

# Rivet vs TopFiducial

16/5/2015

# How we validate the Rivet routine

- TopFiducial is run on NTUP\_TOP, Rivet is run on EVNT files
- The output should be identical - so we want to compare
- **Output of TopFiducial running on**
  - mc12\_8TeV.110872.MadGraphCT10Pythia\_CT10\_P2011C\_ttbar\_dilepton.merge.**NTUP\_TOP**.e2609\_a188\_a222\_r3549\_p1635
- **Output of Rivet running on**
  - mc12\_8TeV.110872.MadGraphCT10Pythia\_CT10\_P2011C\_ttbar\_dilepton.evgen.**EVNT**.e2609

# Rivet vs TopFiducial output

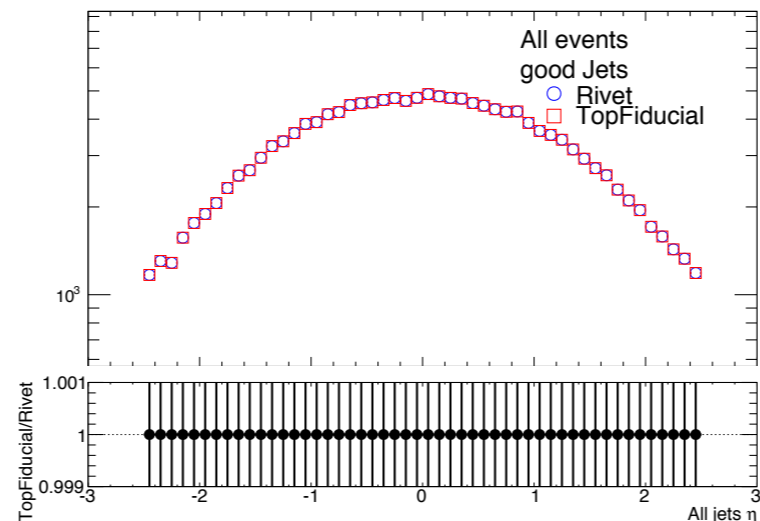
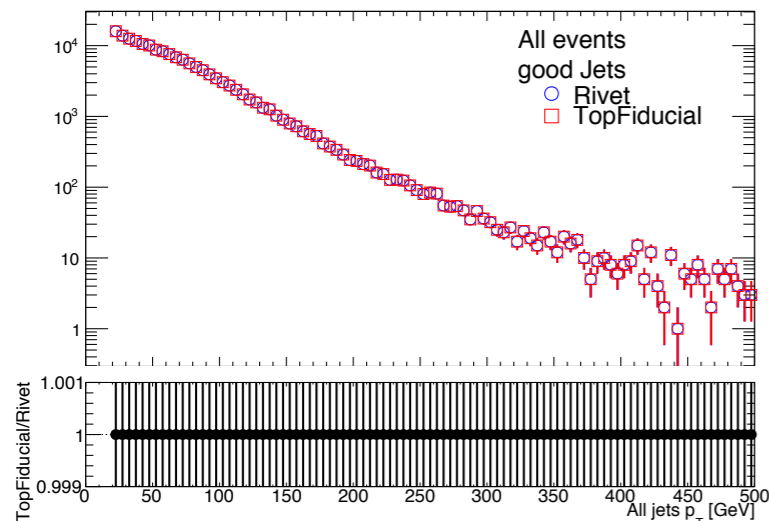
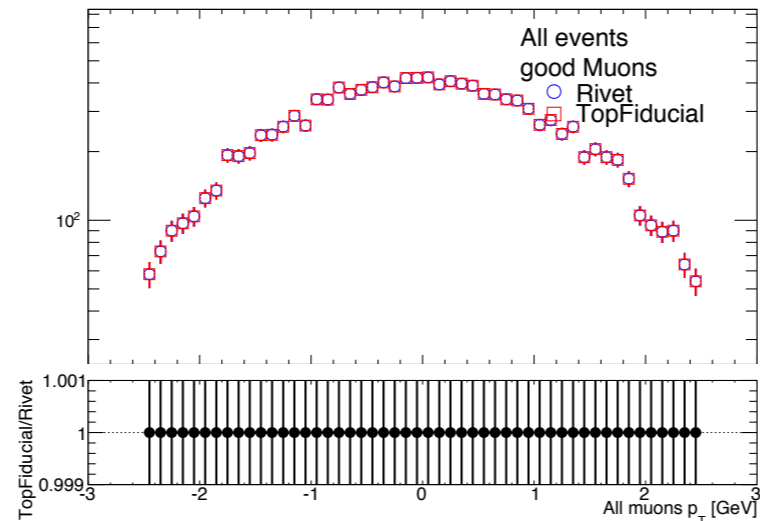
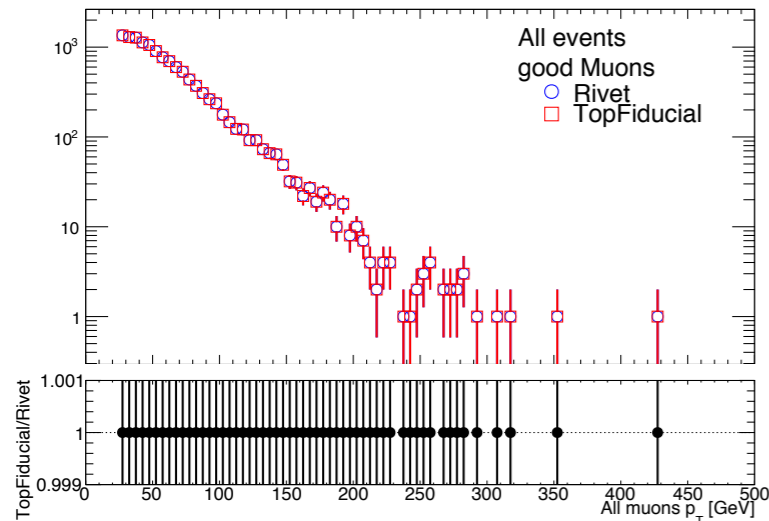
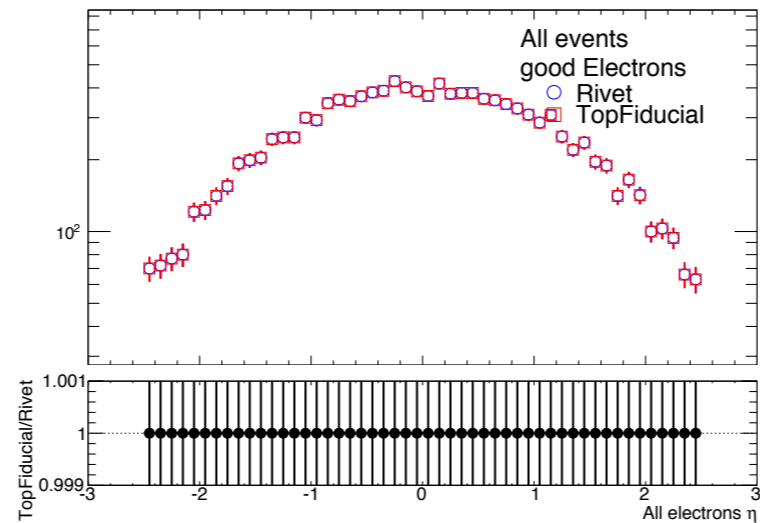
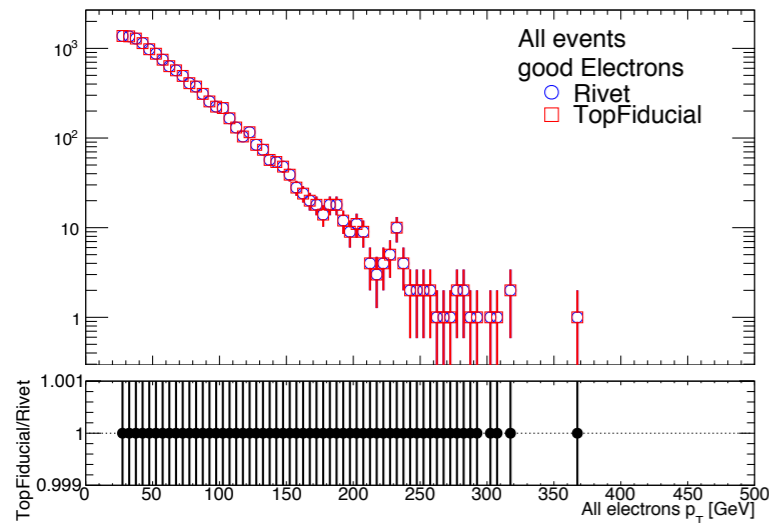
	All events	Passing fiducial selection
Rivet	4998000	2506
TopFiducial	4994497	2464
Rivet - TopFiducial	<b>3503</b>	42
(Rivet-TF)/Rivet	0.07%	<b>1.7%</b>

- We see a **1.7% discrepancy** between the two analyses
- **EVNT file has 3503 events more than NTUP\_TOP**
- I think it's unlikely that the 42 more events in Rivet come from the surplus of 3503 events that are in EVNT and not in NTUP\_TOP, but it could account for part of the difference
- **Possible causes of discrepancy (what I am investigating)**
  - object definition
  - event selection
  - something else (e.g. difference between EVNT and NTUP\_TOP, ...)

# A problem

- For unknown reasons it is impossible to make an event-by-event comparison of NTUP\_TOP and EVNT since the eventNumber information is lost in NTUP\_TOP!
- Andrea Knue has provided EVNT and NTUP\_COMMON samples (Powheg hdamp=mtop) where an event-by-event comparison is possible - for the rest of the comparisons I have been using these samples
- Caveat: **only 40k events in total**  $\Rightarrow$  **only 3 events passing fiducial selection**

# Comparison of object definition



- In these 40k events the electrons, muons and jets are identical!

- I consider it **highly unlikely that the discrepancy is due to the object definition**

Aside: there was a discrepancy (fixed) in the definition of b-jets: Rivet is **excluding excited b-hadrons from ghost matching** - TopFiducial should do the same in the future!

This affects the number of selected events at the per mille level.

# Comparison of event selection

- The same 3 events pass the fiducial selection in Rivet and TopFiducial
- Not much to say here unless we increase the sample size - unfortunately completely dependent on Andrea for this
- I don't know how realistic it is for Andrea to increase the sample size 10x
- NB: the **fiducial selection code is copied and pasted from TopFiducial into Rivet**, so I **would not expect the discrepancy to come from the event selection**

# Conclusions

- On the bright side: **when feeding the same events into Rivet and TopFiducial we observe no discrepancy!**
- On the down side: still unclear why we see a difference between NTUP\_TOP and EVNT
- It's **definitely not the object selection**, it's **most probably not the event selection**  $\Rightarrow$  **it must be something else**, like a difference between NTUP\_TOP and EVNT (it already looks strange to me why NTUP\_TOP has less events than the EVNT from which it was derived)

With the rate at which the NTUP\_COMMON files are being produced for this comparison I consider it unlikely that this will be sorted out during the next week. I propose that we go forward with the predictions forgetting about this 1.7% discrepancy which is much smaller than the theory errors.