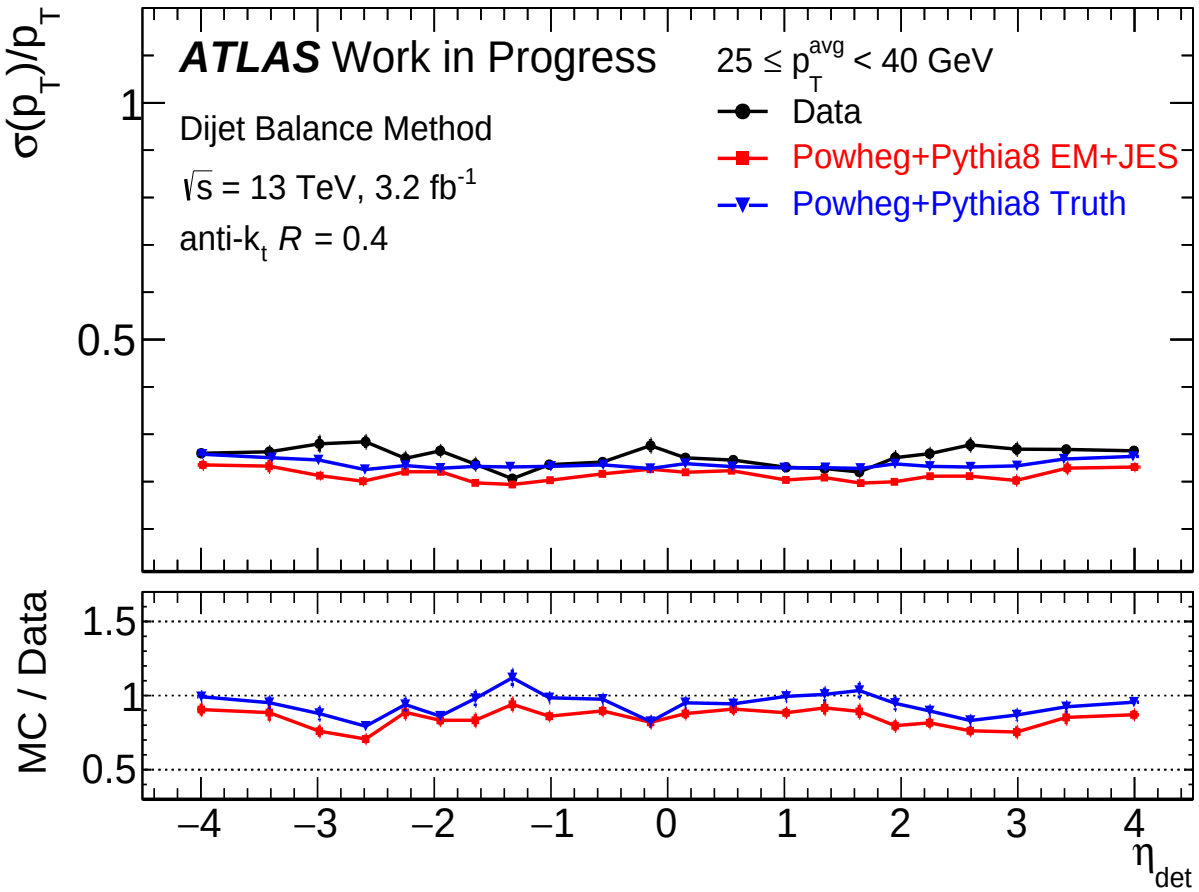
Status

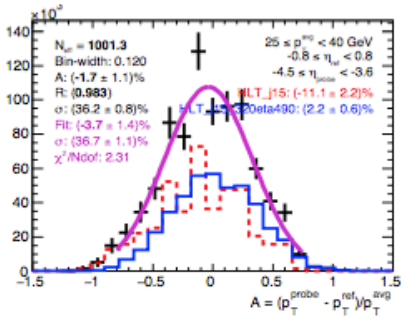
- Started looking at the fits for the 25GeV $<$ pTavg $<$ 40GeV.
- Started to look at subtracting the MC Truth resolution from the MC Reco and Data for Sherpa
- Compared Powheg+Pythia8 with Sherpa for EM+JES and Truth
- Corrected resolution calculation due to the EtaInterCalibration method's deviation from the original method of calculating Asymmetry (factor of $\sqrt{2}$)

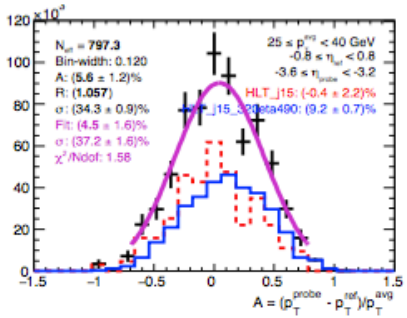
JER vs Eta: 25 < pTavg < 40

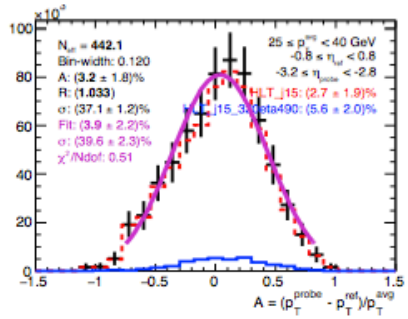


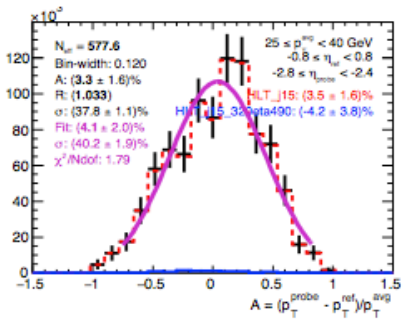
- Truth MC has a higher resolution than Reco MC.

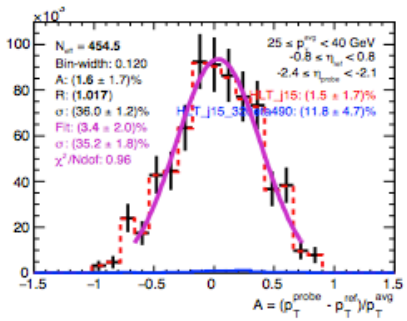
JER vs Eta: $25 < \text{pTavg} < 40$: Data fits

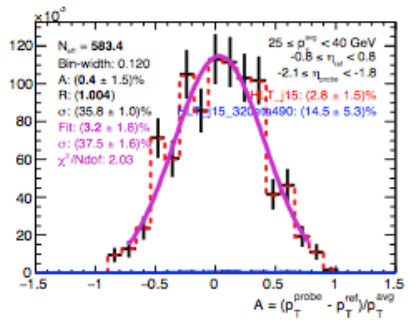


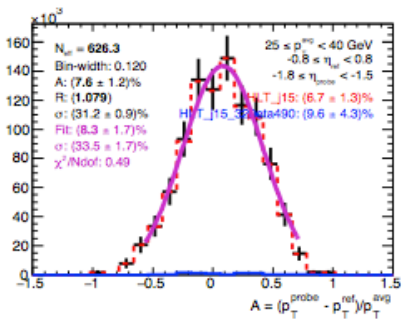


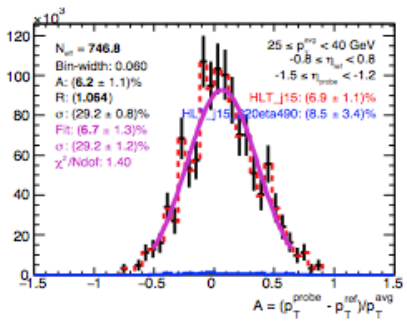


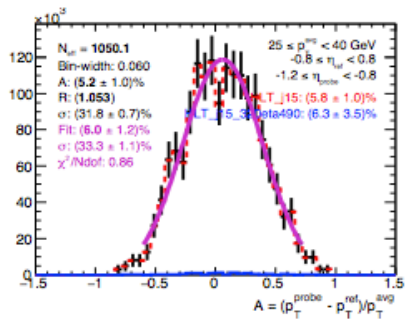




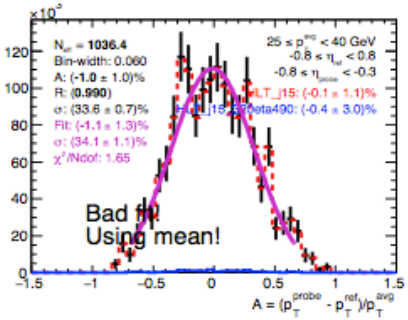


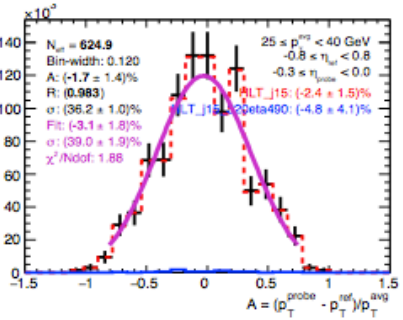
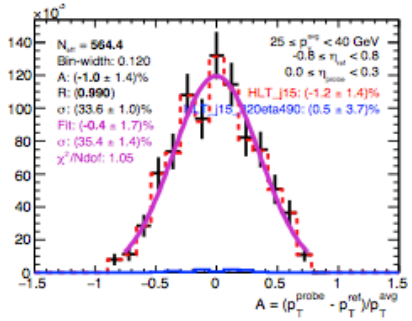
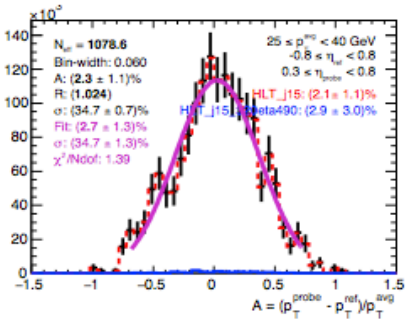
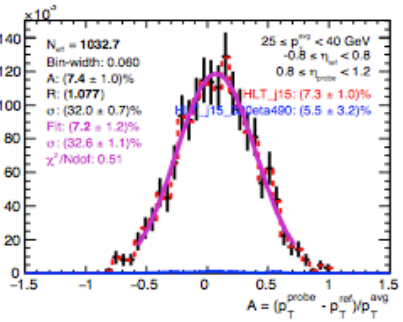
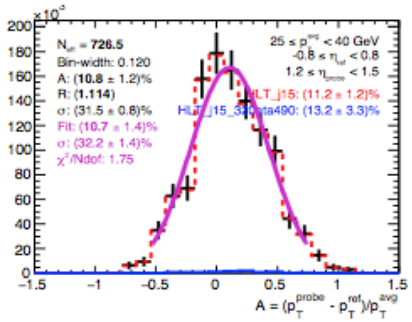
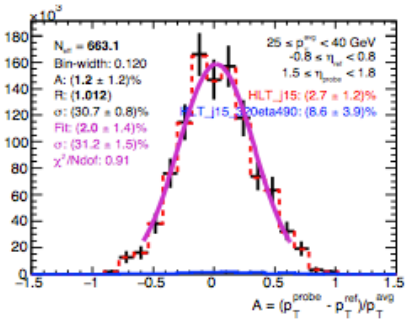
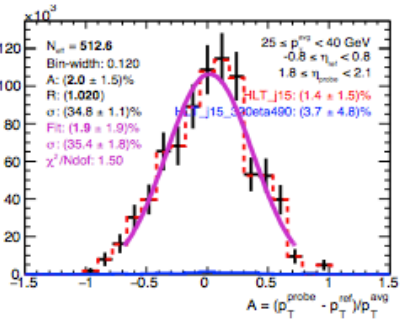
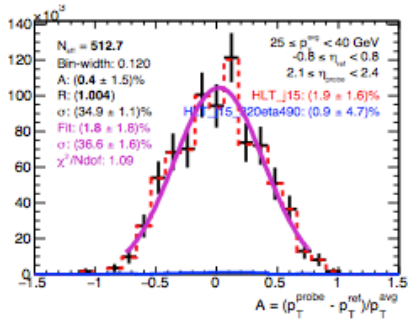




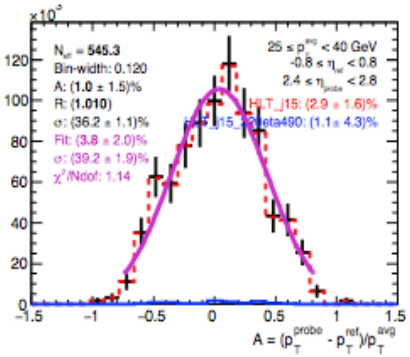


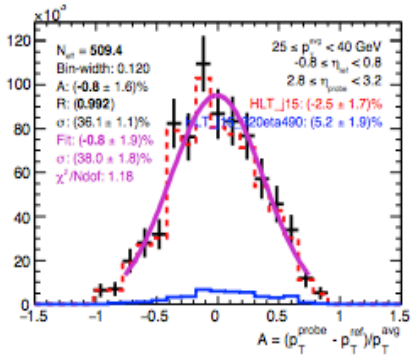
JER vs Eta: $25 < \text{pTavg} < 40$: Data fits

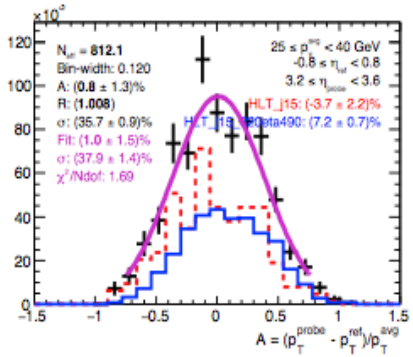


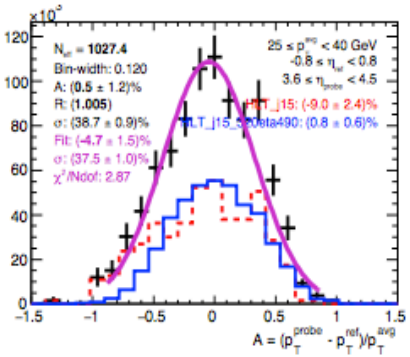









JER vs Eta: $25 < \text{pTavg} < 40$: Data fits

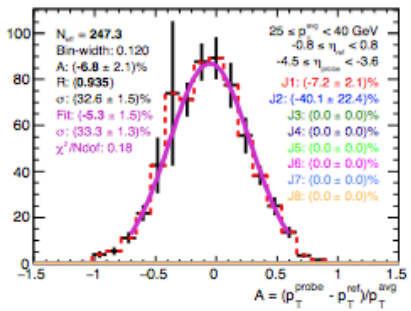


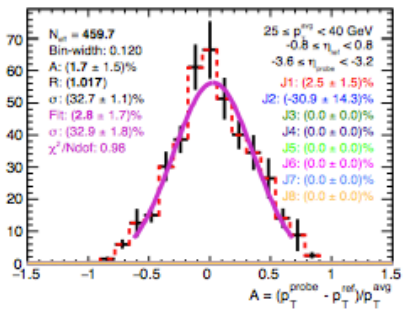


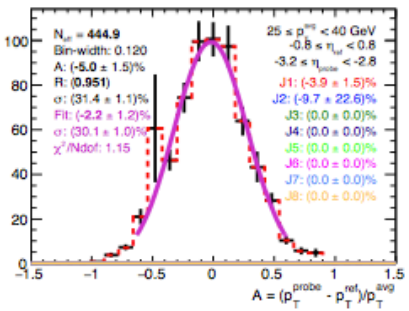


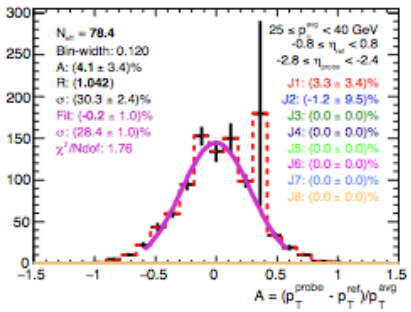


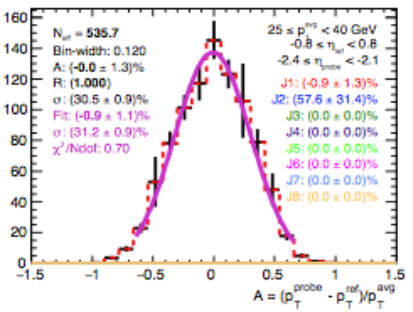
JER vs Eta: $25 < \text{pTavg} < 40$: Powheg+Pythia8 EM+JES fits

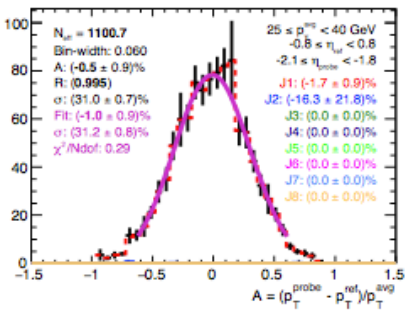


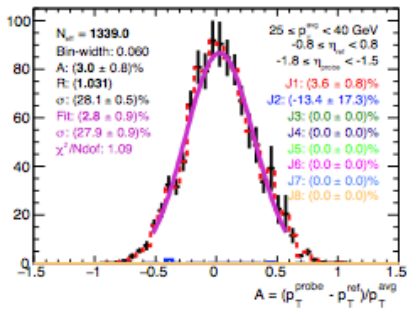


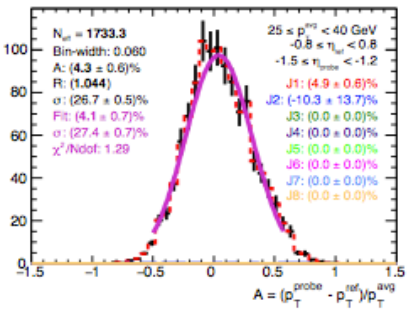


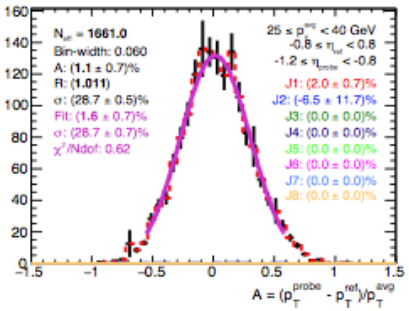




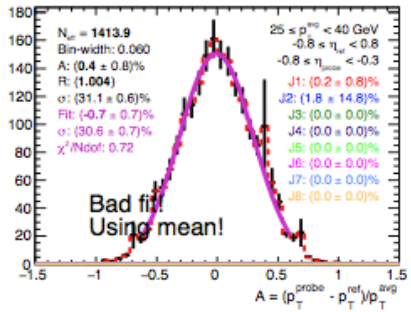


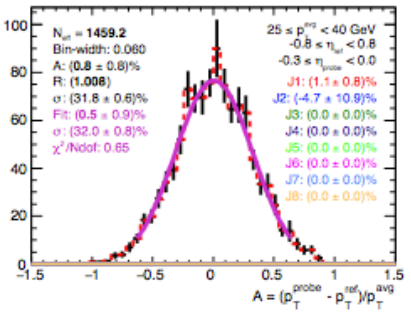
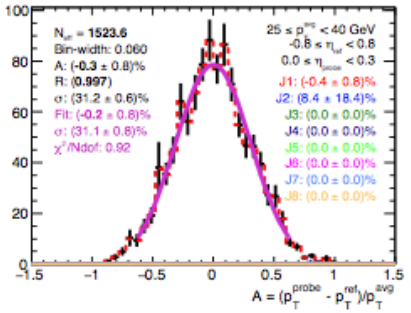
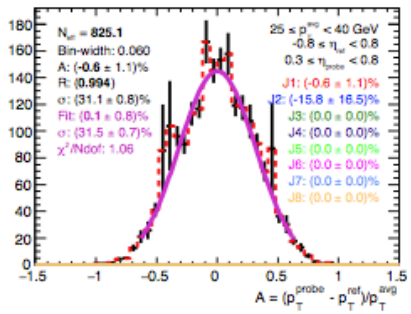
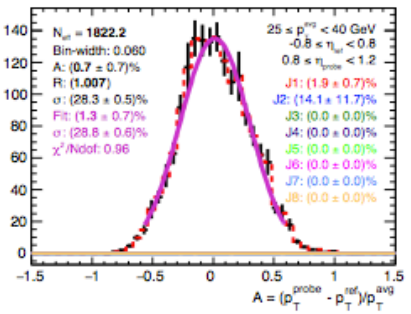
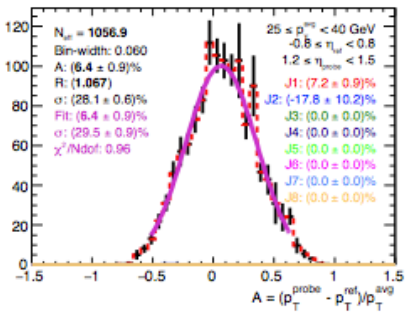
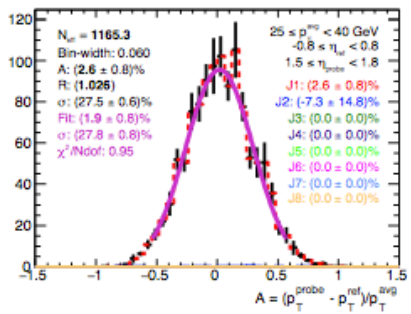
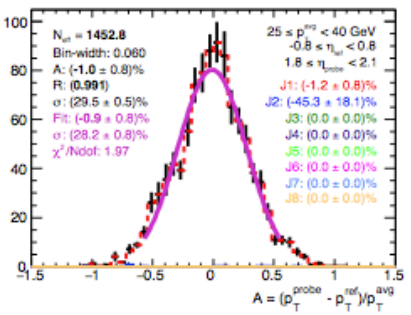
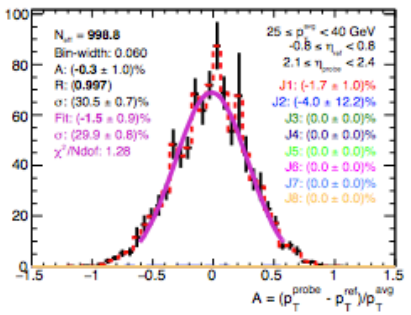






JER vs Eta: 25 < pTavg < 40 : Powheg+Pythia8 EM+JES fits



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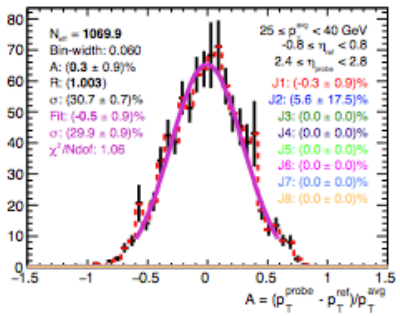
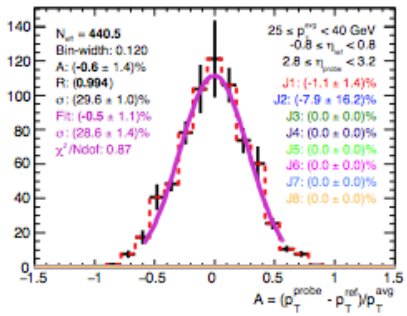
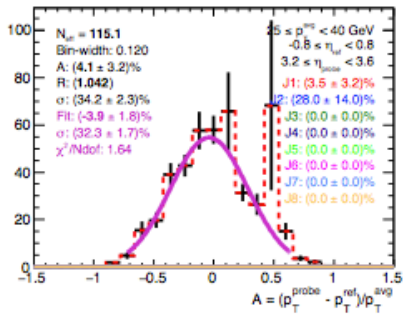
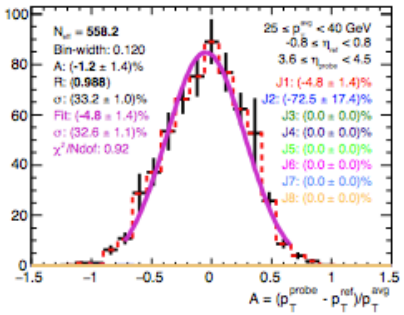
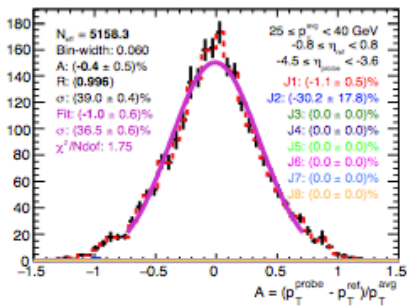


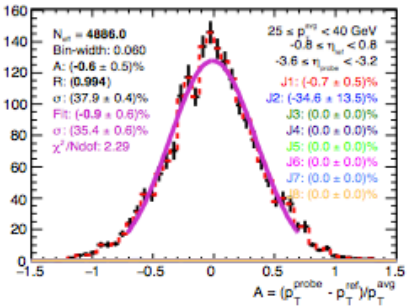


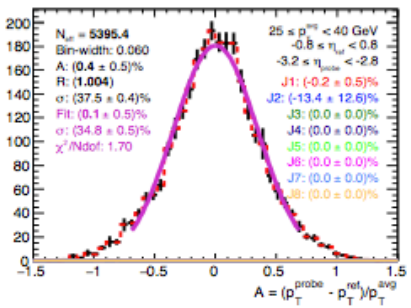


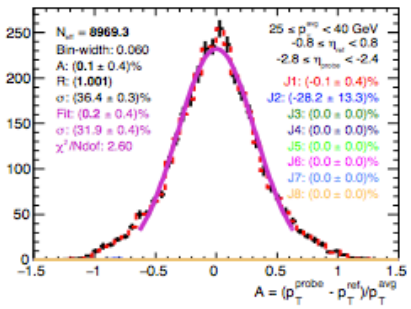


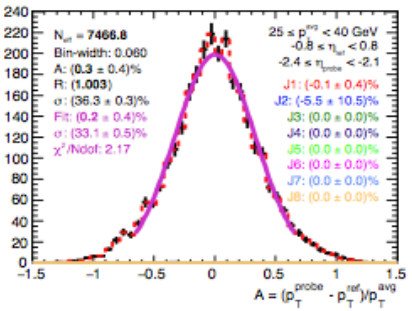
JER vs Eta: $25 < pTavg < 40$: Powheg+Pythia8 Truth fits

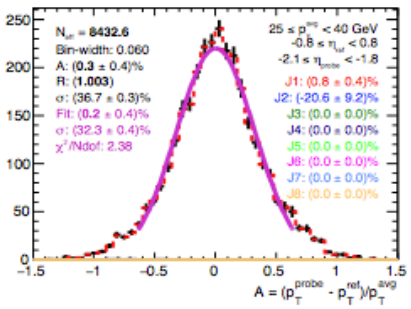


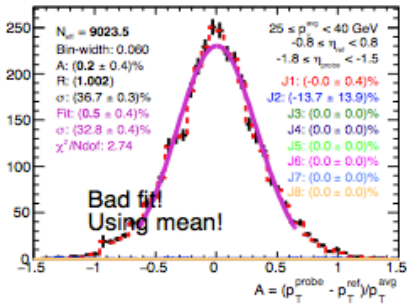


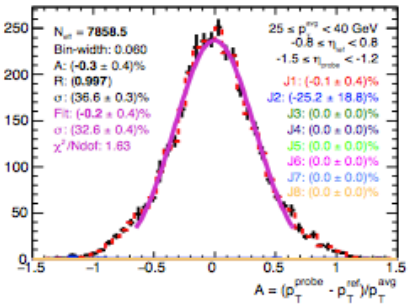


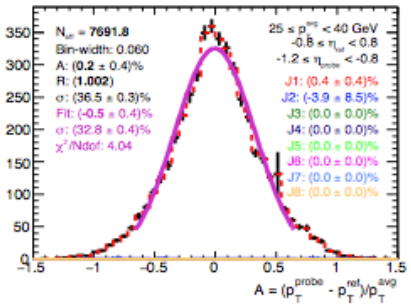




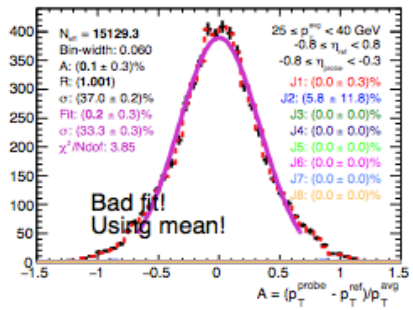


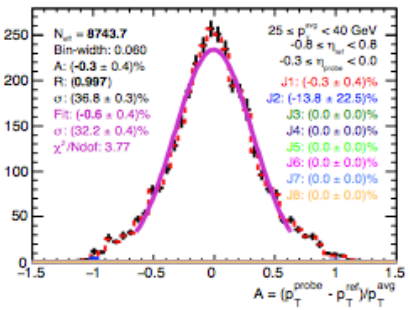


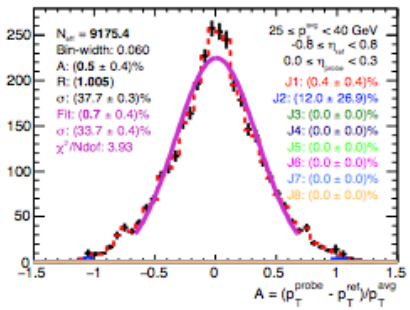


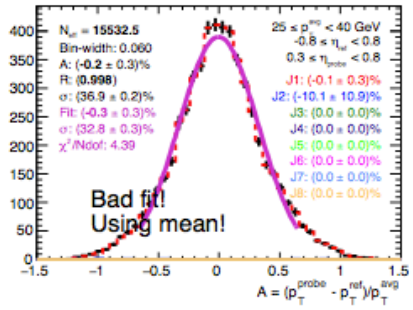


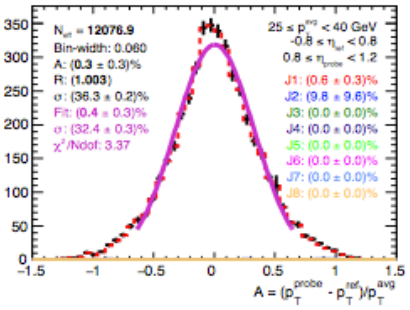
JER vs Eta: $25 < \text{pTavg} < 40$: Powheg+Pythia8 Truth fits

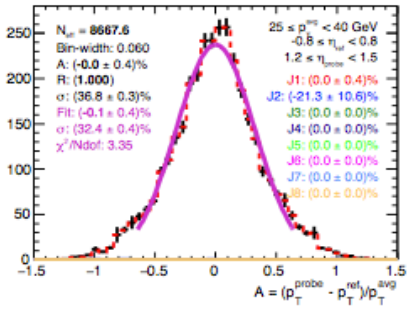


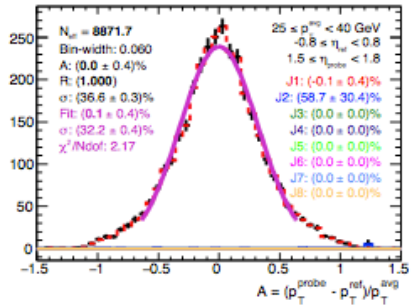


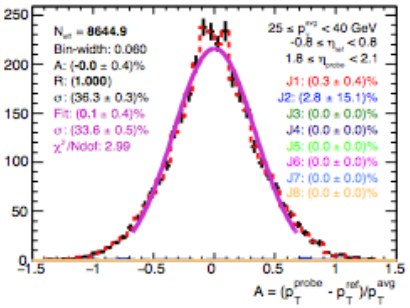


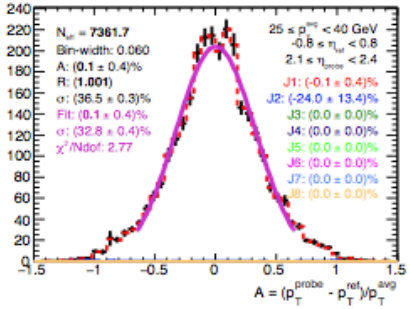




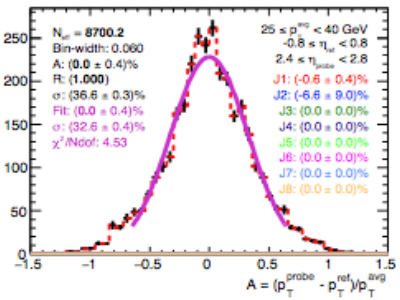


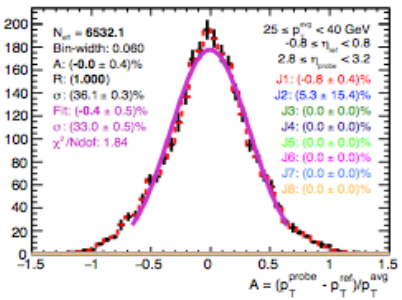


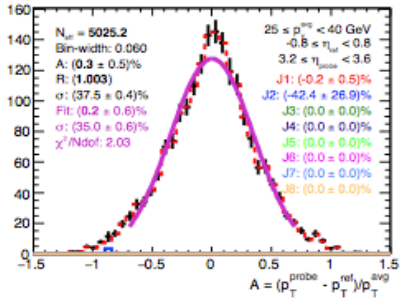


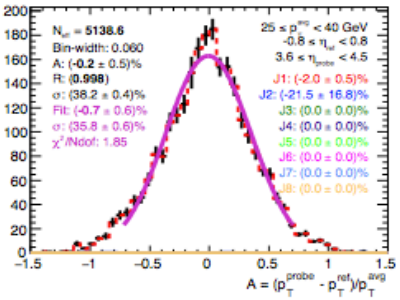


JER vs Eta: $25 < \text{pTavg} < 40$: Powheg+Pythia8 Truth fits

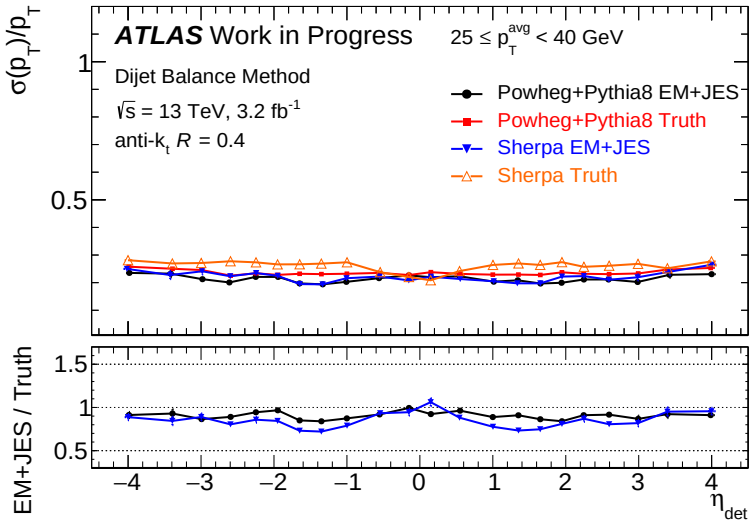


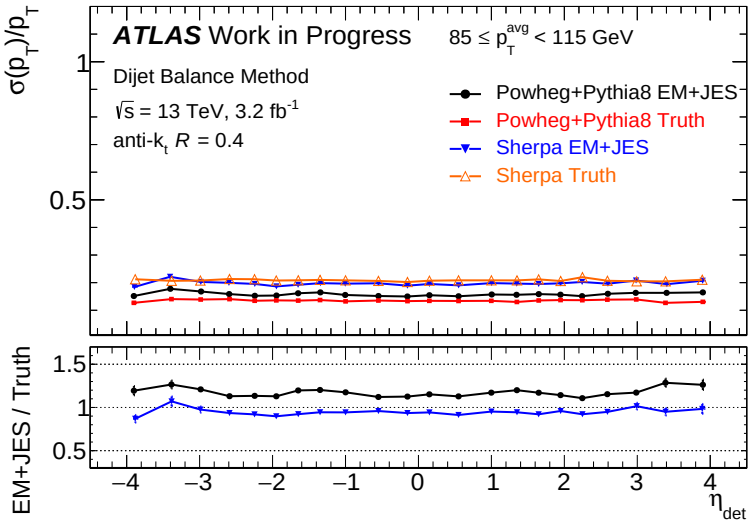


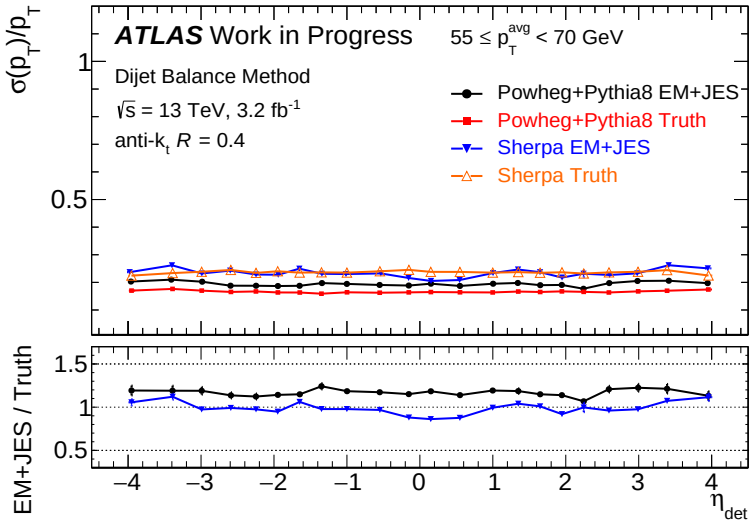


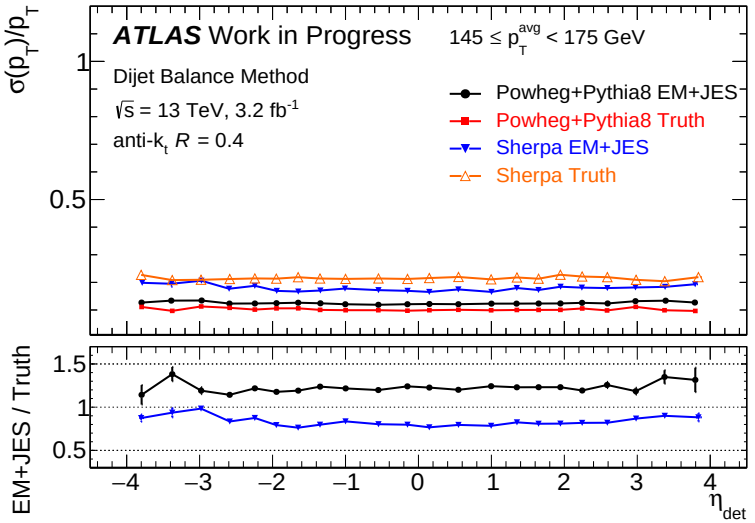


Powheg+Pythia8 vs Sherpa

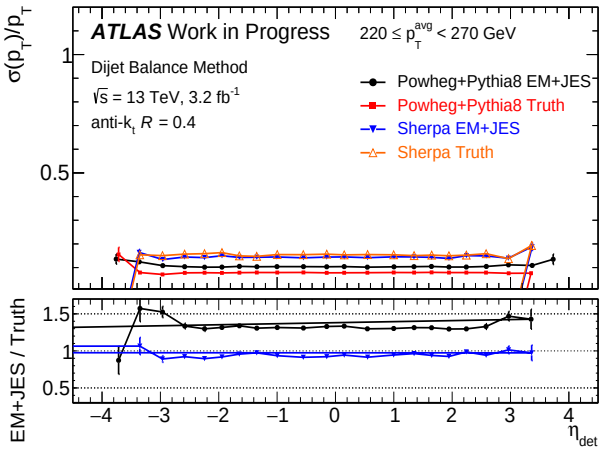


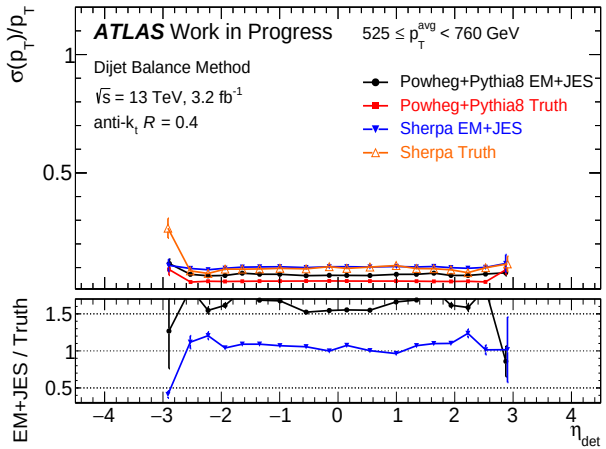


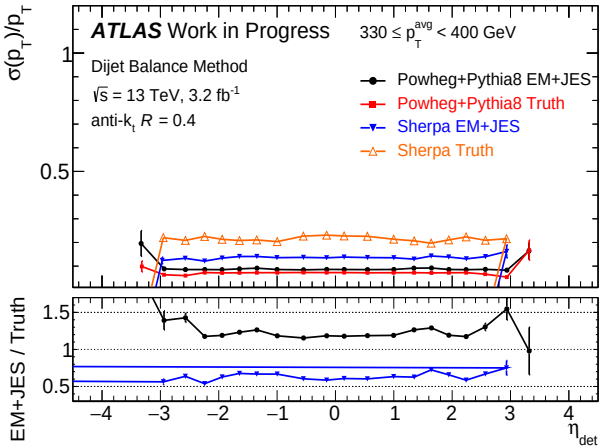


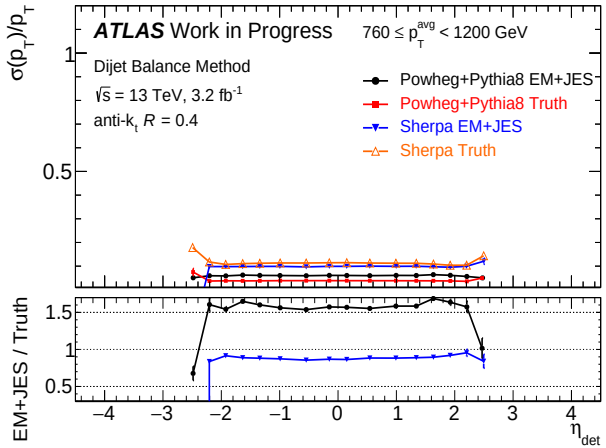


Powheg+Pythia8 vs Sherpa: Problematic bins



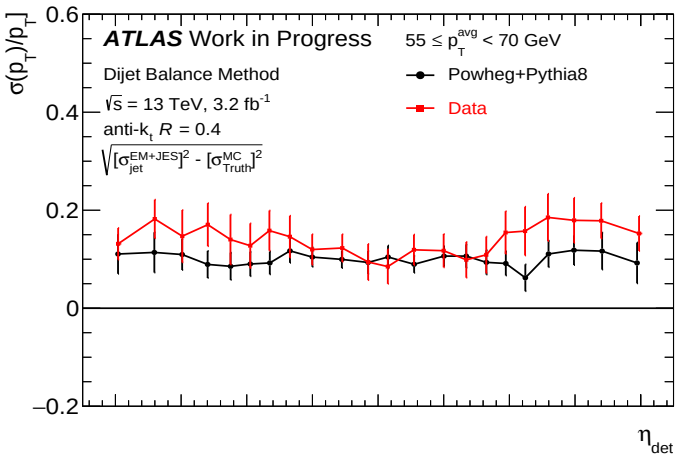


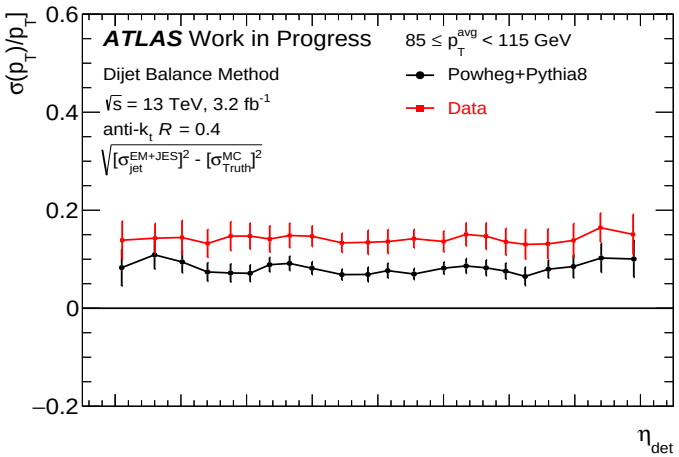


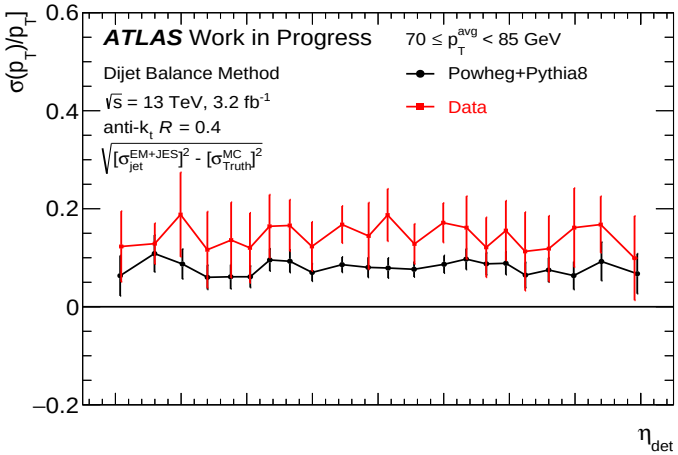


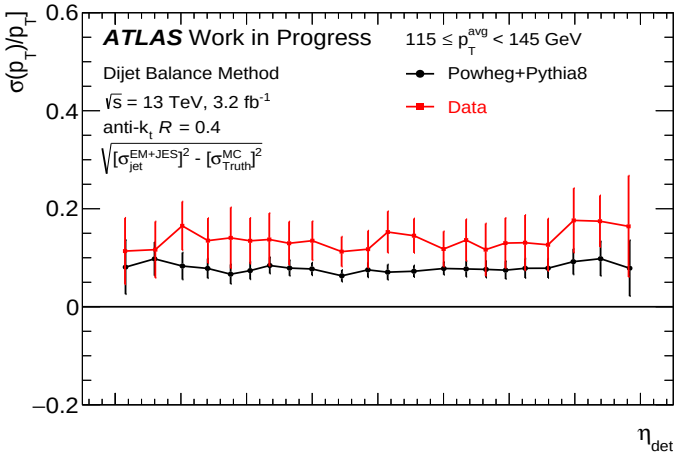
- The problems seem to lie in the extreme eta regions and so could be down to the definition of the resolution that I'm currently using.

Powheg+Pythia8 subtraction



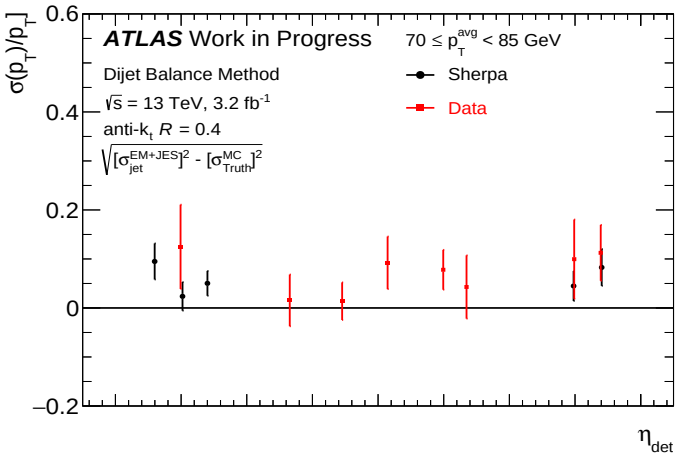


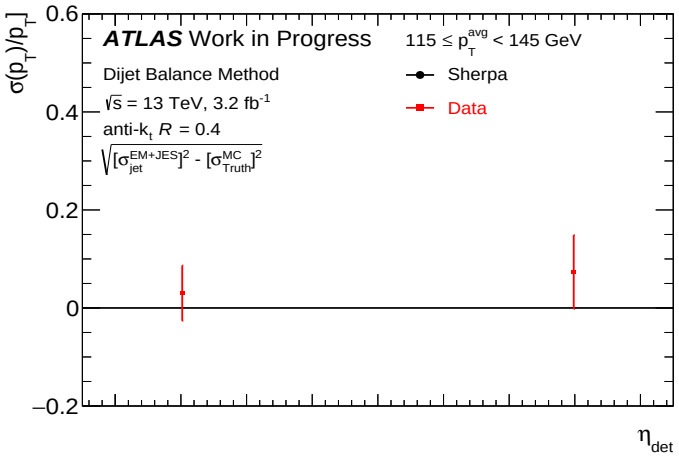


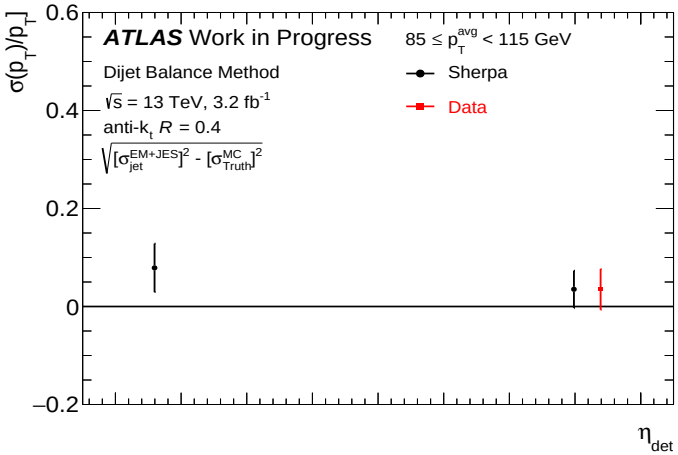


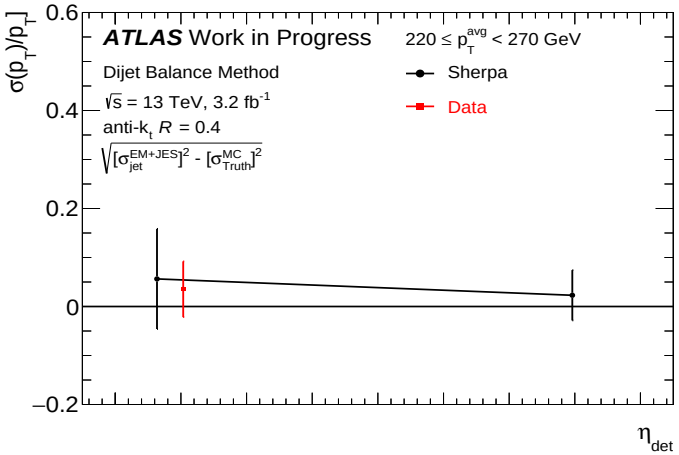
- Changed the resolution calculation to account for the EtaInterCal deviation from the run 1 method

Sherpa subtraction...









- Lots of the points seem to be missing... any ideas?

Calculating the resolution:

- For jets in the same rapidity region: $\sigma(\mathrm{A}) = \sqrt{2}\frac{\sigma(p_T)}{p_T}$
- If one of the two leading jets is in the probe region and the other is in the reference region:

$$\frac{\sigma(p_T)}{p_T} = \sqrt{4\sigma^2(A_{(i,j)}) - 2\sigma^2(A_{(i,i)})}$$

- Need to correct for this

To-do

- Restrict the RMS value for the fits
- Look into the missing points in the sherpa subtraction
- Change the resolution definition to take into account the difference in asymmetry for the probe and reference rapidity regions