Update on Top Dilepton Tau Analysis based on 100-300 pb^{-1} of ATLAS data.

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Analysis fixes (I)

- Total normalization for tt-bar signal expectations fixed:
  - Using MC@NLO event weights (positive and negative) to compute the total number of events in 5200 CSC sample.
  - tt-bar expectations increased by 2%

$$L_{MC} = \frac{N_{EVT}^{MC\ TOTAL}}{\sigma_{THEO}}$$

$$N_{EVT}^{100\ pb^{-1}} = N_{EVT}^{MC} \times \frac{100\ pb^{-1}}{L_{MC}}$$

	N_{evt} $(100\ pb^{-1})$					
	$t\bar{t}(e\tau_h)$	$W(e\nu_e)+3p$	$Z(\tau_e\tau_h)+2p$	$t\bar{t}(\mu\tau_h)$	$W(\mu\nu_\mu)+3p$	$Z(\tau_\mu\tau_h)+2p$
	1206 ± 24	12390 ± 123	741.9 ± 7.5	1145 ± 24	6468 ± 52	764.2 ± 7.6
1 e/μ $P_T > 20\ GeV$	614 ± 17	5560 ± 82	250.5 ± 4.4	772 ± 19	3711 ± 39	377.4 ± 5.3
1 τ $P_T > 15\ GeV$	238 ± 11	1827 ± 47	98.0 ± 2.7	335 ± 13	1298 ± 23	148.6 ± 3.4
Tau ID	90 ± 7	377 ± 21	49.5 ± 1.9	125 ± 8	226 ± 10	69.6 ± 2.3
$E_T^{1st\ jet} > 50\ GeV$	83 ± 6	297 ± 19	21.7 ± 1.3	118 ± 8	169 ± 8	30.8 ± 1.5
$E_T^{2nd\ jet} > 30\ GeV$	79 ± 6	269 ± 18	14.6 ± 1.1	109 ± 7	140 ± 8	20.4 ± 1.2
$E_T > 25$	67 ± 6	214 ± 16	6.9 ± 0.7	99 ± 7	113 ± 7	9.1 ± 0.8
$H_T > 250\ GeV$	68 ± 6	200 ± 16	5.5 ± 0.6	97 ± 7	98 ± 6	5.5 ± 0.6
Z veto	67 ± 6	198 ± 16	3.6 ± 0.5	92 ± 7	95 ± 6	3.6 ± 0.5
Opposite Charge	57 ± 5	86 ± 10	2.2 ± 0.4	84 ± 6	45 ± 4	1.9 ± 0.4
b-tagging	45 ± 5	33 ± 6	2.2 ± 0.4	69 ± 6	19 ± 3	1.9 ± 0.4

Analysis fixes (II)

- Tau had 3-prong contribution was underestimated
  - Root analysis macros: generator level logic fixed.
  - R(1-prong/3-prong)~30%

Category	τ Decay Mode	BR from 100K evts 5200 MC@NLO
tt-bar →evb τvb	tt-bar →evb τ_{had1p}vb	49.2 ±1.0
	tt-bar →evb τ_{had3p}vb	16.2 ±0.6
	tt-bar →evb τ_{evs}b	17.4 ±0.6
	tt-bar →evb $\tau_{\mu vs}$b	17.2 ±0.6
tt-bar →μvb τvb	tt-bar →μvb τ_{had1p}vb	47.9 ±1.0
	tt-bar →μvb τ_{had3p}vb	16.2 ±0.6
	tt-bar →μvb τ_{evs}b	18.0 ±0.6
	tt-bar →μvb $\tau_{\mu vs}$b	17.8 ±0.6

N tt-bar(e-τ) events in 100 pb^{-1}

~30 %

	N_{evt} (100 pb^{-1})							
	$t\bar{t}(e\tau_{h:1-prong})$	$Eff(e\tau_{h:1-prong})$	$t\bar{t}(W_e\tau_{h:1-prong})$	$t\bar{t}(\tau_e\tau_{h:1-prong})$	$t\bar{t}(e\tau_{h:3-prong})$	$Eff(e\tau_{h:3-prong})$	$t\bar{t}(W_e\tau_{h:3-prong})$	$t\bar{t}(\tau_e\tau_{h:3-prong})$
	916.0 ± 21.2	0.00 ± 0.00	756.1 ± 19.2	159.8 ± 8.8	289.8 ± 11.9	0.00 ± 0.00	235.6 ± 10.7	54.3 ± 5.1
1 e/μ $P_T > 20$ GeV	472.1 ± 15.2	0.52 ± 0.01	429.1 ± 14.5	43.0 ± 4.6	142.2 ± 8.3	0.49 ± 0.02	132.9 ± 8.1	9.3 ± 2.1
1 τ $P_T > 15$ GeV	176.0 ± 9.3	0.37 ± 0.02	162.3 ± 8.9	13.7 ± 2.6	62.1 ± 5.5	0.44 ± 0.03	59.6 ± 5.4	2.4 ± 1.1
Tau ID	61.1 ± 5.5	0.35 ± 0.03	56.2 ± 5.2	4.9 ± 1.5	28.8 ± 3.8	0.46 ± 0.04	26.4 ± 3.6	2.4 ± 1.1
$E_T^{1st\ jet} > 50$ GeV	$55.7 + 5.2$	$0.91 + 0.03$	$50.8 + 5.0$	$4.9 + 1.5$	$27.4 + 3.7$	$0.95 + 0.03$	$24.9 + 3.5$	$2.4 + 1.1$
$E_T^{2nd\ jet} > 30$ GeV	52.8 ± 5.1	0.95 ± 0.02	48.4 ± 4.9	4.4 ± 1.5	26.4 ± 3.6	0.96 ± 0.02	23.9 ± 3.4	2.4 ± 1.1
$E_T > 25$	43.0 ± 4.6	0.81 ± 0.04	38.6 ± 4.3	4.4 ± 1.5	24.4 ± 3.5	0.93 ± 0.04	22.0 ± 3.3	2.4 ± 1.1
$H_T > 250$ GeV	43.5 ± 4.6	1.01 ± 0.01	39.1 ± 4.4	4.4 ± 1.5	24.4 ± 3.5	1.00 ± 0.00	22.0 ± 3.3	2.4 ± 1.1
Z veto	42.5 ± 4.6	0.98 ± 0.02	38.1 ± 4.3	4.4 ± 1.5	24.4 ± 3.5	1.00 ± 0.00	22.0 ± 3.3	2.4 ± 1.1
Opposite Charge	39.1 ± 4.4	0.92 ± 0.03	35.7 ± 4.2	3.4 ± 1.3	17.6 ± 2.9	0.72 ± 0.06	15.6 ± 2.8	2.0 ± 1.0
b-tagging	31.3 ± 3.9	0.80 ± 0.04	28.8 ± 3.8	2.4 ± 1.1	14.2 ± 2.6	0.81 ± 0.07	12.7 ± 2.5	1.5 ± 0.8

Eff(ttbar(e-τ_{had1p})) = 0.35 ± 0.03

Eff(ttbar(e-τ_{had3p})) = 0.46 ± 0.04

N tt-bar(μ-τ) events in 100 pb^{-1}

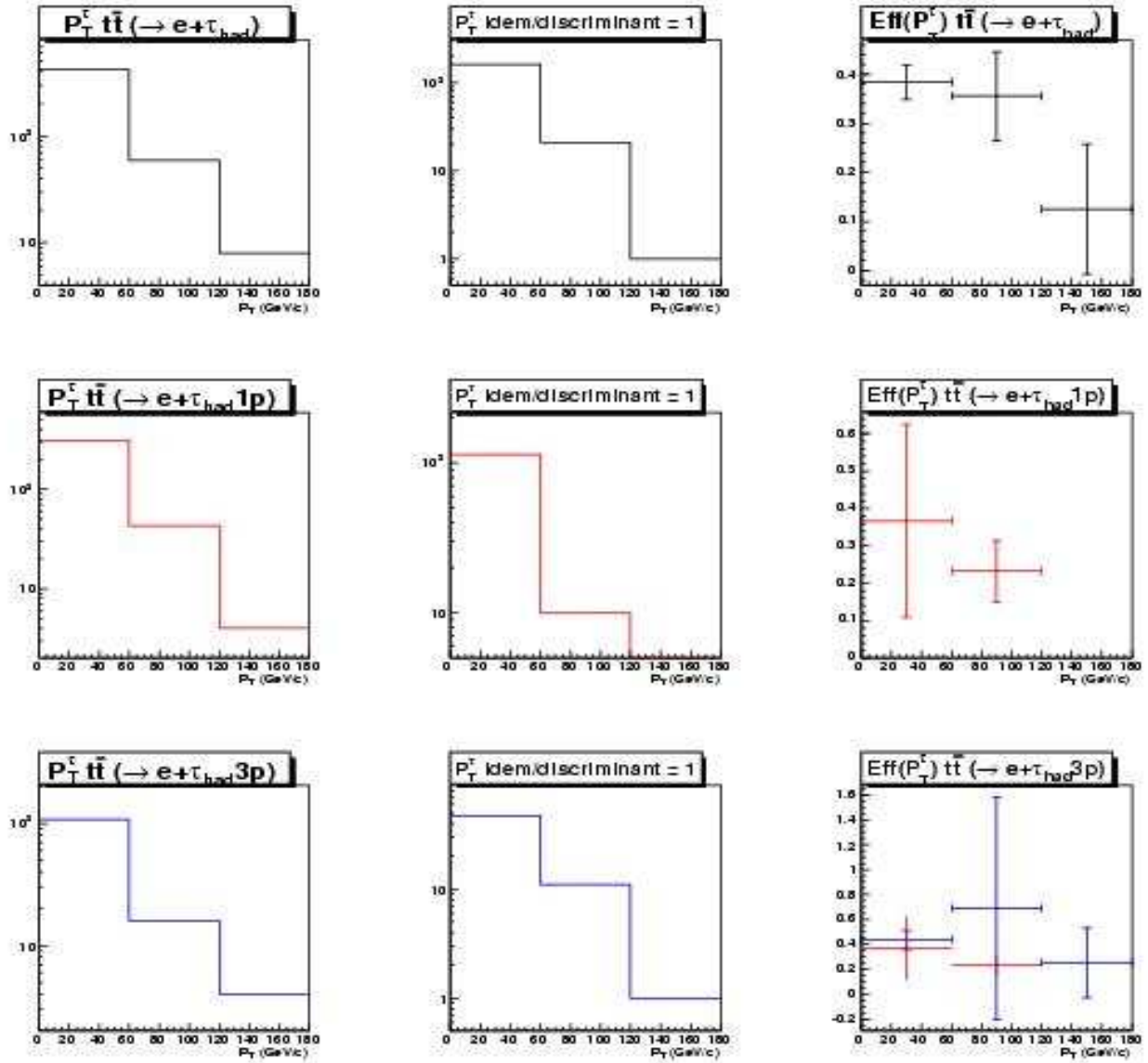
~30 %

	N_{evt} (100 pb^{-1})							
	$t\bar{t}(\mu\tau_{h:1-prong})$	$Eff(\mu\tau_{h:1-prong})$	$t\bar{t}(W_\mu\tau_{h:1-prong})$	$t\bar{t}(\tau_\mu\tau_{h:1-prong})$	$t\bar{t}(\mu\tau_{h:3-prong})$	$Eff(\mu\tau_{h:3-prong})$	$t\bar{t}(W_\mu\tau_{h:3-prong})$	$t\bar{t}(\tau_\mu\tau_{h:3-prong})$
	844.6 ± 20.3	0.00 ± 0.00	767.4 ± 19.4	77.2 ± 6.1	300.6 ± 12.1	0.00 ± 0.00	271.8 ± 11.5	28.8 ± 3.8
1 e/μ $P_T > 20$ GeV	571.4 ± 16.7	0.68 ± 0.01	547.9 ± 16.4	23.5 ± 3.4	200.9 ± 9.9	0.67 ± 0.02	191.6 ± 9.7	9.3 ± 2.1
1 τ $P_T > 15$ GeV	249.3 ± 11.0	0.44 ± 0.01	240.5 ± 10.8	8.8 ± 2.1	85.5 ± 6.5	0.43 ± 0.02	80.6 ± 6.3	4.9 ± 1.5
Tau ID	82.6 ± 6.4	0.33 ± 0.02	78.7 ± 6.2	3.9 ± 1.4	42.5 ± 4.6	0.50 ± 0.04	40.6 ± 4.5	2.0 ± 1.0
$E_T^{1st\ jet} > 50$ GeV	77.7 ± 6.2	0.94 ± 0.02	73.8 ± 6.0	3.9 ± 1.4	40.1 ± 4.4	0.94 ± 0.02	38.1 ± 4.3	2.0 ± 1.0
$E_T^{2nd\ jet} > 30$ GeV	71.4 ± 5.9	0.92 ± 0.02	67.4 ± 5.7	3.9 ± 1.4	37.6 ± 4.3	0.94 ± 0.03	35.7 ± 4.2	2.0 ± 1.0
$E_T > 25$	64.0 ± 5.6	0.90 ± 0.03	61.1 ± 5.5	2.9 ± 1.2	34.7 ± 4.1	0.92 ± 0.03	32.7 ± 4.0	2.0 ± 1.0
$H_T > 250$ GeV	62.6 ± 5.5	0.98 ± 0.01	60.1 ± 5.4	2.4 ± 1.1	34.2 ± 4.1	0.99 ± 0.01	32.3 ± 4.0	2.0 ± 1.0
Z veto	59.1 ± 5.4	0.95 ± 0.02	56.7 ± 5.3	2.4 ± 1.1	33.2 ± 4.0	0.97 ± 0.02	31.3 ± 3.9	2.0 ± 1.0
Opposite Charge	53.3 ± 5.1	0.90 ± 0.03	51.3 ± 5.0	2.0 ± 1.0	30.8 ± 3.9	0.93 ± 0.03	29.3 ± 3.8	1.5 ± 0.8
b-tagging	41.5 ± 4.5	0.78 ± 0.04	40.1 ± 4.4	1.5 ± 0.8	27.9 ± 3.7	0.90 ± 0.04	26.4 ± 3.6	1.5 ± 0.8

Eff(ttbar(μ-τ_{had1p})) = 0.33± 0.02

Eff(ttbar(μ-τ_{had3p})) = 0.50 ± 0.04

Efficiency Tau1p3p versus P^{τ}_{T} in tt-bar(e-τ)



Efficiency Tau1p3p versus P^{τ}_{T} in tt-bar(μ-τ)