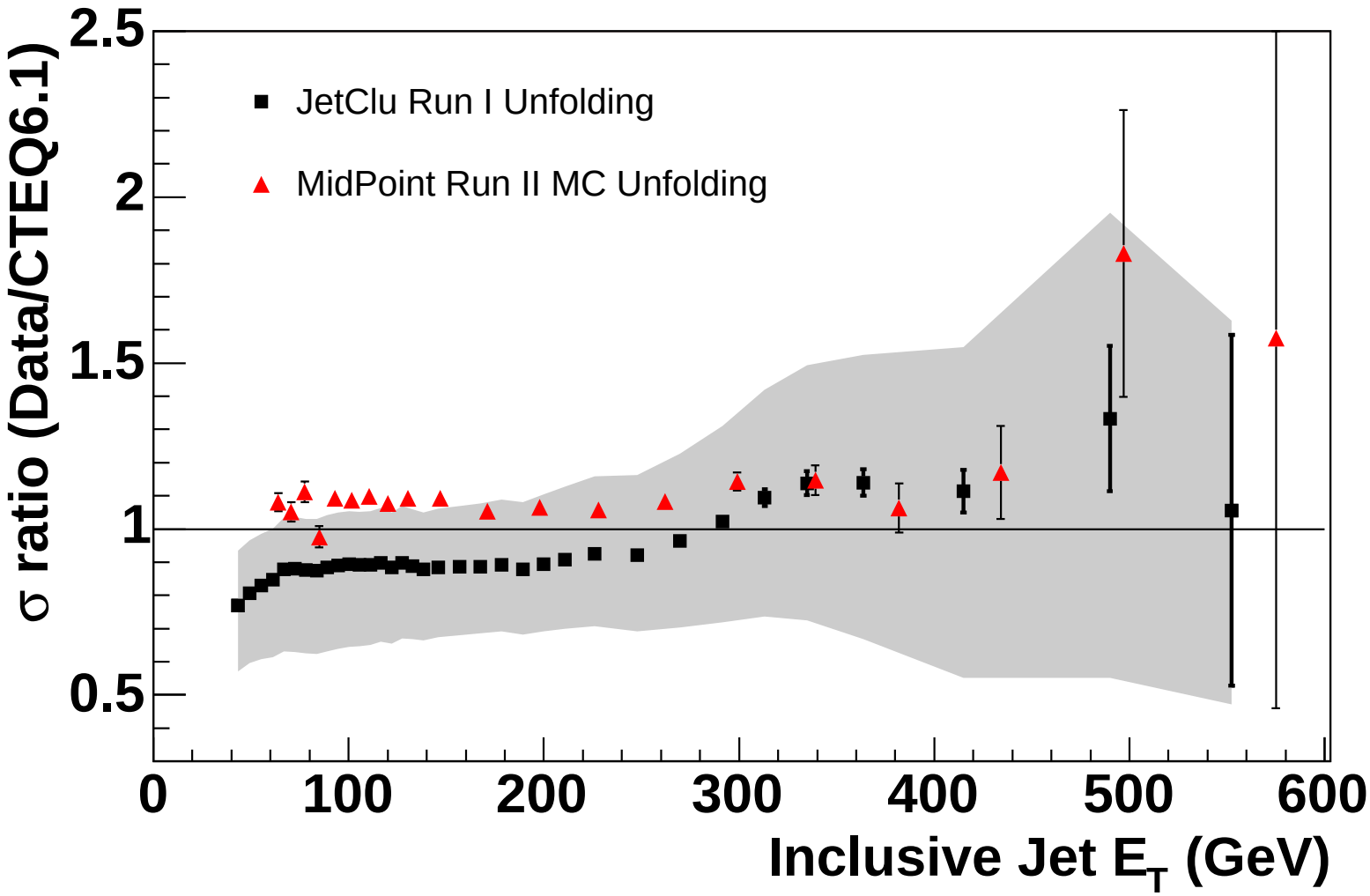
Comparison of Jet Algorithms

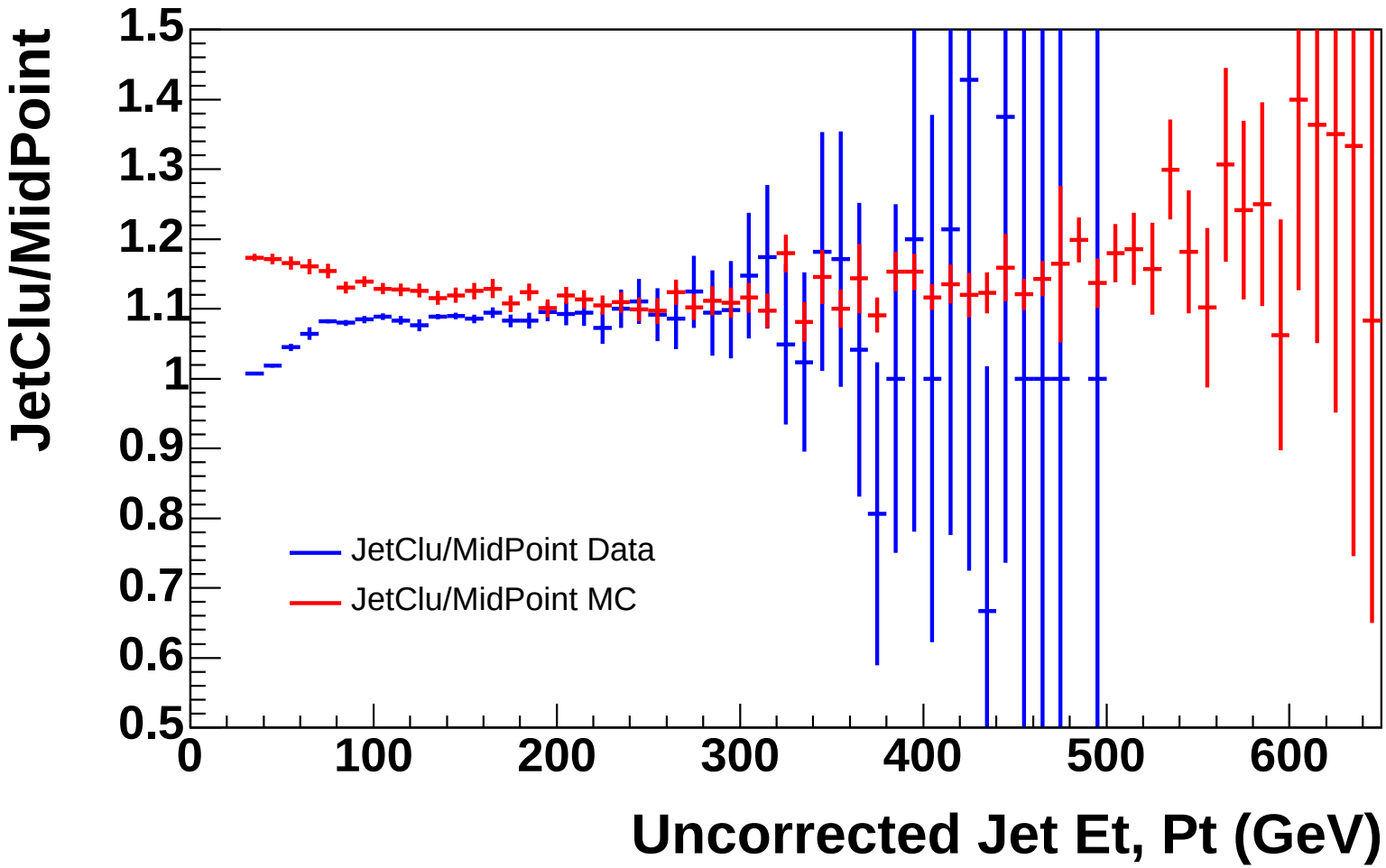


Comparison of MidPoint (MC unfolding) and JetClu (Run I Method)

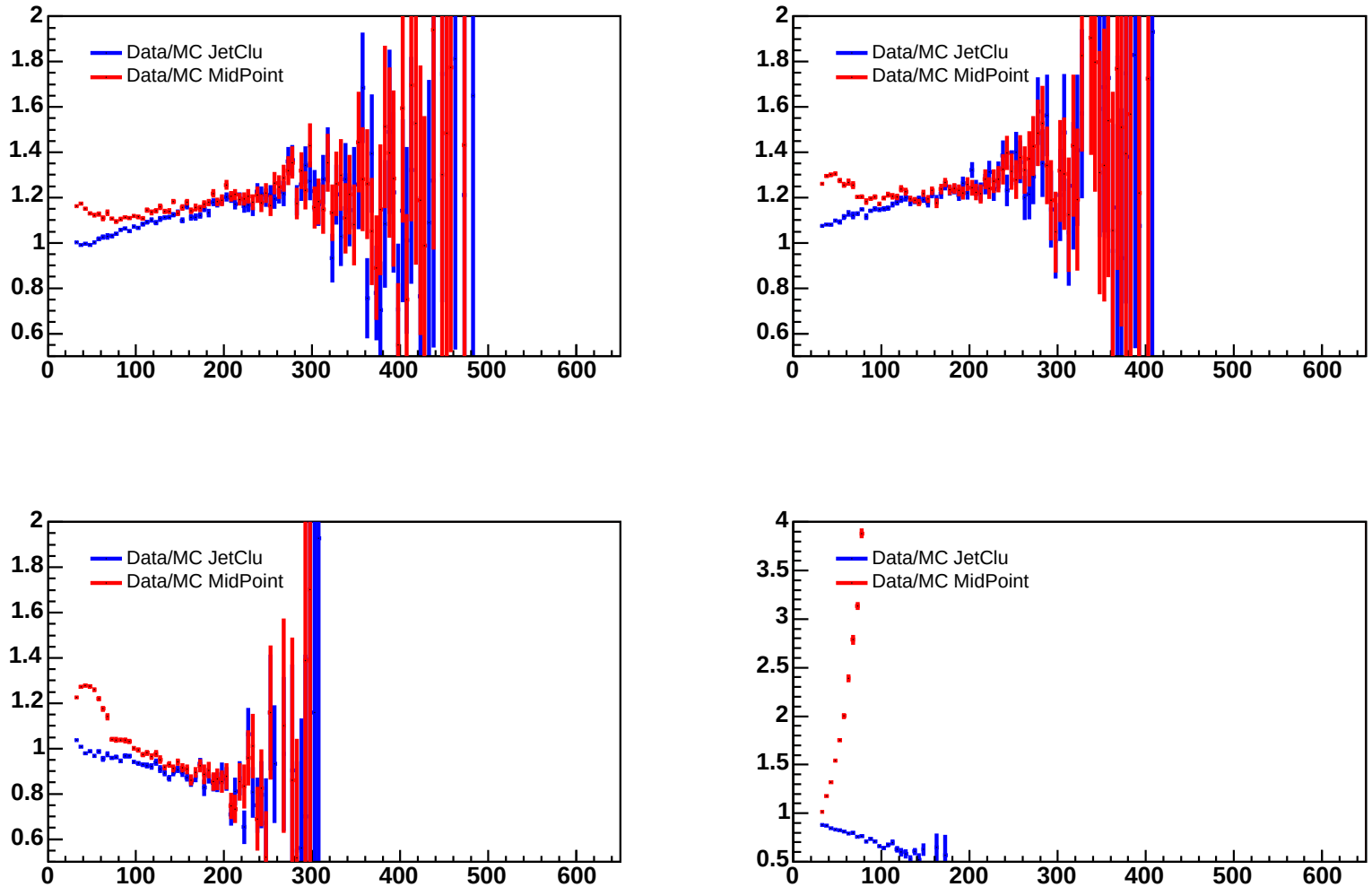
Midpoint has correction for underlying event

Ratio of JetClu/MidPoint for Data and MC

See a different behavior in Data/MC at low E_T



Trend worsens as we move to higher rapidities...



$0.1 < |\eta| < 0.7$ $\quad$ $0.7 < |\eta| < 1.4$

$1.4 < |\eta| < 2.1$ $\quad$ $2.1 < |\eta| < 2.8$

Could not find anything obvious with the way I handled the data...

What's Changed Since Last Time...

Last time I compared Data to MC I left in a scale factor in the data (used to scale the data to the Run I energy scale)
→ scale factor removed

Data was processed using 5.3.1 and jets redone using 5.3.3
→ now reprocessed using 5.3.3_nt

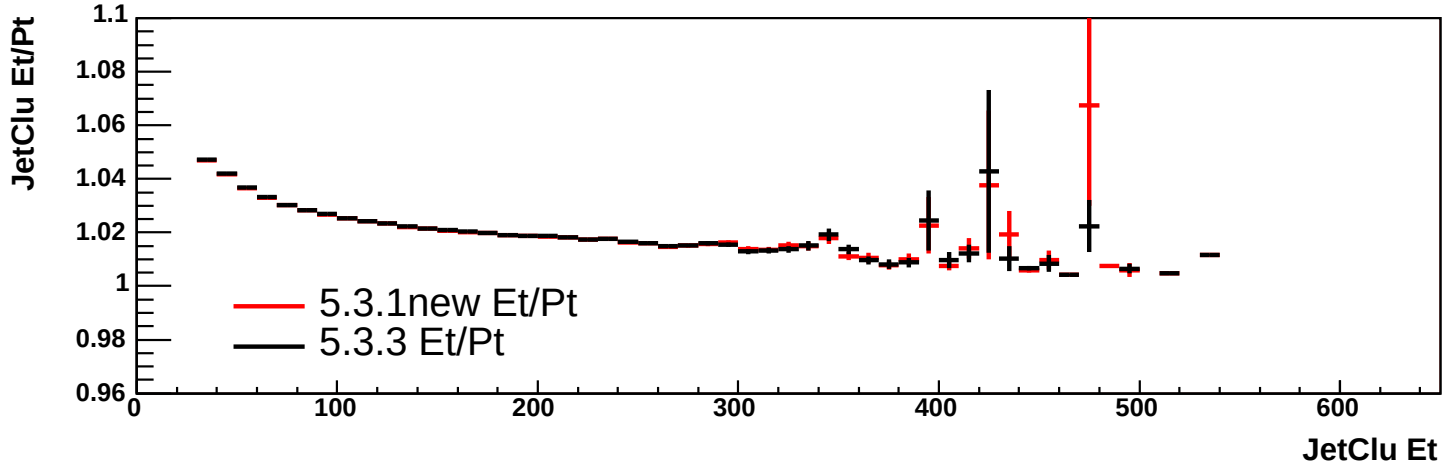
Data was spread over two datasets gjtXXd and gjtXXe
→ data now all available in gjtXXe

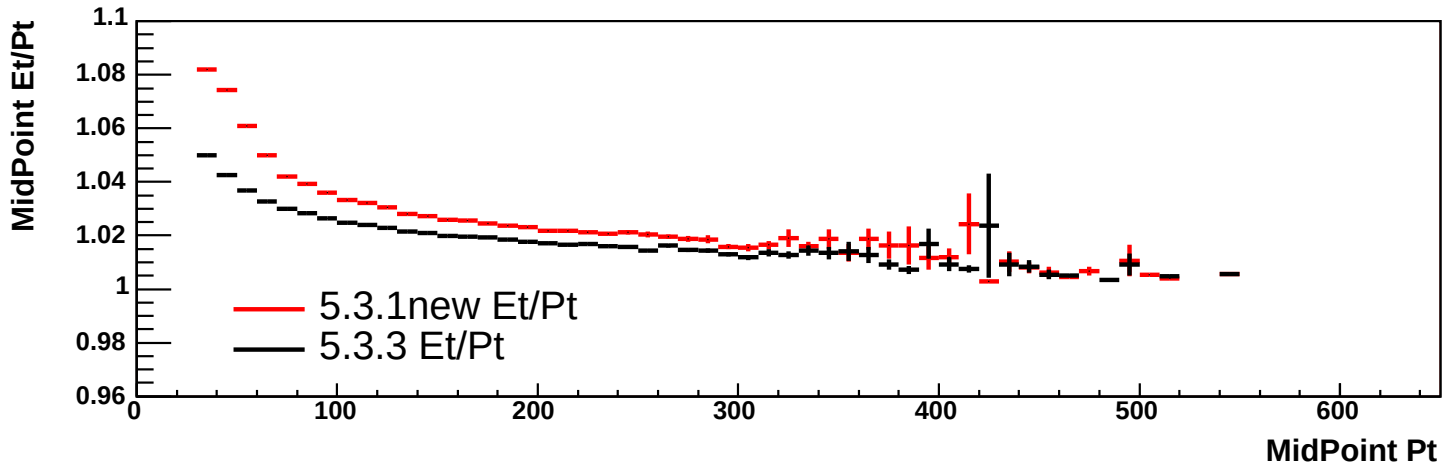
I was using 4.9.1 Pythia
→ now using 5.3.3 MC

Good Run List (V7) has been updated to include all runs
→ Still use old list for comparison purposes

```
5.3.1new   processed using 5.3.1, jets redone using 5.3.3
5.3.3      processed using 5.3.1, jets redone using 5.3.3_nt
           - New vertex definition
           - Modified MidPoint settings
```

Et/pT ratio for JetClu and MidPoint

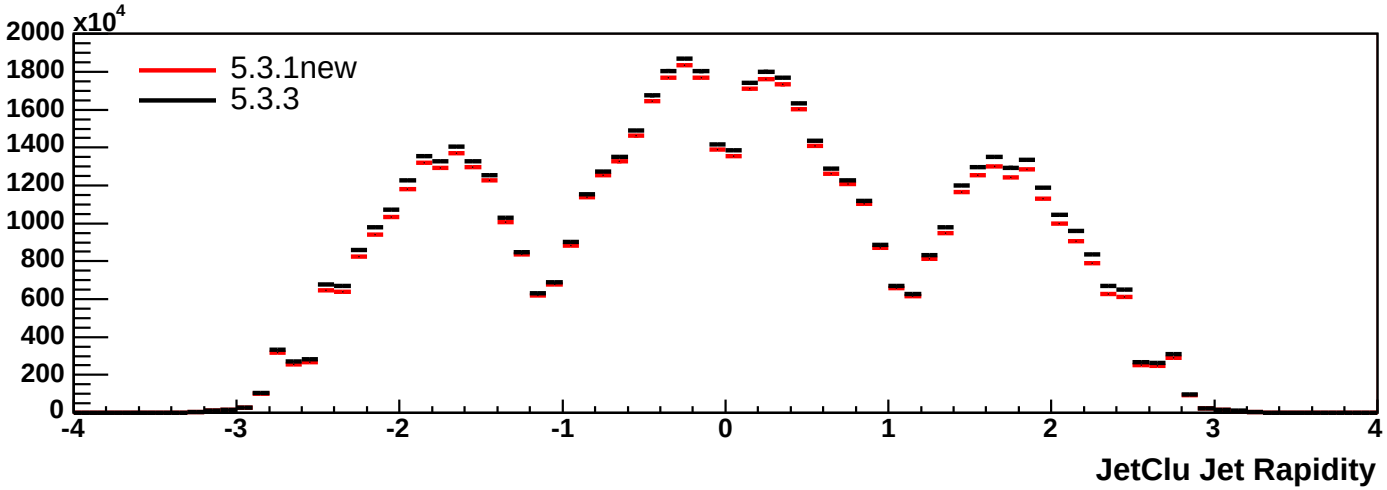


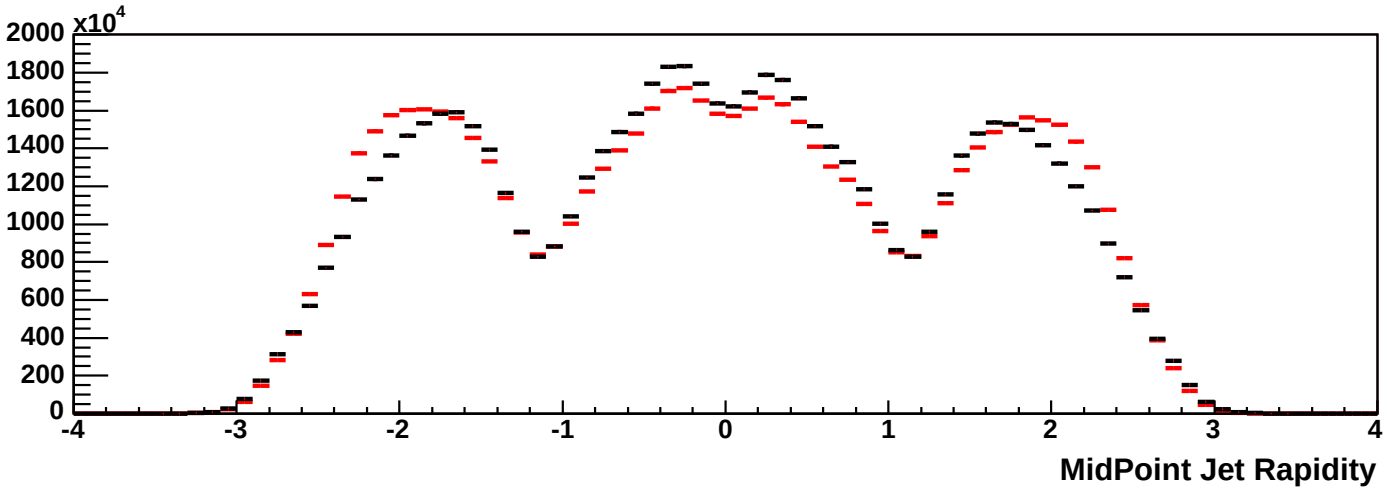


JetClu looks the same...

See differences in MidPoint

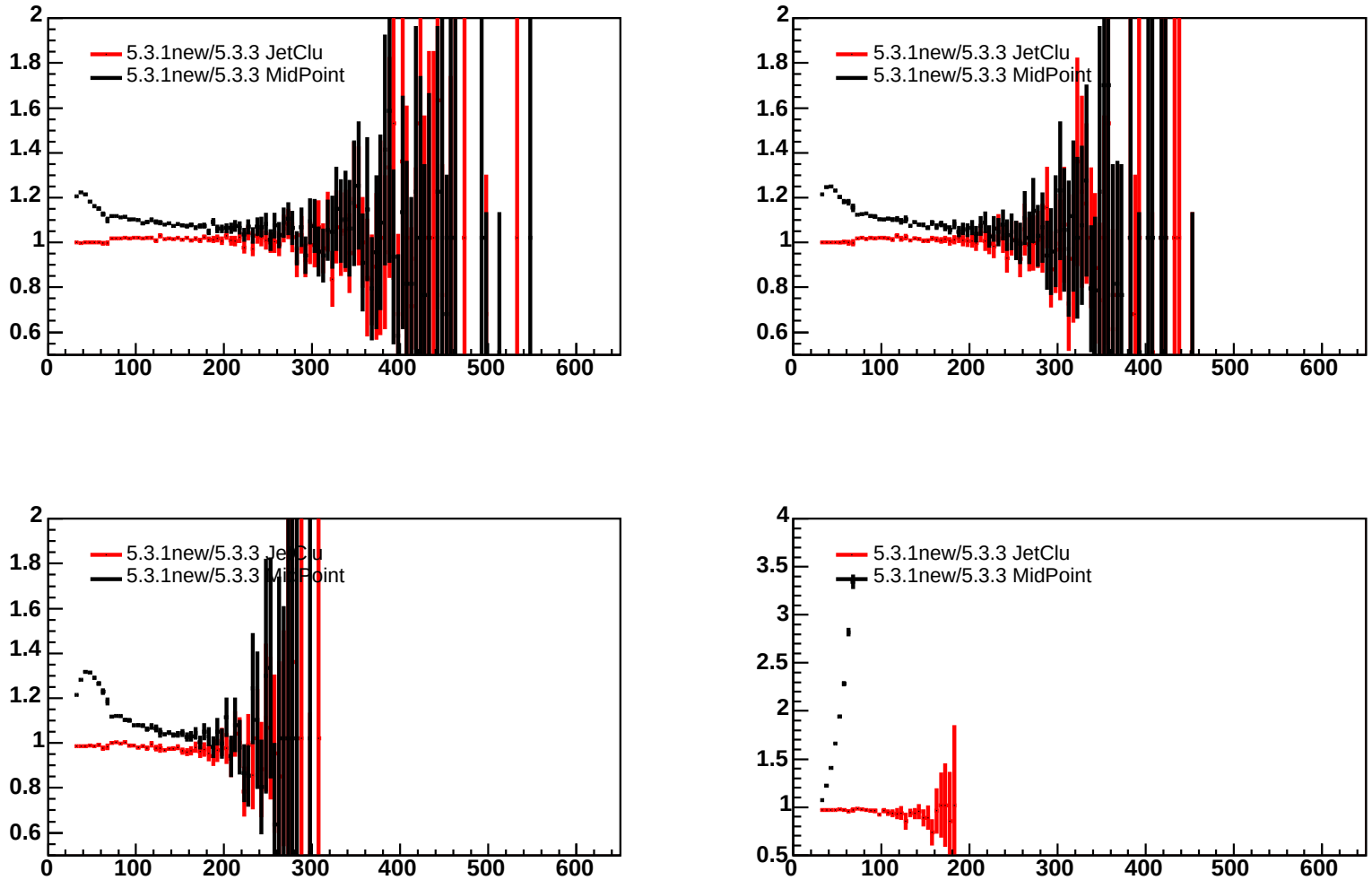
Comparison of the rapidity distribution for MidPoint and JetClu





Rapidity distribution looks very different for MidPoint

Comparison between 5.3.1new and 5.3.3_nt

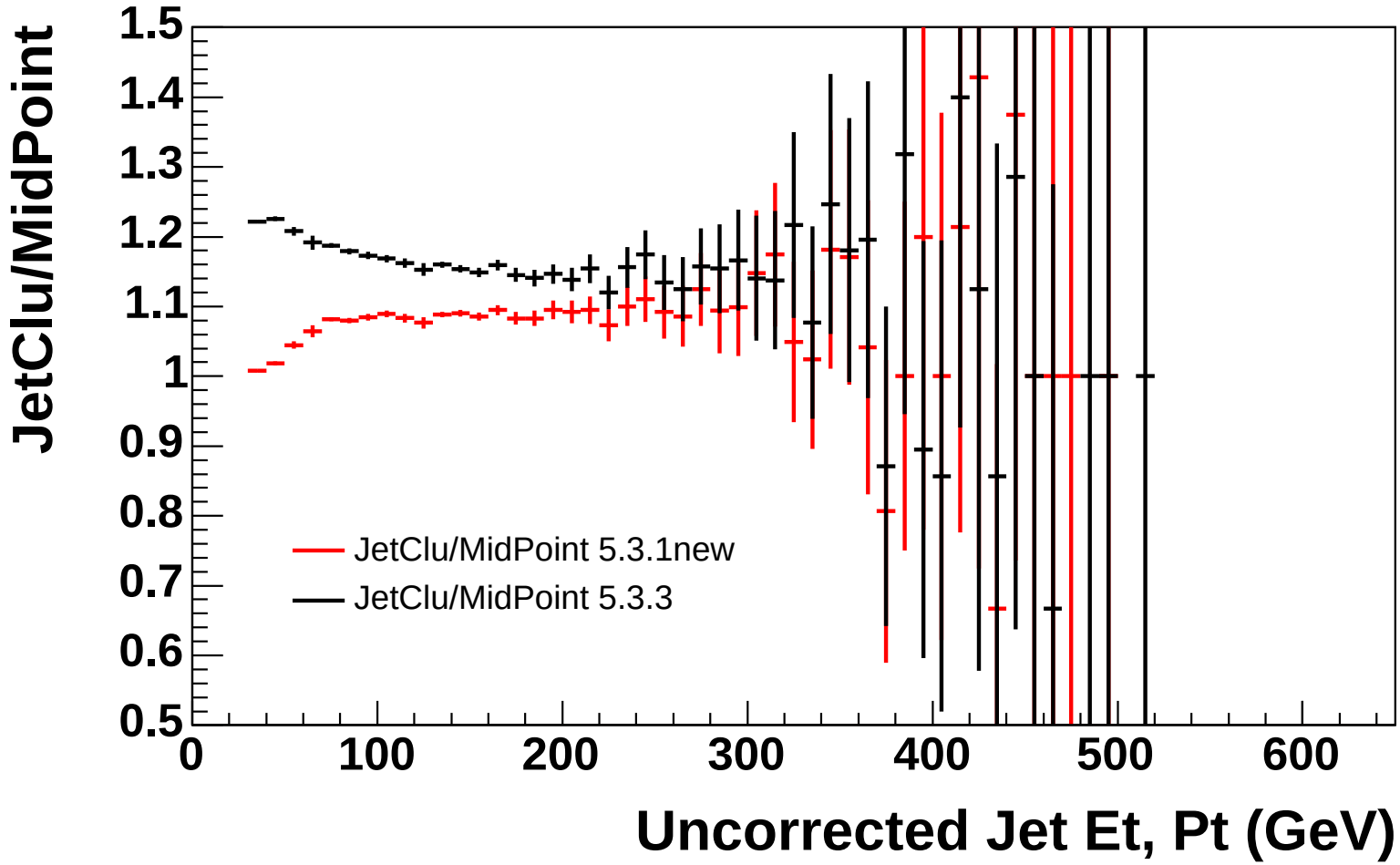


→ *JetClu results remain the same*

→ *MidPoint results are very different*

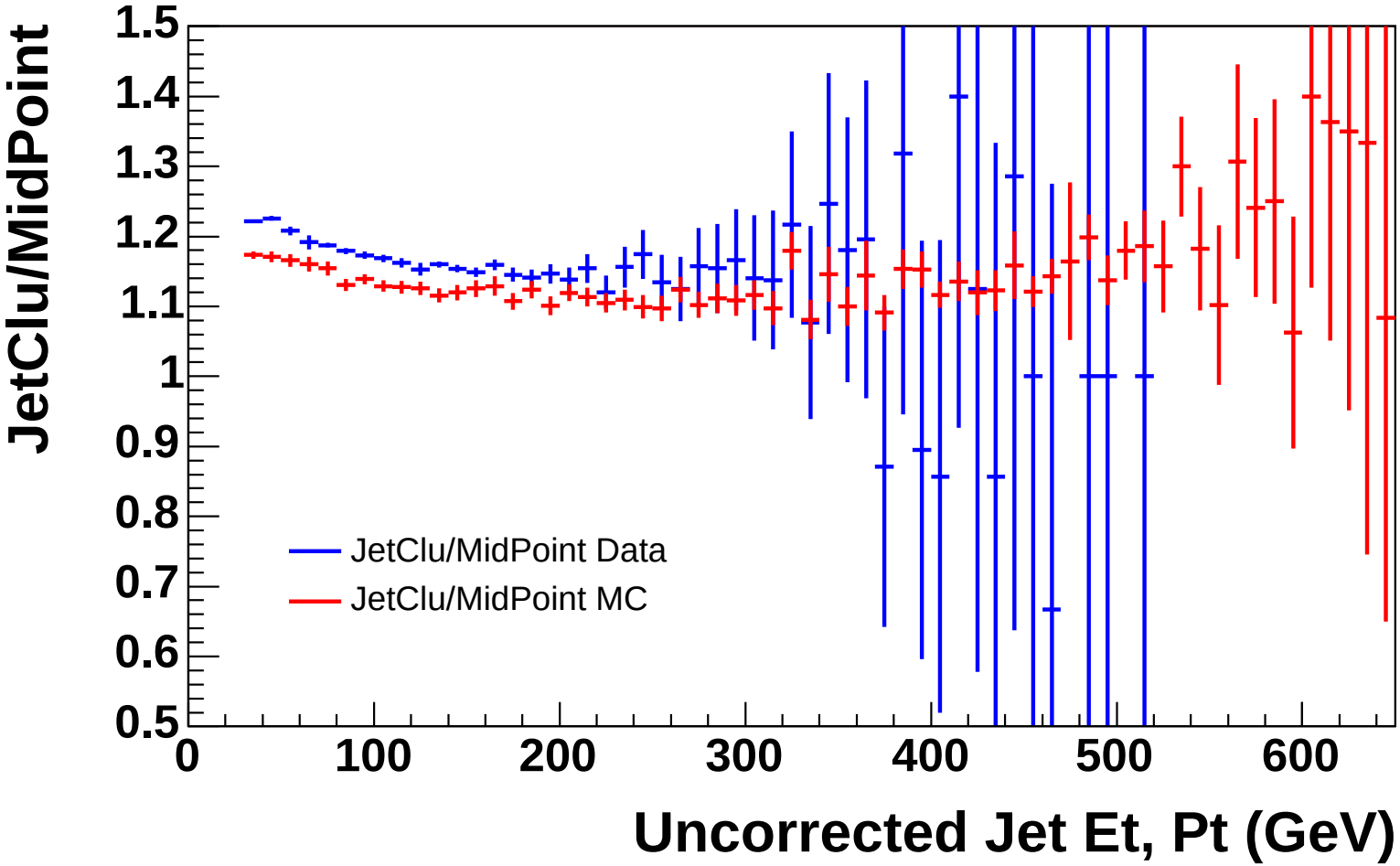
(5.3.1new has more jets at lower E_T)

Ratio of JetClu/MidPoint for different versions of the MC



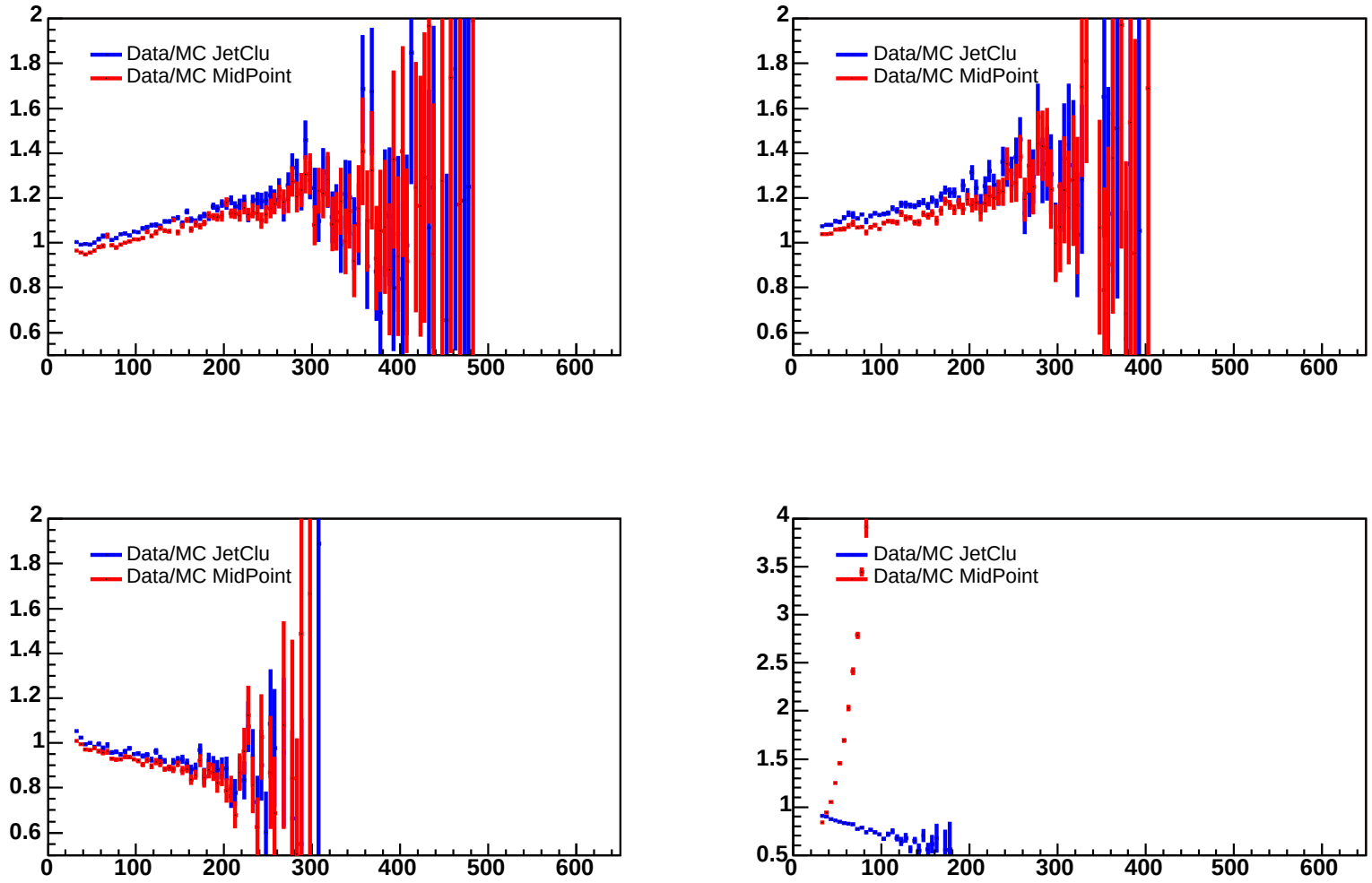
Comparisons using 5.3.3_nt

Ratio of JetClu(E_T)/MidPoint(p_T) for Data and MC



→ *See much better agreement between JetClu and MidPoint*

Ratio of Data/MC for JetClu and MidPoint



Same trend in the central regions

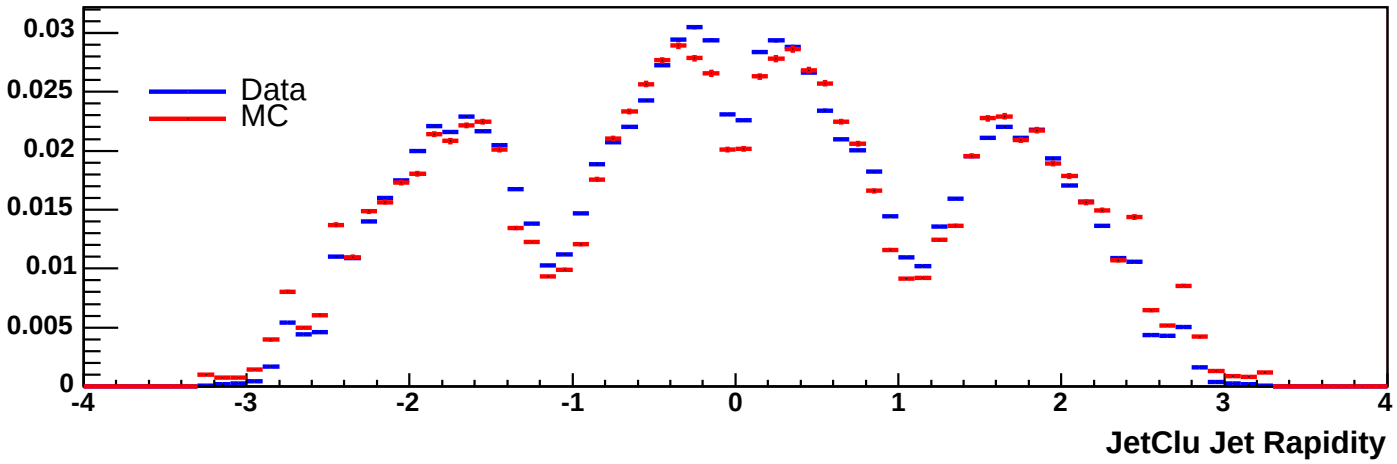
Divergence in the most forward region

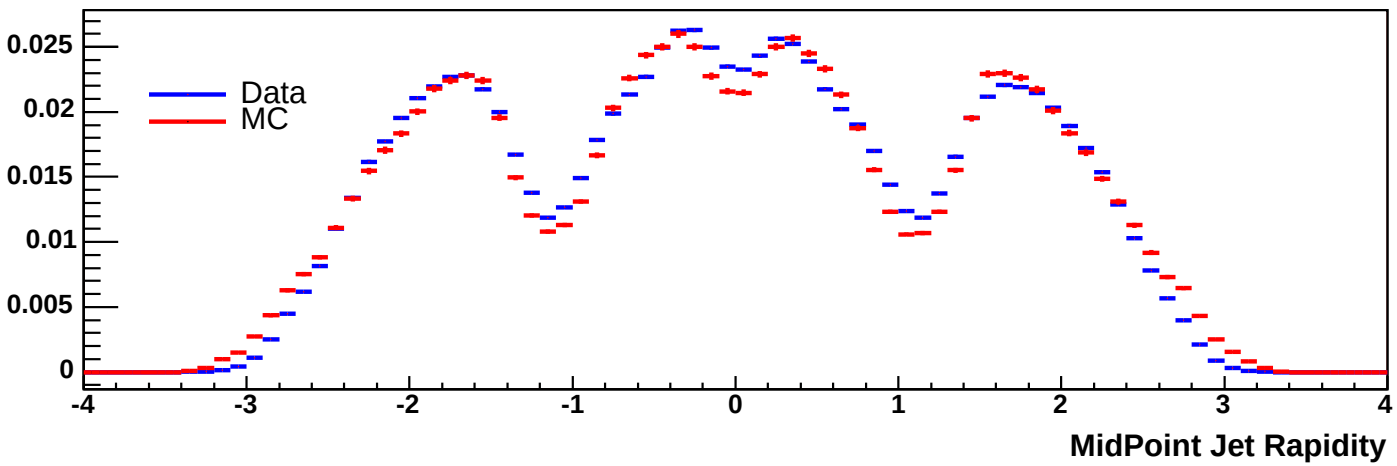
Recall that jets in different rapidity regions probe a different kinematic region

See that data is above the MC for the central region but below the MC in the more forward region

$\rightarrow$ *Simulation not accurate in the forward region*

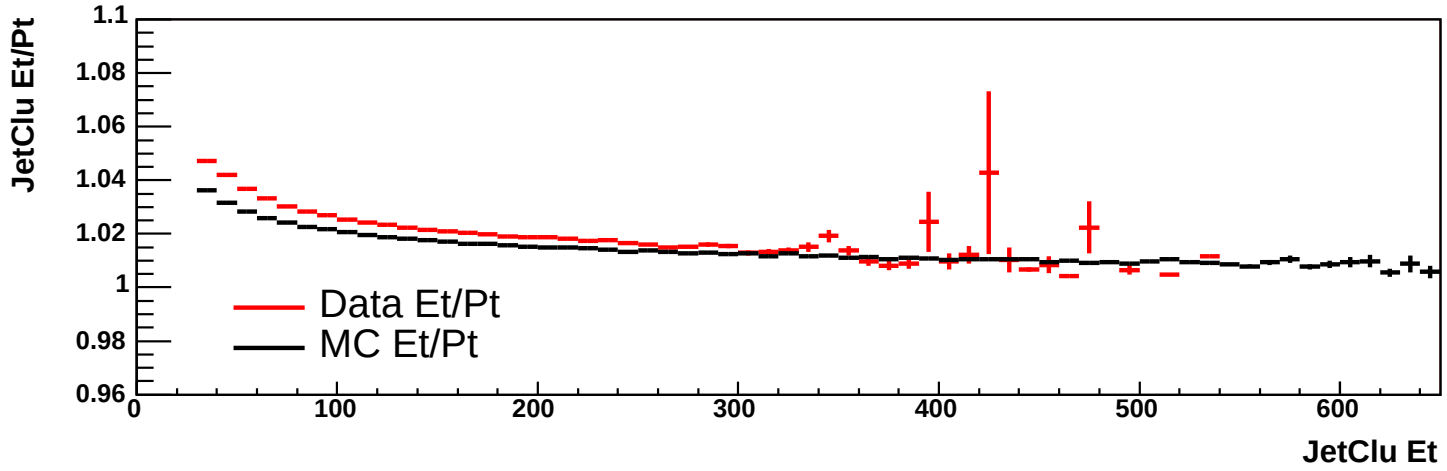
$\rightarrow$ *Telling us something about PDFs*

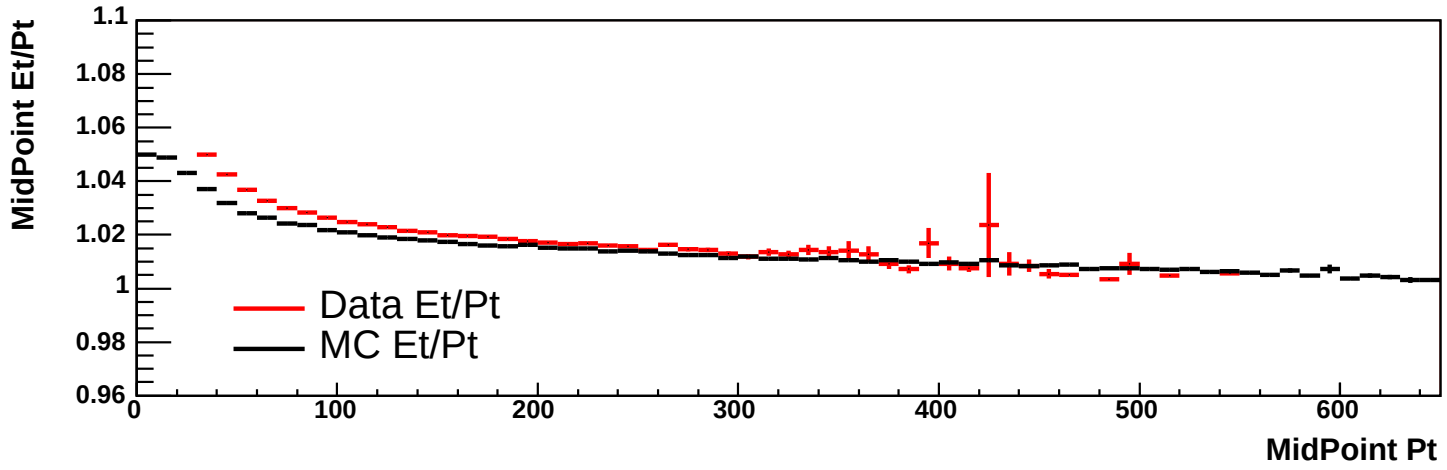




See larger disagreement between data and MC in the forward region.

Et/pT ratio for JetClu and MidPoint





Previously saw a $\sim$ 3% shift between Data and MC for JetClu *due to scale factor... (now removed)*

Summary

- Results updated using 5.3.3_nt

- Compared raw distributions of JetClu and MidPoint

- Previously saw divergences at low E_T

These differences are now gone after the reprocessing...

$\rightarrow$ *Could be a real problem in the processed data*
$\rightarrow$ *Could be my problem in my ntuples*

• See a change in the trend as we move from central (data above MC) to forward jets (Data below MC).

$\rightarrow$ *Forward simulation is not good enough*
$\rightarrow$ *Telling us something about PDFs*

- Would like to compare this to the standard ntuple...

I put the reconstructed quantities for a few events at:

`http://ncdf76.fnal.gov/~chlebana/qcd/ana/incJet/compareEvt.html`