GEFÖRDERT VOM

Bundesministerium für Bildung und Forschung

FSP 101 ATLAS

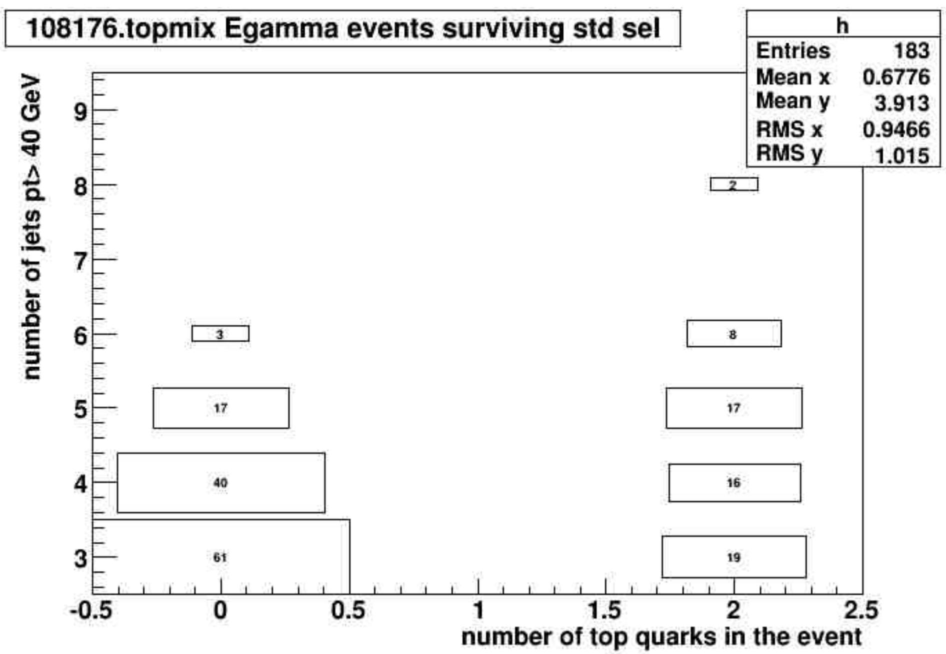
Top-mass analysis update

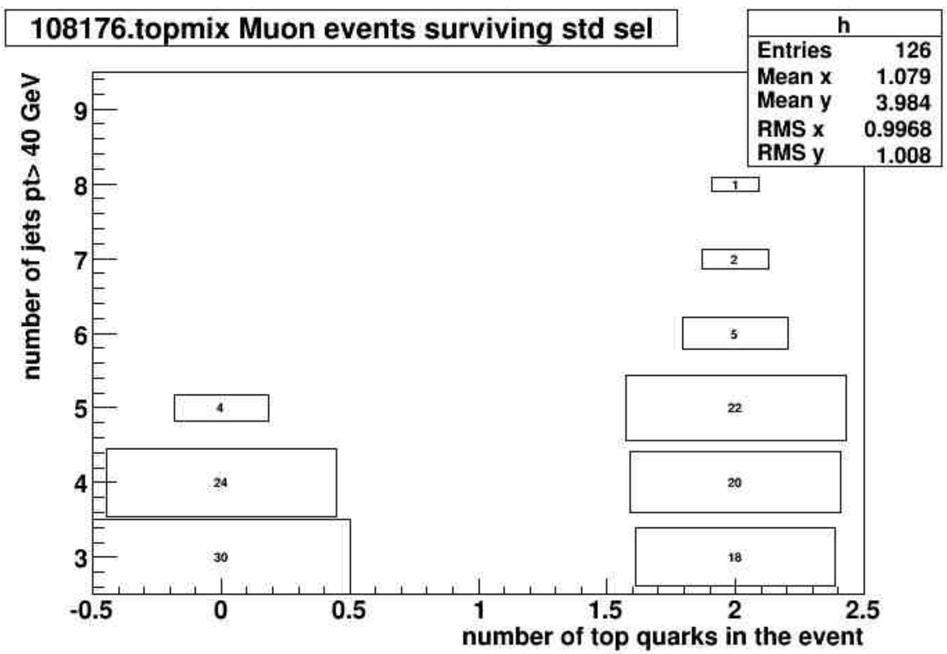
reprocessed datasets, and top mixing exercise

Giorgio Cortiana

Max-Planck-Institut für Physik
(Werner-Heisenberg-Institut)

- DPD production using mc08 datasets finished, all datasets plus top-mixing exercises (standard and for QCD).
  - HEC quadrant on, NEW alpgen QCD samples, also available as topmix 108176, but be aware of ttbar pairs!





I decided to veto QCD events containing ttbar pairs (ttbar veto).

datasets and std sel

- DPD production using mc08 datasets finished, all datasets plus top-mixing exercises (standard and for QCD).
  - HEC quadrant on, NEW alpgen QCD samples, also available as topmix 108176, but be aware of ttbar pairs!

- Updated kinematical selections to comply with standard cuts in single-lepton x-sec note.
  - Electrons (medium):
    - |eta|<1.37 or 1.52<|eta|<1.47
    - pT>20 GeV
  - Muons (staco)
    - |eta| <2.5
    - pT>20 GeV
  - Jets (cone4H1Tower)
    - ≥4 with pT >20 GeV
    - ≥3 with pT >40 GeV
  - Overlap removal
    - Drop jets if ΔR<0.2 from ele
    - Drop muons if ΔR<0.3 from jets
  - Missing eT >20 GeV
  - Cross-checked with single lepton note

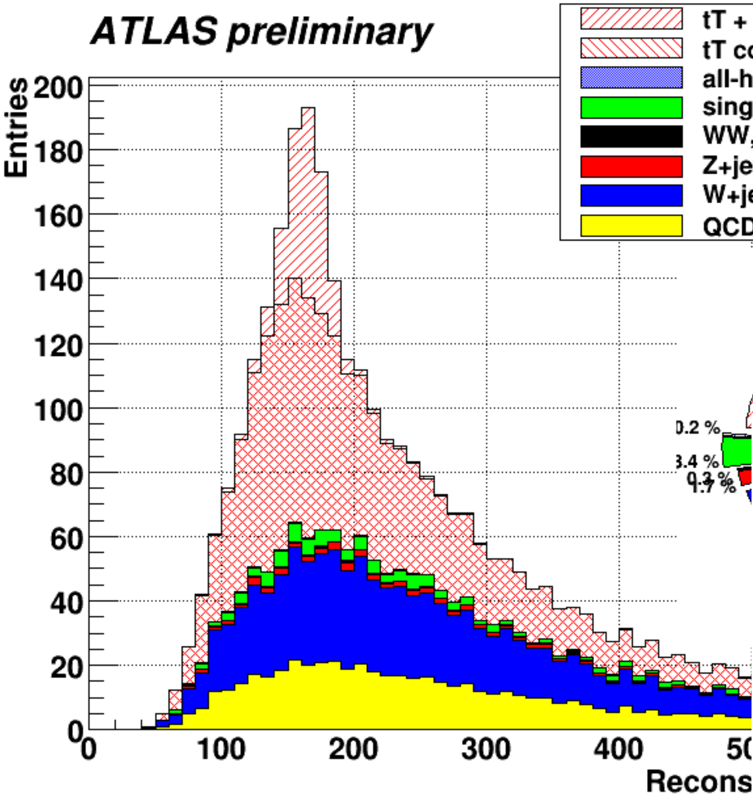
muon channel (145734 evts)

	NIKEF	MPI	evts
eff 1	31.09	30.40 +/- 0.12	44299
eff 2	66.88	67.53 +/- 0.22	29917
eff 3	91.21	91.19 +/- 0.16	27280
eff 4	47.66	47.32 +/- 0.30	12909
eff 5	79.87	81.29 +/- 0.34	10494

electron channel (145734 evts)

	NIKEF	MPI	evts
eff 1	24.96	24.74 +/- 0.11	36059
eff 2	70.17	70.00 +/- 0.24	25242
eff 3	90.62	90.53 +/- 0.18	22852
eff 4	47.47	46.95 +/- 0.33	10729
eff 5	79.91	79.76 +/- 0.39	8557

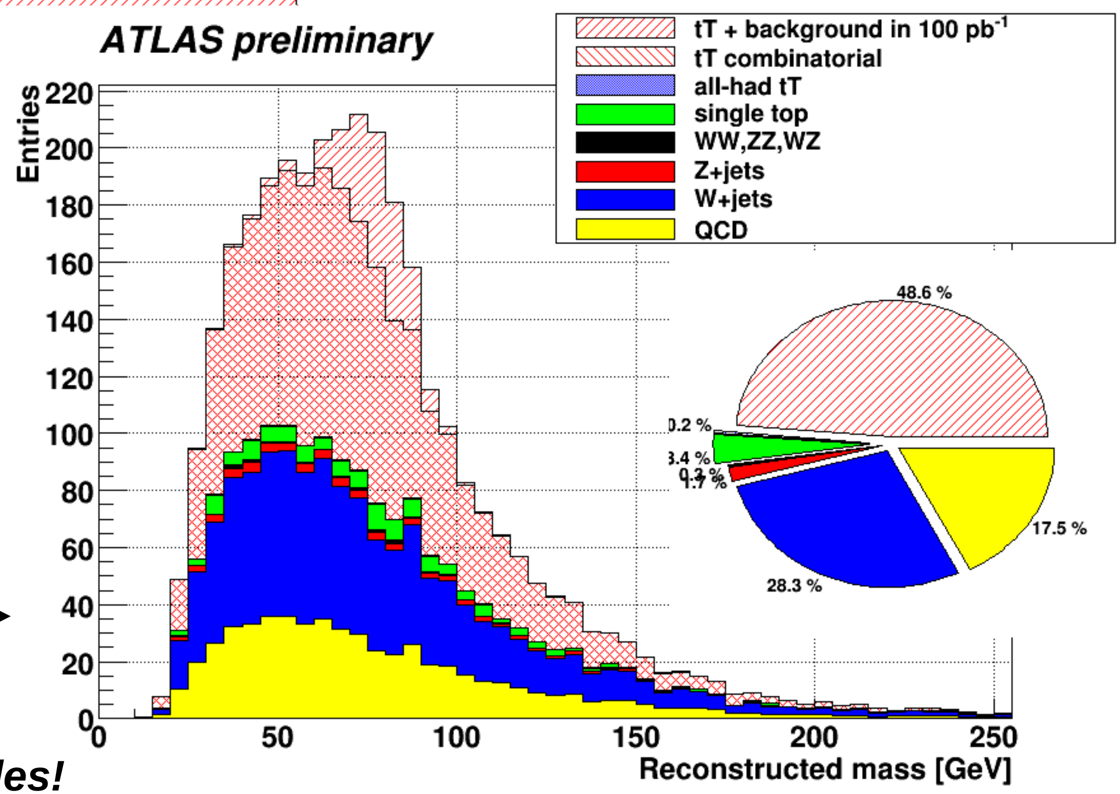
muon channel, std sel



QCD norm from
topmix sample 108176
muon stream (ttbar veto)

QCD shape from W+jets

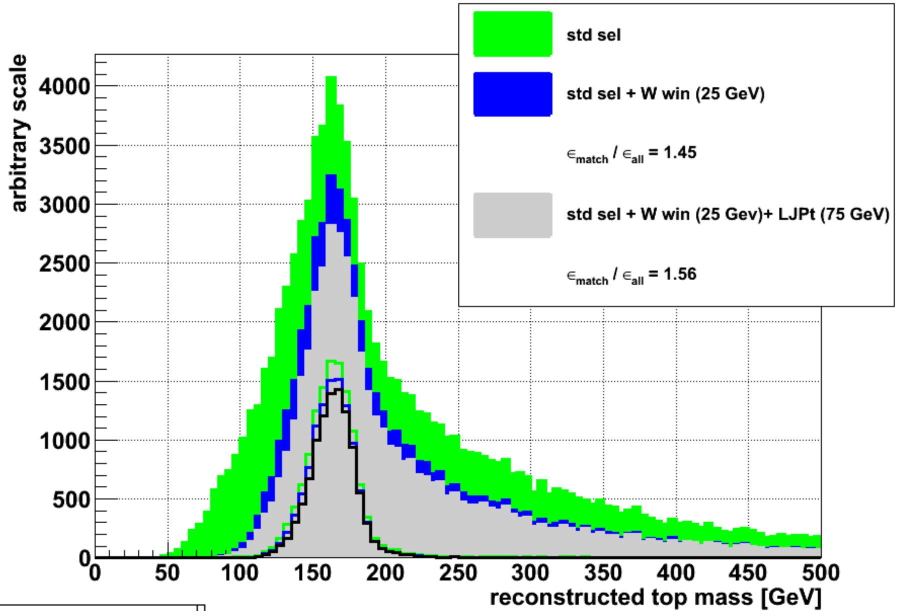
W reco as the dijet pair, in
top-rest-frame, closest in ΔR



Electron channel in backup slides!

selection variations

- Tighter isolation requirement, using cone0.4 around leptons (iso40<6Gev) to reduce QCD background
- W mass windows and tighter leading jet pT cuts to reduce ttbar combinatorial (at the cost of ~1 GeV shift on correct top combinations)



Muon channel: exp evts in 100pb^{-1}

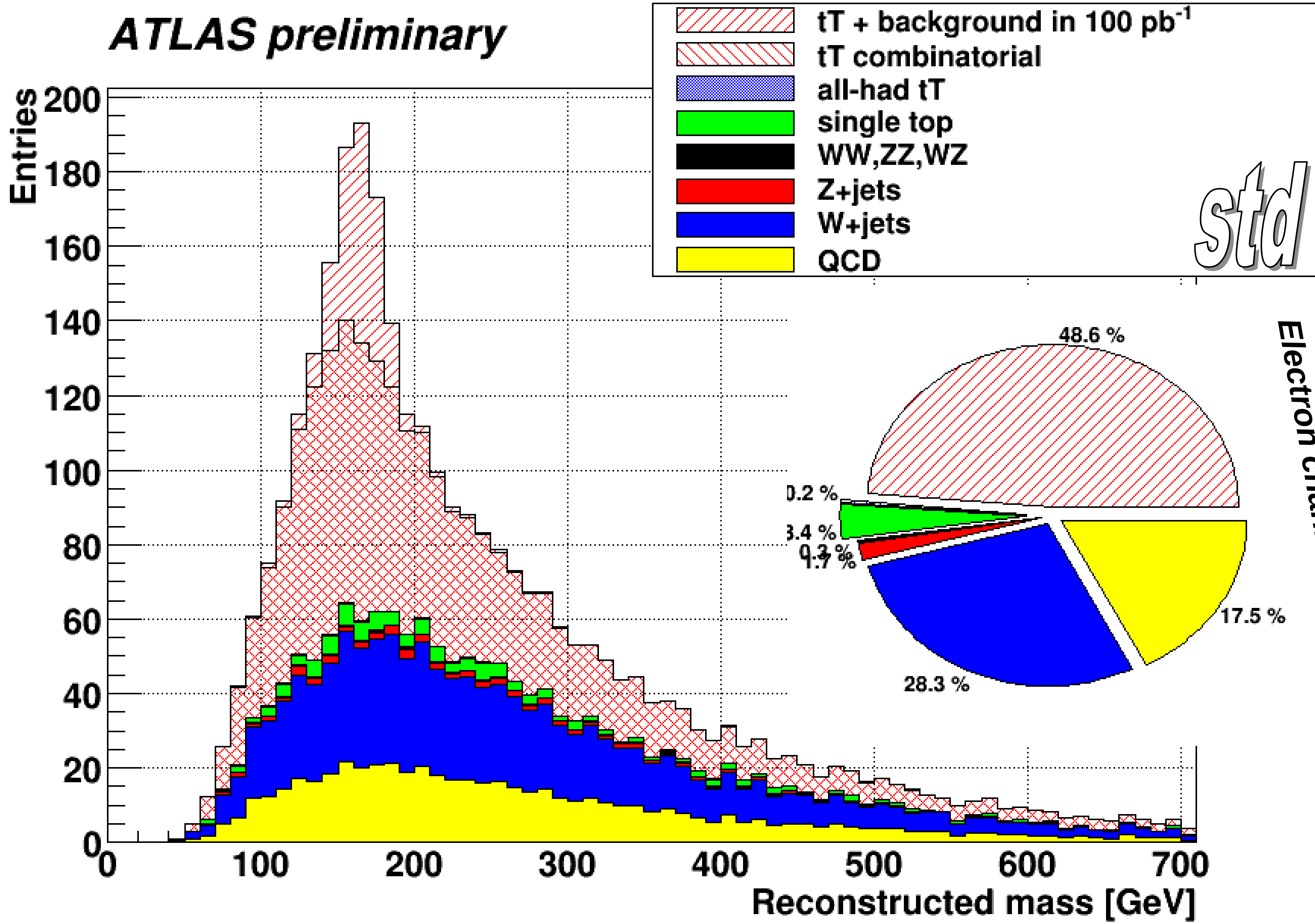
Process	std sel	std sel + iso40	std sel + WLJ cuts	std sel + iso40 + WLJ cuts
$t\bar{t}$	1584± 5	1454± 5	803± 4	734± 3
$W \to e\nu$+jets	0± 2	0± 2	0± 2	0± 2
$W \to \mu\nu$+jets	836± 10	779± 10	332± 7	309± 7
$W \to \tau\nu$+jets	68± 4	65± 4	30± 3	28± 3
$W + b\bar{b}$+jets	20± 1	18± 1	7± 1	6± 1
$Z \to ee$+jets	0± 0	0± 0	0± 0	0± 0
$Z \to \mu\mu$+jets	35± 1	33± 1	14± 1	13± 1
$Z \to \tau\tau$+jets	20± 1	19± 1	7± 1	7± 1
$ZZ/WZ/WW$	10± 1	10± 1	5± 1	5± 1
single top	112± 5	104± 5	43± 3	39± 3
all had top	6± 0	3± 0	3± 0	1± 0
QCD	573± 83	302± 61	219± 53	146± 44
Total sgn	1583.88	1453.57	803.13	734.40
Total bkg	1680.21	1332.81	659.59	555.48
S/B	0.94	1.09	1.22	1.32
$S/\sqrt{S+B}$	27.72	27.54	21.00	20.45

10 TeV vs 7* TeV

LHC $\sqrt{s}$	$S = N_{sgn}$	$B = N_{bkg}$	S/B	$S/\sqrt{(S+B)}$
standard selection				
10 TeV	1583.88	1680.21	0.94	27.72
7 TeV	633.49	1022.30	0.62	15.57
standard selection+iso40+WLJ cut				
10 TeV	734.40	555.48	1.32	20.45
7 TeV	293.73	334.46	0.88	11.72

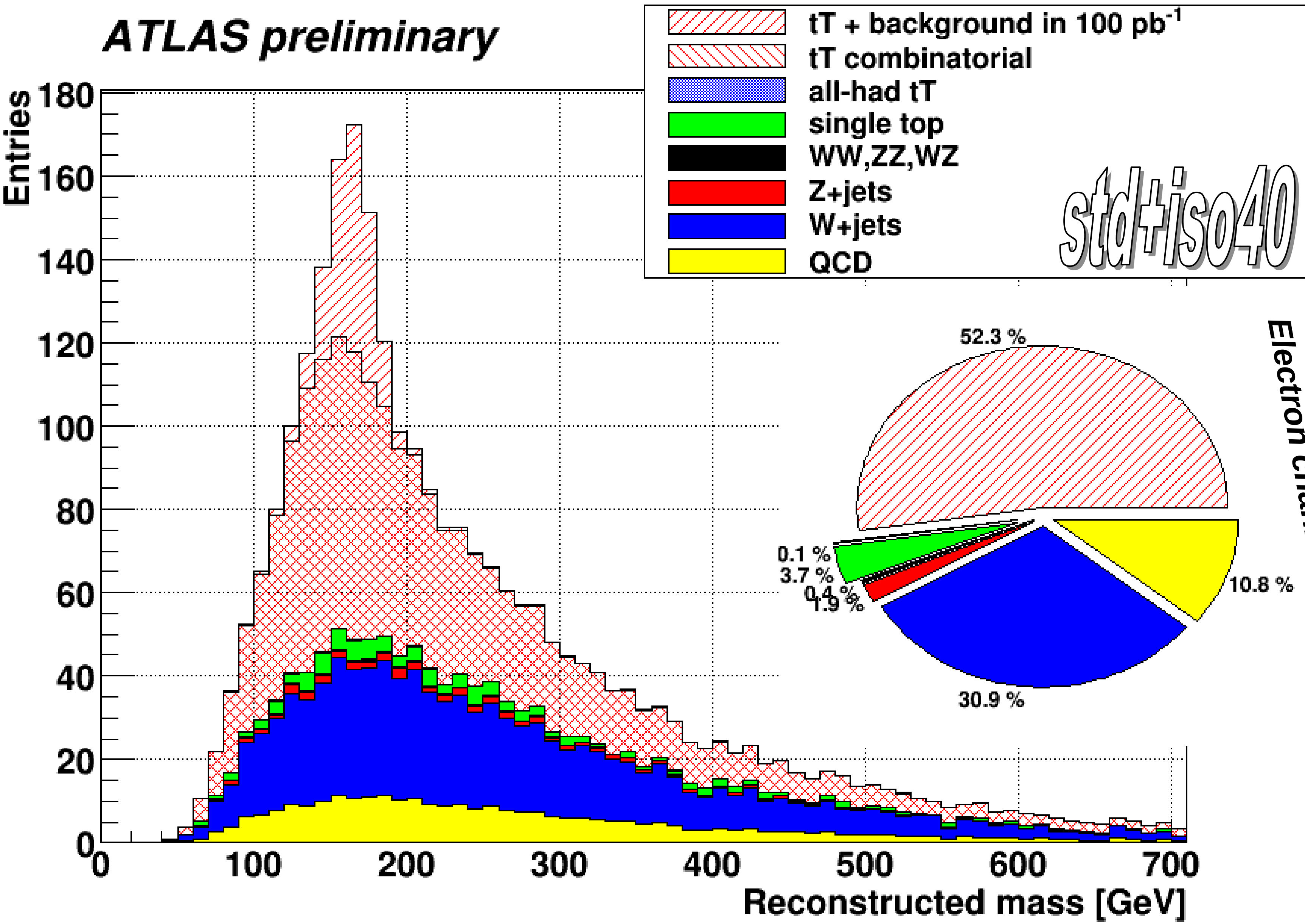
*SF(tT)=1/2.5, SF(s-top)=1/2, SF(QCD)=1/1.5
SF(others)=1/1.7

10TeV cut variations for mu-channel



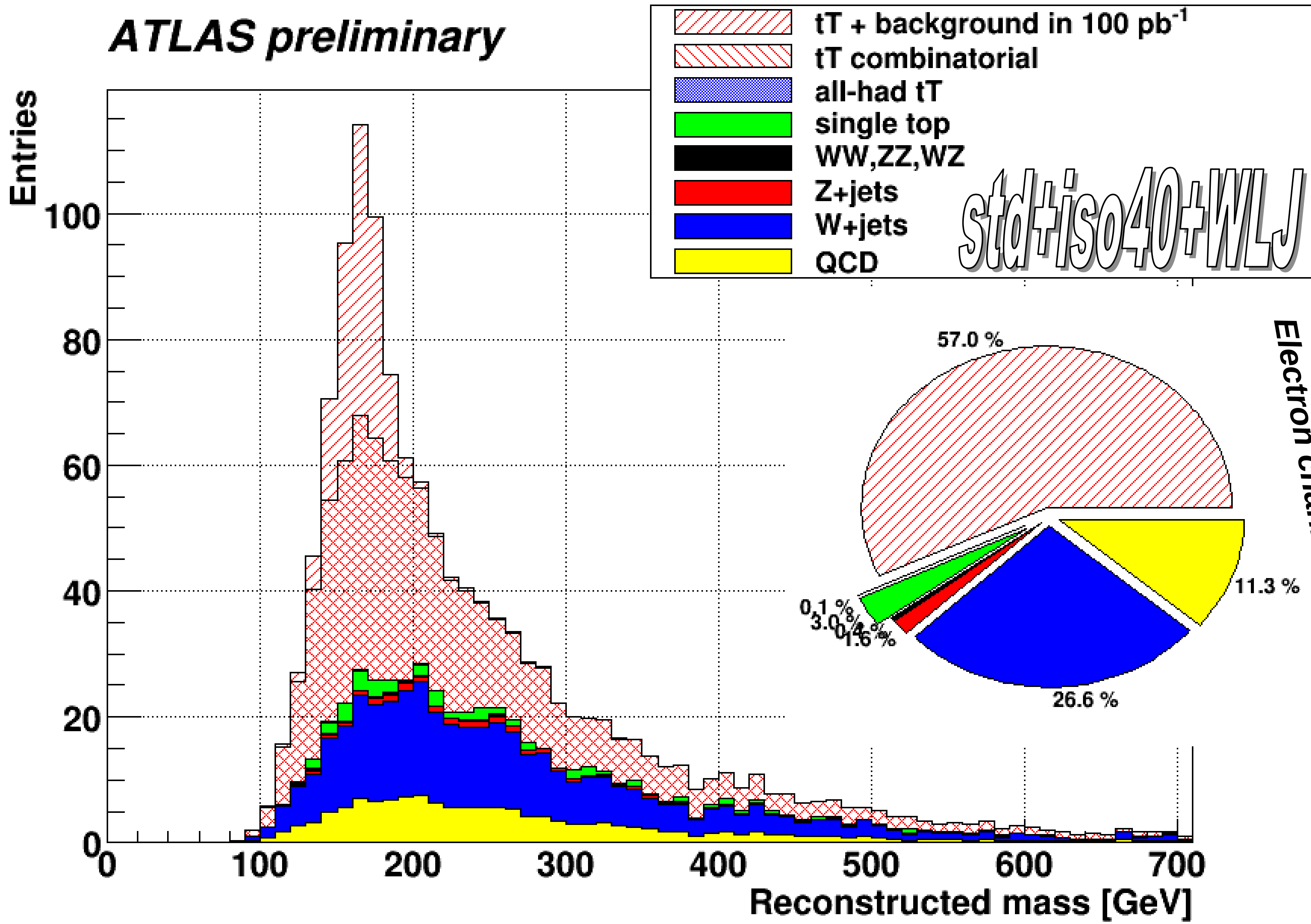
Electron channel in backup slides!

10TeV cut variations for mu-channel



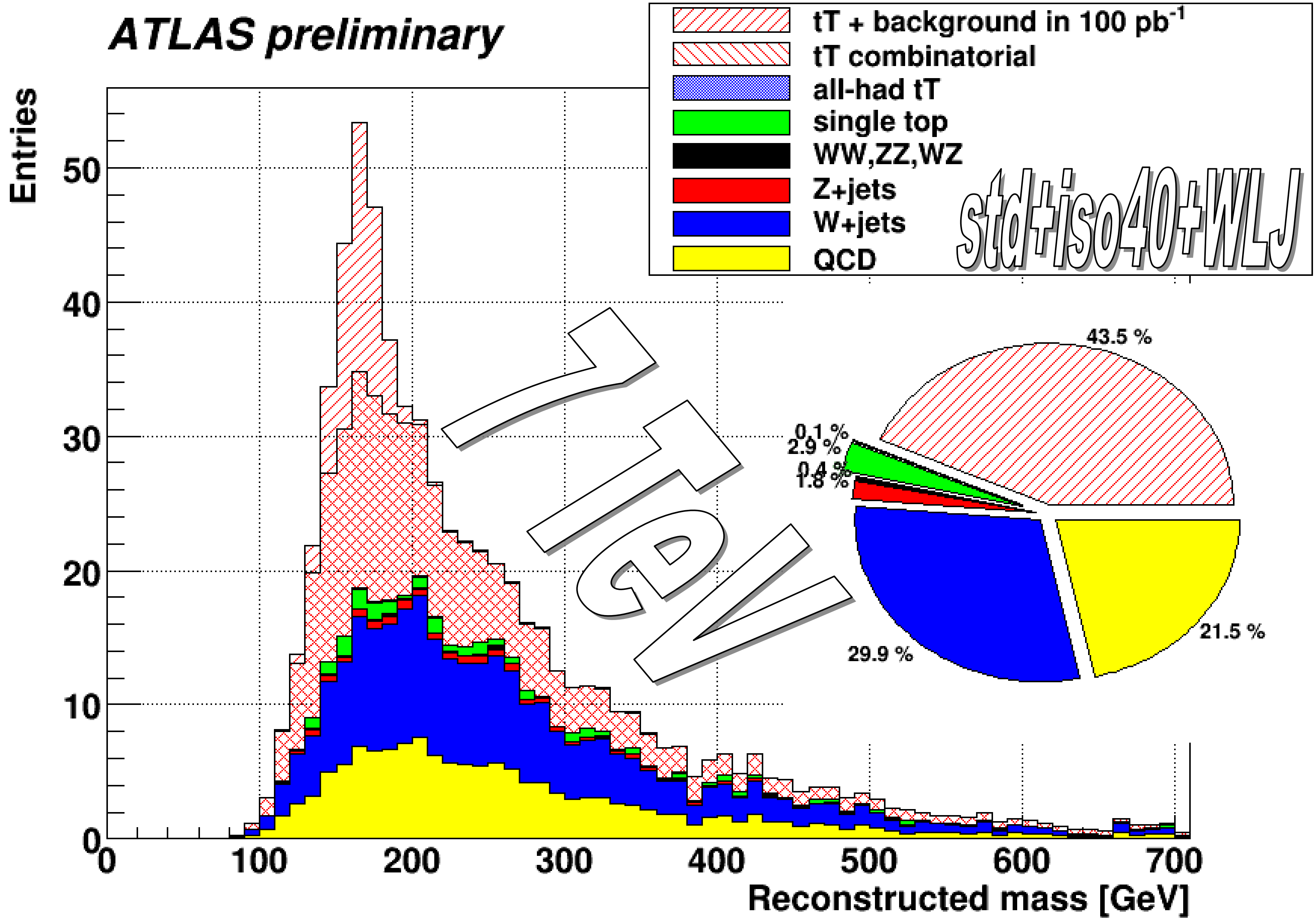
Electron channel in backup slides!

10TeV cut variations for mu-channel



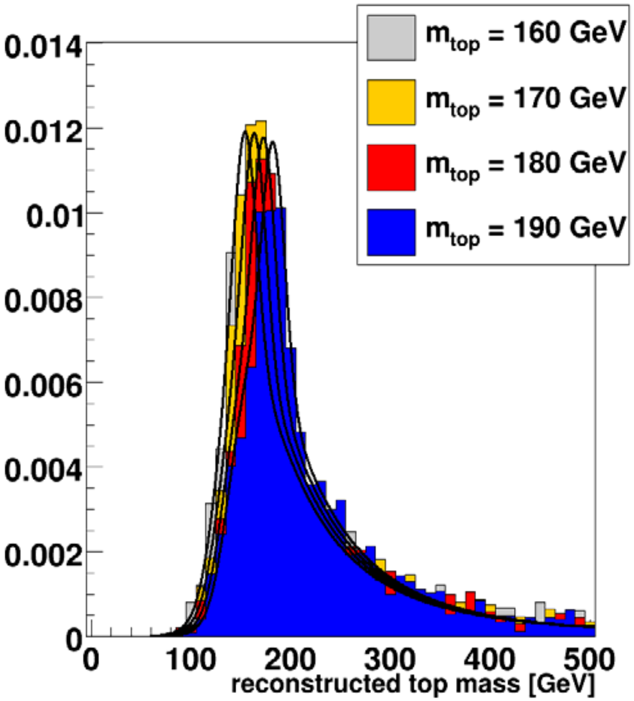
Electron channel in backup slides!

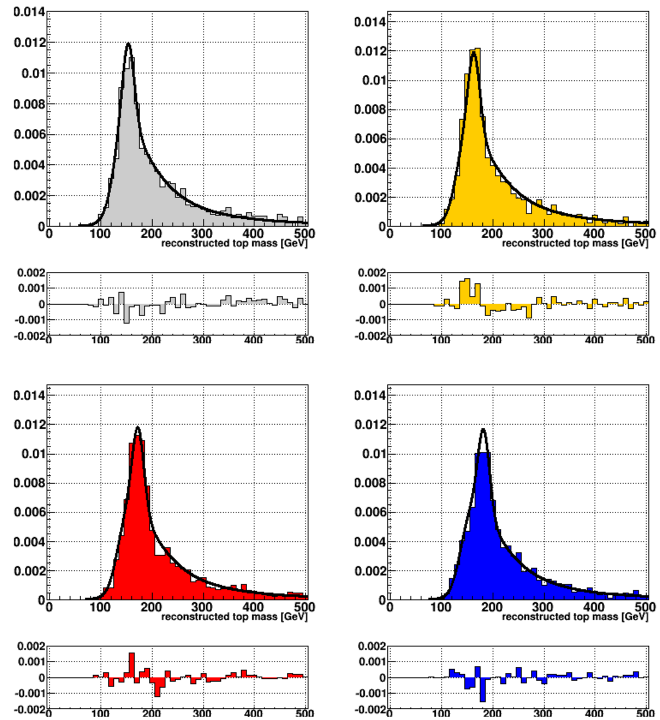
7TeV cut variations for mu-channel



templates

$$P_{sig}(m_{top}^{rec}|m_{top}) = (1-\delta_5)\left[1+\left(\frac{\delta_1 - m_{top}^{rec}}{\delta_2}\right)^2\right]^{-\delta_3} \cdot e^{-\delta_4 \tan^{-1}\left(\frac{\delta_1 - m_{top}^{rec}}{\delta_2}\right)} + \delta_5 \cdot \frac{1}{\sqrt{2\pi}\delta_7} e^{-\frac{(m_{top}^{rec}-\delta_6)^2}{2\delta_7^2}}$$



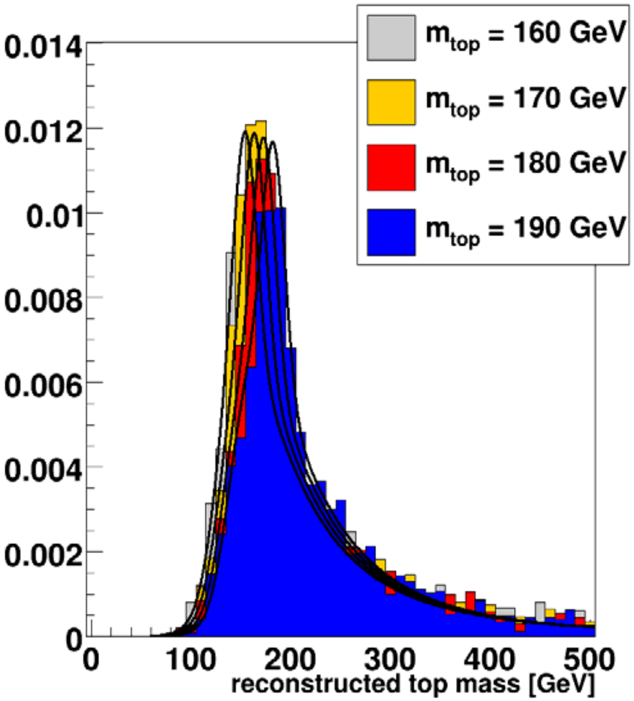


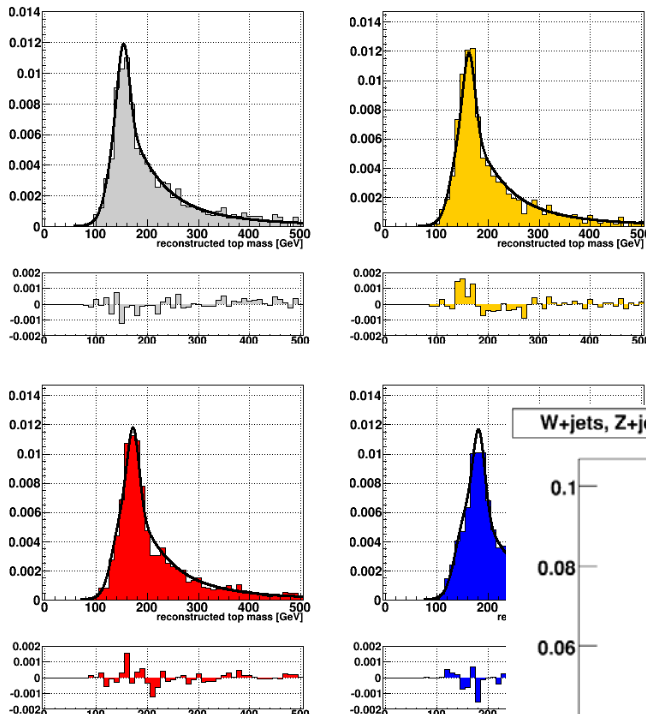
Parameterization of the signal m_{top}^{reco} by a single PDF depending on m_{top}^{true}.

$$p_i = \alpha_i + \beta_i \cdot m_{top}$$

templates

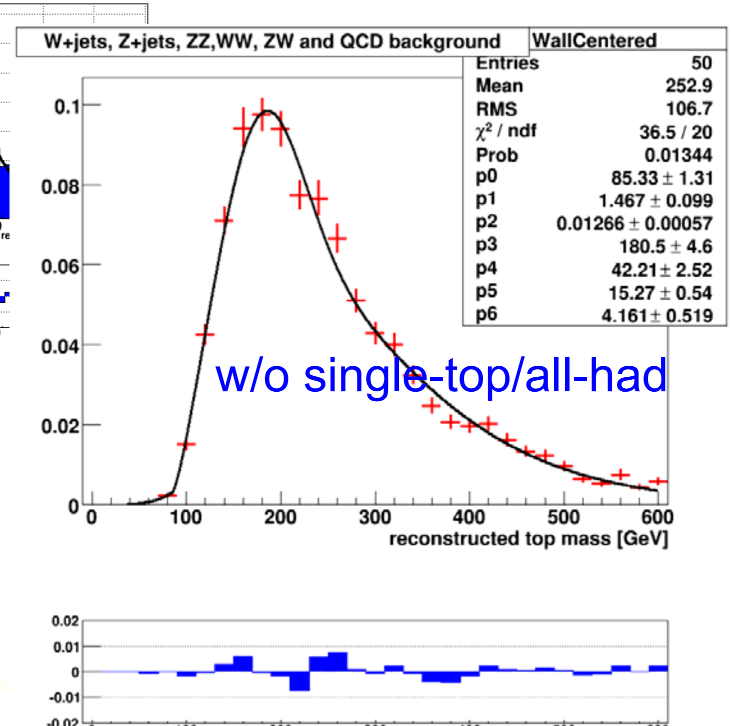
$$P_{sig}(m^{rec}_{top}|m_{top}) = (1-\delta_5)\left[1+\left(\frac{\delta_1 - m^{rec}_{top}}{\delta_2}\right)^2\right]^{-\delta_3} \cdot e^{-\delta_4 \tan^{-1}\left(\frac{\delta_1 - m^{rec}_{top}}{\delta_2}\right)} + \delta_5 \cdot \frac{1}{\sqrt{2\pi}\delta_7} e^{-\frac{(m^{rec}_{top}-\delta_6)^2}{2\delta_7^2}}$$





Parameterization of the signal m_{top}^{reco} by a single PDF depending on m_{top}^{true}.

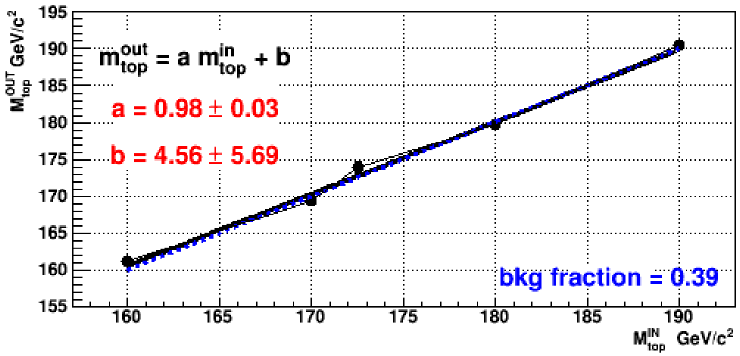
$$p_i = \alpha_i + \beta_i \cdot m_{top}$$

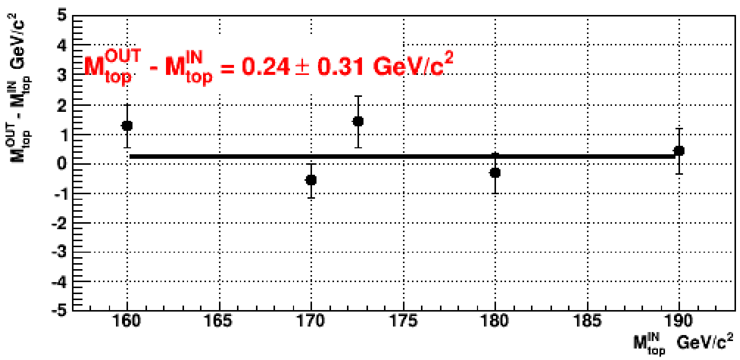


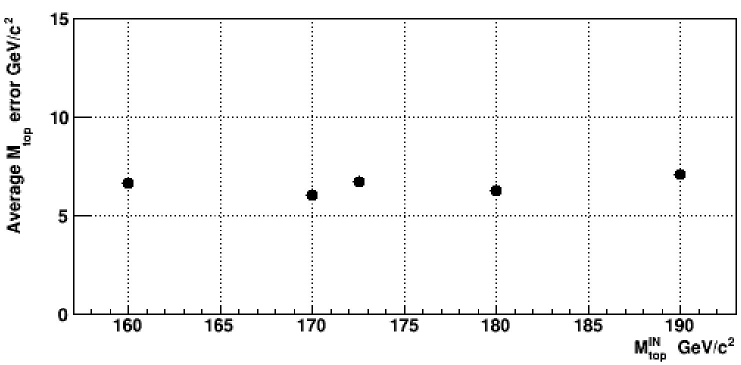
Background template is parameterized with PDF independent of m_{top}.

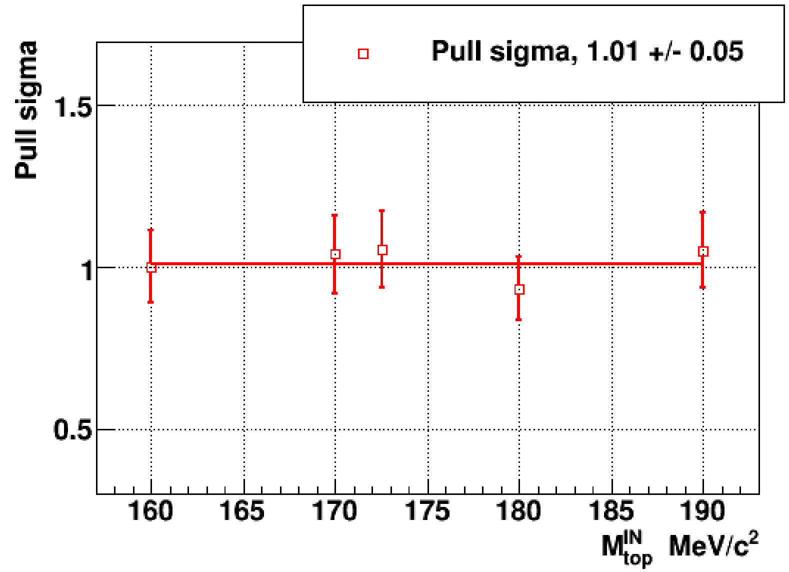
$$P_{bkg} = \delta_5 \cdot \frac{\delta_2^{1+\delta_1}}{\Gamma(1+\delta_1)} \cdot (m^{rec}_{top} - \delta_0)^{\delta_1} \cdot e^{-\delta_2 (m^{rec}_{top} - \delta_0)} + (1-\delta_5) \cdot \frac{1}{\sqrt{2\pi}\delta_4} e^{-\frac{(m^{rec}_{top}-\delta_3)^2}{2\delta_4^2}}$$

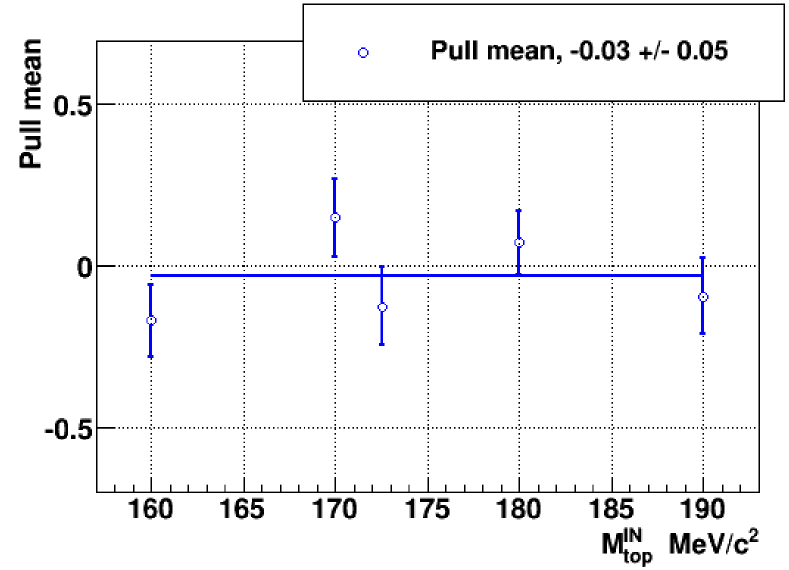
p-exp results, 10pb^{-1}, muon-channel





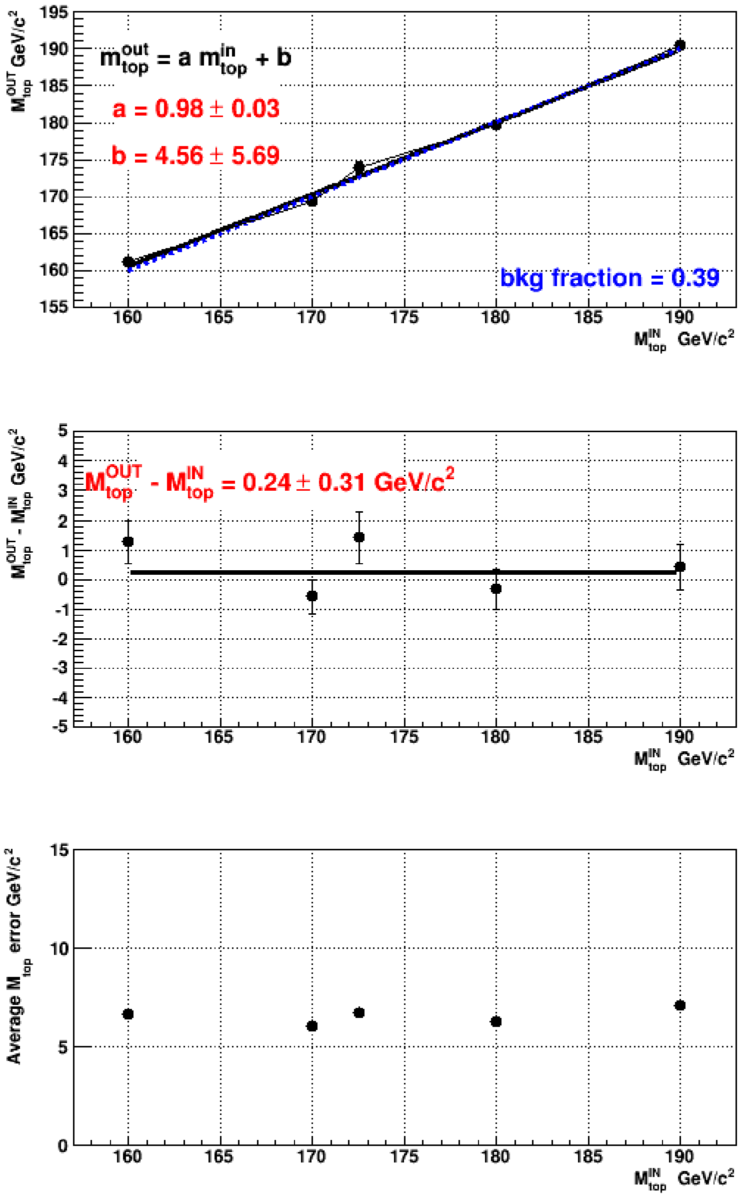


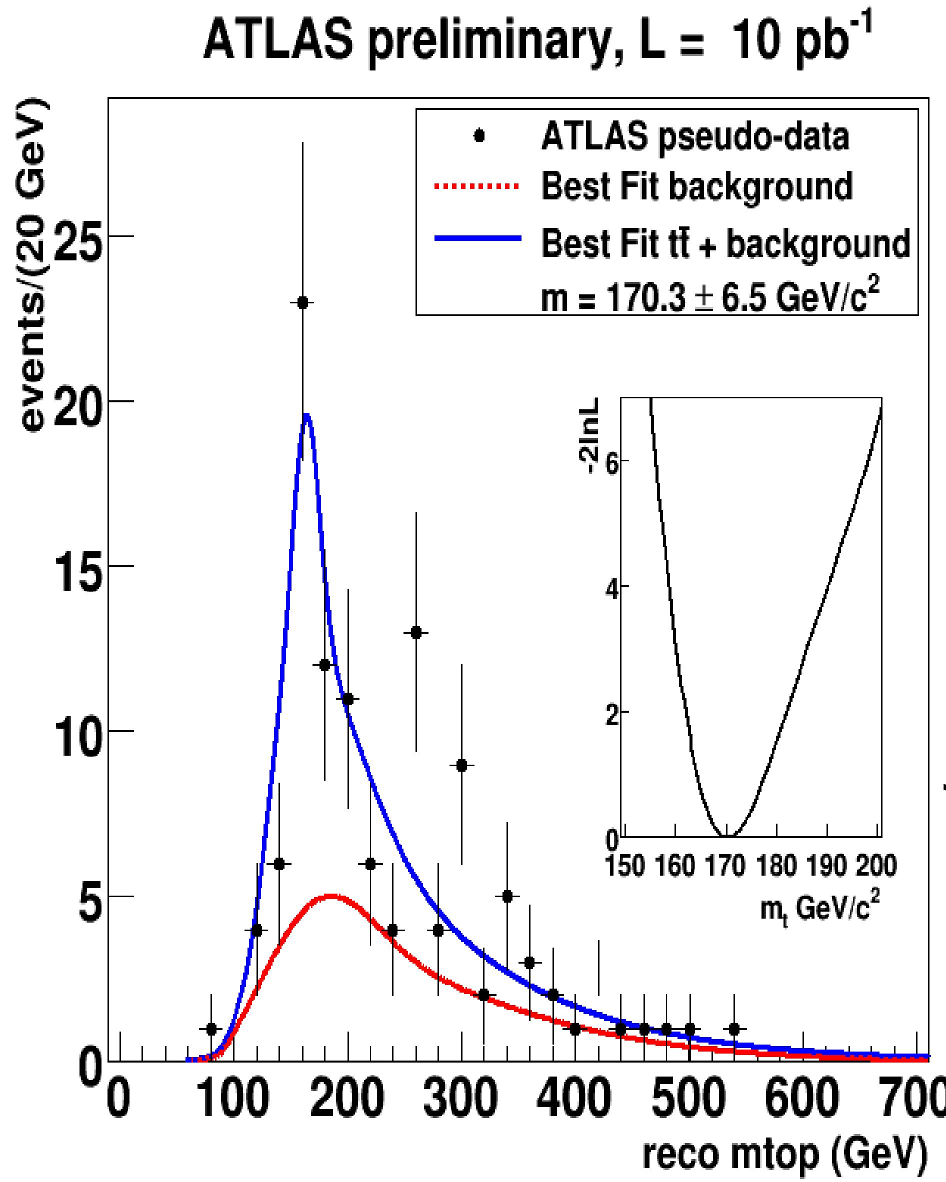




Electron channel in backup slides!

p-exp results, $10pb^{-1}$, muon-channel





Electron channel in backup slides!

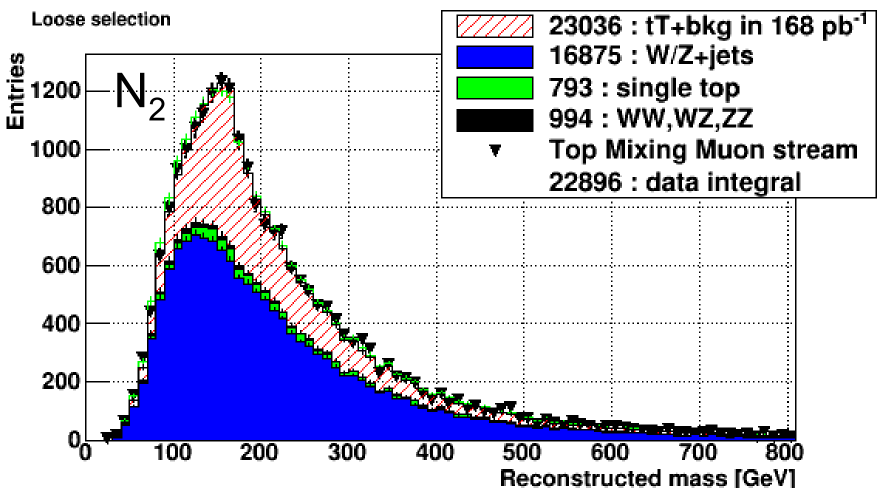
performances vs bkg fraction/syst

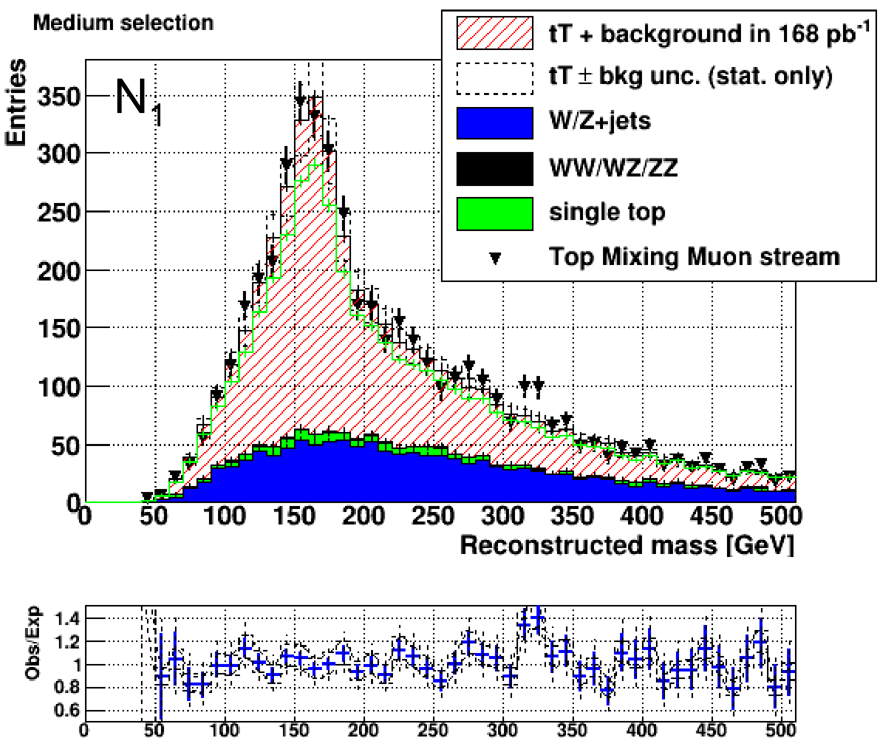
muon channel					
Background fraction	a	b	pull mean	pull sigma	$\sigma(m_{top}\|172.5)$
0.00	0.98 ± 0.02	3.86 ± 3.99	0.04 ± 0.05	1.02 ± 0.05	4.92 ± 0.94
0.10	1.00 ± 0.03	0.48 ± 4.37	-0.04 ± 0.05	1.01 ± 0.05	5.00 ± 0.88
0.20	1.02 ± 0.03	-3.91 ± 4.46	-0.01 ± 0.05	0.99 ± 0.05	5.38 ± 1.13
0.30	1.00 ± 0.03	0.08 ± 5.30	-0.03 ± 0.05	0.98 ± 0.05	5.51 ± 1.22
0.39	0.98 ± 0.03	4.56 ± 5.69	-0.03 ± 0.05	1.01 ± 0.05	6.73 ± 1.82
0.40	0.96 ± 0.03	6.92 ± 5.61	-0.05 ± 0.05	0.97 ± 0.05	5.70 ± 1.20
0.50	0.97 ± 0.03	4.34 ± 5.91	0.03 ± 0.06	1.08 ± 0.06	6.23 ± 1.73
0.60	0.96 ± 0.04	7.29 ± 6.60	0.04 ± 0.05	0.96 ± 0.05	7.12 ± 2.08
0.70	0.97 ± 0.04	5.86 ± 6.14	-0.05 ± 0.05	0.92 ± 0.05	6.86 ± 2.06
0.80	1.04 ± 0.04	-6.31 ± 6.53	0.00 ± 0.04	0.90 ± 0.04	7.78 ± 2.29
0.90	0.98 ± 0.03	2.69 ± 5.73	0.01 ± 0.04	0.82 ± 0.04	7.56 ± 2.62

and similar results for electron channel

Systematics (GeV/c^2)		
Source	Electron channel	Muon channel
+-5% JES	6.74 ± 0.49	7.25 ± 0.41
ISR/FSR	2.12 ± 0.51	1.85 ± 0.46
+-50% assumed bkg	0.89 ± 0.48	0.94 ± 0.42
full sim	0.32 ± 0.36	0.71 ± 0.30
s-top	0.21 ± 0.37	0.41 ± 0.29
Total	7.13 ± 1.00	7.58 ± 0.86

top mixing v5 (run 108175)





std event selection
(called medium here)

$$N_1 = \varepsilon_1^{top} N^{top} + \varepsilon_1^{W/Z} N^{W/Z}$$

$$N_2 = \varepsilon_2^{top} N^{top} + \varepsilon_2^{W/Z} N^{W/Z}$$

loose event selection

Loose event selection (W/Z+jet fraction ~3/4)

- Trigger fired (e15_medium/ mu15)
- Only one lepton with p_T> 20 according to the stream
- *At least 3 jets with p_T>20 GeV*
- Missing energy > 20 GeV

$\#W_{top\ mix} = (0.87 \pm 0.05^*) \times \#W_{SM}$
$\#Tt_{top\ mix} = (1.29 \pm 0.13) \times \#tT_{SM}$
#s-top/dibos are fixed to σ_{SM}

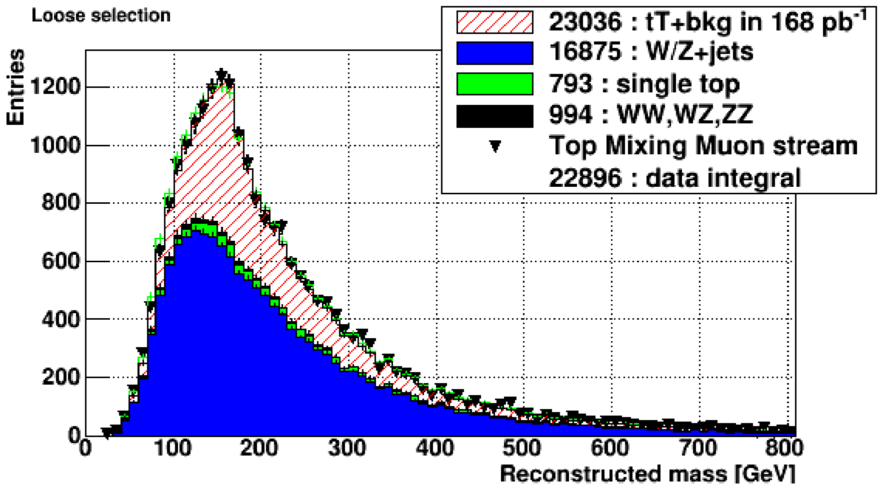
μ-channel

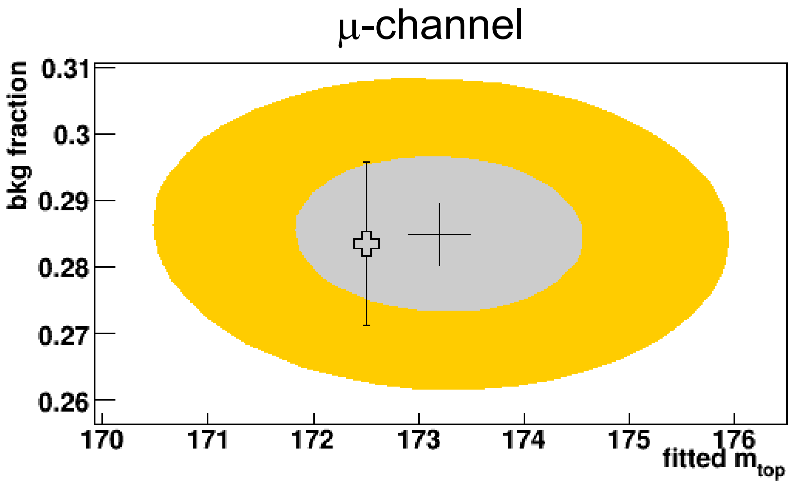
$\#W_{top\ mix} = (0.89 \pm 0.06^*) \times \#W_{SM}$
$\#Tt_{top\ mix} = (1.32 \pm 0.14) \times \#tT_{SM}$
#s-top/dibos are fixed to σ_{SM}

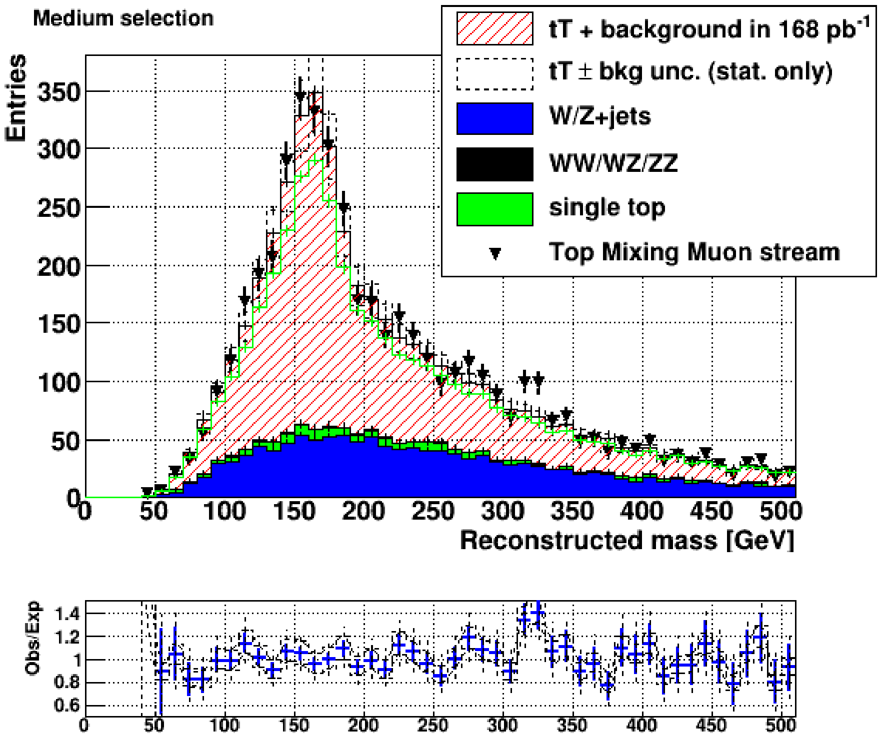
e-channel

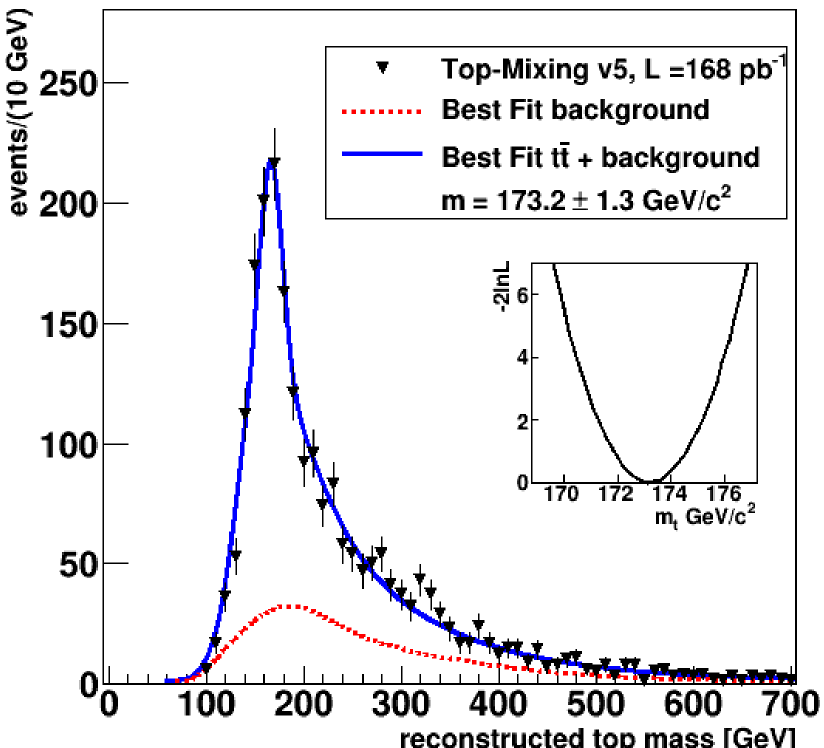
*stat+4% syst due to s-top/dibos treatment

top mixing v5



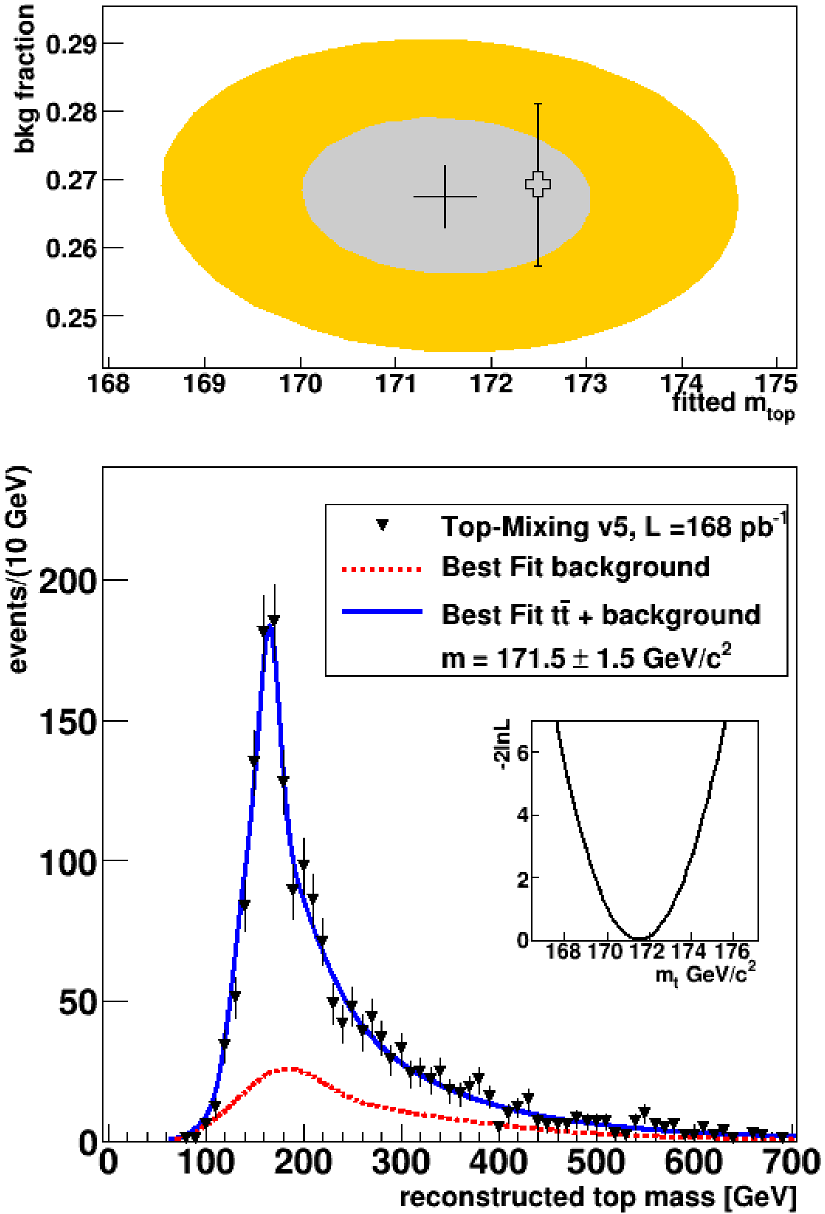




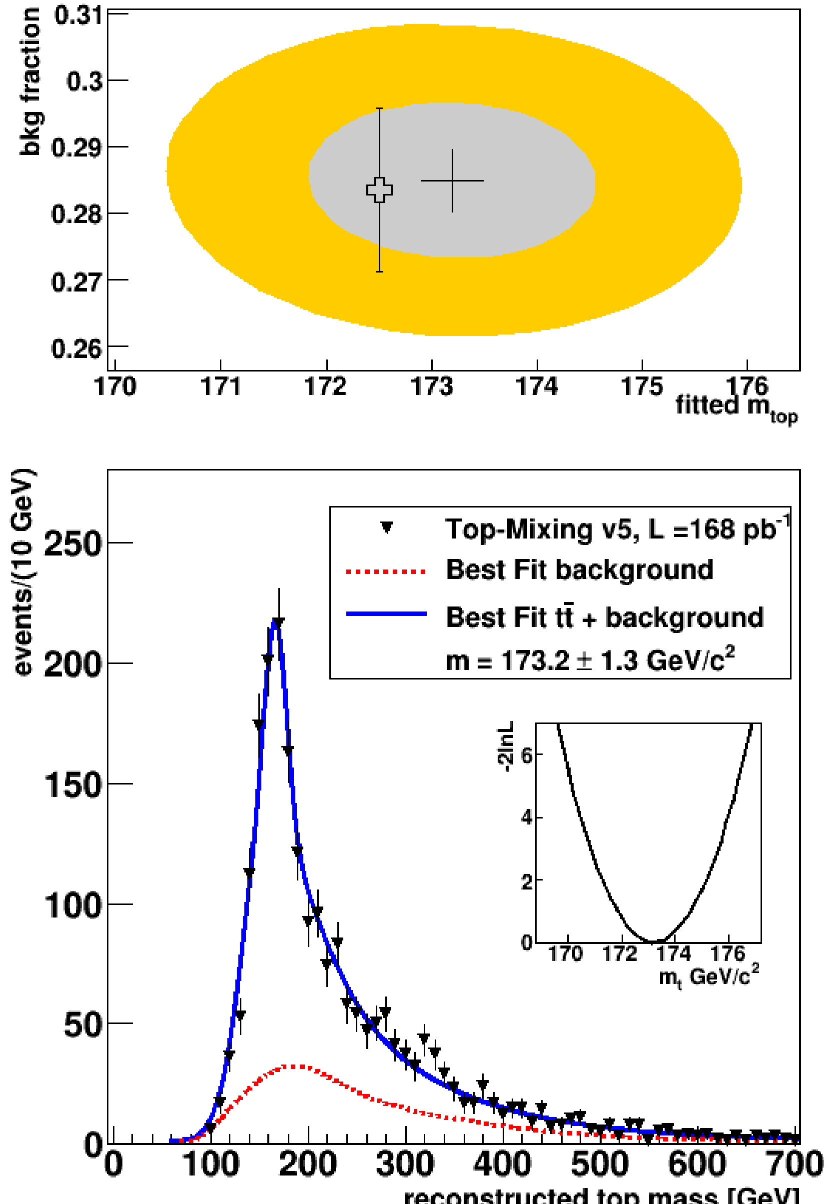


top mixing v5

e-channel



μ-channel



conclusions/plans

- 1-d template method total uncertainty will be soon limited by systematics, but it can be used with first data (no b-tagging involved).
- Matrix-method (semi-data-driven) application allow to estimate the W/Z+jets to ttbar contributions. It was used successfully for previous top mixing exercises. Is this still valid? Of course! But we need cross-checks from other analyses…
- QCD background will be not negligible. We need to find ways to cope/measure/understand it. A second matrix-method, lepton iso vs missing energy? Something else? Can we test this with MC?
- The goal is to finalize an internal note, then ask for approval of the results.
- Add the results to a general top mass group public note (not clear about the deadlines, but should be this autumn..)

Statistical uncertainty vs integrated luminosity, 10 TeV			
	10 pb^{-1}	30 pb^{-1}	100 pb^{-1}
electron channel	7.08 ± 1.62	4.70 ± 1.36	1.84 ± 0.55
muon channel	6.73 ± 1.82	3.81 ± 0.72	1.90 ± 0.27

Statistical uncertainty vs integrated luminosity, 7 TeV			
	10 pb^{-1}	30 pb^{-1}	100 pb^{-1}
electron channel	10.82 ± 3.11	7.81 ± 2.34	4.33 ± 0.92
muon channel	10.21 ± 2.71	6.77 ± 2.50	3.66 ± 0.83

Systematics (GeV/c^2)		
Source	Electron channel	Muon channel
+-5% JES	6.74 ± 0.49	7.25 ± 0.41
ISR/FSR	2.12 ± 0.51	1.85 ± 0.46
+-50% assumed bkg	0.89 ± 0.48	0.94 ± 0.42
full sim	0.32 ± 0.36	0.71 ± 0.30
s-top	0.21 ± 0.37	0.41 ± 0.29
Total	7.13 ± 1.00	7.58 ± 0.86

- backup slides -

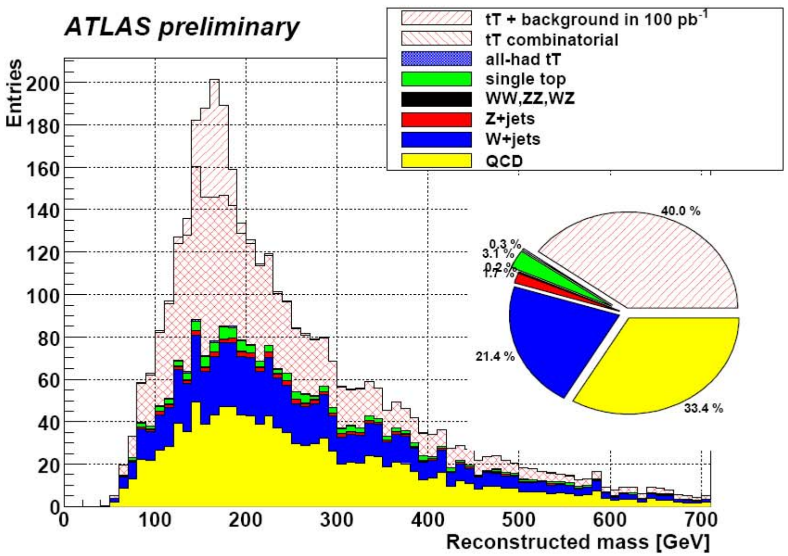
electron channel tables

Process	std sel	std sel + iso40	std sel + WLJ cuts	std sel + iso40 + WLJ cuts
$t\bar{t}$	1489± 5	1218± 4	758± 3	615± 3
$W \rightarrow e\nu$+jets	722± 12	586± 10	301± 7	246± 7
$W \rightarrow \mu\nu$+jets	1± 1	1± 1	1± 1	1± 1
$W \rightarrow \tau\nu$+jets	59± 4	49± 4	27± 3	22± 3
$W + b\bar{b}$+jets	17± 1	14± 1	7± 1	6± 0
$Z \rightarrow ee$+jets	43± 1	34± 1	18± 1	14± 1
$Z \rightarrow \mu\mu$+jets	0± 0	0± 0	0± 0	0± 0
$Z \rightarrow \tau\tau$+jets	20± 1	17± 1	8± 1	7± 1
$ZZ/WZ/WW$	9± 1	8± 1	3± 1	3± 1
single top	114± 5	100± 4	46± 3	40± 3
all had top	10± 1	2± 0	5± 0	1± 0
QCD	1250±119	188± 50	510± 78	104± 38
Total sgn	1488.64	1218.45	757.79	614.88
Total bkg	2244.85	997.68	926.73	444.71
S/B	0.66	1.22	0.82	1.38
$S/\sqrt{S+B}$	24.36	25.88	18.46	18.89

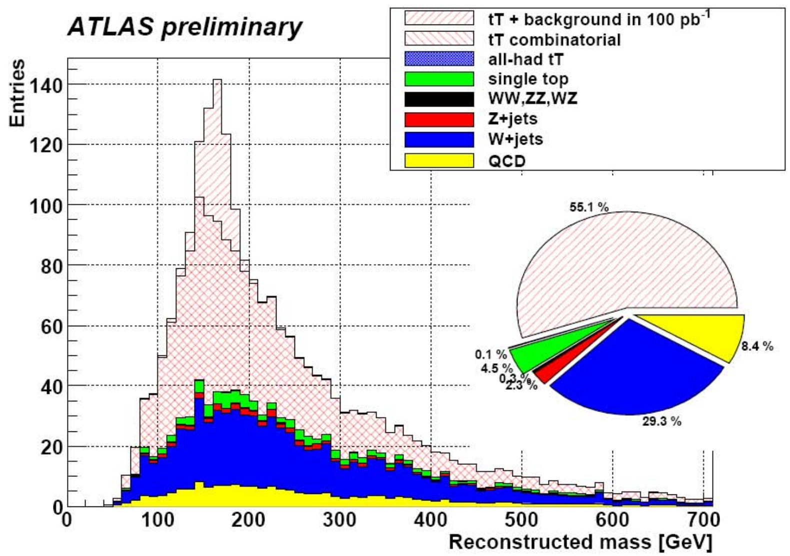
LHC $\sqrt{s}$	$S = N_{sgn}$	$B = N_{bkg}$	S/B	$S/\sqrt{(S+B)}$
standard selection				
10 TeV	1488.64	2244.85	0.66	24.36
7 TeV	595.40	1406.57	0.42	13.31
standard selection+iso40+WLJ cut				
10 TeV	614.88	444.71	1.38	18.89
7 TeV	245.93	266.02	0.92	10.87

electron channel					
Background fraction	a	b	pull mean	pull sigma	$\sigma(m_{top}\|172.5)$
0.00	0.99 ± 0.03	1.16 ± 5.56	-0.01 ± 0.05	0.96 ± 0.05	6.60 ± 1.75
0.10	0.99 ± 0.04	1.84 ± 6.67	-0.05 ± 0.05	1.03 ± 0.05	6.85 ± 2.25
0.20	0.96 ± 0.04	6.87 ± 6.44	-0.00 ± 0.05	0.93 ± 0.05	6.89 ± 2.13
0.30	0.94 ± 0.04	10.16 ± 7.06	0.09 ± 0.05	1.01 ± 0.05	6.93 ± 2.10
0.38	1.02 ± 0.04	-2.98 ± 7.44	0.03 ± 0.05	1.03 ± 0.05	7.08 ± 1.62
0.40	1.04 ± 0.04	-5.72 ± 7.28	-0.06 ± 0.06	1.09 ± 0.06	7.83 ± 2.38
0.50	1.04 ± 0.04	-6.22 ± 7.16	-0.04 ± 0.05	0.98 ± 0.05	8.49 ± 2.72
0.60	0.98 ± 0.06	3.27 ± 9.65	0.07 ± 0.05	0.99 ± 0.05	8.50 ± 2.74
0.70	1.01 ± 0.05	-2.98 ± 8.58	0.21 ± 0.05	0.97 ± 0.05	9.02 ± 2.60
0.80	1.02 ± 0.06	-5.07 ± 10.05	0.19 ± 0.05	0.96 ± 0.05	9.39 ± 2.60
0.90	0.95 ± 0.06	4.76 ± 10.04	0.24 ± 0.05	0.90 ± 0.05	9.50 ± 3.15

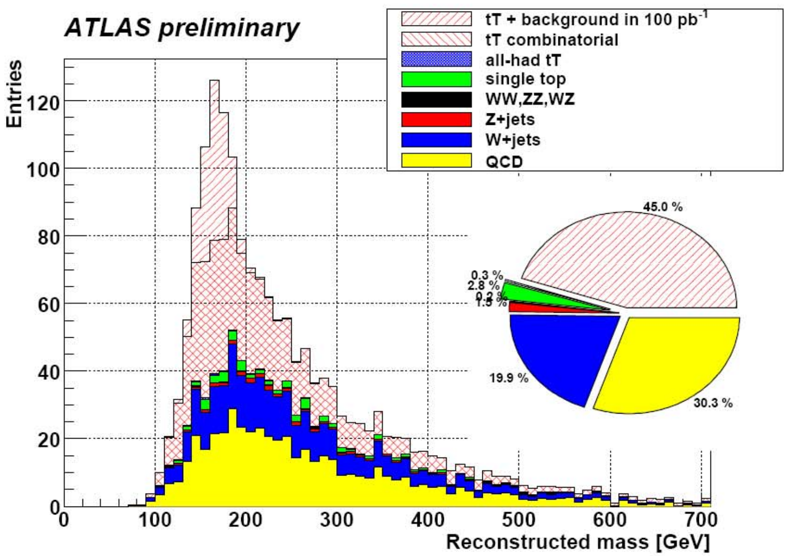
electron channel plots



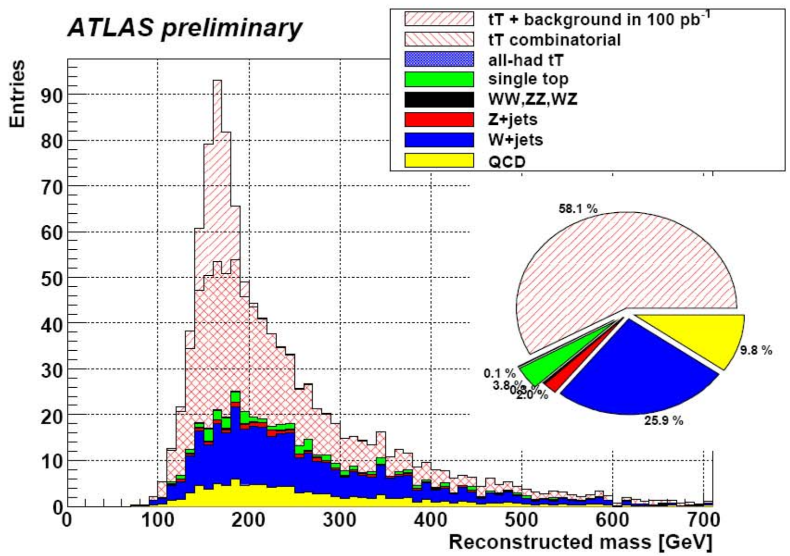
(a) electron channel, std sel



(b) electron channel, std sel + iso40

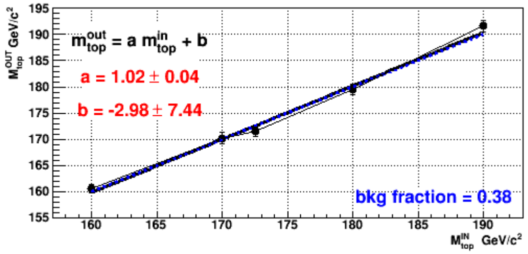


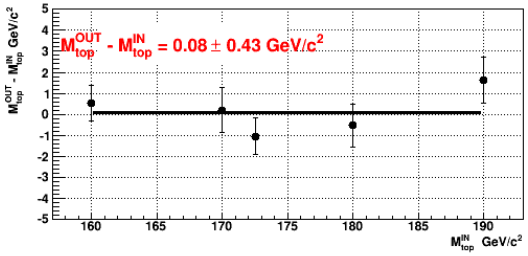
(c) electron channel, std sel+WLJ cuts

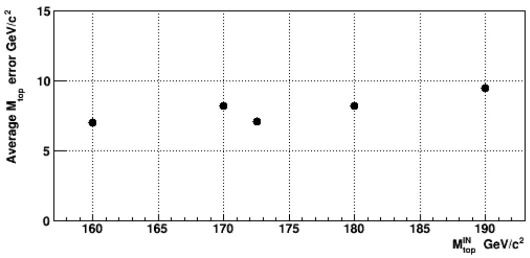


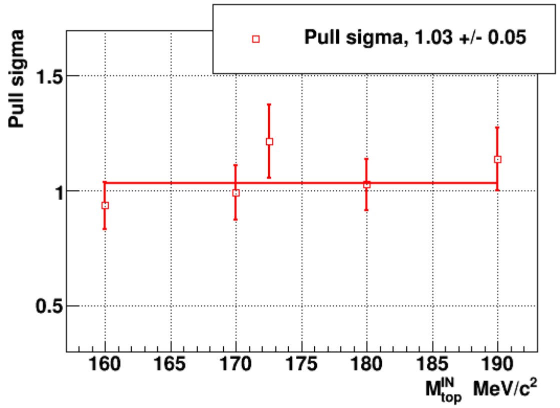
(d) electron channel,std sel+iso40+WLJ cut

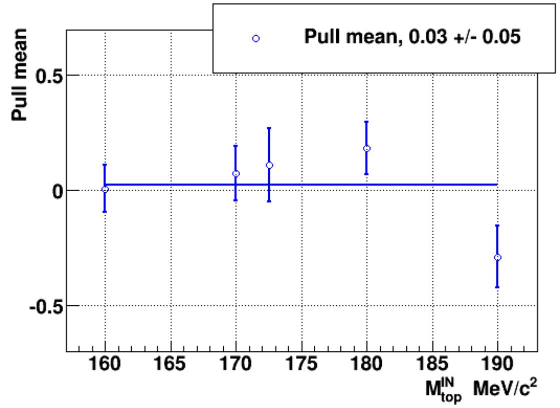
electron channel plots

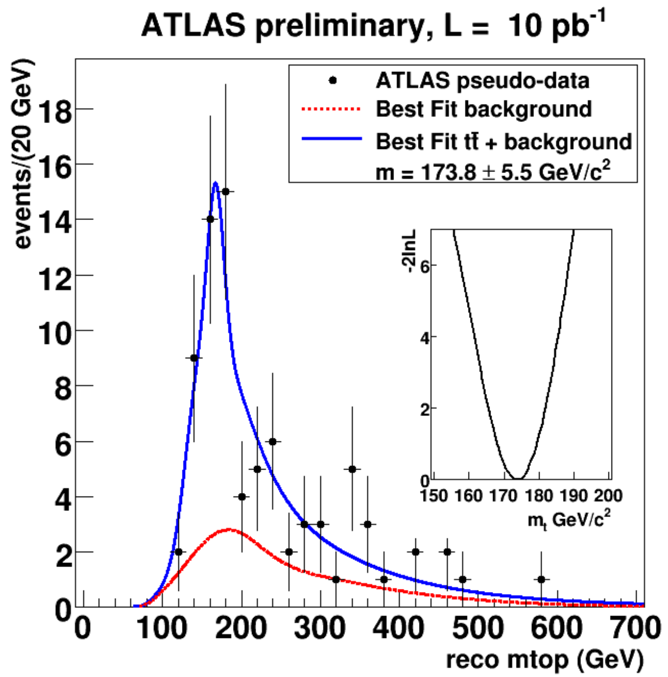




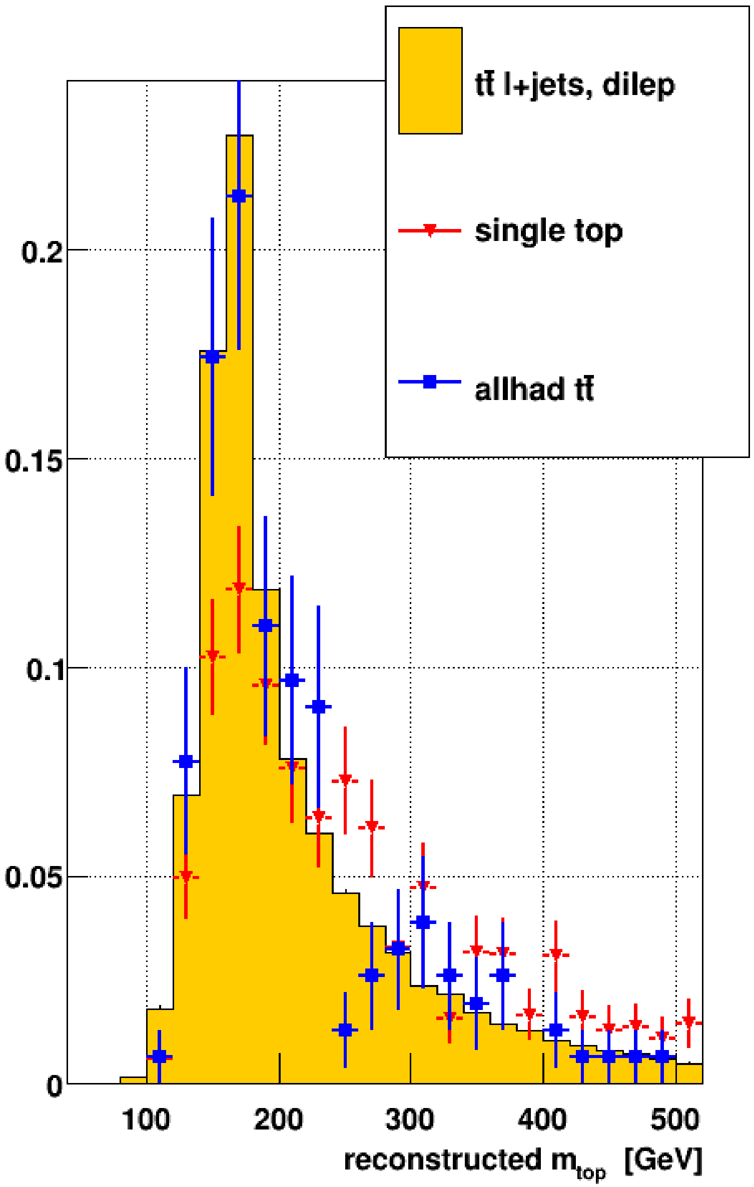


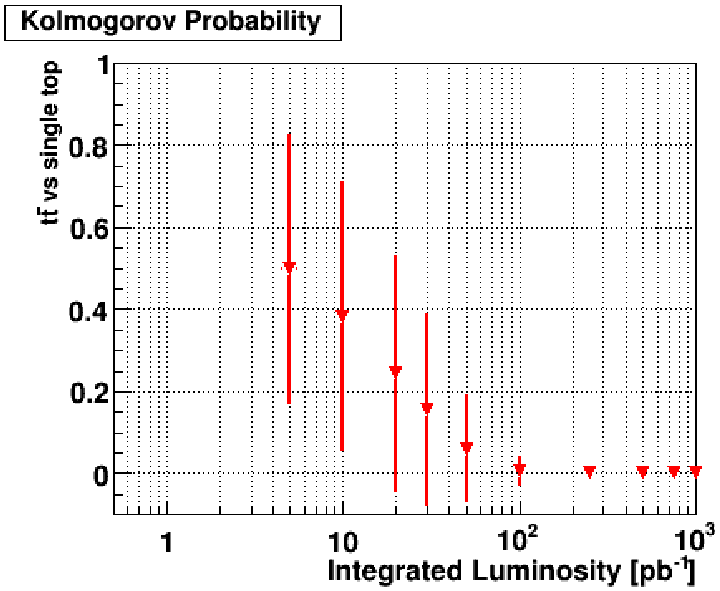


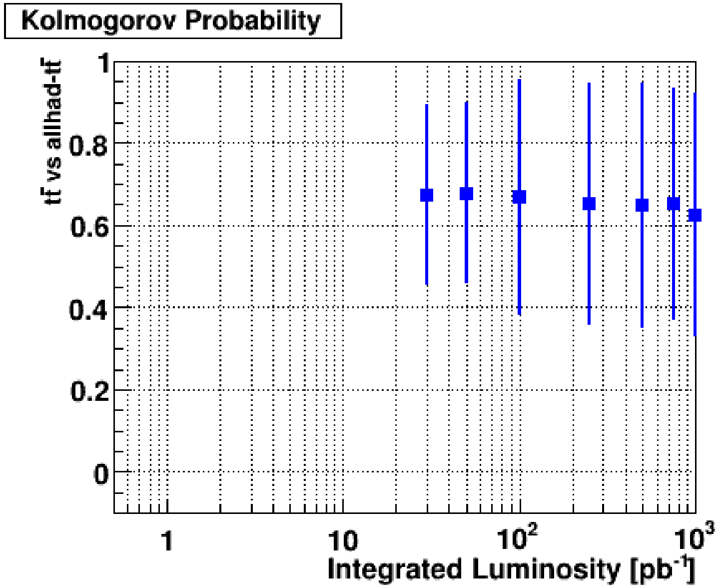




single-top/all-had treatment







rep 08 DPD prod details

Process	Run #	Raw x-sec (pb)	K-factor	x-sec x K-factor	DPD event out	DPD event in	DPD filter eff	DPD x-sec	eqv Lumi pb
tt MC@NLO (di/lep) full sim	**105200**	**202.86**	1.07	217.0602	926048	1284515	0.721	**156.48565**	**5917.8**
tt MC@NLO (di/lep) fast sim	**105200**	**202.86**	1.07	217.0602	563154	778059	0.724	**157.10675**	**3584.5**
tt (non-hadronic) AcerMC	**105205**	**108.64**	2.01	218.3664	90506	124478	0.727	**158.77078**	**570.0**
tt MC@NLO all-hadronic	**105204**	**170.74**	1.07	182.6918	621243	735487	0.845	**154.31408**	**4025.8**
tt MC@NLO a68 (mt 160)	**106203**	**295.96**	1.06	313.7176	31411	44108	0.712	**223.41035**	**140.6**
tt MC@NLO a68 (mt 170)	**106201**	**220.66**	1.06	233.8996	31911	44262	0.721	**168.63156**	**189.2**
tt MC@NLO a68 (mt 180)	**106202**	**166.82**	1.06	176.8292	32170	44304	0.726	**128.39914**	**250.5**
tt MC@NLO a68 (mt 190)	**106204**	**127.71**	1.06	135.3726	32599	44518	0.732	**99.128698**	**328.9**
				0					
Single top Wt	**105500**	**14.41**	0.99	14.2659	6468	9999	0.647	**9.2281069**	**700.9**
Single top s-chan	**105501**	**0**		0					
Single top t-chan	**105502**	**41.42**	0.98	40.5916	9039	17185	0.526	**21.350449**	**423.4**
Wenu+0 parton	**107680**	**10184.7541**	1.22	12425.4	18023	1186414	0.015	**188.75619**	**95.5**
Wenu+1 parton	**107681**	**2112.45082**	1.22	2577.19	30922	201977	0.153	**394.55913**	**78.4**
Wenu+2 parton	**107682**	**676.1**	1.22	824.842	353451	768783	0.460	**379.22435**	**932.0**
Wenu+3 parton	**107683**	**205.3**	1.22	250.466	24965	44624	0.559	**140.12378**	**178.2**
Wenu+4 parton	**107684**	**57.45**	1.22	70.089	36677	58872	0.623	**43.665142**	**840.0**
Wenu+5 parton	**107685**	**17.86**	1.22	21.7892	12061	17492	0.690	**15.023985**	**802.8**
Wmnu+0 parton	**107690**	**10125.69672**	1.22	12353.35	7511	1308674	0.006	**70.900783**	**105.9**
Wmnu+1 parton	**107691**	**2155.532787**	1.22	2629.75	6239	248220	0.025	**66.085618**	**94.4**
Wmnu+2 parton	**107692**	**682.5**	1.22	832.65	188893	779540	0.242	**201.75942**	**936.2**
Wmnu+3 parton	**107693**	**203.9**	1.22	248.758	112508	179907	0.625	**155.56518**	**723.2**
Wmnu+4 parton	**107694**	**57**	1.22	69.54	40303	52928	0.761	**52.952513**	**761.1**
Wmnu+5 parton	**107695**	**17.59**	1.22	21.4598	14380	17475	0.823	**17.659051**	**814.3**
Wtnu+0 parton	**107700**	**10178.27869**	1.22	12417.5	10239	1326080	0.008	**95.878667**	**106.8**
Wtnu+1 parton	**107701**	**2106.918033**	1.22	2570.44	5723	246827	0.023	**59.598942**	**96.0**
Wtnu+2 parton	**107702**	**672.8**	1.22	820.816	63977	703286	0.091	**74.668549**	**856.8**
Wtnu+3 parton	**107703**	**204.58**	1.22	249.5876	7959	43922	0.181	**45.227169**	**176.0**
Wtnu+4 parton	**107704**	**56.79**	1.22	69.2838	12987	46779	0.278	**19.234886**	**675.2**
Wtnu+5 parton	**107705**	**18.37**	1.22	22.4114	6515	17413	0.374	**8.3851301**	**777.0**

rep 08 DPD prod details

Zee+0 parton	**107650**	**898.4**	1.22	1096.048	49170	269280	0.182598039	**200.13622**	**245.7**
Zee+1 parton	**107651**	**197.8**	1.22	241.316	25307	41909	0.603855974	**145.72011**	**173.7**
Zee+2 parton	**107652**	**62.3**	1.22	76.006	162406	216945	0.748604485	**56.898432**	**2854.3**
Zee+3 parton	**107653**	**18.76**	1.22	22.8872	52614	63412	0.829716773	**18.989894**	**2770.6**
Zee+4 parton	**107654**	**4.97**	1.22	6.0634	16536	18314	0.902915802	**5.4747397**	**3020.4**
Zee+5 parton	**107655**	**1.43**	1.22	1.7446	5313	5500	0.966	**1.6852836**	**3152.6**
Zmm+0 parton	**107660**	**895.3**	1.22	1092.266	1702	260098	0.006543687	**7.1474472**	**238.1**
Zmm+1 parton	**107661**	**198.6**	1.22	242.292	1899	51736	0.036705582	**8.8934689**	**213.5**
Zmm+2 parton	**107662**	**63.5**	1.22	77.47	63178	197372	0.320096062	**24.797842**	**2547.7**
Zmm+3 parton	**107663**	**18.7**	1.22	22.814	48729	64706	0.753083176	**17.18084**	**2836.2**
Zmm+4 parton	**107664**	**4.99**	1.22	6.0878	16590	18470	0.898213319	**5.468143**	**3033.9**
Zmm+5 parton	**107665**	**1.37**	1.22	1.6714	5183	5471	0.947358801	**1.5834155**	**3273.3**
Ztt+0 parton	**107670**	**893**	1.22	1089.46	6327	270649	0.023377142	**25.468461**	**248.4**
Ztt+1 parton	**107671**	**197.7**	1.22	241.194	6242	62678	0.099588372	**24.020118**	**259.9**
Ztt+2 parton	**107672**	**62.63**	1.22	76.4086	51003	210234	0.242601102	**18.536811**	**2751.4**
Ztt+3 parton	**107673**	**18.86**	1.22	23.0092	25074	63434	0.395276981	**9.0950071**	**2756.9**
Ztt+4 parton	**107674**	**4.98**	1.22	6.0756	10303	18500	0.556918919	**3.3836166**	**3045.0**
Ztt+5 parton	**107675**	**1.39**	1.22	1.6958	3577	5479	0.652856361	**1.1071138**	**3230.9**
Wbb+0 parton	**106280**	**5.13**	1.22	6.2586	3807	15500	0.245612903	**1.5371929**	**2476.6**
Wbb+1 parton	**106281**	**5.01**	1.22	6.1122	7293	15457	0.471825063	**2.8838892**	**2528.9**
Wbb+2 parton	**106282**	**2.89**	1.22	3.5258	5189	8953	0.579582263	**2.0434911**	**2539.3**
Wbb+3 parton	**106283**	**1.61**	1.22	1.9642	3251	5000	0.6502	**1.2771228**	**2545.6**
WW	**105985**	**15.62**	1.69	26.3978	11412	25000	0.45648	**12.050068**	**947.0**
ZZ	**105986**	**1.356**	1.42	1.92552	5788	10000	0.5788	**1.114491**	**5193.4**
WZ	**105987**	**4.872**	1.81	8.81832	4944	9997	0.494548365	**4.3610857**	**1133.7**

rep 08 DPD prod details

di-jet Qcd J2 Np2_TOPfiltjet	**108382**	**30562854.5**	0.002	63230.31	350416	629012	**0.55708953**	**35224.944**	**9.9**
di-jet Qcd J2 Np3_TOPfiltjet	**108383**	**10081466.4**	0.008	81822.44					
di-jet Qcd J2 Np4_TOPfiltjet	**108384**	**1526155.5**	0.090	137037.51	340388	1230667	**0.27658822**	**37902.962**	**9.0**
di-jet Qcd J2 Np5_TOPfiltjet	**108385**	**242189.7**	0.212	51316.69	247075	474369	**0.5208498**	**26728.288**	**9.2**
di-jet Qcd J3 Np2_TOPfiltjet	**108387**	**1134806.7**	0.008	8841.55	39731	88310	0.45	**3977.85**	**10.0**
di-jet Qcd J3 Np3_TOPfiltjet	**108388**	**1491614.2**	0.082	122797.54	364155	1186965	0.31	**37673.68**	**9.7**
di-jet Qcd J3 Np4_TOPfiltjet	**108389**	**548801.7**	0.383	210360.99	603750	2079406	0.29	**61077.75**	**9.9**
di-jet Qcd J3 Np5_TOPfiltjet	**108390**	**190789.2**	0.603	115115.12	[illegible]	[illegible]	0.59	**68190.50**	**4.4**
di-jet Qcd J4 Np2	**108362**	**31872**	1	31872	[illegible]	[illegible]	0.059199817	**1886.82**	**9.3**
di-jet Qcd J4 Np3	**108363**	**65508.9**	1	[illegible]	[illegible]	[illegible]	0.141363267	[illegible]	**10.0**
di-jet Qcd J4 Np4	**108364**	**49028.2**	1	[illegible]	140280	459406	0.305350823	[illegible]	**9.4**
di-jet Qcd J4 Np5	**108365**	**24249.3**	[illegible]	[illegible]	131794	231597	[illegible]	[illegible]	**9.6**
di-jet Qcd J4 Np6	**108366**	**11571.7**	[illegible]	[illegible]					
di-jet Qcd J5+ Np2	**108367**	[illegible]	1	750.2	[illegible]	[illegible]	[illegible]	**55.07**	**271.9**
di-jet Qcd J5+ Np3	**108368**	[illegible]	1	[illegible]	[illegible]	[illegible]	0.166087345	**323.01**	**292.6**
di-jet Qcd J5+ Np4	**108369**	**2149.9**	1	[illegible]	[illegible]	642301	0.32197054	**692.20**	**298.8**
di-jet Qcd J5+ Np5	**108370**	**1392.8**	1	[illegible]	[illegible]	406906	0.560502917	[illegible]	**292.1**
di-jet Qcd J5+ Np6	**108371**	**972.6**	[illegible]	[illegible]					
AlpgenQcdbbJ4Np0	**107310**	[illegible]	1	147.9	[illegible]	[illegible]	[illegible]	**22.427459**	**9.9**
AlpgenQcdbbJ4Np1	[illegible]	[illegible]	1	1078.6	[illegible]	[illegible]	[illegible]	**269.15218**	**9.0**
AlpgenQcdbbJ4Np2	[illegible]	[illegible]	1	1430	[illegible]	[illegible]	0.36137931	**516.77241**	**10.1**
AlpgenQcdbbJ4Np3	[illegible]	**1021.2**	1	[illegible]	[illegible]	[illegible]	0.567471053	**579.50144**	**9.0**
AlpgenQcdbbJ4Np4	[illegible]	**706.5**	1	[illegible]	[illegible]	7500	0.818533333	**578.2938**	**10.6**
AlpgenQcdbbJ5PlusNp0	**107315**	**3.2**	[illegible]	[illegible]	201	1000	0.201	**0.6432**	**312.5**
AlpgenQcdbbJ5PlusNp1	**107316**	**25.2**	[illegible]	[illegible]	2244	7000	0.320571429	**8.0784**	**277.8**
AlpgenQcdbbJ5PlusNp2	**107317**	[illegible]	[illegible]	50	6272	15429	0.406507227	**20.325361**	**308.6**
AlpgenQcdbbJ5PlusNp3	**107318**	[illegible]	[illegible]	52.9	9221	15967	0.577503601	**30.549941**	**301.8**
AlpgenQcdbbJ5PlusNp4	[illegible]	[illegible]	1	55.5	12744	16882	0.754886862	**41.896221**	**304.2**
AlpgenQcdbbJ2Np0	**107320**	[illegible]	0.002	276.6	1687	3000	0.562333333	**155.5414**	**10.8**
AlpgenQcdbbJ2Np1	**107321**	[illegible]	0.006	1085	5188	11000	0.471636364	**511.72545**	**10.1**
AlpgenQcdbbJ2Np2	**107322**	**52648.8**	0.069	3637.9	10297	36397	0.282907932	**1029.1908**	**10.0**
AlpgenQcdbbJ2Np3	**107323**	**13402.3**	0.195	2608.3	13825	26392	0.52383298	**1366.3136**	**10.1**
AlpgenQcdbbJ3Np0	**107325**	**5369.9**	0.009	46.1	236	500	0.472	**21.7592**	**10.8**
AlpgenQcdbbJ3Np1	**107326**	**27024.2**	0.064	1734.4	5787	17422	0.332166227	**576.1091**	**10.0**
AlpgenQcdbbJ3Np2	**107327**	**18838**	0.330	6216.2	20024	62081	0.322546351	**2005.0126**	**10.0**
AlpgenQcdbbJ3Np3	**107328**	**9439.7**	0.570	5384.1	32722	53944	0.606592021	**3265.9521**	**10.0**

substituted by topmix108176.Muon and topmix108176.Egamma