7 TeV Dilepton Control Plots

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7 TeV Dilepton ttH

- Made a few plots of basic quantities using the available Monte Carlo
  - Used MC@NLO for ttbar and Cécile's ntuples
- Cuts:
  - ==2 opposite sign leptons
  - $p_T^e > 25GeV$, $p_T^\mu > 20GeV$
  - $p_T^{jet} > 25GeV$
  - eμ-channel:
    - $H_T > 130GeV$ (using Cécile's definition)
  - ee/μμ:
    - $M_{ll} > 15GeV$ && $|M_{ll}-M_Z| < 10GeV$
    - MET > 60GeV
- Looked at various N_{jet} / $N_{b\text{-}jet}$ bins

	0 tag	1 tag	2 tag	3 tag	≥4 tag
2 jet	✔	✔	✔	✗	✗
3 jet	✗	✗	✔	✔	✗
4 jet	✗	✗	✔	✔	✔

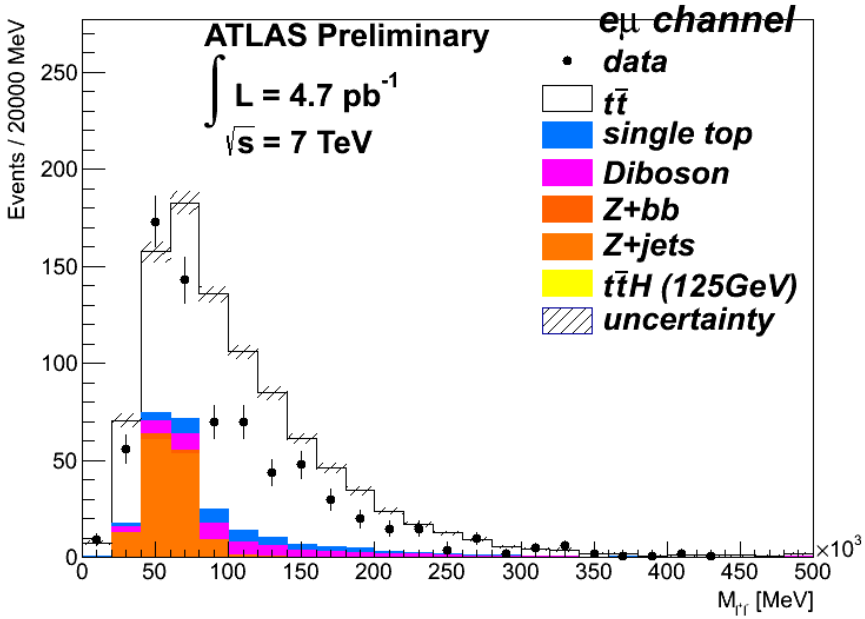
Cross sections on ttH wiki:

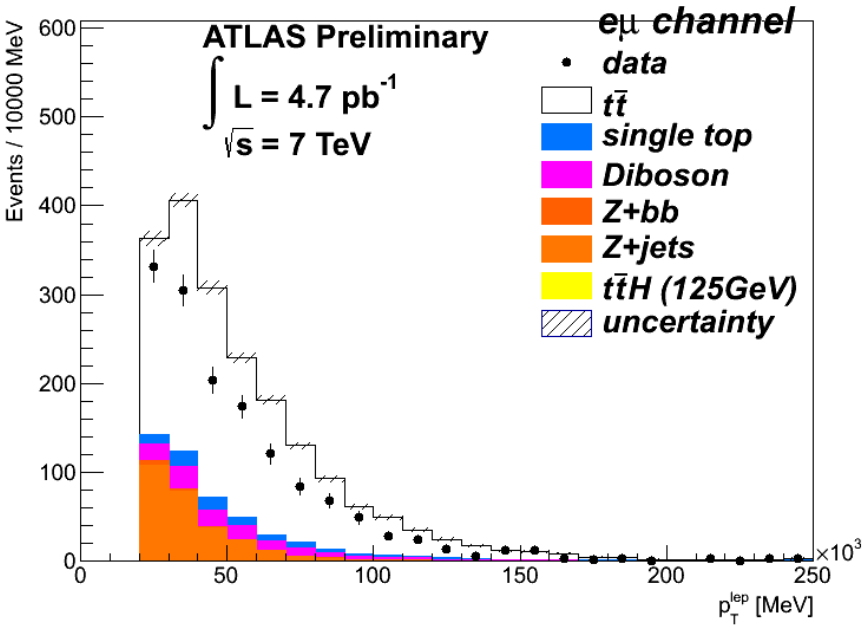
https://twiki.cern.ch/twiki/bin/viewauth/AtlasProtected/TTH2bbWinter2013#MC11x

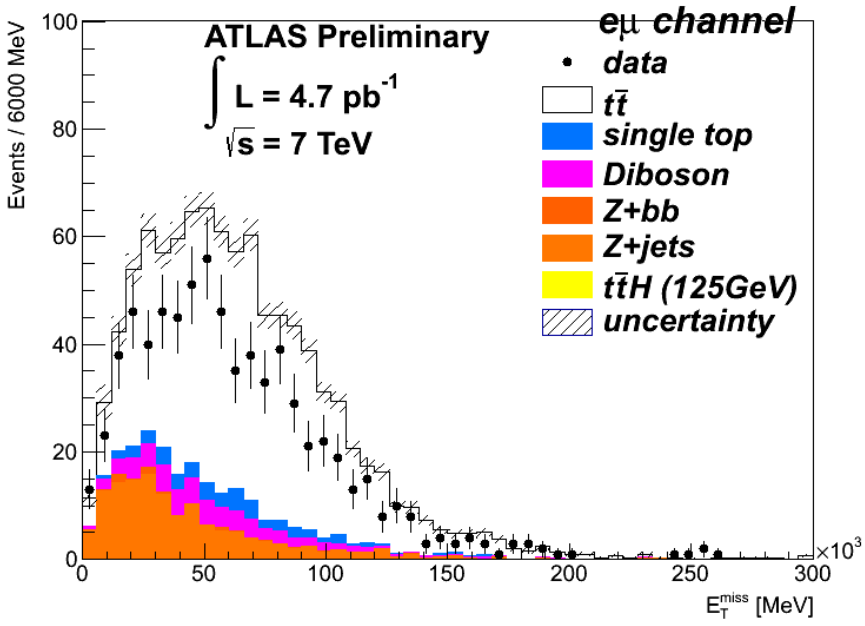
(Corrections welcome!)

Id	nr_evts	xsec_pb	K	filename	comment
105200	14983650	164.60	1.146	105200.root	ttbar MC@NLO
108343	299948	0.469	1.00	108343.root	single top s-channel enu MC@NLO
108344	299998	0.469	1.00	108344.root	single top s-channel munu MC@NLO
108345	299899	0.469	1.00	108345.root	single top s-channel taunu MC@NLO
108346	899694	14.59	1.079	108346.root	Wt MC@NLO
117360	999295	8.06	0.865	117360.root	single top t-channel enu AcerMC
117361	999948	8.06	0.865	117361.root	single top t-channel enu AcerMC
117362	998995	8.05	0.866	117362.root	single top t-channel enu AcerMC
105985	2489242	11.50	1.48	105985.root	WW Herwig
105986	249999	0.9722	1.30	105986.root	ZZ Herwig
105987	999896	3.4641	1.60	105987.root	WZ Herwig
107650	6607991	668.32	1.25	107650.root	Zee+0j Alpgen
107651	1325600	134.36	1.25	107651.root	Zee+1j Alpgen
107652	1972565	40.54	1.25	107652.root	Zee+2j Alpgen
107653	535054	11.16	1.25	107653.root	Zee+3j Alpgen
107654	144123	2.88	1.25	107654.root	Zee+4j Alpgen
107655	47280	0.83	1.25	107655.root	Zee+5j Alpgen
107660	6604729	668.68	1.25	107660.root	Zmumu+0j Alpgen
107661	1324902	134.14	1.25	107661.root	Zmumu+1j Alpgen
107662	1968541	40.33	1.25	107662.root	Zmumu+2j Alpgen
107663	535149	11.19	1.25	107663.root	Zmumu+3j Alpgen
107664	144250	2.75	1.25	107664.root	Zmumu+4j Alpgen
107665	47310	0.77	1.25	107665.root	Zmumu+5j Alpgen
107670	10596380	668.40	1.25	107670.root	Ztautau+0j Alpgen
107671	3310673	134.81	1.25	107671.root	Ztautau+1j Alpgen
107672	988961	40.36	1.25	107672.root	Ztautau+2j Alpgen
107673	495954	11.25	1.25	107673.root	Ztautau+3j Alpgen
107674	139302	2.79	1.25	107674.root	Ztautau+4j Alpgen
107675	42614	0.77	1.25	107675.root	Ztautau+5j Alpgen
109300	400208	6.57	1.00	109300.root	Zee+bb+Np0 Alpgen
109301	151504	2.48	1.00	109301.root	Zee+bb+Np1 Alpgen
109302	55179	0.89	1.00	109302.root	Zee+bb+Np2 Alpgen
109303	26535	0.39	1.00	109303.root	Zee+bb+Np3 Alpgen
109305	400300	6.57	1.00	109305.root	Zmumu+bb+Np0 Alpgen
109306	146883	2.48	1.00	109306.root	Zmumu+bb+Np1 Alpgen
109307	55236	0.89	1.00	109307.root	Zmumu+bb+Np2 Alpgen
109308	26587	0.39	1.00	109308.root	Zmumu+bb+Np3 Alpgen
109310	146425	6.57	1.00	109310.root	Ztautau+bb+Np0 Alpgen
109311	94705	2.48	1.00	109311.root	Ztautau+bb+Np1 Alpgen
109312	36806	0.89	1.00	109312.root	Ztautau+bb+Np2 Alpgen
109313	8007	0.39	1.00	109313.root	Ztautau+bb+Np3 Alpgen
116300	30000	0.01435	1.00	116300.root	ttH(115) l+jets Pythia6
116303	30000	0.01445	1.00	116303.root	ttH(115) l-jets pos+neg xsec=0.0287pb @NLO incl 0.84 filter
109840	29999	0.01165	1.00	109840.root	ttH(120) l+jets Pythia6
109841	29950	0.01165	1.00	109841.root	ttH(120) l-jets pos+neg xsec=0.0233pb @NLO incl 0.84 filter
116301	30000	0.00930	1.00	116305.root	ttH(125) l+jets Pythia6
116304	30000	0.00930	1.00	116305.root	ttH(125) l-jets pos+neg xsec=0.0186pb @NLO incl 0.85 filter
116302	29999	0.00695	1.00	116302.root	ttH(130) l+jets Pythia6
116305	30000	0.00695	1.00	116305.root	ttH(130) l-jets pos+neg xsec=0.0139pb @NLO incl 0.84 filter
146474	49900	0.00843	1.00	146474.root	ttH(110) ll xsec=0.1257pb BR=0.745 @NLO 9% dilep
146475	49900	0.00702	1.00	146475.root	ttH(115) ll xsec=0.1106pb BR=0.705 @NLO 9% dilep
146476	50000	0.00570	1.00	146476.root	ttH(120) ll xsec=0.0976pb BR=0.649 @NLO 9% dilep
146477	49998	0.00450	1.00	146477.root	ttH(125) ll xsec=0.0863pb BR=0.578 @NLO 9% dilep
146478	50000	0.00340	1.00	146478.root	ttH(130) ll xsec=0.0766pb BR=0.494 @NLO 9% dilep
146479	50000	0.00192	1.00	146479.root	ttH(140) ll xsec=0.0681pb BR=0.314 @NLO 9% dilep

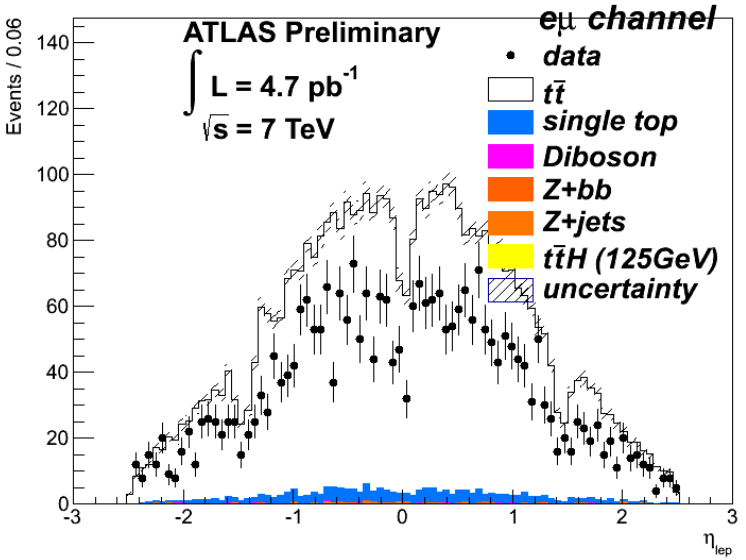
2 jets, 0 tags: MC overshoots data

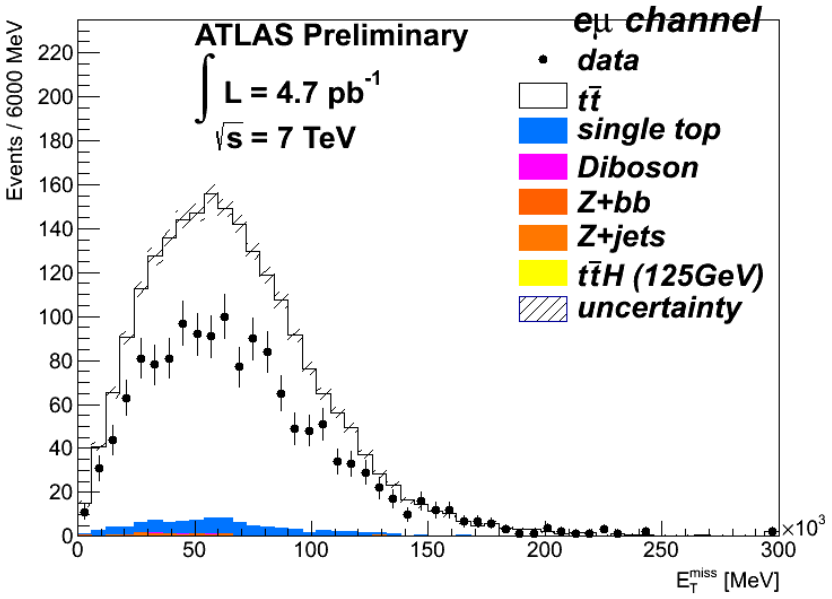


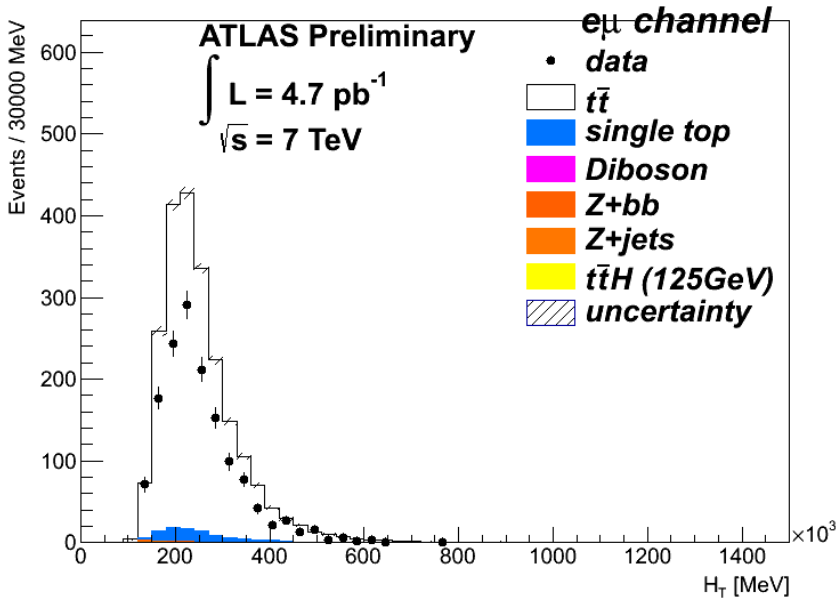




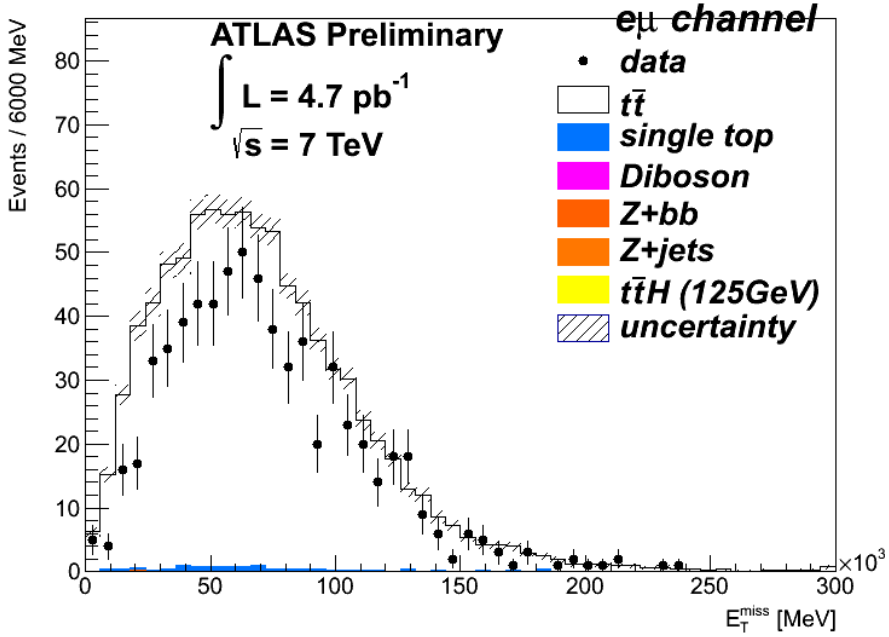
2 jets, 1 tags: MC overshoots data

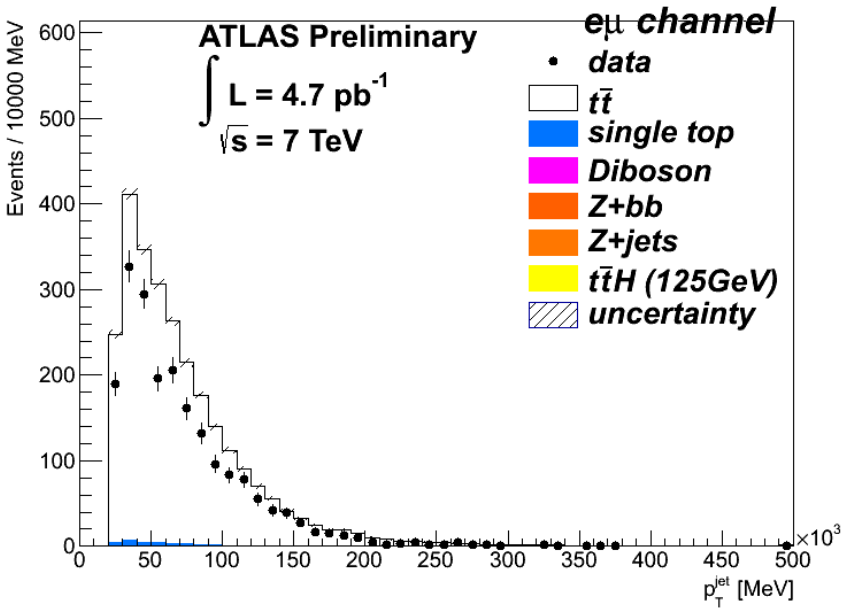


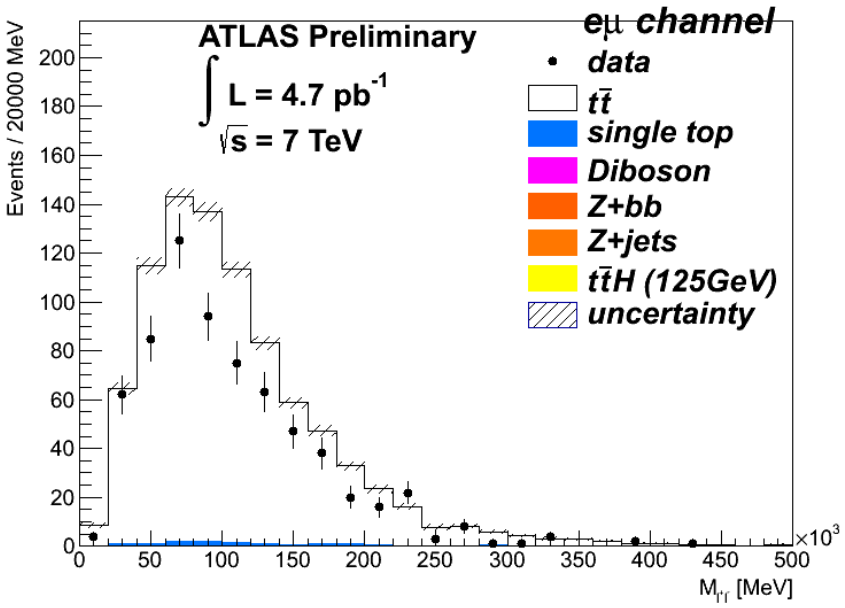




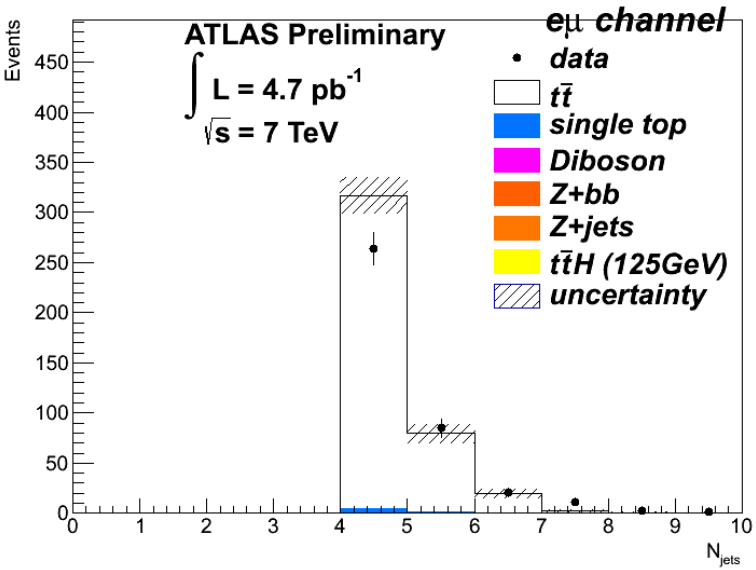
3 jets, 3 tags: Better, but MC still overshoots data

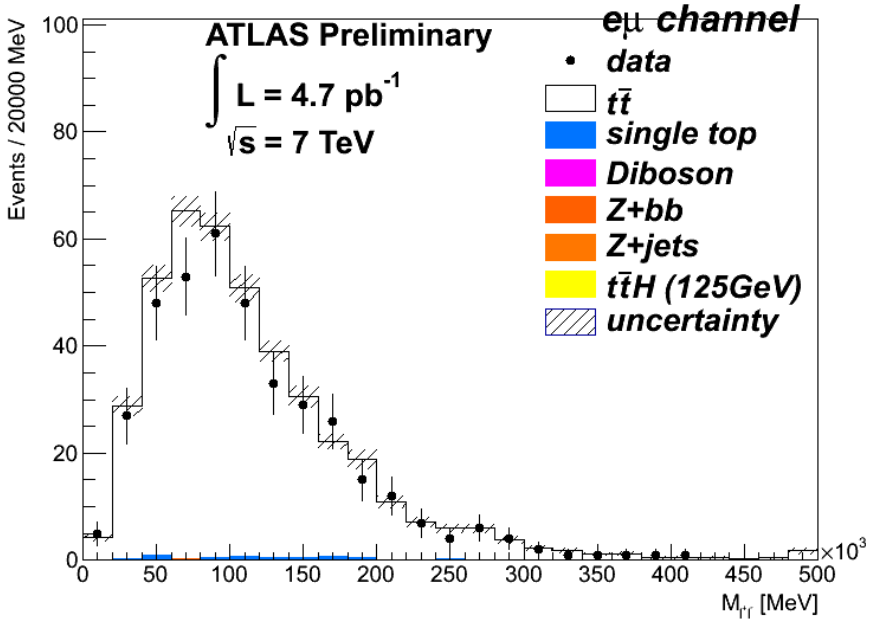


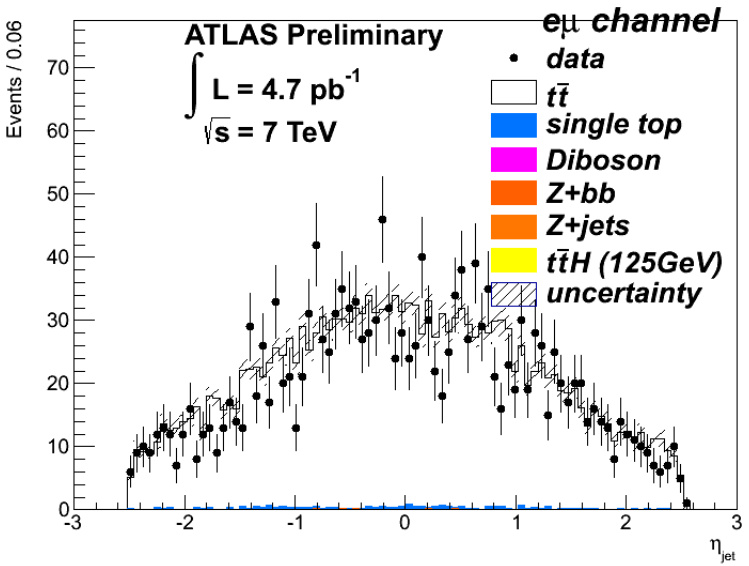




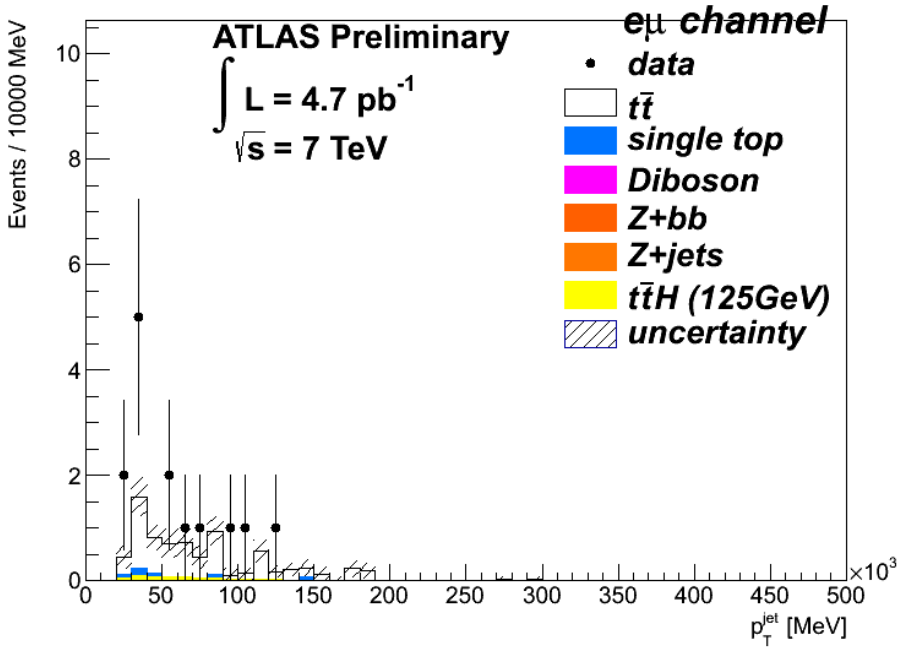
≥4 jets, ≥2 tags: Inclusive #jets distribution looks ≈ok!

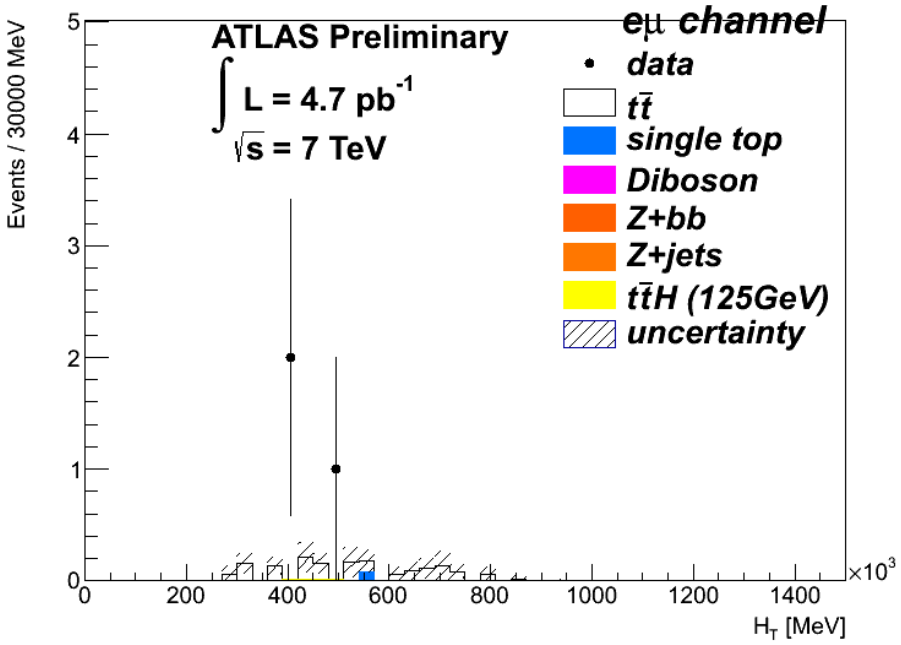




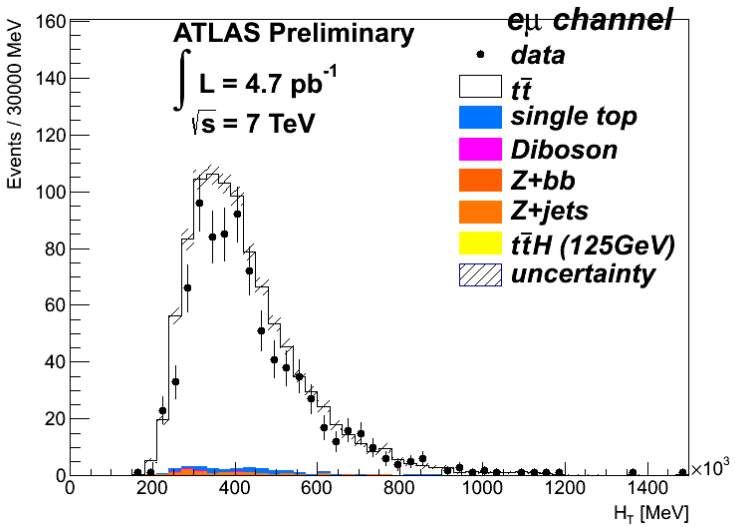


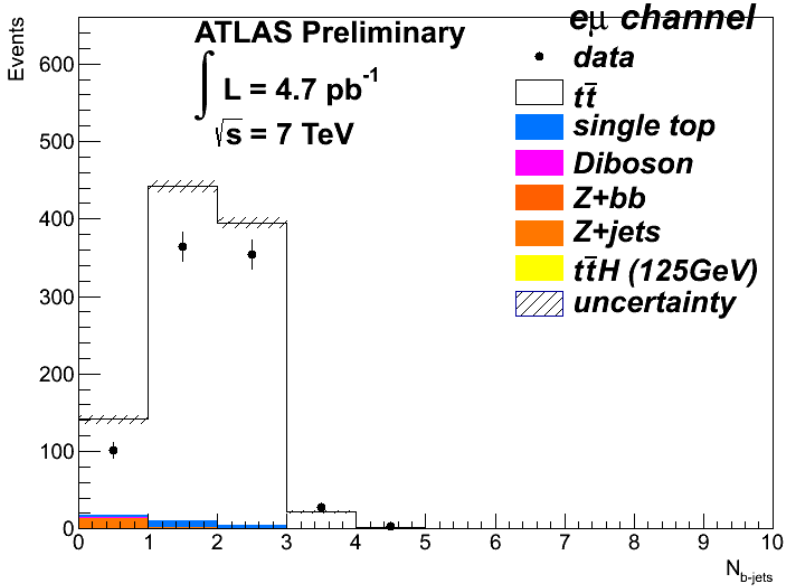
≥4 jets, ≥4 tags:
Run out of events



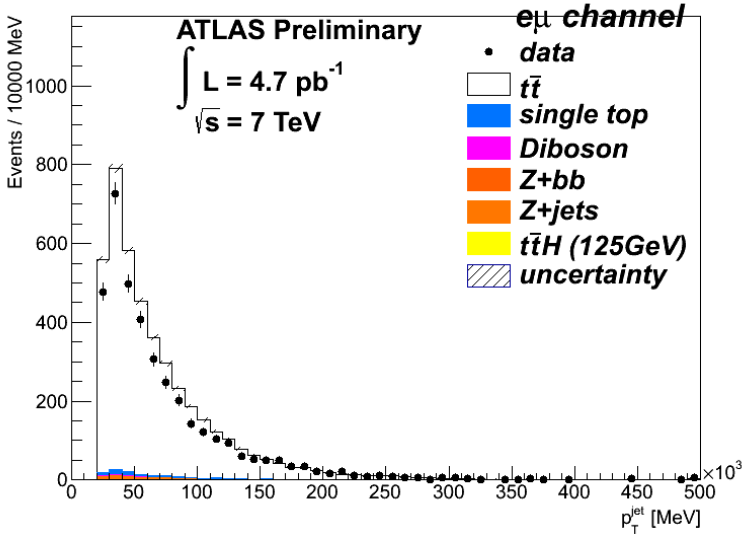


Removed HT cut: ≥4jets ≥0 btag





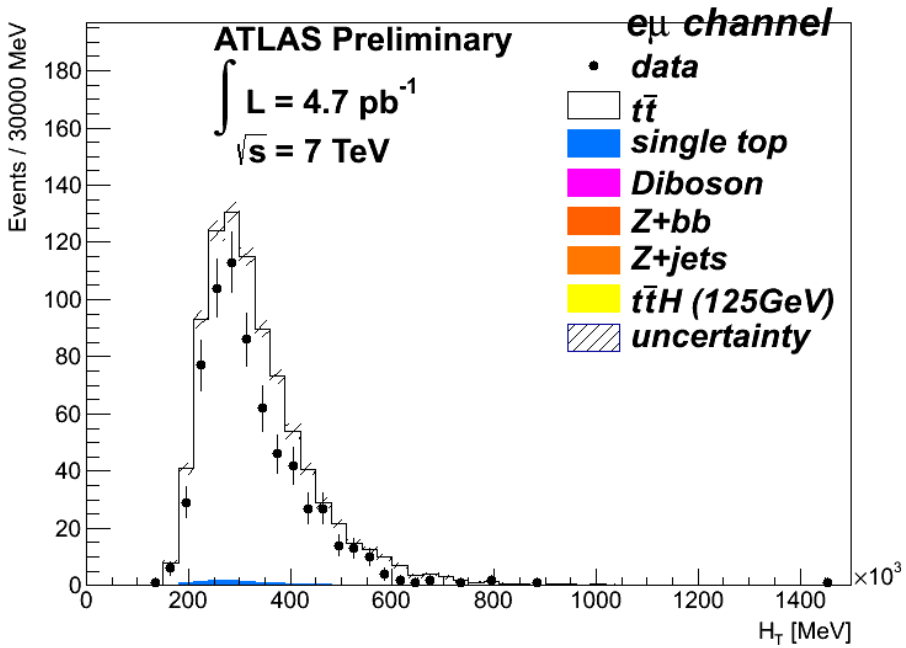
- ==2 opposite sign leptons
- $p_T^e > 25GeV$, $p_T^\mu > 20GeV$
- $p_T^{jet} > 25GeV$
- eμ-channel:
  - No H_T cut
- ee/μμ:
  - $M_{ll} > 15GeV$ && $|M_{ll}-M_Z| < 10GeV$
  - MET > 60GeV



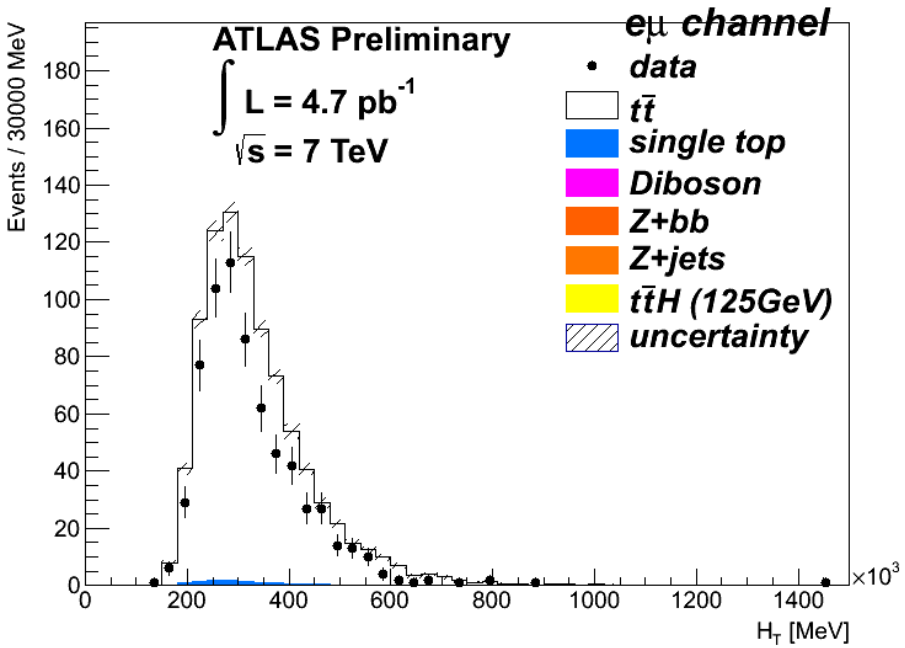
Removed HT cut: 3jets 2 btag

HT cut has little effect since HT is already quite above the standard thresholds

Left: HT>130



Right: HT>0



The story so far…

- Looked at eμ channel – completely dominated by ttbar
- Exclusive jet/b-jet bins not well described by MC@NLO
  - To be expected if Njets distribution not well described
- HT cut seems superfluous in the cases examined
  - Examine HT definition and try some other possibilities… next time