Jet Energy Resolution for the Dijet Balance Method

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Status

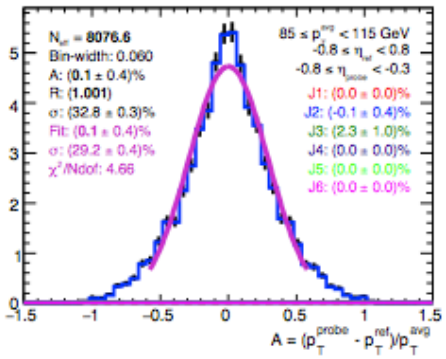
- Used the Dijet Balance Method to find the Jet Energy Resolution for Powheg+Pythia8, Sherpa and Pure Pythia8 MCs.

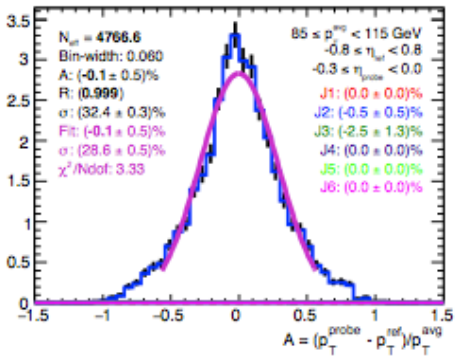
- Found an issue with the truth resolution being larger than reco for Sherpa, Pure Pythia8 and some bins of Powheg+Pythia8.
  - Restricted the fit of the asymmetry to ± 0.5.
  - Ensured ΔR matching of truth and reco jets to <0.4.
- Calculated MC detector resolution from:

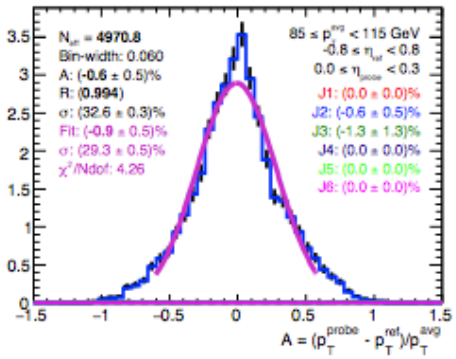
$$\frac{P_T^{reco} - P_T^{truth}}{P_T^{reco}}$$

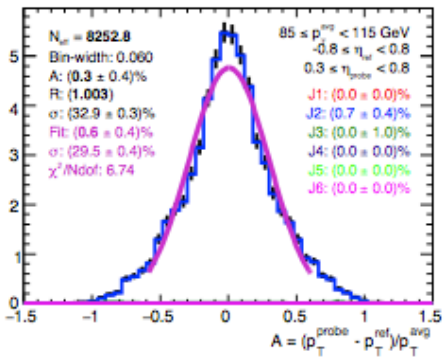
in bins of (P_T^{reco}, η) for ΔR matched jets for each MC.

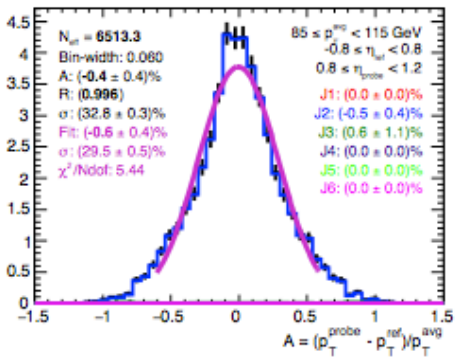
Sherpa Truth: Before any restrictions

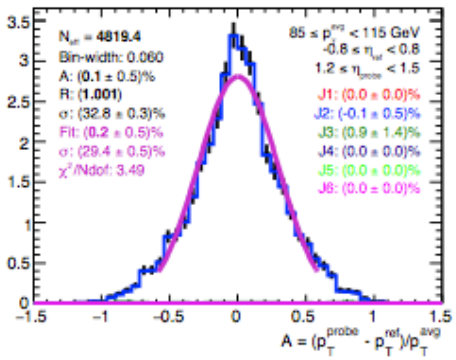


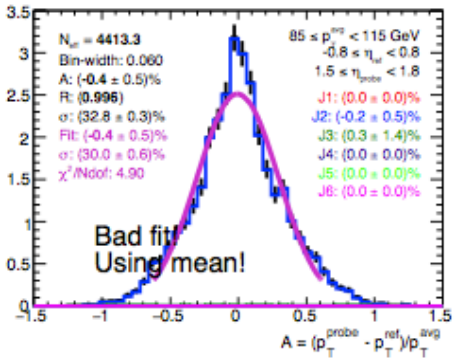


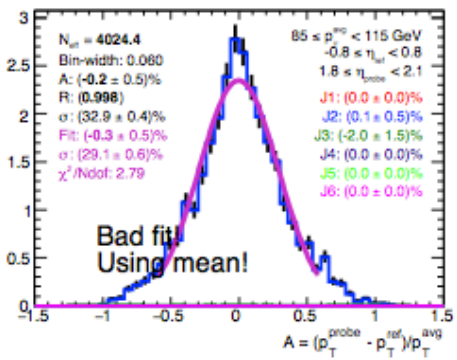


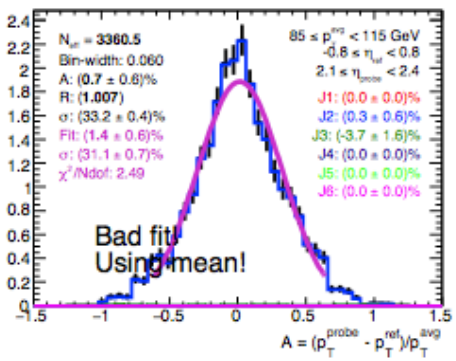




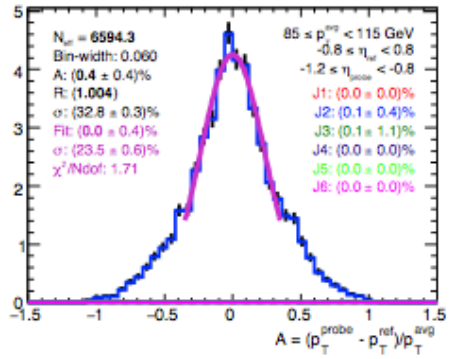


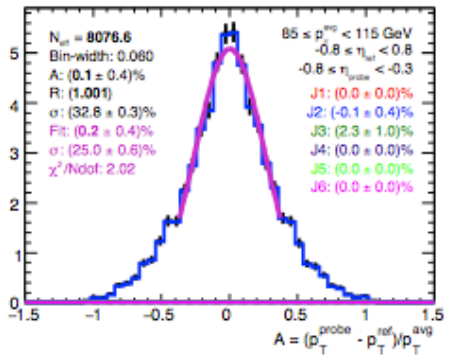


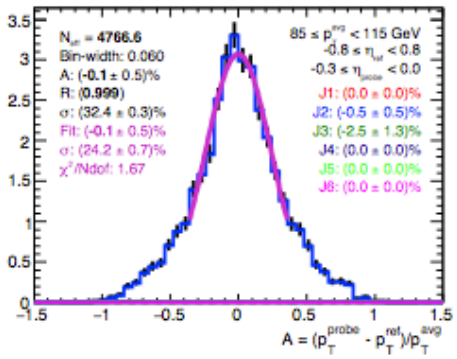


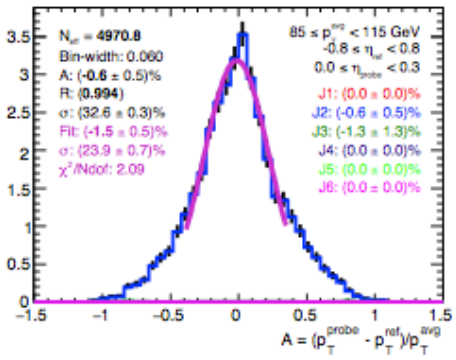


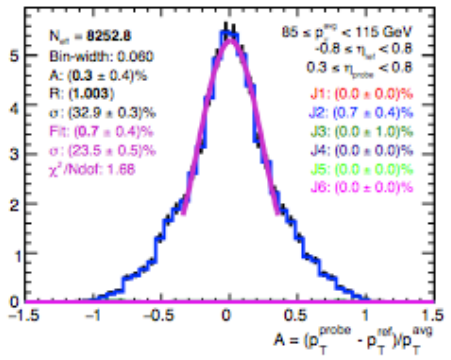
Sherpa Truth: After restriction to fit

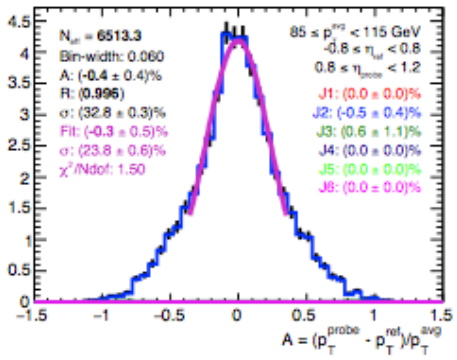


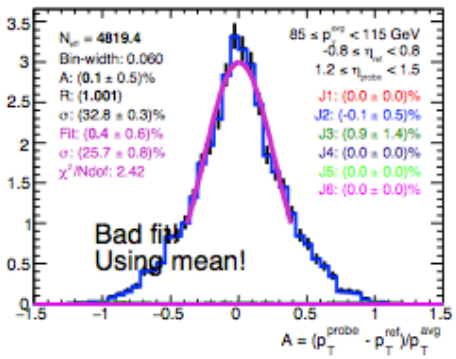


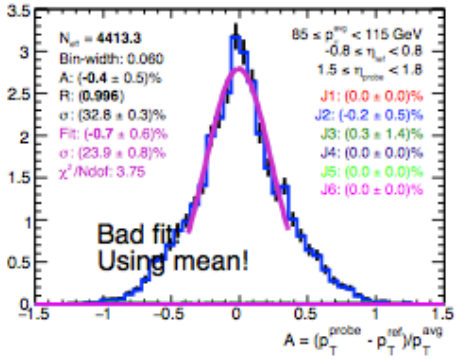


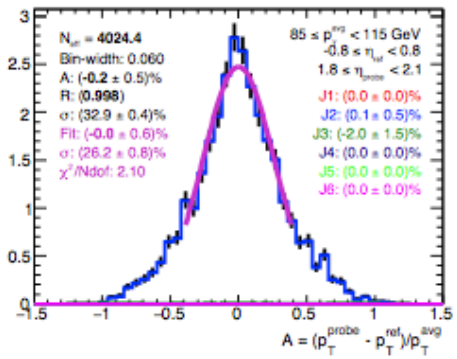




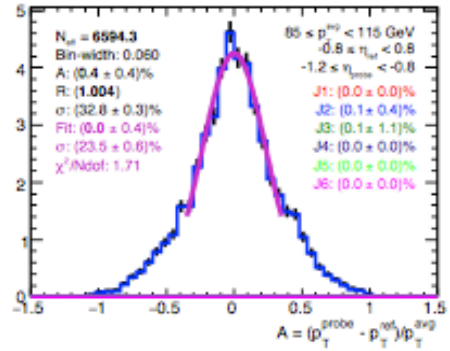


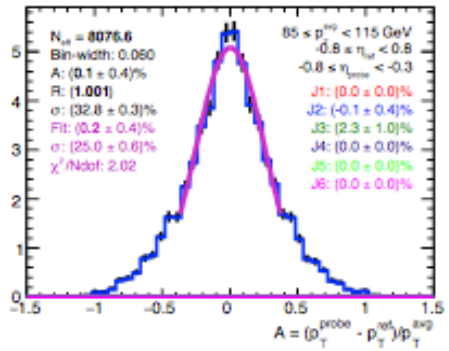


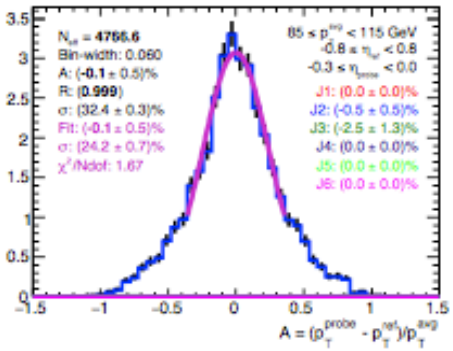


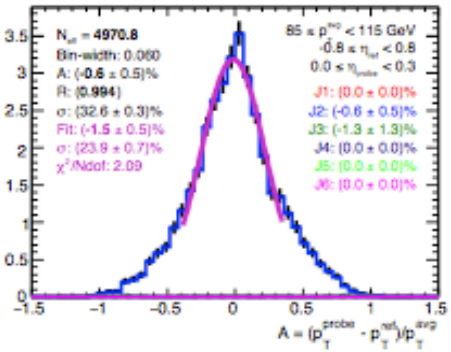


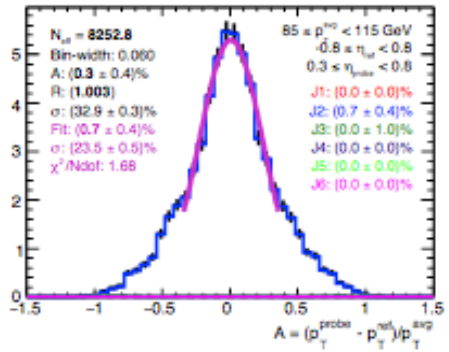
Sherpa Truth: After restriction to fit and ΔR

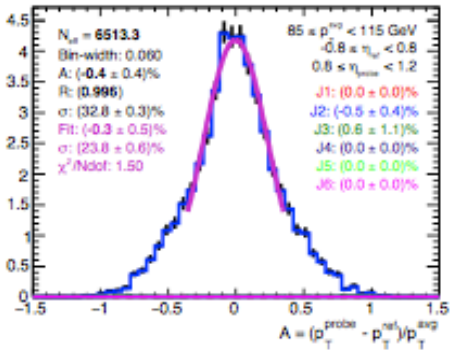


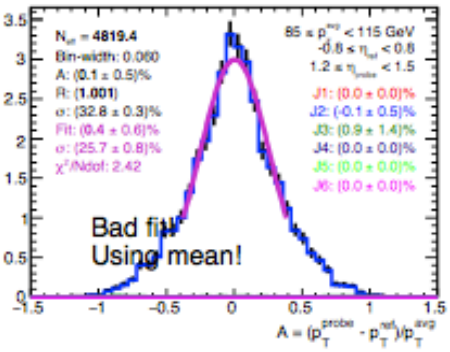


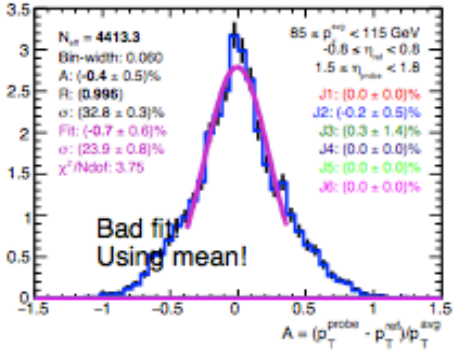


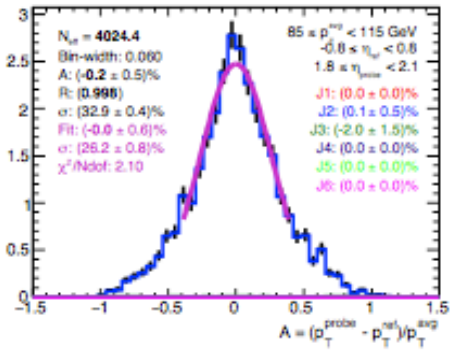




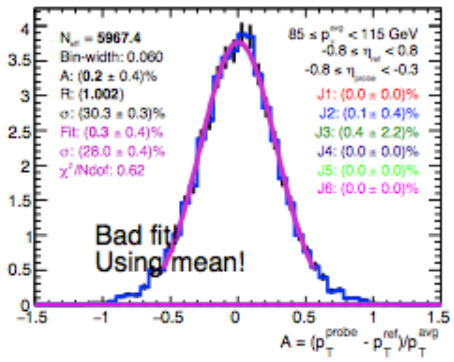


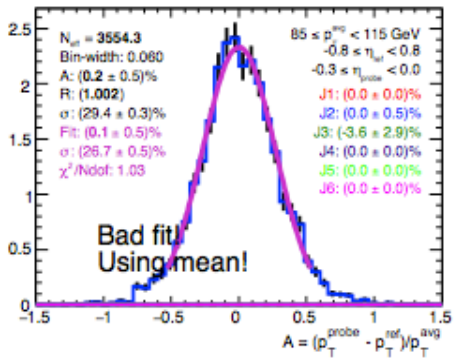


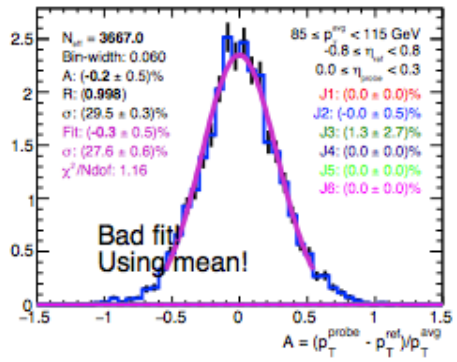


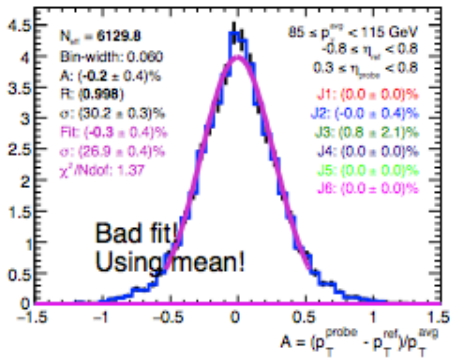


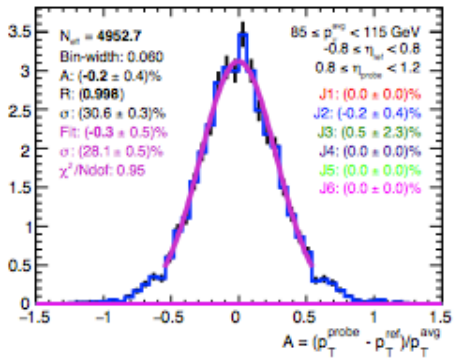
Sherpa Reco: Before any restrictions

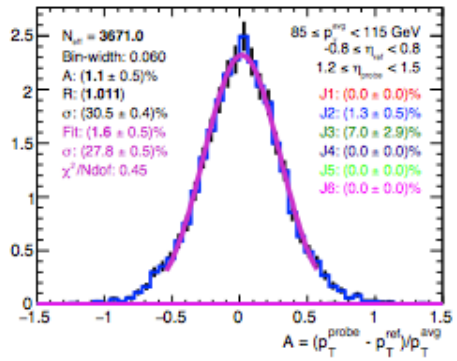


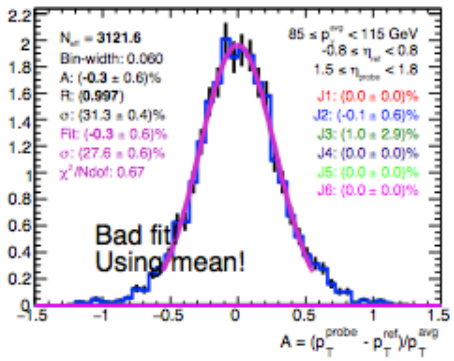


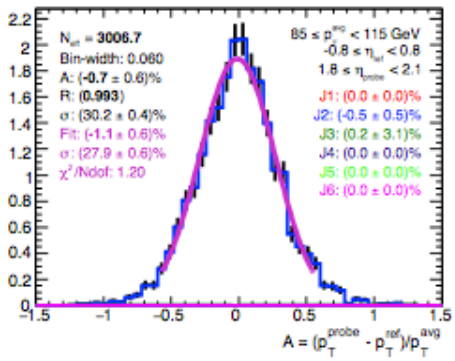


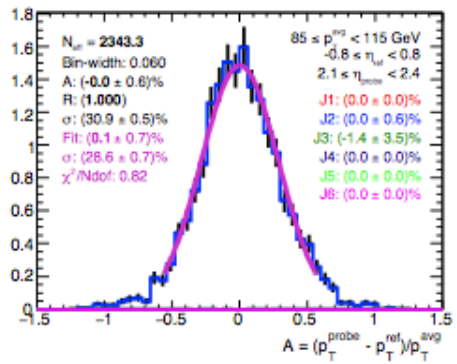




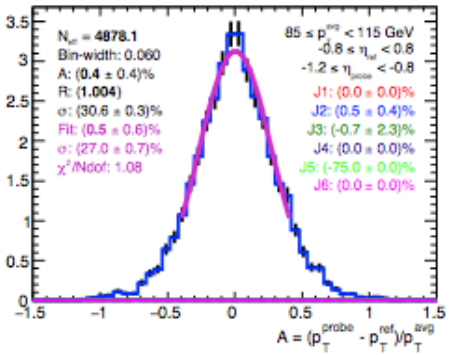


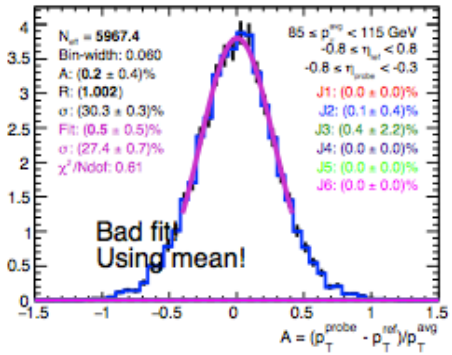


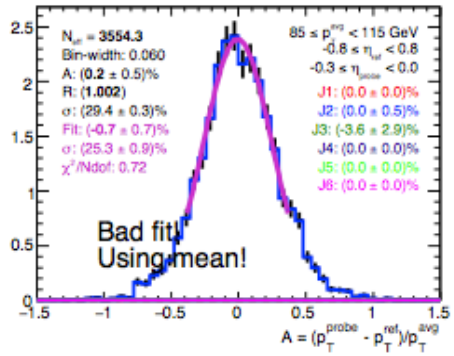


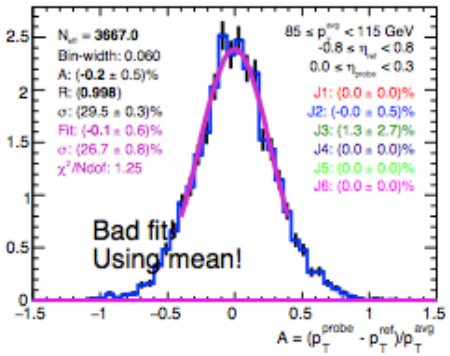


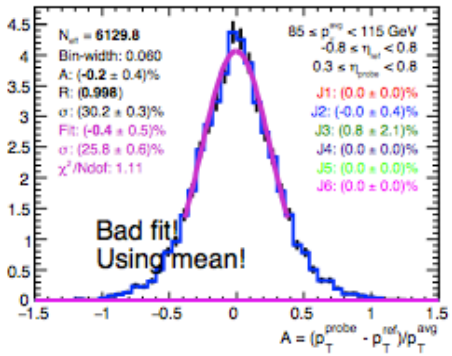
Sherpa Reco: After restriction to fit

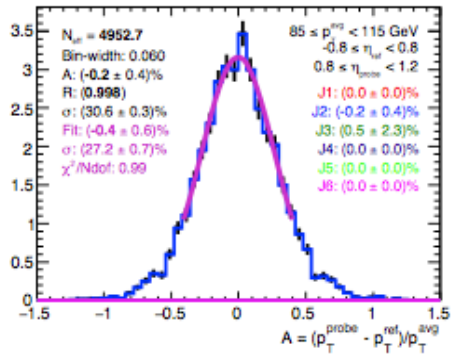


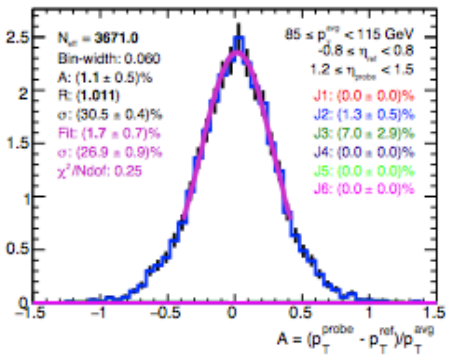


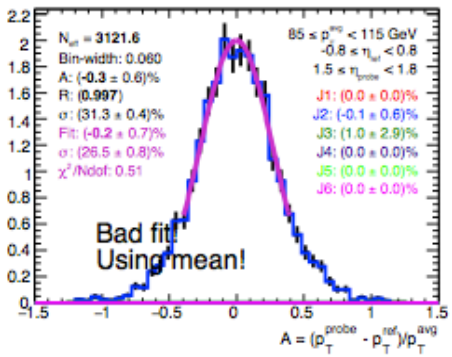


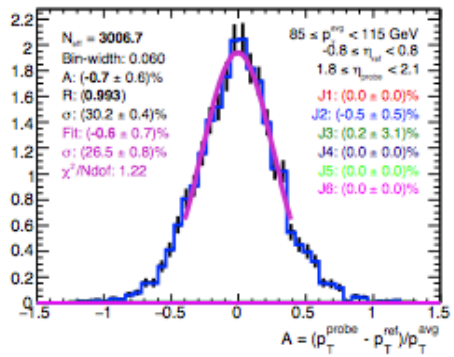




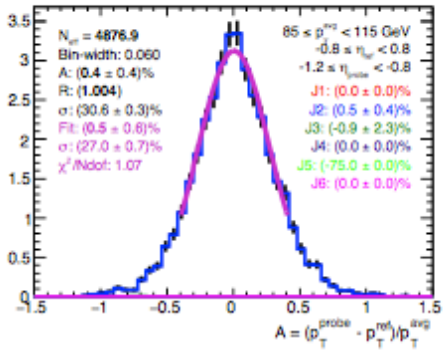


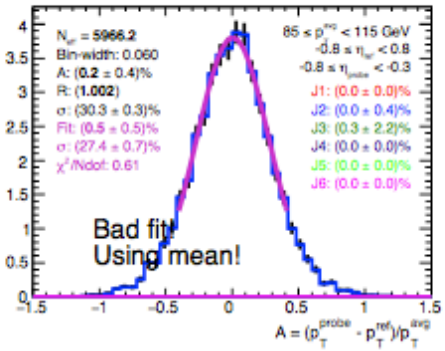


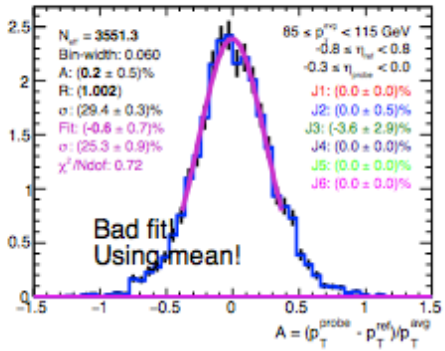


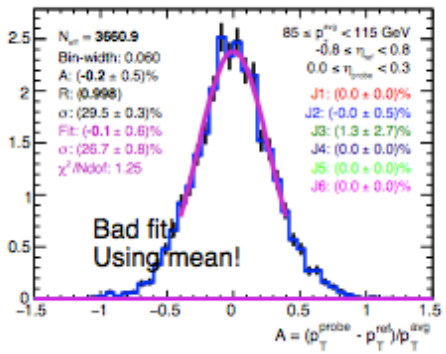


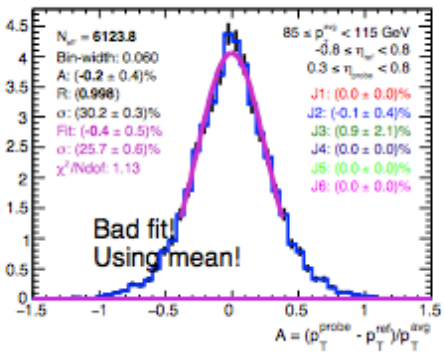
Sherpa Reco: After restriction to fit and ΔR

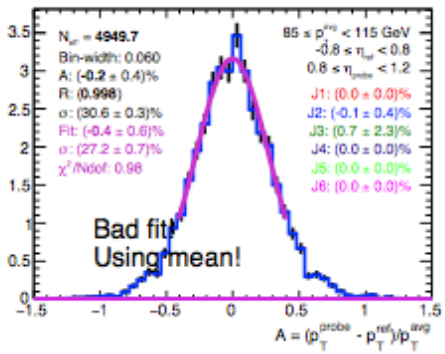


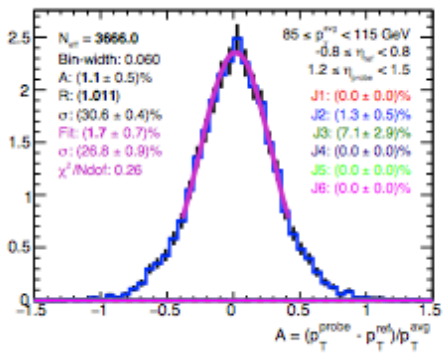


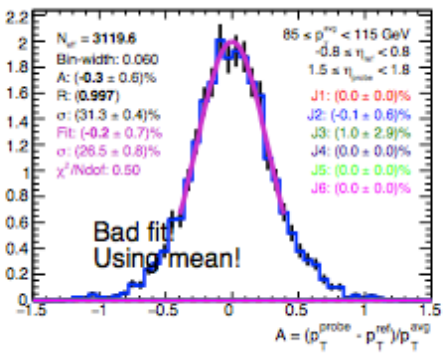


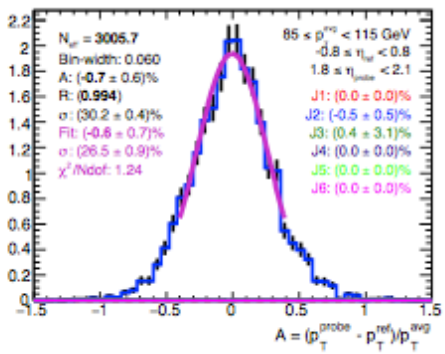




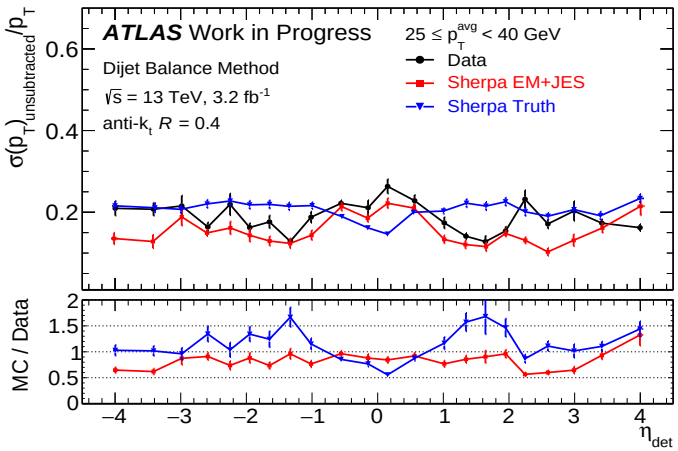


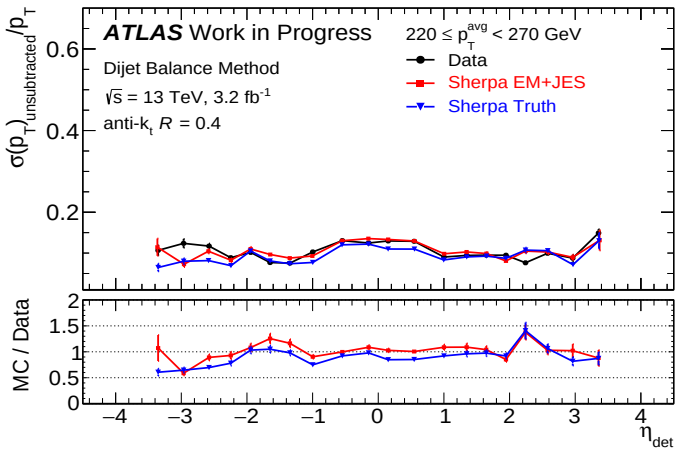


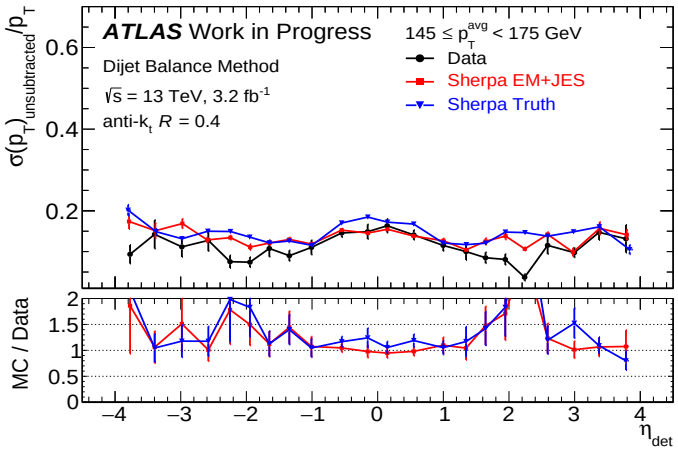


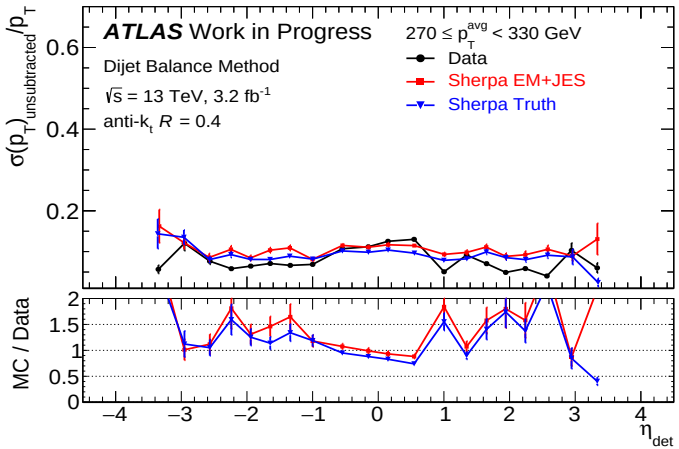


Sherpa unsubtracted $\sigma(P_T)/P_T$ vs η_{det} with restrictions



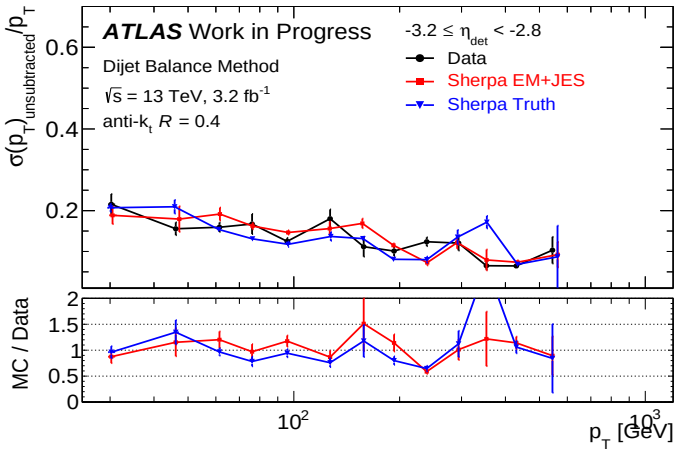


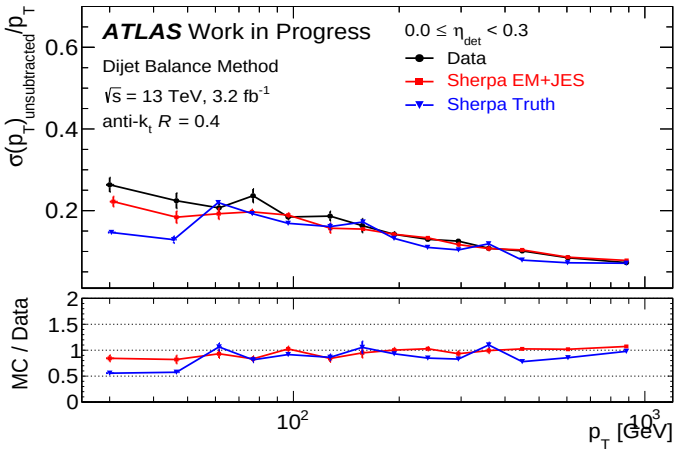


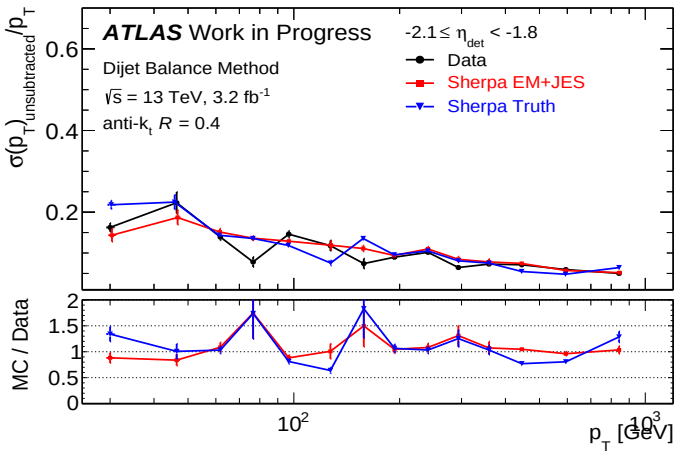


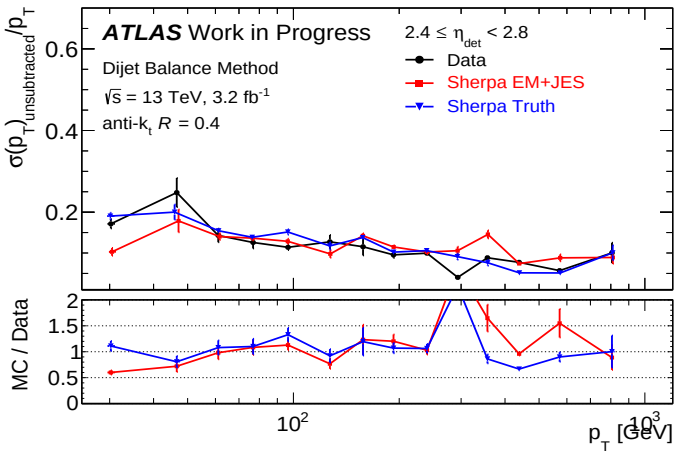
A much smaller number of eta bins of truth are higher than Reco after fit and ΔR restriction.

Sherpa unsubtracted $\sigma(P_T)/P_T$ vs P_T with restrictions

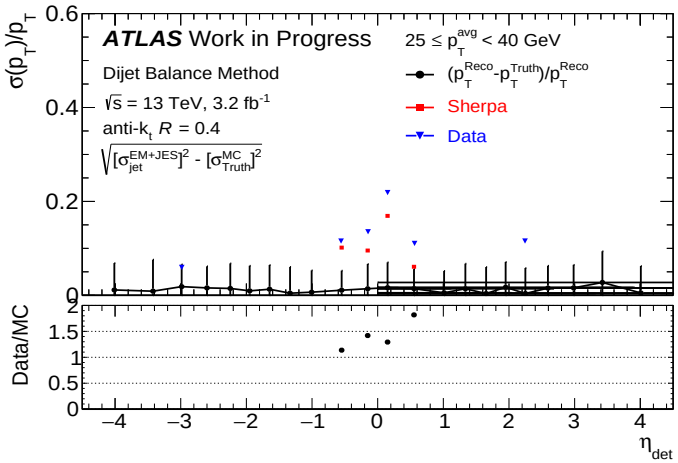


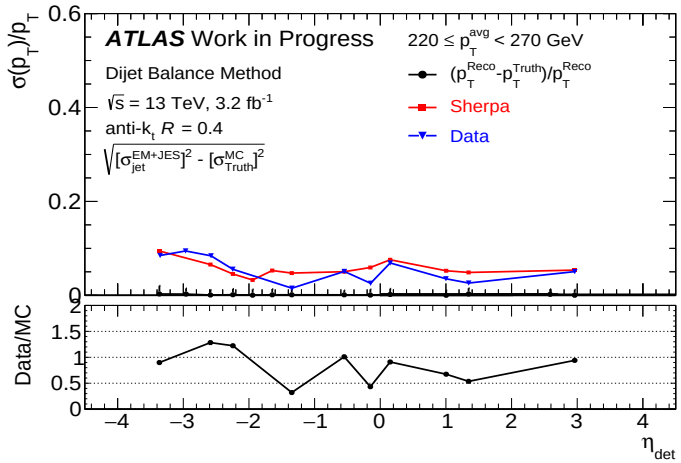


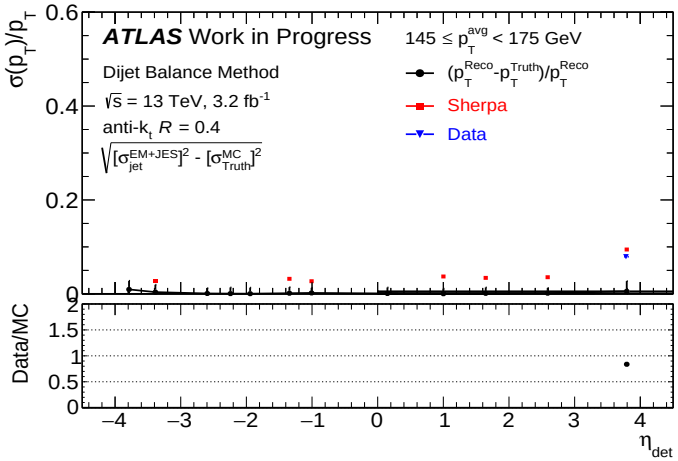


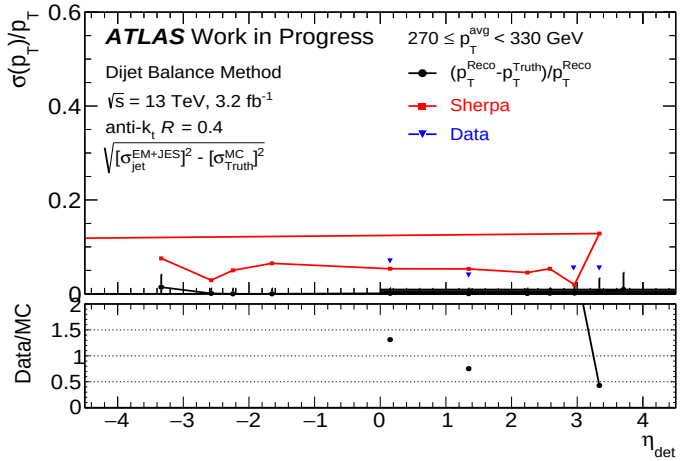


Sherpa $\sigma(P_T)/P_T$









- There seems to be an issue with the line connecting points here (Working on it).

To-Do:

- Fix bugs in code causing lack of connecting points.
- Find reason behind truth being larger than reco.
- Start looking at the bisector method.