

Search for strong production with at least three b -jets + E_T^{miss} , [1]

Energy: 8 TeV

Luminosity: 20.1 fb⁻¹

Validation notes:

- Validation has been performed versus all published cutflows, see Tables 1 to 3.
 - The Monte-Carlo generator was Herwig++ 2.5.2 [2] for models with b -quark final states, see Table 1.
 - The Monte-Carlo generator was MadGraph5-v1.5.12 [3] and showered with Pythia 6.420 [4] with upto 2 additional QCD partons using the MLM [5] matching algorithm in the final state for for models with t -quark final states, see Tables 2 and 3.
 - Cross-sections calculated with NLL-Fast 2.1 [6, 7, 8, 9, 10].
- B-tagging efficiency was reduced by 3% compared with the nominal value in the experimental paper to better agree with cutflow data.
- Triggers are fully efficient for signal regions.

Process	$pp \rightarrow \tilde{g}\tilde{g}, \tilde{g} \rightarrow b\bar{b}\tilde{\chi}_1^0$					
Point	$m(\tilde{g}) = 1300 \text{ GeV}, m(\tilde{\chi}_1^0) = 100 \text{ GeV}$					
Channel	0 Lepton, 4 Jets					
Source	ATLAS			CheckMATE		
No selection	100 %			- %		
Jet/Event cleaning*	(98.2 ± 0) %			- %		
Cosmic μ rejection*	(98.2 ± 0) %			- %		
$\geq 4 \text{ j } (p_T > 30 \text{ GeV})$	(95.4 ± 0.1) %			(94.6 ± 0.1) %		
1st jet $p_T > 90 \text{ GeV}$	(95.4 ± 0.1) %			(94.6 ± 0.1) %		
$\cancel{E}_T > 150 \text{ GeV}$	(88.7 ± 0.1) %			(88.0 ± 0.1) %		
Electron veto	(88.7 ± 0.1) %			(86.1 ± 0.1) %		
Muon veto	(88.2 ± 0.1) %			(85.7 ± 0.1) %		
$\Delta\phi_{min}^{4j} > 0.5$	(58.5 ± 0.2) %			(59.9 ± 0.2) %		
$\cancel{E}_T/m_{\text{eff}}^{4j} > 0.2$	(46.2 ± 0.2) %			(48.7 ± 0.2) %		
Signal region cuts	SR-0l-4j-A		SR-0l-4j-B		SR-0l-4j-C	
Source	ATLAS	C.- MATE	ATLAS	C.- MATE	ATLAS	C.- MATE
$\geq 4j, p_T > 30, 50, 50$	46.2 ± 0.2	48.7 ± 0.2	42.8 ± 0.2	45.3 ± 0.2	42.8 ± 0.2	45.3 ± 0.2
$\geq 3b, p_T > 30, 50, 50$	20.5 ± 0.1	20.0 ± 0.1	17.9 ± 0.1	17.5 ± 0.1	17.9 ± 0.1	17.4 ± 0.1
$\cancel{E}_T > 200, 350, 250$	20.5 ± 0.1	19.9 ± 0.1	16.2 ± 0.1	15.7 ± 0.1	17.4 ± 0.1	17.1 ± 0.1
$m_{\text{eff}}^{\text{incl}} > 1000, 1100, 1300$	20.3 ± 0.1	19.7 ± 0.1	15.9 ± 0.1	15.6 ± 0.1	15.9 ± 0.1	16.1 ± 0.1
$\cancel{E}_T/\sqrt{H_T^{4j}} > 16, 0, 0$	10.8 ± 0.1	10.9 ± 0.1	-	-	-	-

Table 1: Cutflow validation for atlas_conf_2013_061, testing gluino pair production decaying into bottom quarks. The cutflow is given as an absolute efficiency in % for each step of event selection. Final error displayed on signal regions is due to finite Monte Carlo statistics. *No cosmic muon rejection or event cleaning is performed by CheckMATE, instead a flat efficiency factor is included.

Process	$pp \rightarrow \tilde{g}\tilde{g}, \tilde{g} \rightarrow t\bar{t}\tilde{\chi}_1^0$					
Point	$m(\tilde{g}) = 1300 \text{ GeV}, m(\tilde{\chi}_1^0) = 100 \text{ GeV}$					
Channel	0 Lepton, 7 Jets					
Source	ATLAS			CheckMATE		
No selection	100 %			- %		
Jet and Event cleaning *	$(98.4 \pm 0) \%$			- %		
Cosmic muon rejection *	$(97.2 \pm 0.1) \%$			- %		
≥ 4 jets ($p_T > 30 \text{ GeV}$)	$(96.9 \pm 0.1) \%$			$(97.6 \pm 0) \%$		
1st jet $p_T > 90 \text{ GeV}$	$(96.9 \pm 0.1) \%$			$(97.5 \pm 0.1) \%$		
$\cancel{E}_T > 150 \text{ GeV}$	$(88.3 \pm 0.1) \%$			$(87.7 \pm 0.1) \%$		
Electron veto	$(59.7 \pm 0.2) \%$			$(60.2 \pm 0.2) \%$		
Muon veto	$(41.8 \pm 0.2) \%$			$(40.7 \pm 0.2) \%$		
$\Delta\phi_{min}^{4j} > 0.5$	$(30.0 \pm 0.2) \%$			$(29.6 \pm 0.1) \%$		
$\cancel{E}_T/m_{\text{eff}}^{4j} > 0.2$	$(25.9 \pm 0.1) \%$			$(25.4 \pm 0.1) \%$		
≥ 7 jets ($p_T > 30 \text{ GeV}$)	$(24.6 \pm 0.1) \%$			$(24.1 \pm 0.1) \%$		
≥ 3 b -jets ($p_T > 30 \text{ GeV}$)	$(11.5 \pm 0.1) \%$			$(11.4 \pm 0.1) \%$		
Signal region cuts	SR-0l-7j-A		SR-0l-7j-B		SR-0l-7j-C	
Source	ATLAS	C.- MATE	ATLAS	C.- MATE	ATLAS	C.- MATE
$\cancel{E}_T > 200, 350, 250$	11.3 ± 0.1	11.3 ± 0.1	9.2 ± 0.1	8.9 ± 0.1	10.8 ± 0.1	10.8 ± 0.1
$m_{\text{eff}}^{\text{incl}} > 1000, 1000, 1500$	11.3 ± 0.1	11.2 ± 0.1	9.2 ± 0.1	8.9 ± 0.1	9.5 ± 0.1	9.2 ± 0.1

Table 2: Cutflow validation for atlas_conf_2013_061, testing gluino pair production decaying into top quarks with no signal leptons. The cutflow is given as an absolute efficiency in % for each step of event selection. Final error displayed on signal regions is due to finite Monte Carlo statistics. *No cosmic muon rejection or event cleaning is performed by CheckMATE, instead a flat efficiency factor is included.

Process Point	$pp \rightarrow \tilde{g}\tilde{g}, \tilde{g} \rightarrow t\bar{t}\tilde{\chi}_1^0$ $m(\tilde{g}) = 1300 \text{ GeV}, m(\tilde{\chi}_1^0) = 100 \text{ GeV}$					
Channel	1 Lepton					
Source	ATLAS			CheckMATE		
No selection	100 %			- %		
Jet and Event cleaning *	$(98.4 \pm 0) \%$			- %		
Cosmic muon rejection *	$(97.2 \pm 0.1) \%$			- %		
≥ 4 jets ($p_T > 30 \text{ GeV}$)	$(96.9 \pm 0.1) \%$			$(97.6 \pm 0) \%$		
1st jet $p_T > 90 \text{ GeV}$	$(96.8 \pm 0.1) \%$			$(97.5 \pm 0.1) \%$		
$\cancel{E}_T > 150 \text{ GeV}$	$(88.3 \pm 0.1) \%$			$(87.5 \pm 0.1) \%$		
≥ 1 signal lepton	$(37.0 \pm 0.2) \%$			$(40.6 \pm 0.2) \%$		
≥ 6 jets ($p_T > 30 \text{ GeV}$)	$(33.8 \pm 0.2) \%$			$(36.7 \pm 0.2) \%$		
≥ 3 b -jets ($p_T > 30 \text{ GeV}$)	$(14.3 \pm 0.1) \%$			$(16.1 \pm 0.1) \%$		
Signal region cuts	SR-1l-6j-A		SR-1l-6j-B		SR-1l-6j-C	
Source	ATLAS	C.- MATE	ATLAS	C.- MATE	ATLAS	C.- MATE
$m_T > 140, 140, 160 \text{ GeV}$	11.3 ± 0.1	12.0 ± 0.1	11.3 ± 0.1	12.0 ± 0.1	10.7 ± 0.1	11.3 ± 0.1
$\cancel{E}_T > 175, 225, 275 \text{ GeV}$	10.9 ± 0.1	11.6 ± 0.1	10.0 ± 0.1	10.7 ± 0.1	8.8 ± 0.1	9.3 ± 0.1
$\cancel{E}_T/\sqrt{H_T} > 5 \text{ GeV}^{1/2}$	10.8 ± 0.1	11.3 ± 0.1	10.0 ± 0.1	10.6 ± 0.1	8.8 ± 0.1	9.3 ± 0.1
$m_{\text{eff}} > 700, 800, 900 \text{ GeV}$	10.8 ± 0.1	11.3 ± 0.1	10.0 ± 0.1	10.6 ± 0.1	8.8 ± 0.1	9.2 ± 0.1

Table 3: Cutflow validation for atlas_conf.2013_061, testing gluino pair production decaying into top quarks with one signal lepton. The cutflow is given as an absolute efficiency in % for each step of event selection. Final error displayed on signal regions is due to finite Monte Carlo statistics. *No cosmic muon rejection or event cleaning is performed by CheckMATE, instead a flat efficiency factor is included.

References

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