

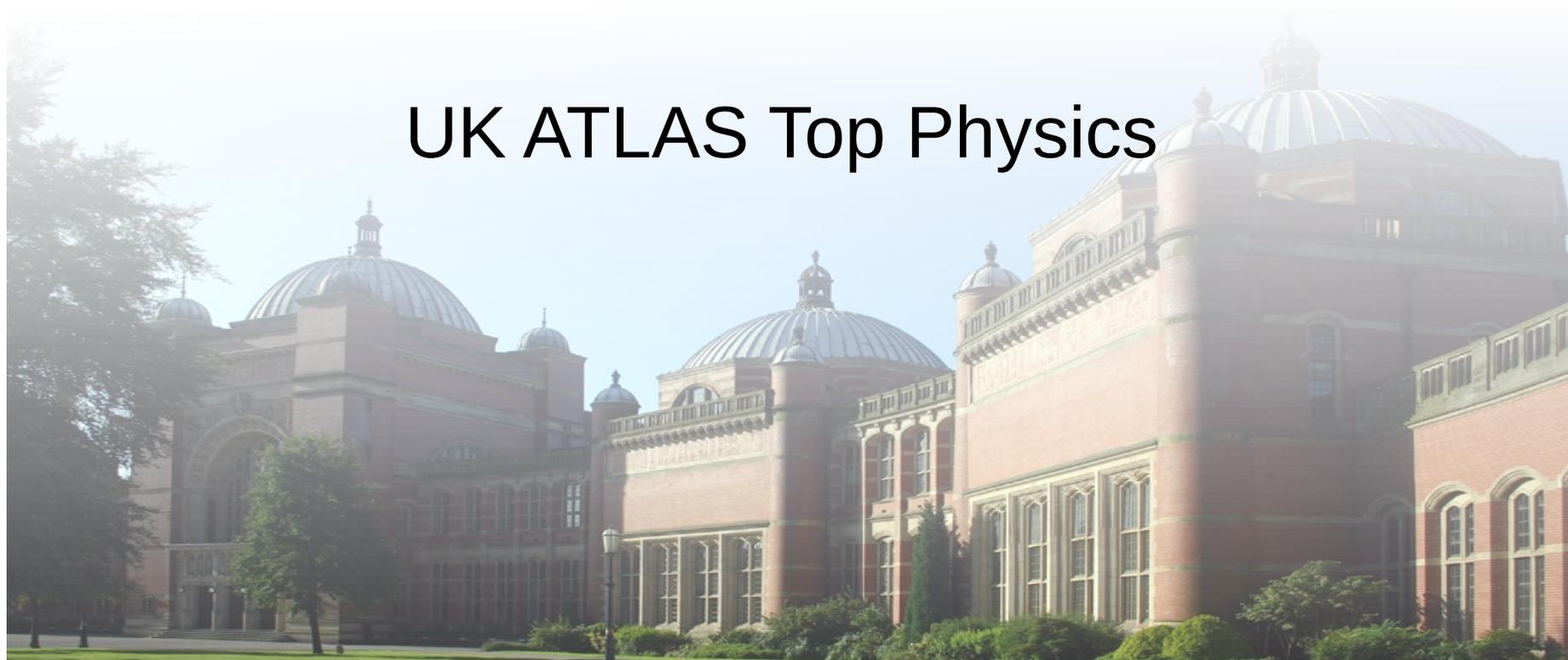


Single Top Quark



Common Preselection

UK ATLAS Top Physics





Outline



- Aims
- Phenomenology
- Efficiency definition
- Performance
- Comments



Aims of Study



- Top Mass measurement in the t-channel
 - Use Multivariate (BDT) techniques
- Selection algorithms run in Athena 13.0.30
- Run directly on the AOD
 - Independent of TopView/TopPhysTools packages
 - Cross check of CSC Note preselection
 - Baseline for further study

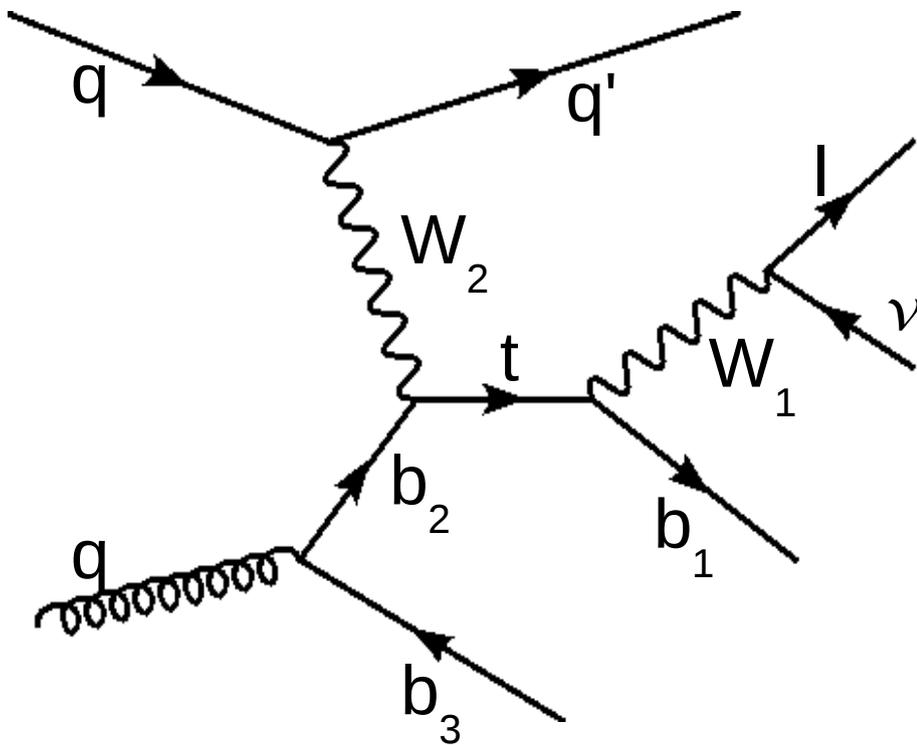


Single Top t-channel



- Require:

- 1 good, central, isolated, high P_T lepton
- 2 high P_T jets of which one must be b-tagged
- No more than 4 jets with $P_T > 15\text{GeV}$
- $\text{MET} > 20\text{ GeV}$





Efficiency Definition



$$eff = \frac{(N \text{ passing Preselection})}{(N \text{ Truth Events Processed})}$$

- Efficiencies quoted for number of events preselected using:
 - High P_T electron
 - High P_T muon



Performance (Muon, Without Trigger)



Channel	CSC Note		BUSTopAnalysis	
	ϵ (%)	N(1fb ⁻¹)	ϵ (%)	N(1fb ⁻¹)
s-channel \rightarrow l	7.10 \pm 0.10	166 \pm 3	7.30 \pm 0.30	162 \pm 8
s-channel \rightarrow τ	0.70 \pm 0.10	8 \pm 1	0.60 \pm 0.13	7 \pm 2
t-channel \rightarrow l	5.90 \pm 0.20	3143 \pm 80	6.00 \pm 0.10	3306 \pm 72
t-channel \rightarrow τ	0.60 \pm 0.10	169 \pm 19	0.56 \pm 0.06	154 \pm 16
Wt-channel \rightarrow l	6.80 \pm 0.10	1314 \pm 27	6.40 \pm 0.35	1144 \pm 62
Wt-channel \rightarrow τ	1.00 \pm 0.10	93 \pm 7	0.70 \pm 0.20	65 \pm 16
ttbar \rightarrow l + jets	4.90 \pm 0.05	11846 \pm 130	<i>Grid jobs still running!</i>	
ttbar \rightarrow τ + jets	0.60 \pm 0.01	754 \pm 34		
ttbar \rightarrow l + l	5.80 \pm 0.10	2257 \pm 58		
ttbar \rightarrow l + τ	7.90 \pm 0.20	3055 \pm 66		
ttbar \rightarrow τ + τ	1.60 \pm 0.20	158 \pm 16		
WW	0.30 \pm 0.04	78 \pm 11		

* Without Trigger information

* semi + leptonic ttbar σ = 461pb (CSC), 450pb (BUSTop)



Performance (Muon, with Trigger)



Channel	CSC Note		BUSTopAnalysis	
	ϵ (%)	N(1fb^{-1})	ϵ (%)	N(1fb^{-1})
s-channel $\rightarrow l$	7.10 ± 0.10	166 ± 3	3.80 ± 0.25	84 ± 6
s-channel $\rightarrow \tau$	0.70 ± 0.10	8 ± 1	0.30 ± 0.10	3 ± 2
t-channel $\rightarrow l$	5.90 ± 0.20	3143 ± 80	3.05 ± 0.12	1652 ± 64
t-channel $\rightarrow \tau$	0.60 ± 0.10	169 ± 19	0.33 ± 0.05	89 ± 15
Wt-channel $\rightarrow l$	6.80 ± 0.10	1314 ± 27	2.79 ± 0.21	497 ± 39
Wt-channel $\rightarrow \tau$	1.00 ± 0.10	93 ± 7	0.32 ± 0.11	29 ± 11
ttbar $\rightarrow l + \text{jets}$	4.90 ± 0.05	11846 ± 130	<i>Grid jobs still running!</i>	
ttbar $\rightarrow \tau + \text{jets}$	0.60 ± 0.01	754 ± 34		
ttbar $\rightarrow l + l$	5.80 ± 0.10	2257 ± 58		
ttbar $\rightarrow l + \tau$	7.90 ± 0.20	3055 ± 66		
ttbar $\rightarrow \tau + \tau$	1.60 ± 0.20	158 ± 16		
WW	0.30 ± 0.04	78 ± 11		

* semi + leptonic ttbar $\sigma = 461\text{pb}$ (CSC), 450pb (BUSTop)



Performance (Electron, With Trigger)



Channel	CSC Note		BUSTopAnalysis	
	ϵ (%)	N(1fb ⁻¹)	ϵ (%)	N(1fb ⁻¹)
s-channel \rightarrow l	5.80 \pm 0.00	136 \pm 3	6.12 \pm 0.31	135 \pm 7
s-channel \rightarrow τ	0.50 \pm 0.10	6 \pm 1	0.70 \pm 0.15	8 \pm 2
t-channel \rightarrow l	5.20 \pm 0.10	2787 \pm 76	5.35 \pm 0.15	2902 \pm 84
t-channel \rightarrow τ	0.30 \pm 0.05	92 \pm 14	0.41 \pm 0.06	111 \pm 17
Wt-channel \rightarrow l	5.60 \pm 0.10	1091 \pm 24	4.59 \pm 0.27	818 \pm 49
Wt-channel \rightarrow τ	0.80 \pm 0.10	77 \pm 7	0.68 \pm 0.17	61 \pm 15
ttbar \rightarrow l + jets	4.40 \pm 0.05	10734 \pm 124	<i>Grid jobs still running!</i>	
ttbar \rightarrow τ + jets	0.50 \pm 0.02	625 \pm 31		
ttbar \rightarrow l + l	4.60 \pm 0.10	1762 \pm 51		
ttbar \rightarrow l + τ	6.70 \pm 0.20	2595 \pm 61		
ttbar \rightarrow τ + τ	1.60 \pm 0.20	151 \pm 15		
WW	1.60 \pm 0.20	151 \pm 15		

* semi + leptonic ttbar σ = 461pb (CSC), 450pb (BUSTop)



Comments



- Good agreement in the electron channel
- Addition of trigger information in muon channel causes large disparity
 - Under investigation
- Slower progress with background datasets
 - Ttbar channels still running
 - W+jets channels to be simulated using Atlfast