

Multilepton PFlow Jet Performance

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on behalf of Multilepton group

Dihiggs Meeting

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Multilepton Framework

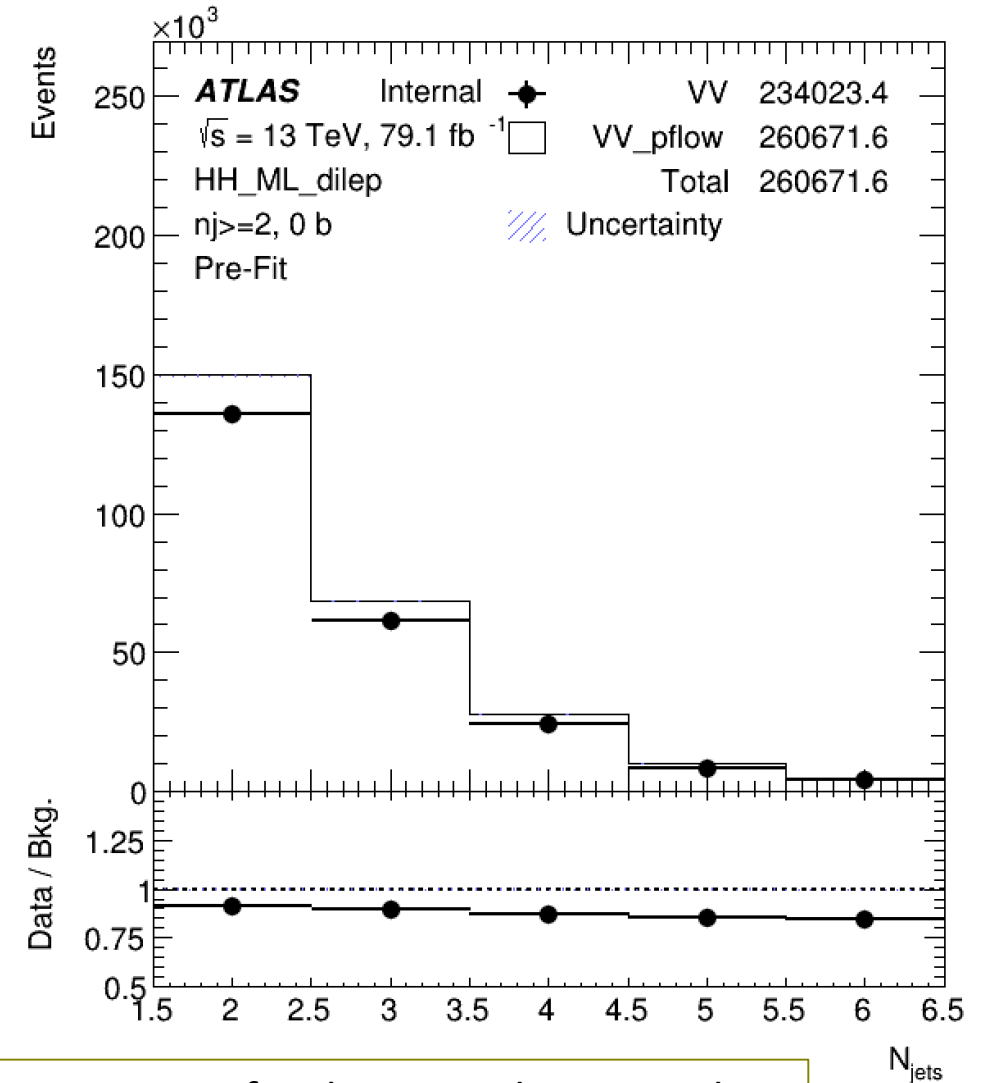
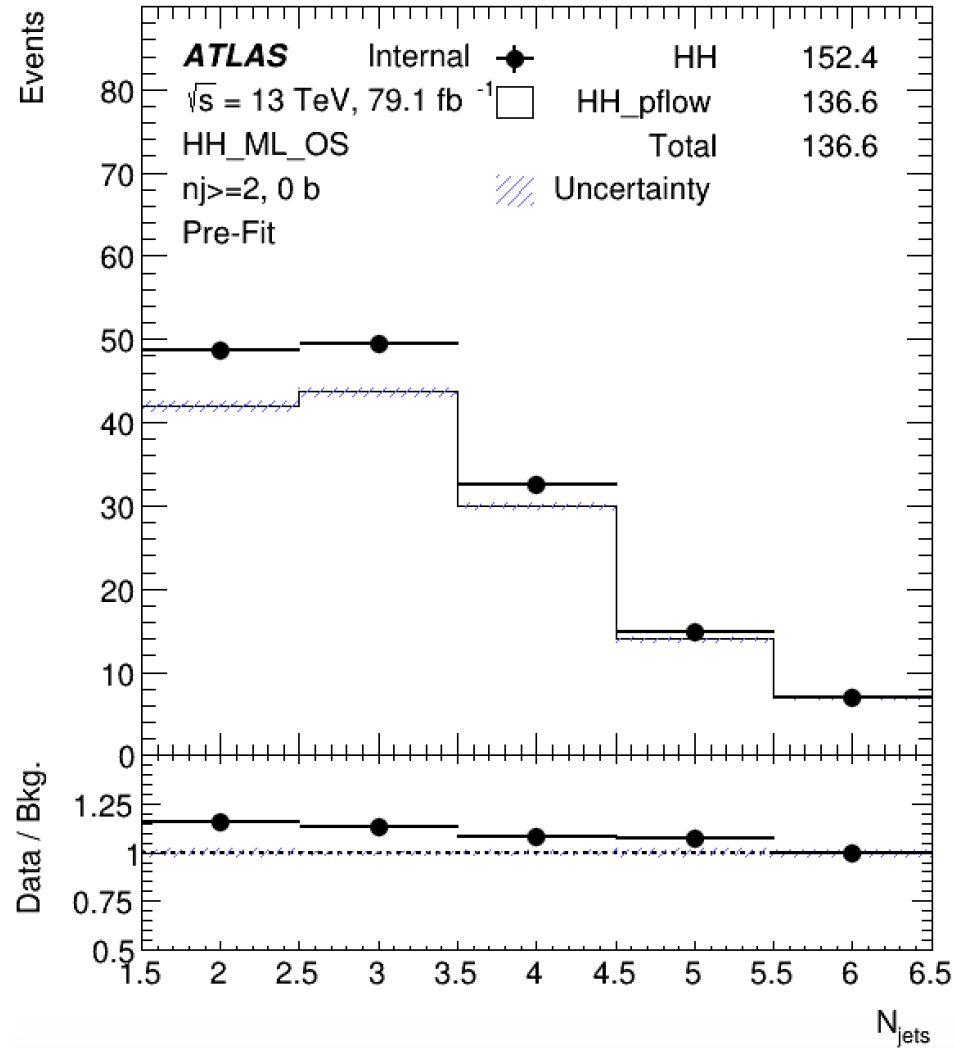
PFlow both available.

- Multilepton 2LSS: ttH framework
 - New B tagging: derivation submitted, in ~2 weeks
 - GFW2 samples would be ready in ~1 month.
- yy+Multilepton: Hgamma Framework
 - For yy+ τ related: Current **TauJets** is generated from LCTopo.
 - Have plan to migrate to Topo, but now unavailable.
 - Current config is 2018 PFlow in v1.8.33-h024
 - Major difference is that JVT cut is 0.2 while in master, 2019 PFlow use 0.5.
 - Would show the comparison in (AntiKt4) PFlowJets, TopoJets and TruthJets.
 - New B tagging: would be included in next derivation. mxAODs in ~1 month.

PFlow 2018, PFlow 2019, EMTopo, TruthJets would be checked.

Multi lepton: 2lepton

The test is done in an **old** derivation so
Jet event cleaning for particle-flow jets are not enabled.

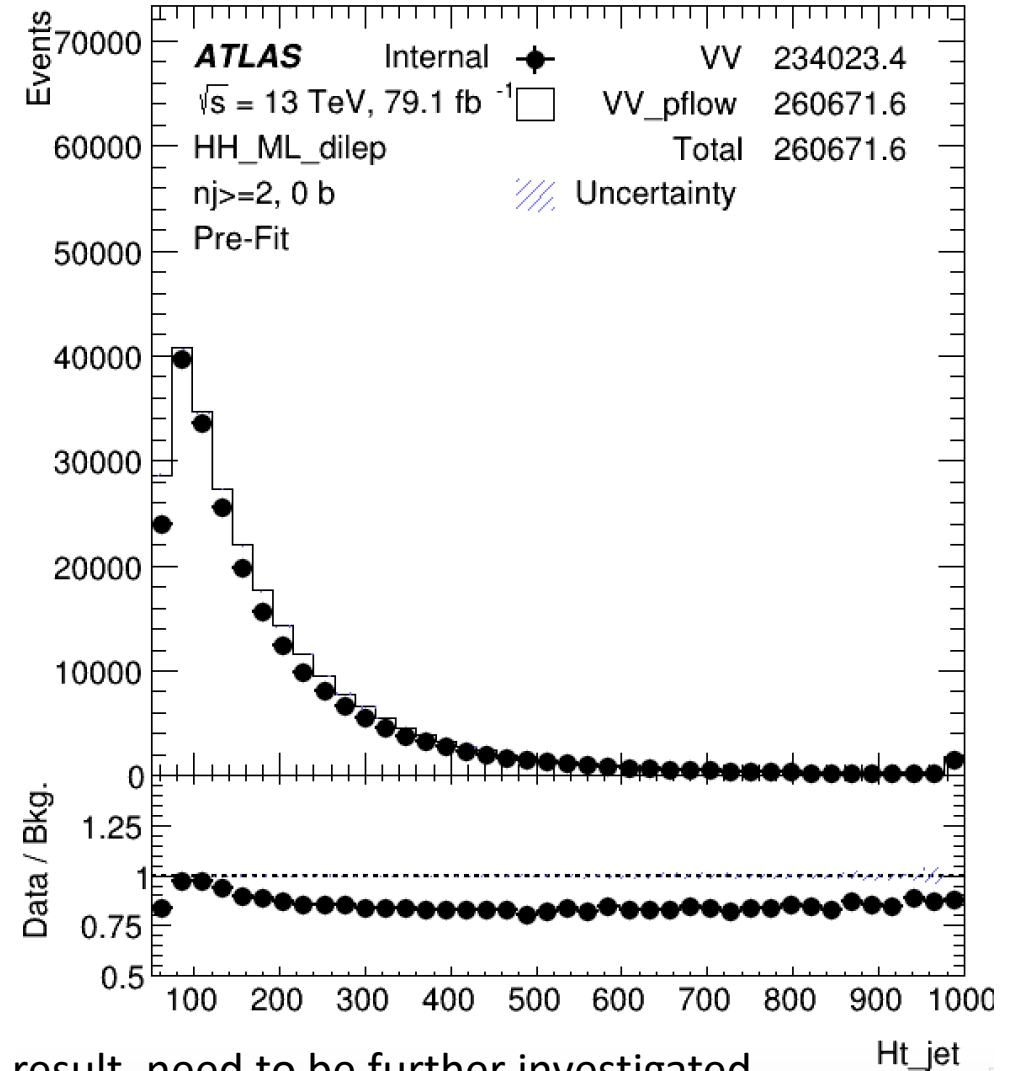
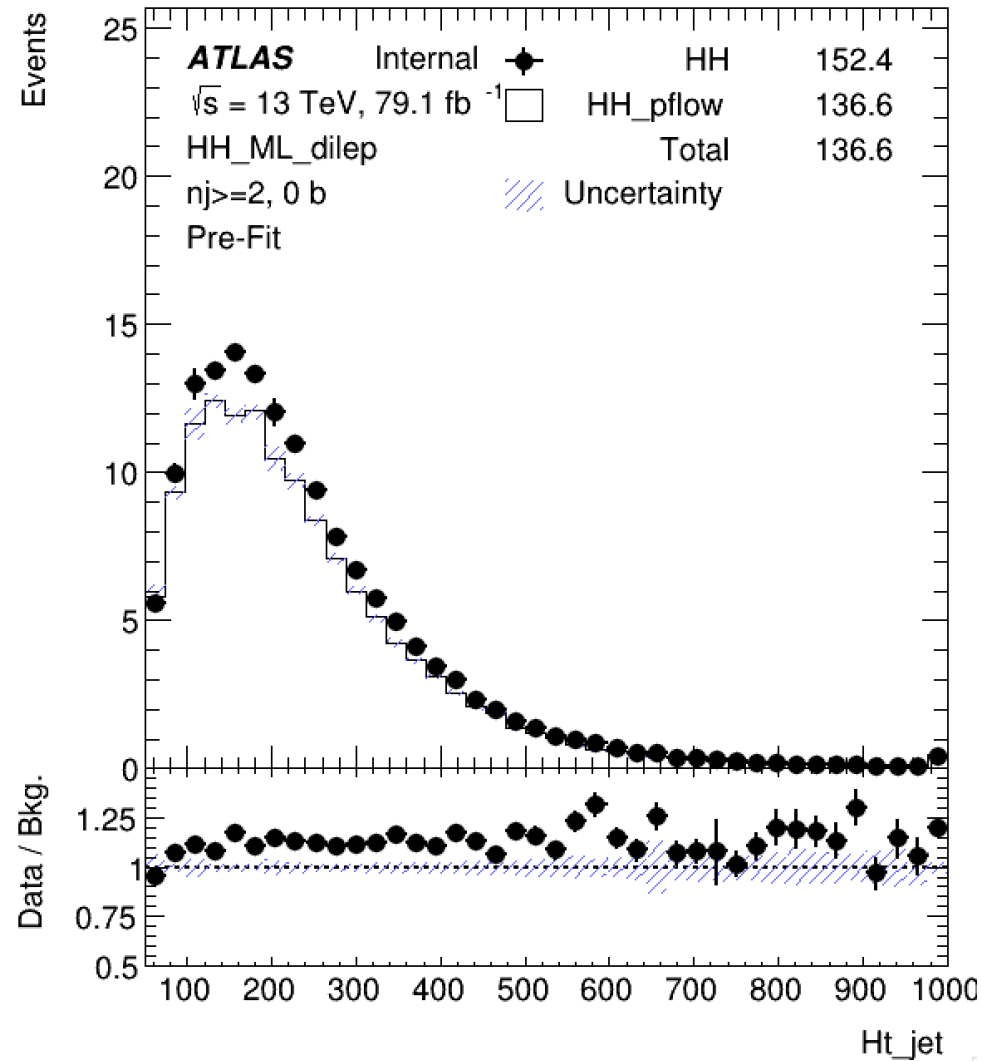


Black Dot: EMTopo;

The behavior is **opposite** for the VV and HH samples.

Multi lepton: 2lepton

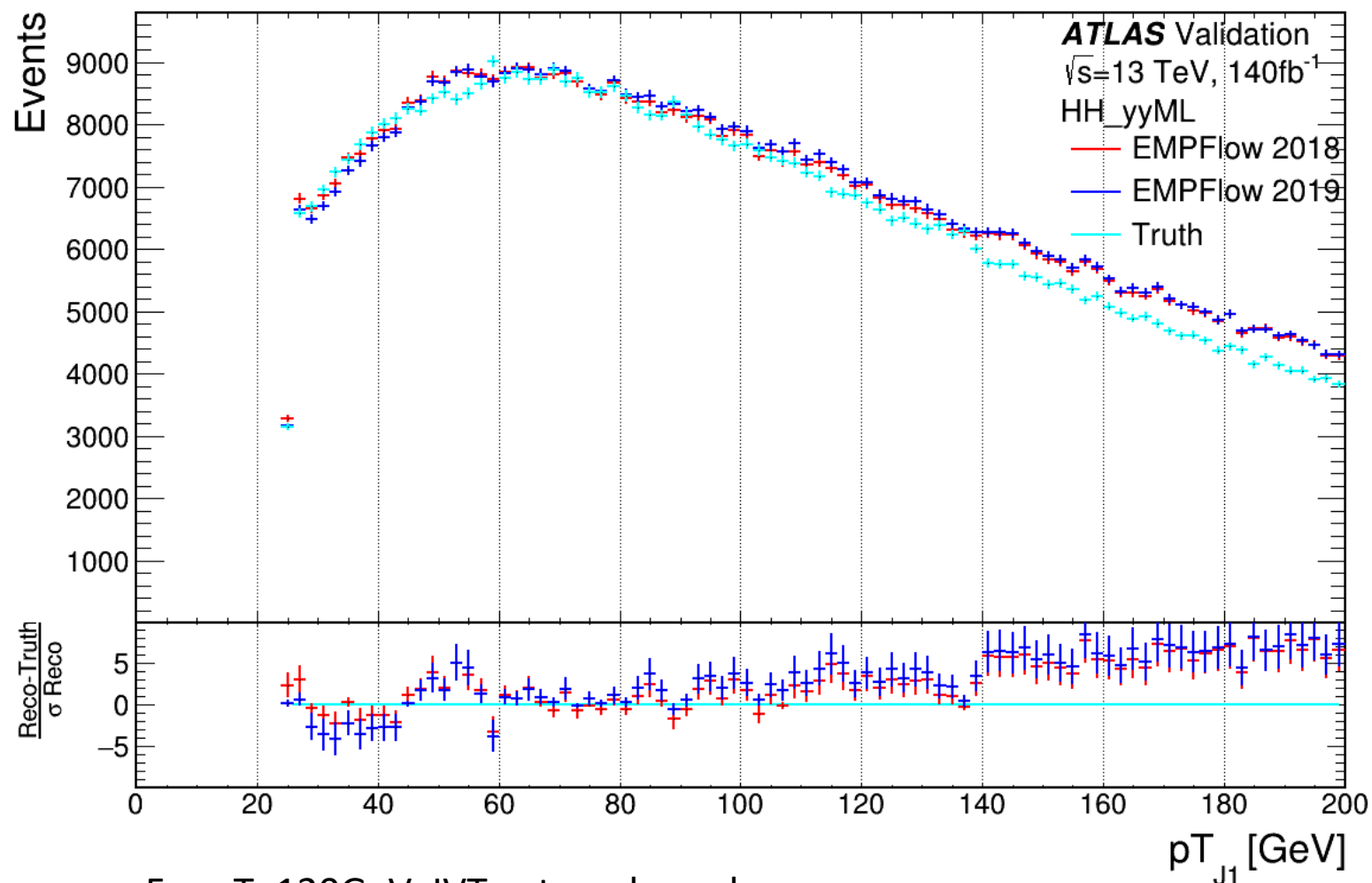
$$H_t = \sum_{jet} p_t$$



Preliminary result, need to be further investigated

$\gamma\gamma$ +Multilepton

Leading Jet Pt, default selection and overlap removal with γ and leptons applied;
 $\gamma\gamma$ +ML do not have specific jet selection beyond b-veto.



For $pT < 120\text{GeV}$, JVT cut works and
Reco&Truth suits well.

2018, 2019PFlow, Topo

For PFlow 2018/2019:

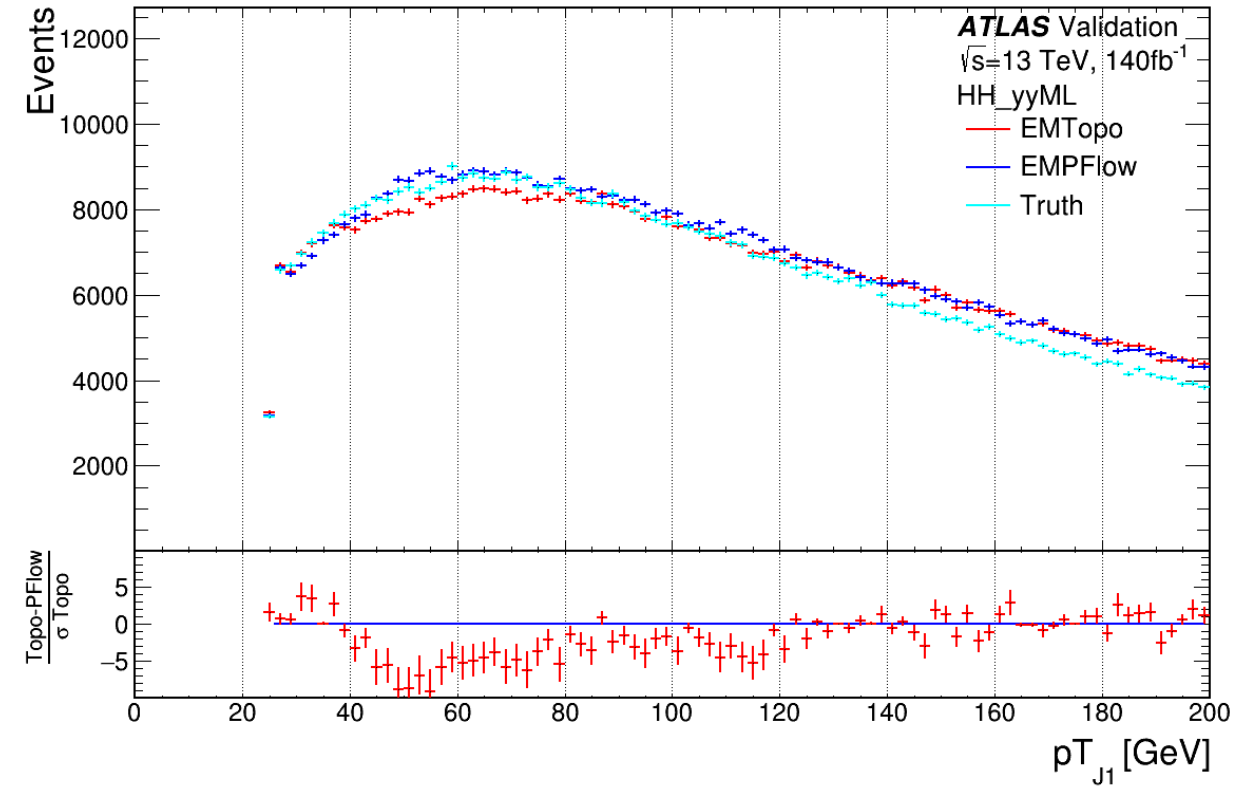
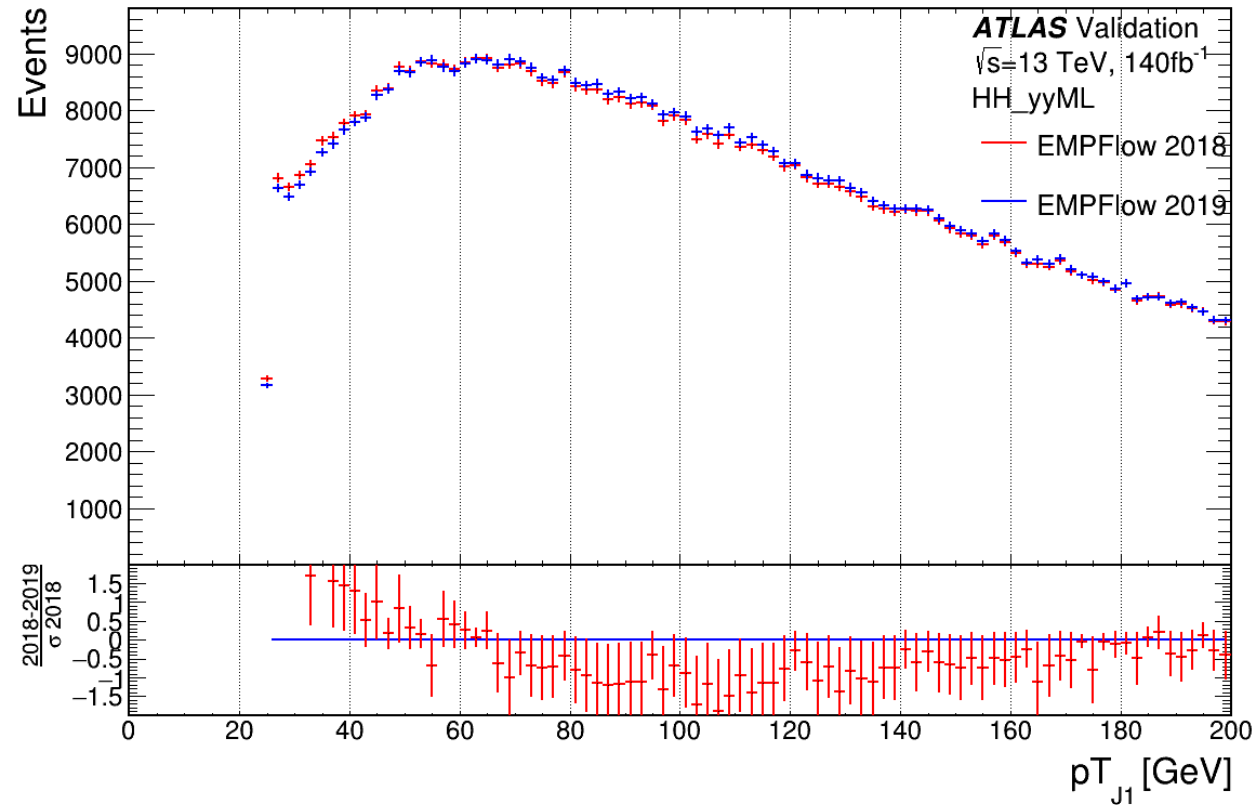
Biggest difference in JVT cut 0.2 $\rightarrow$ 0.5.

For $p_T < 60 \text{ GeV}$, 2018PFlow higher.

For $p_T > 60 \text{ GeV}$, 2019PFlow higher.

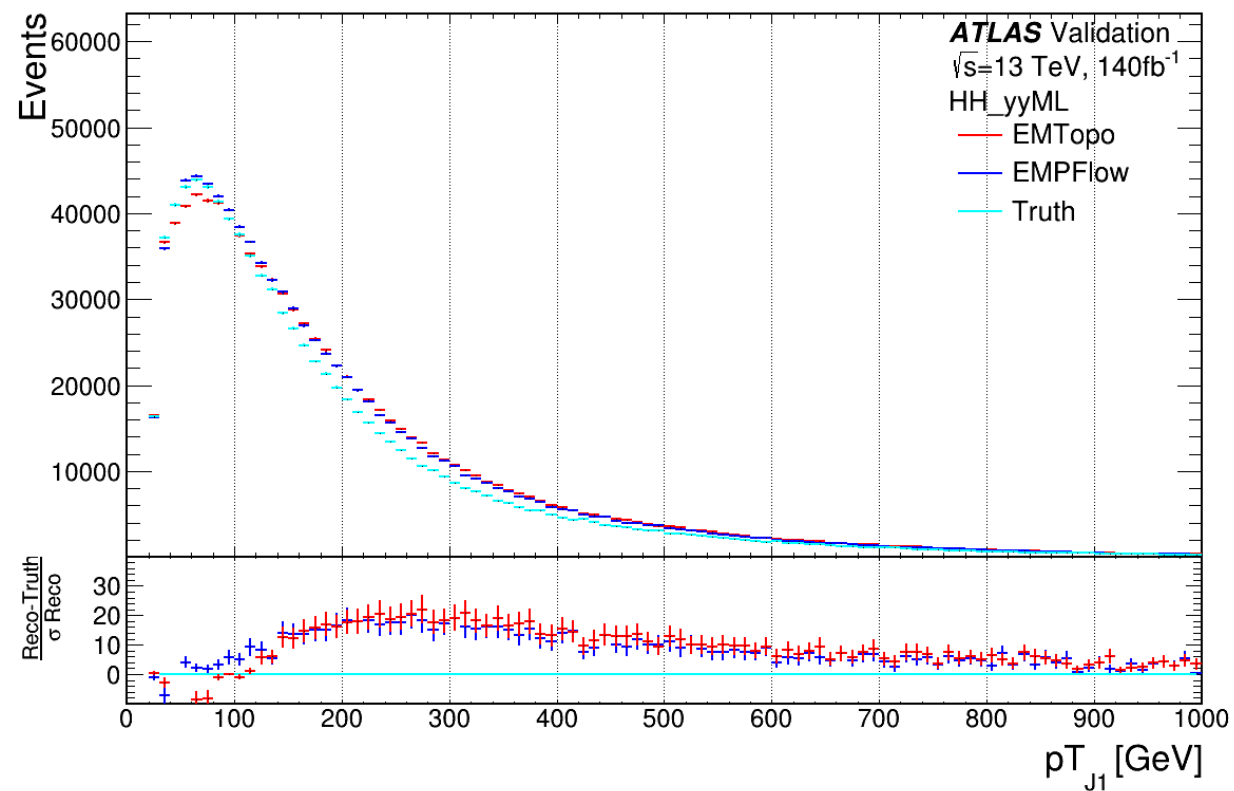
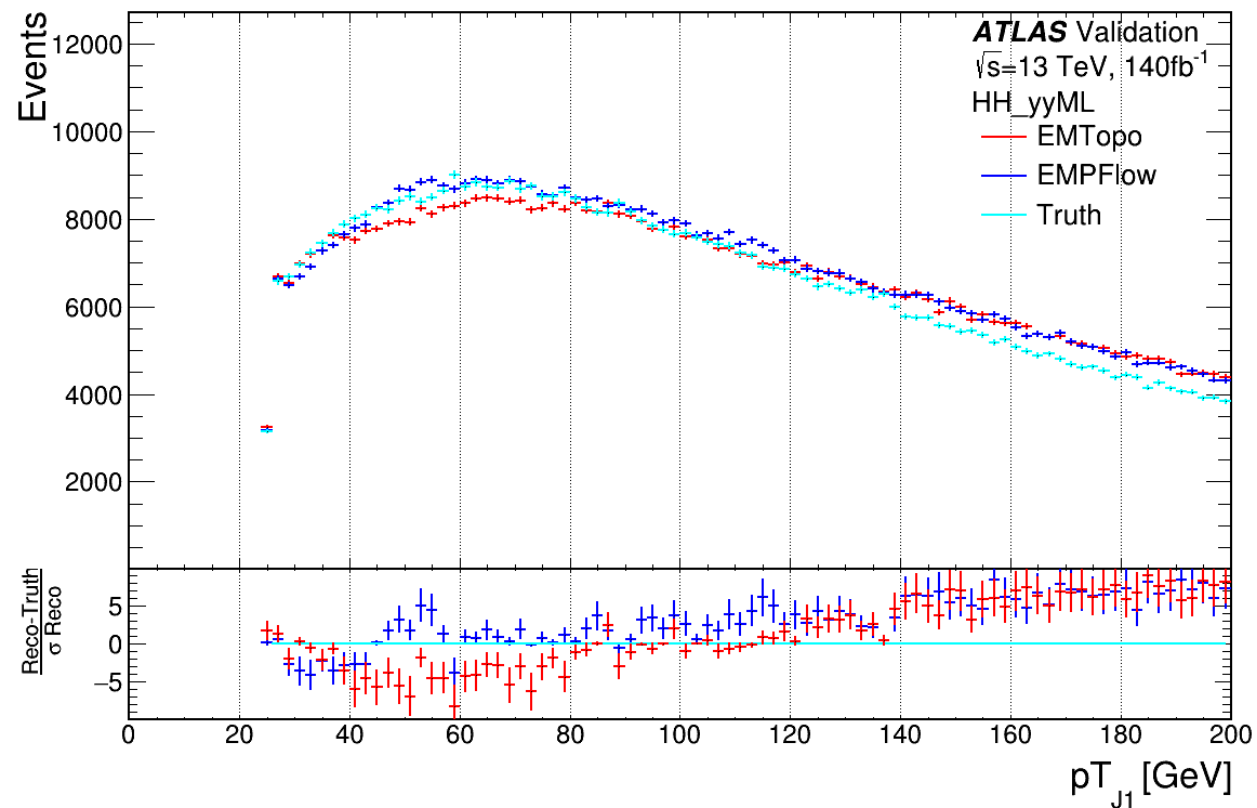
For PFlow(2019) / EMTopo:

PFlow more close to Truth.

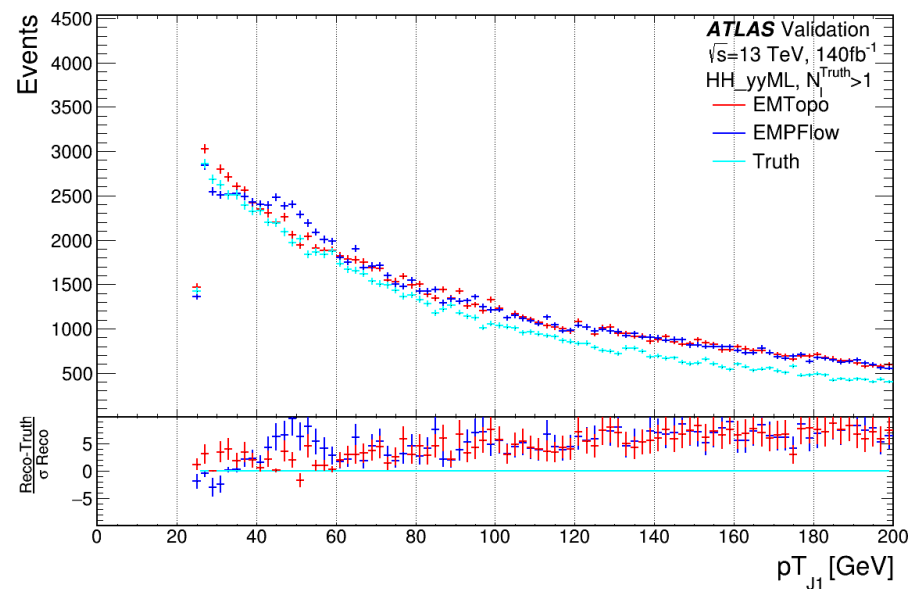
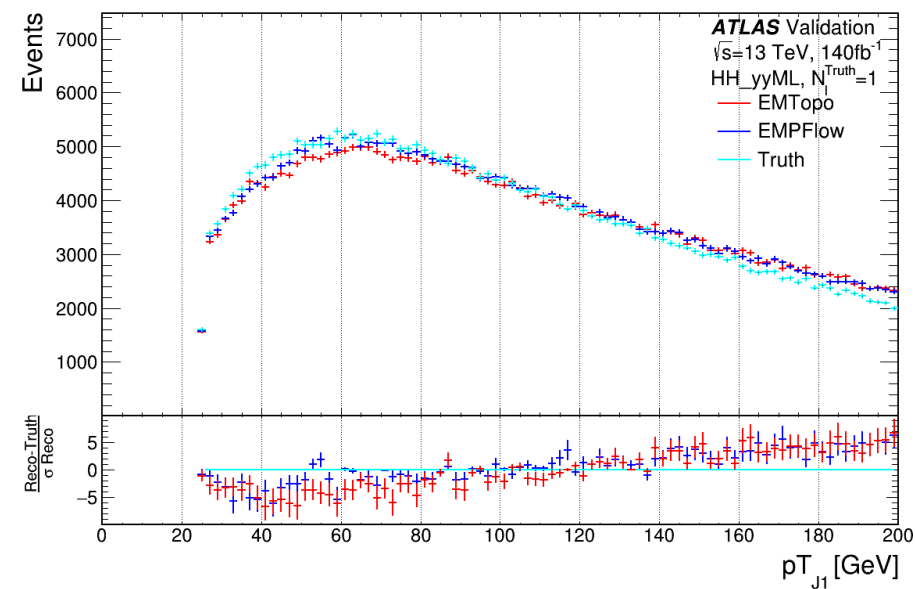
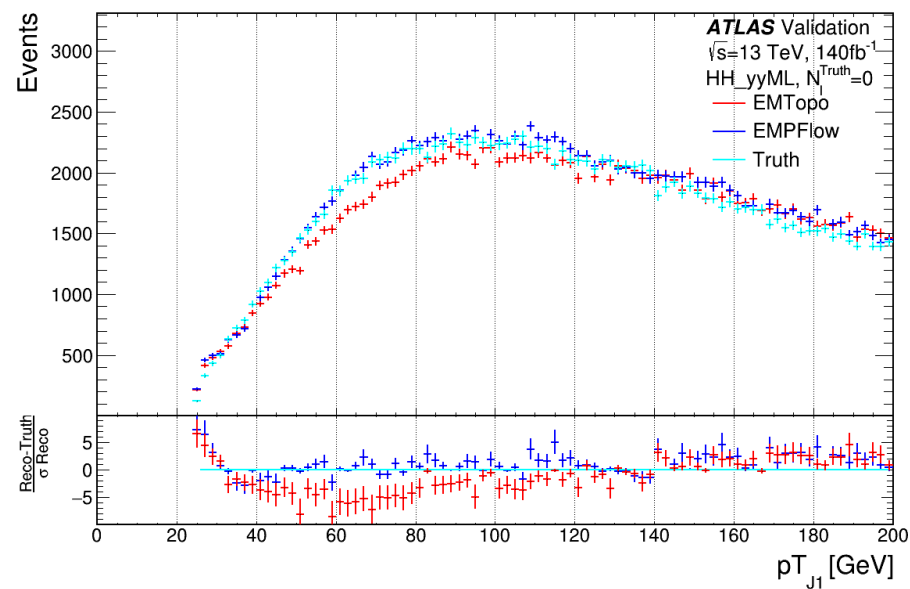


EMTopo VS PFlow

Tail side

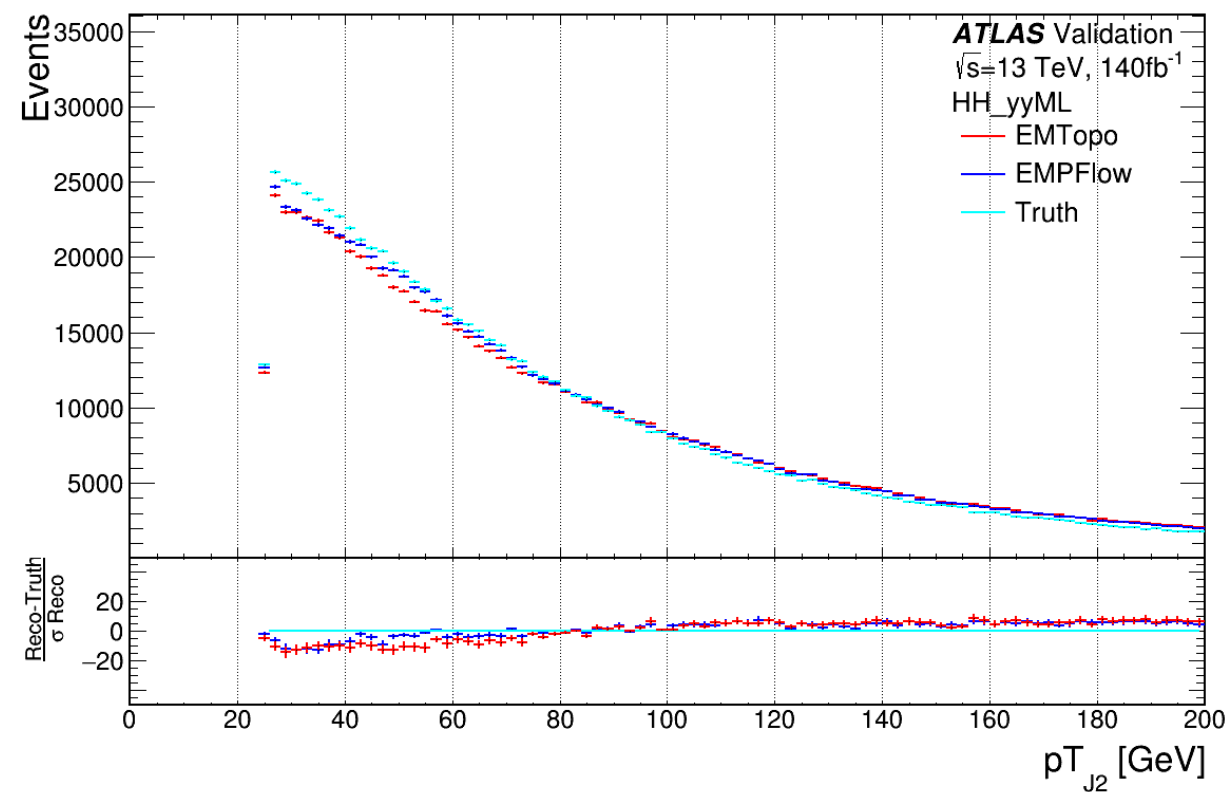
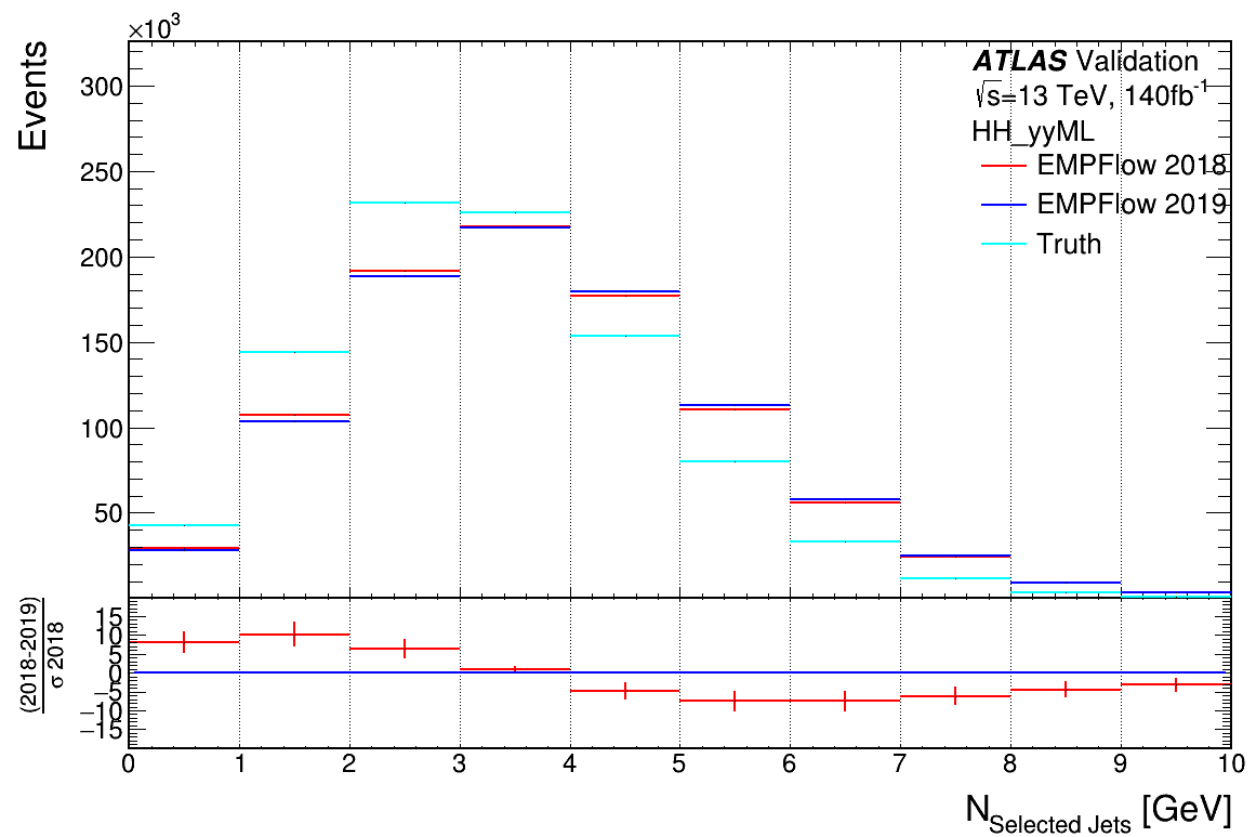


Lepton category

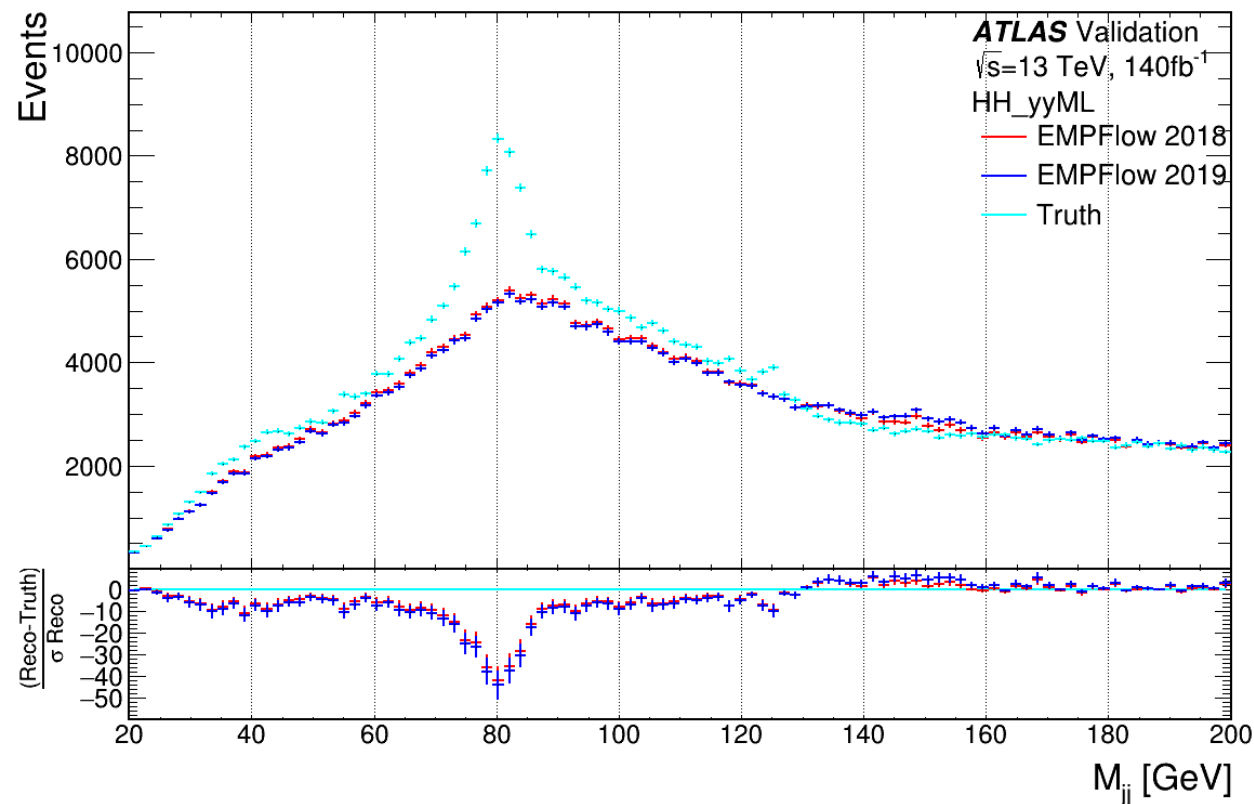


For $N_{\text{lepton}}>1$ (Truth jet more likely to be 1),
PFlow would not be significantly better than Topo.

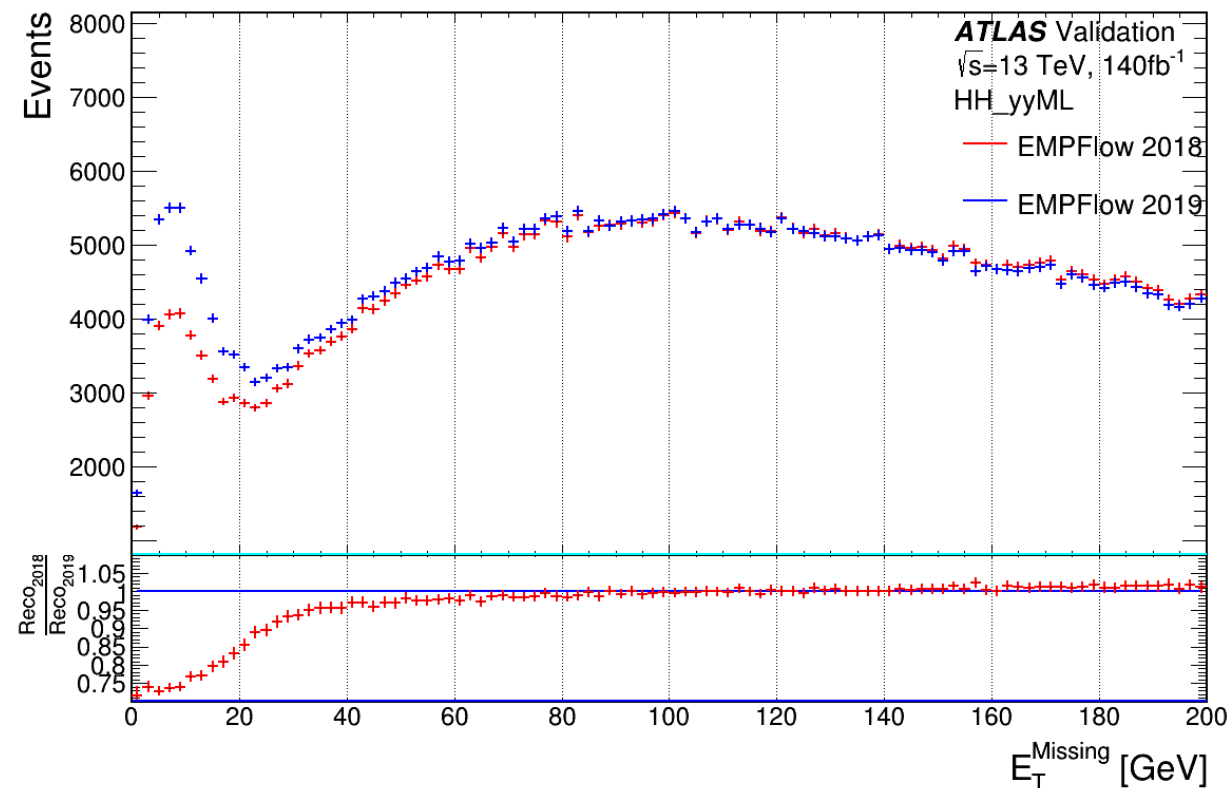
N_jets and pT_j2



M_{jj} and MET



$HH \rightarrow WW\gamma\gamma$ main process; Could see the on-shell and off-shell W mass peak.



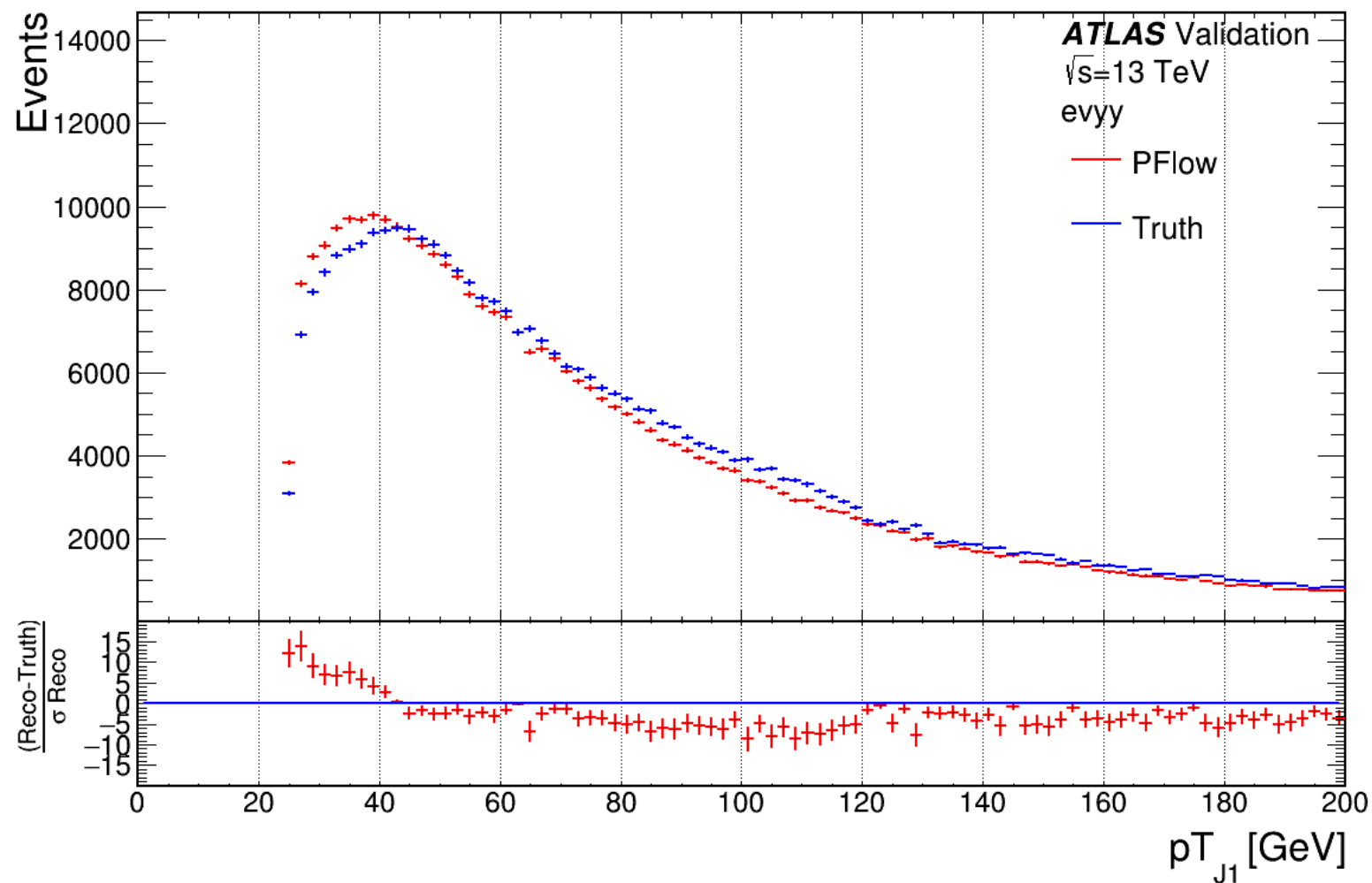
Latest clustering gets higher MET.

Since the reco resolution is not so good, currently we have no plan to reconstruct W using M_{jj} . Also, MET do not have any separation power compared to continuum background.

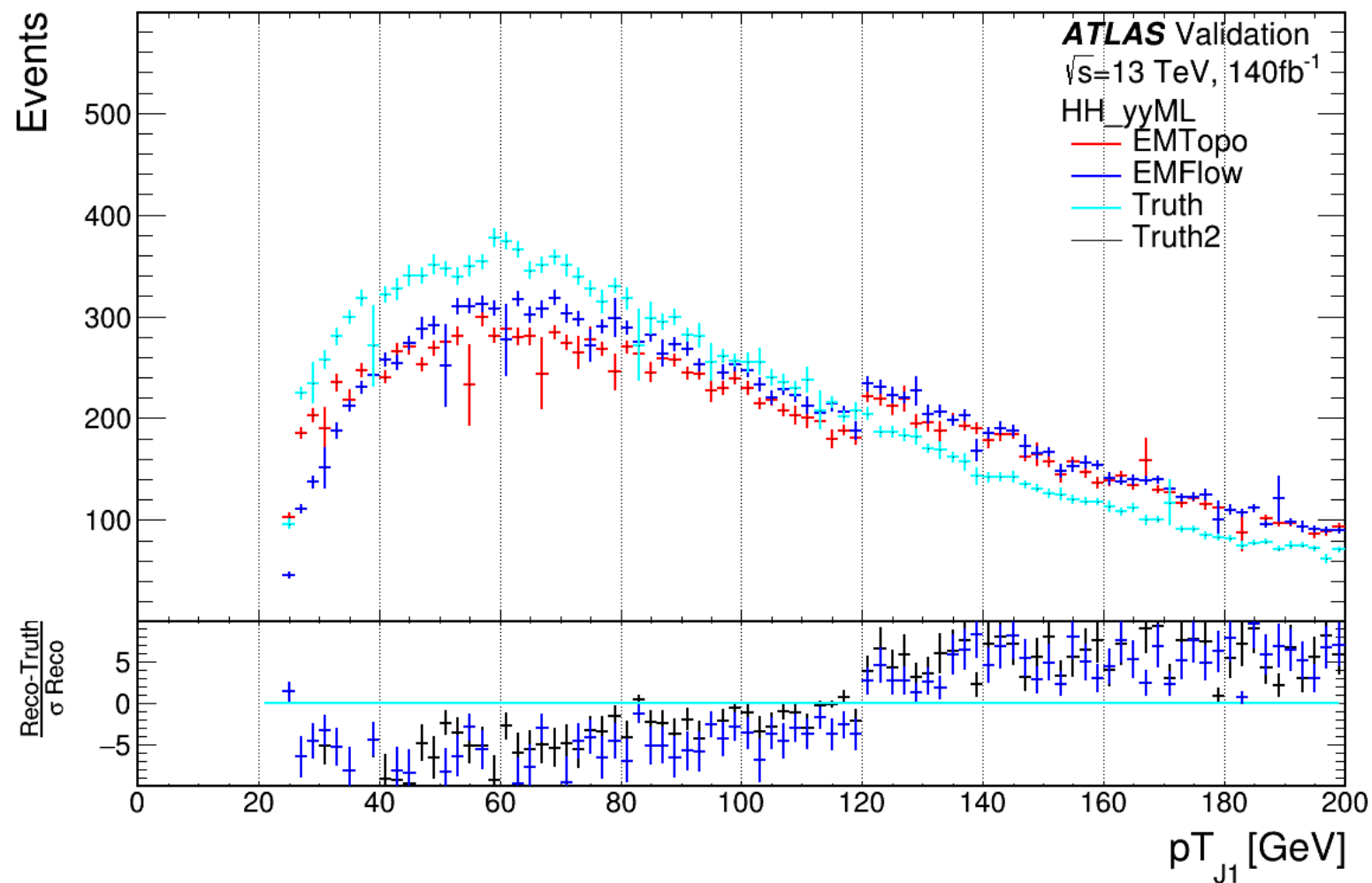
- First look at the PFlowJets in multi-lepton channel
 - Deviation between 2018/2019 PFlow, and EMTopo observed
 - Further checks will be done, to see the impact in the analysis
 - Like MET structure, the different behavior in ML VV and HH sample;
 - Would repeat the comparisons with the new derivations for Multi-lepton part;

backups

Continuum background (VV)



JVT Scale factors — Tuning



mzvj: 17.1%
vzmj: 15.3%
combined: 7.4%

