Status update on boosted VH

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VH analysis

Starting with boosted WH production (muon and electron channels)

- Using our d3pd maker: JSD3PDMaker (Jet Substructure D3PD Maker)
- Preselecting events containing filtered jets [1] with $p_T > 150$ GeV

Cuts

- Using SM W/Z+jets selection criteria
- Specific boosted VH cuts:
  - Jet $p_T > 180$ GeV
  - W $p_T > 200$ GeV
  - No overlap in ϕ between jets and W

- GRL: data11_7TeV.periodAllYear_DetStatus-v13-pro08-02_WZjets_allchannels.xml

[1] ATLAS-CONF-2011-073

VH Analysis

Samples

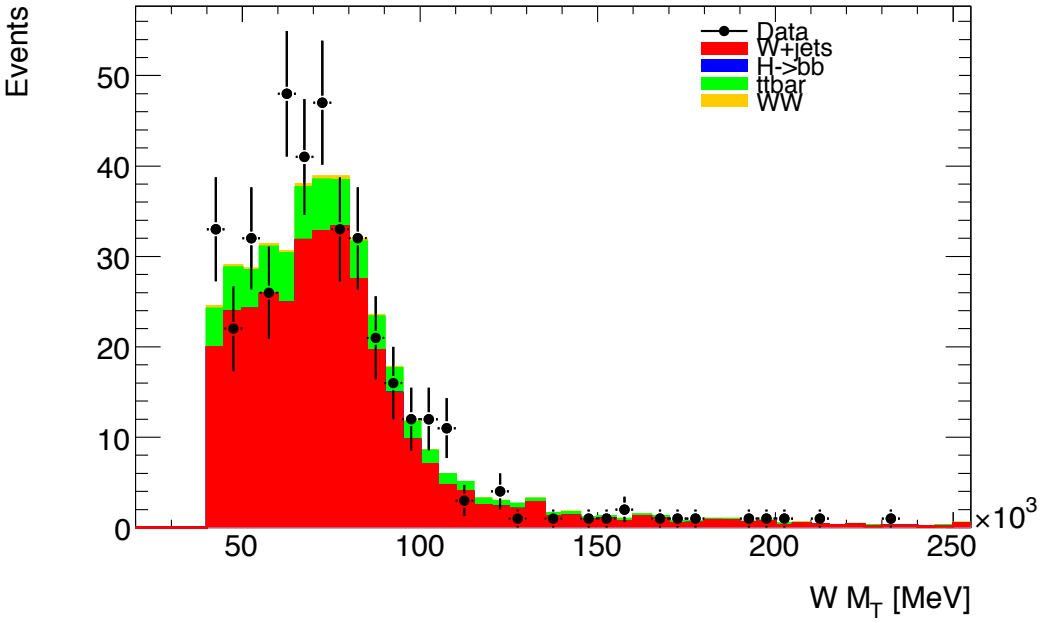
Data

- Muon and Egamma stream
- 2011 Data, period D - recorded luminosity $\sim 152 pb^{-1}$

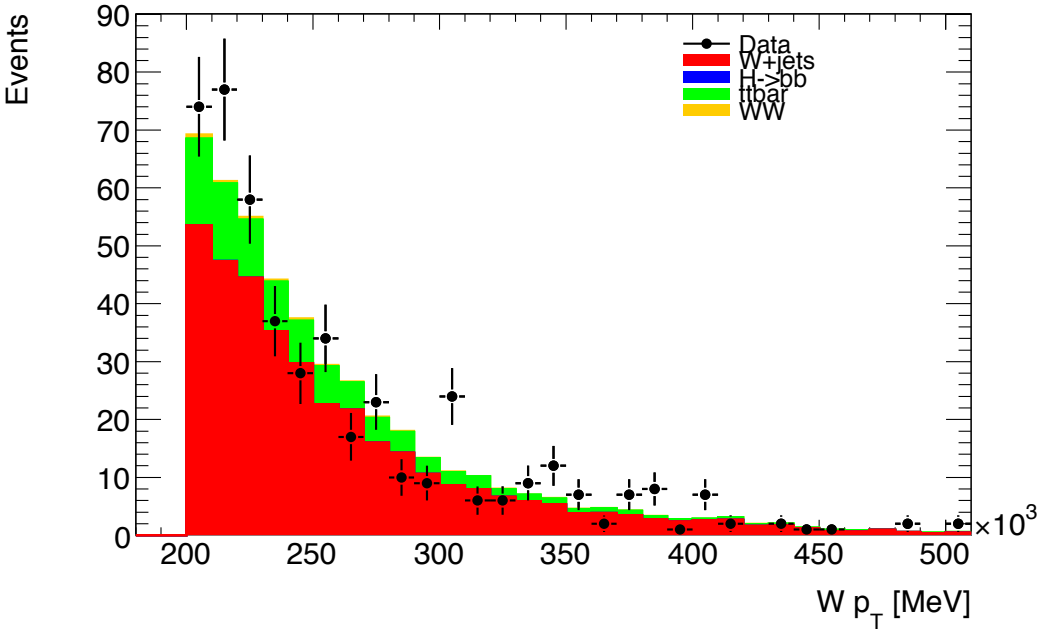
MC

- mc10_7TeV.105200.T1_McAtNlo_Jimmy.merge.AOD.e598_s933_s946_r2302_r2300
- mc10_7TeV.105985.WW_Herwig.merge.AOD.e598_s933_s946_r2302_r2300
- mc10_7TeV.107680.AlpgenJimmyWenuNp0-5_pt20.merge.AOD.e600_s933_s946_r2302_r2300
- mc10_7TeV.107690.AlpgenJimmyWmunuNp0-5_pt20.merge.AOD.e600_s933_s946_r2302_r2300
- mc10_7TeV.109140.WH120lnbb_Herwig.merge.AOD.e598_s933_s946_r2302_r2300

Muon Channel

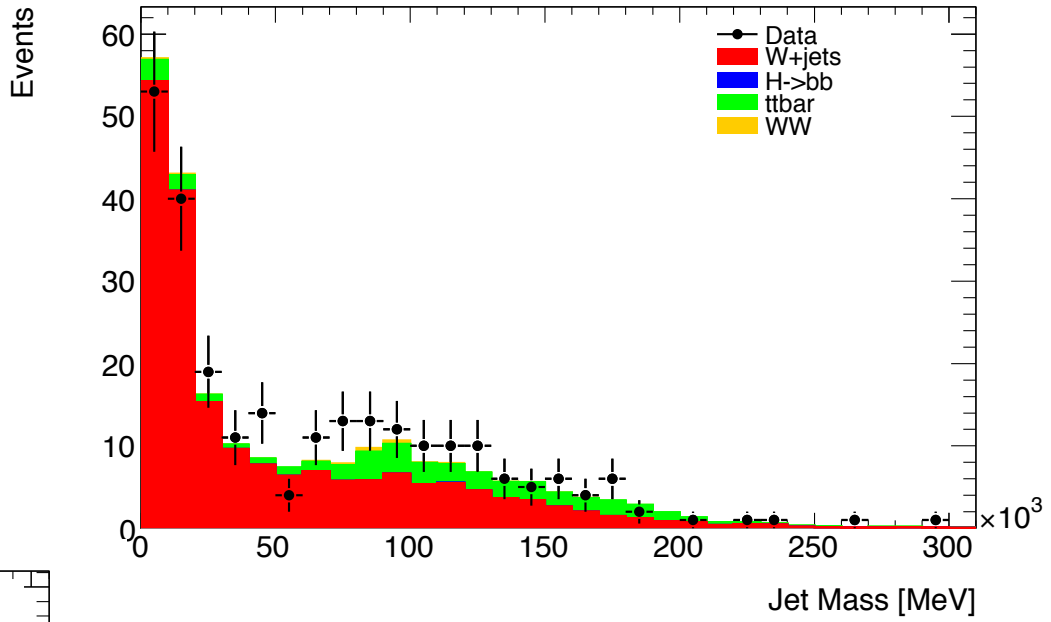


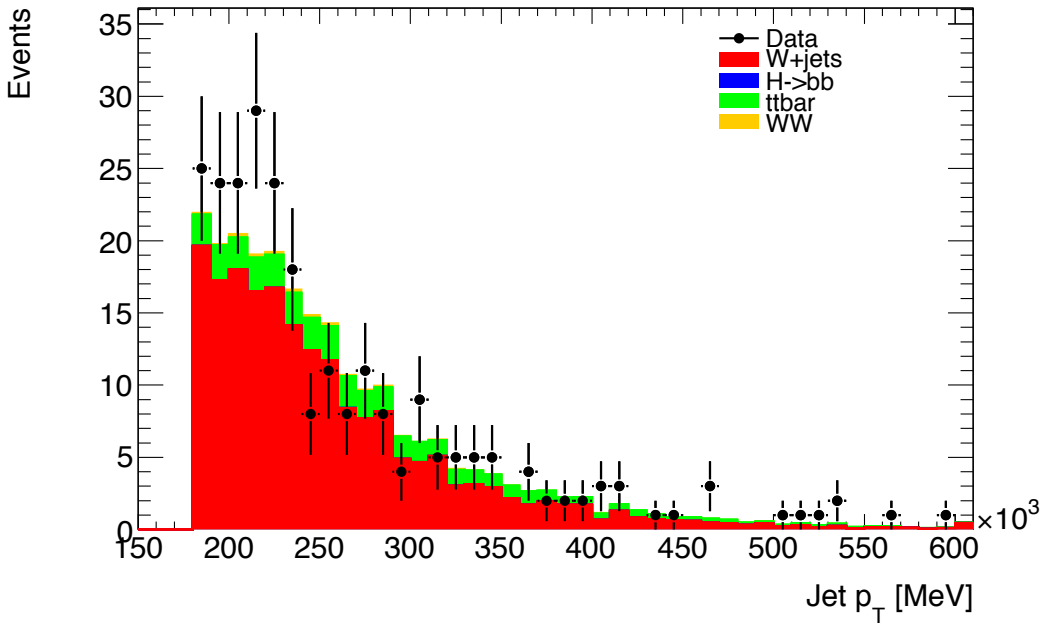
W candidates with $p_T > 200$ GeV



Muon Channel - jet mass

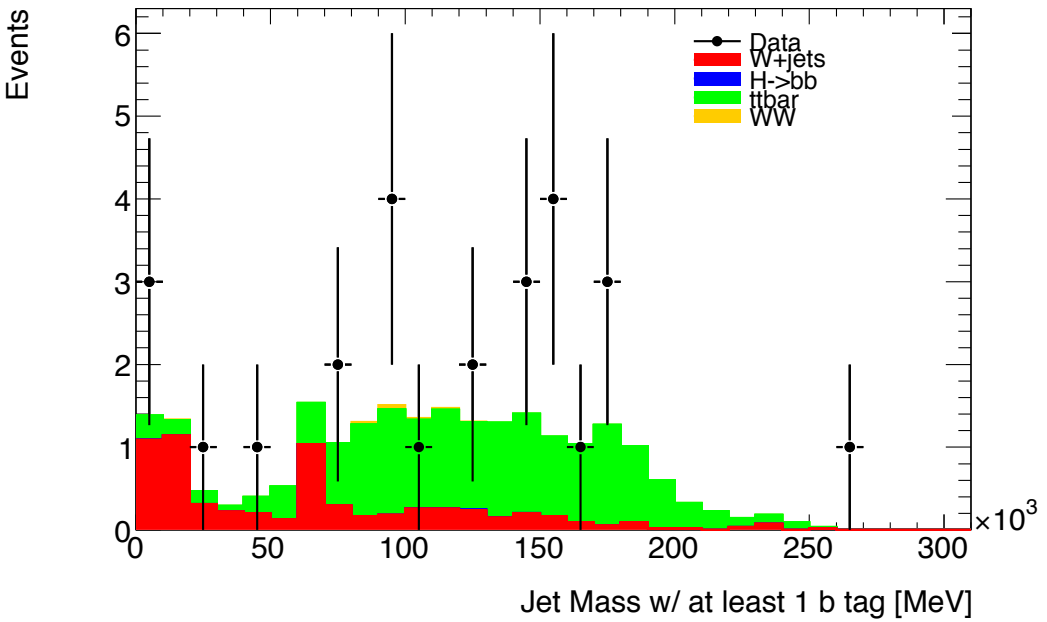
Events with one W and jets passing the spliting/filtering (see backup slide)





- before b-tagging

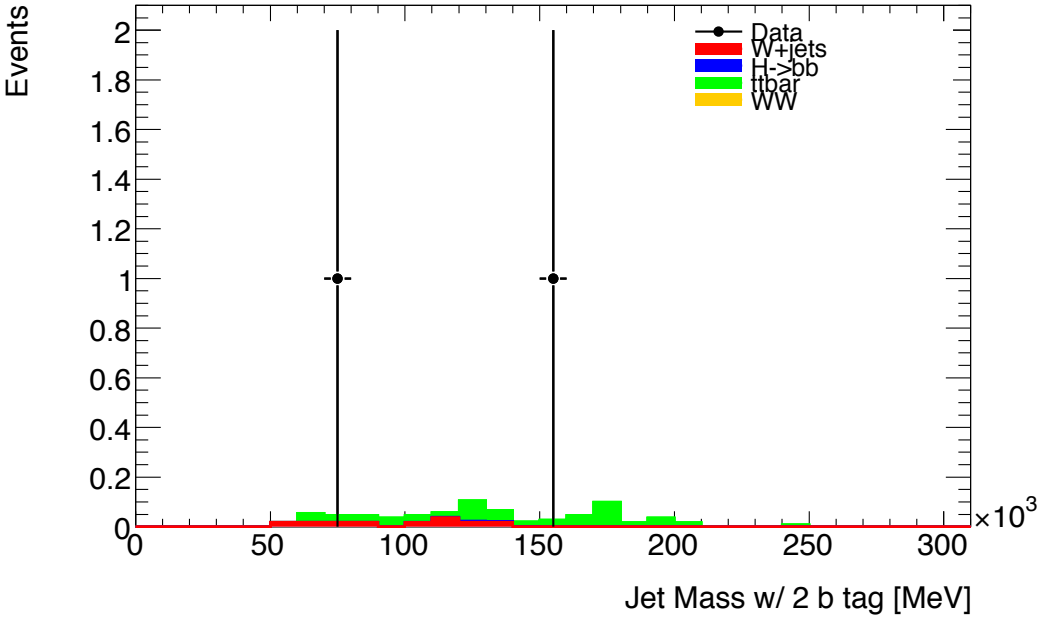
Muon Channel - jet mass



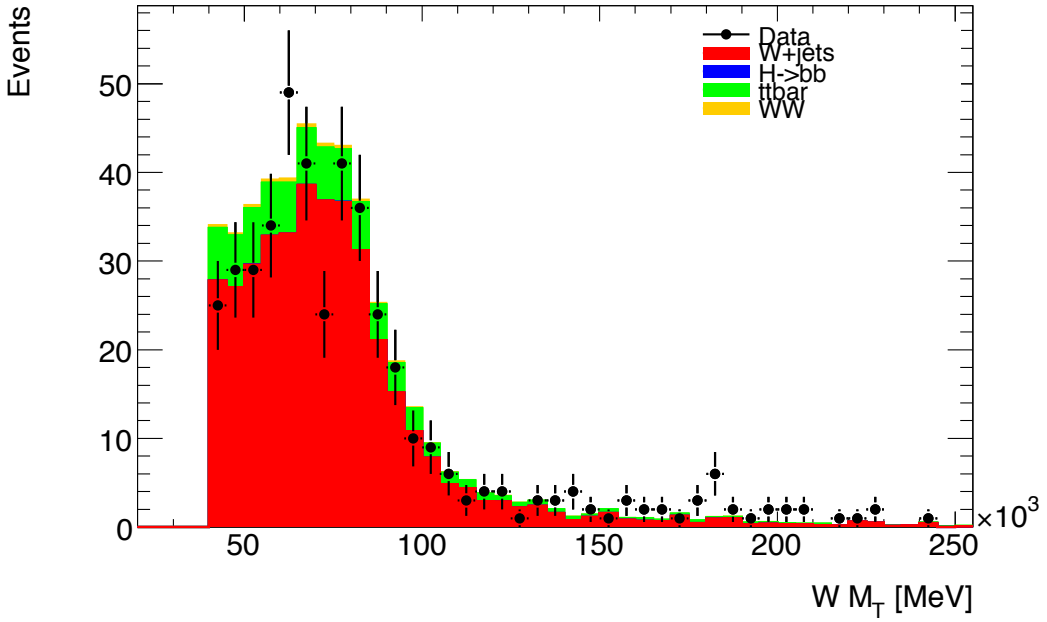
- after single and double b-tagging

JetFitterCOMBNN:

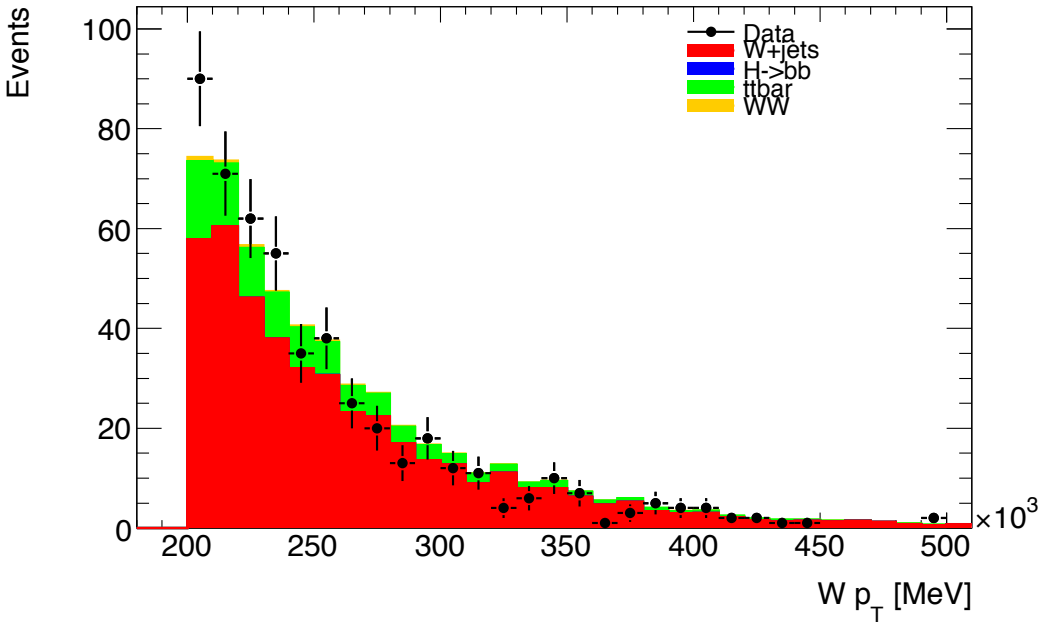
subjets required to have weight > 1



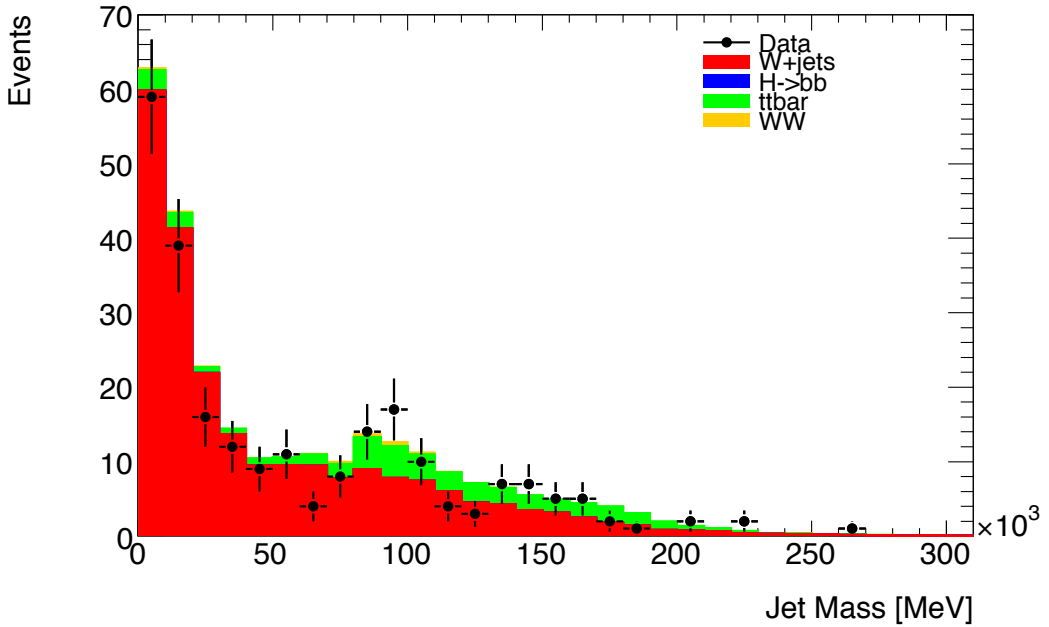
Electron Channel



W candidates with $p_T > 200$ GeV



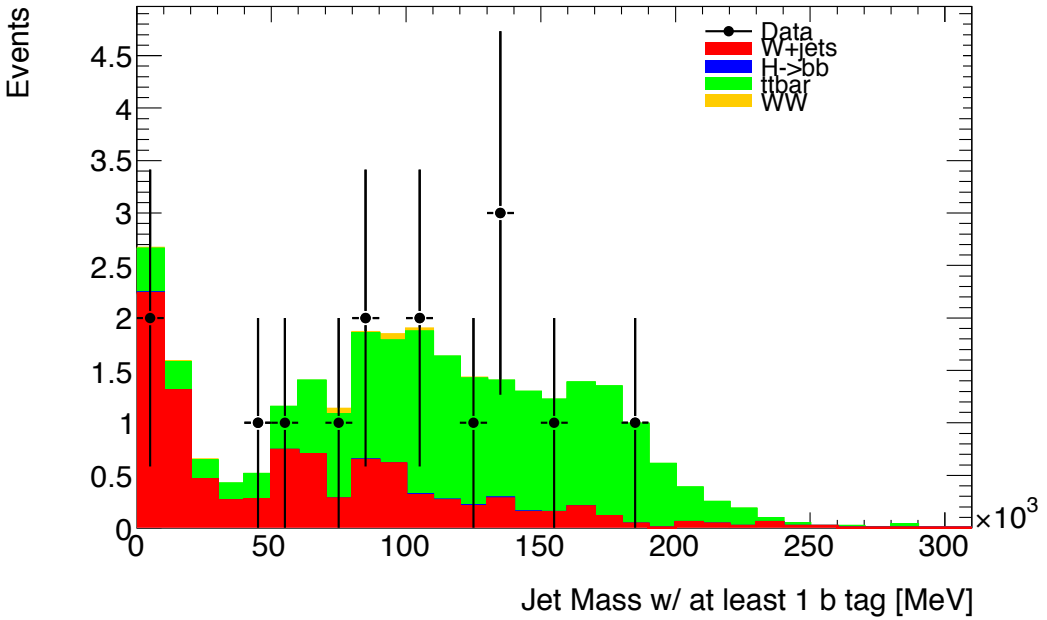
Electron Channel - jet mass



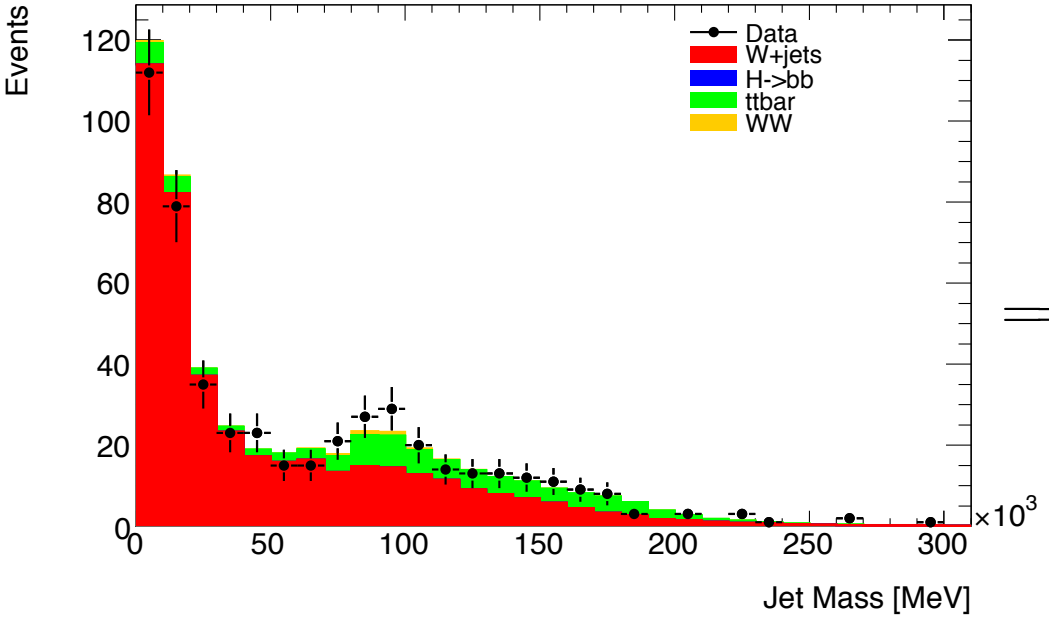
→before b-tagging

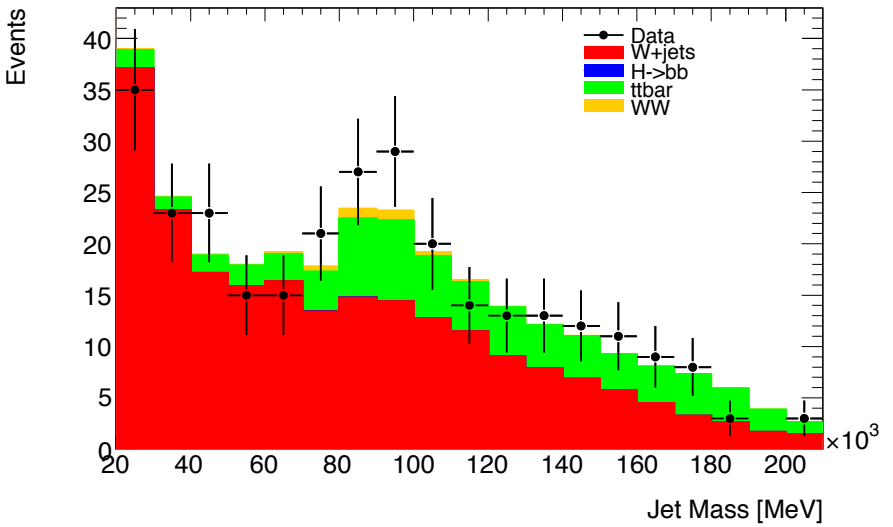
after single b-tagging ↓

No events found in this channel with two b-tags.

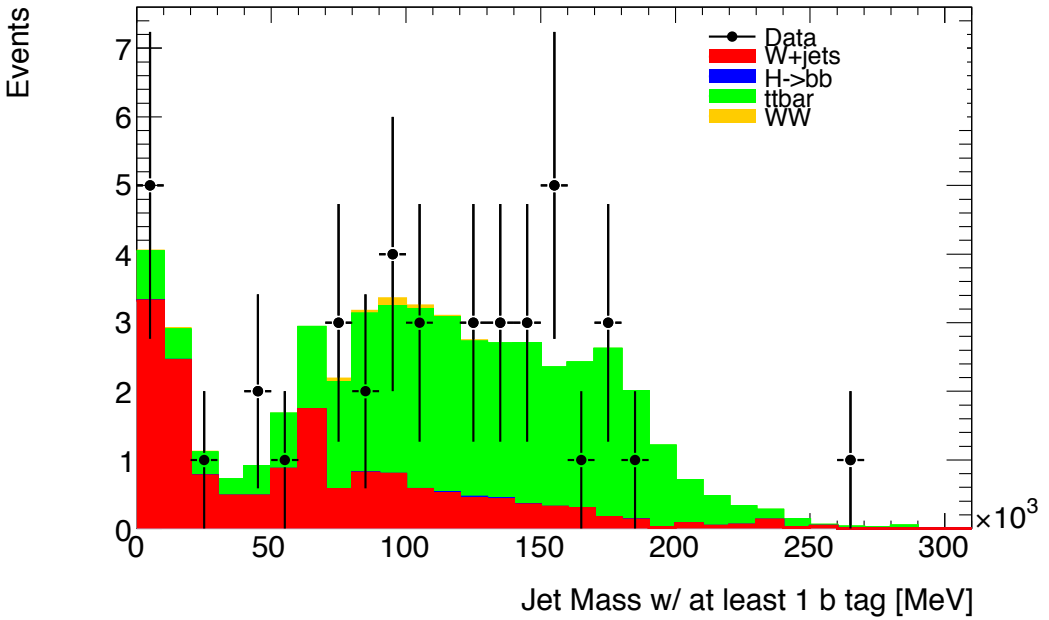


Combined results - Jet mass





Peak around the W boson mass...



Summary

- WH analysis with 2011 data, period D
- Comparison with MC

- Future work:
  - Pileup reweighting
  - Applying lepton efficiency and resolution corrections
  - $Z \to ee$, $Z \to \mu\mu$
  - More data periods...

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Identifying a Boosted Higgs Reminder

- Using the Cambridge-Aachen jet algorithm
  - Recombines closest pair of objects in the event up to R
- When finding a jet that passes a pT cut
  - Clustering can be undone one step at a time
  - Reverse clustering until a large drop in mass is observed
  - Check this splitting is not too asymmetric
  - Recluster remaining constituents with smaller R