atlas_conf_2013_024 Validation

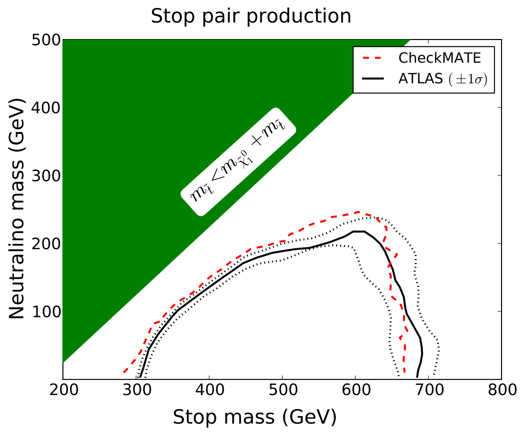

Figure 1: Exclusion curve for the stop pair production with simplified decay, $\tilde{t} \to t\tilde{\chi}_1^0$ for analysis atlas_conf_2013_024. The top produced in the decay has right–handed polarization in 95% of the decays.

All-hadronic stop search, $t\bar{t} + E_T^{miss}$, [1]
Energy: 8 TeV
Luminosity: 20.5 fb^{-1}
Validation notes:

- Validation has been performed versus all published cutflows and a simplified model consisting of pure stop production followed by the decay $\tilde{t} \to t\tilde{\chi}_1^0$, see Table 1 and Figure 1.
  - The Monte-Carlo generator was Herwig++ 2.5.2 [2].
  - Cross-sections calculated with NLL-Fast 2.1 [3, 4, 5, 6, 7]
- Trigger is fully efficient for signal regions.

Process	$\tilde{t}\tilde{t}^*$ direct			
Point	$m(\tilde{t}) = 600$ GeV $m(\tilde{\chi}_1^0) = 0$ GeV			
Top Polarization	Right-handed		Left-handed	
Source	ATLAS	CheckMATE	ATLAS	CheckMATE
Generated events	250000	100000	250000	100000
No selection	507.3 ± 1.0	507.3 ± 1.6	507.3 ± 1.0	507.3 ± 1.6
Trigger	468.0 ± 1.0	469.7 ± 1.5	467.8 ± 1.0	468.8 ± 1.5
Primary vertex *	467.8 ± 1.0	-	467.4 ± 1.0	-
Event Cleaning *	459.0 ± 1.0	-	459.6 ± 1.0	-
Muon veto	381.2 ± 0.9	380.1 ± 1.4	382.5 ± 0.9	380.4 ± 1.4
Electron veto	284.4 ± 0.8	297.6 ± 1.2	292.3 ± 0.8	302.2 ± 1.2
$\not{E}_T >$ 130 GeV	263.1 ± 0.7	275.4 ± 1.0	270.1 ± 0.7	277.7 ± 1.2
Jet multiplicity and p_{T}	97.7 ± 0.4	95.0 ± 0.7	92.2 ± 0.4	87.3 ± 0.7
$\not{E}_T^{\mathrm{track}} > 30$ GeV	96.3 ± 0.4	93.5 ± 0.7	90.5 ± 0.4	85.9 ± 0.7
$\Delta\phi(\not{E}_T, \not{E}_T^{\mathrm{track}}) < \pi/3$	90.3 ± 0.4	89.4 ± 0.7	84.3 ± 0.4	82.2 ± 0.6
$\Delta\phi(\mathrm{jet}, \not{E}_T^{\mathrm{track}}) < \pi/3$	77.1 ± 0.4	76.0 ± 0.6	72.0 ± 0.4	69.2 ± 0.6
Tau veto	67.4 ± 0.4	66.6 ± 0.6	61.9 ± 0.4	59.3 ± 0.5
$2 \geq b$-tagged jets	29.5 ± 0.2	28.6 ± 0.4	31.5 ± 0.3	27.9 ± 0.4
$m_T(b-jet, \not{E}_T) > 175$ GeV	20.2 ± 0.2	20.2 ± 0.3	23.6 ± 0.2	21.3 ± 0.3
80 GeV$< m_{jjj}^0 <$ 175 GeV	17.8 ± 0.2	18.4 ± 0.3	20.4 ± 0.2	19.3 ± 0.3
80 GeV$< m_{jjj}^1 <$ 175 GeV	10.9 ± 0.2	10.8 ± 0.2	11.9 ± 0.2	11.9 ± 0.2
$\not{E}_T >$ 150 GeV	10.8 ± 0.2	10.7 ± 0.2	11.8 ± 0.2	11.9 ± 0.2
$\not{E}_T >$ 200 GeV(SR1)	10.3 ± 0.1	10.2 ± 0.2	11.2 ± 0.2	10.5 ± 0.2
$\not{E}_T >$ 250 GeV	9.2 ± 0.1	9.3 ± 0.2	10.0 ± 0.1	9.3 ± 0.2
$\not{E}_T >$ 300 GeV(SR2)	7.8 ± 0.1	8.1 ± 0.2	8.3 ± 0.1	8.1 ± 0.2
$\not{E}_T >$ 350 GeV(SR3)	6.1 ± 0.1	6.2 ± 0.2	6.6 ± 0.1	6.5 ± 0.2

Table 1: Cutflow validation for atlas_conf_2013_024, testing stop pair production with direct decay. In the left (right) column, the tops from the stop decay are right-handed (left-handed) in 95% (100%) of the decays. Shown are the number of events after each selection cut, normalised to 20.5 fb^{-1}. Final error is from Monte Carlo statistics for both ATLAS and CheckMATE. **No vertex finding or event cleaning is performed by CheckMATE. Instead, a flat efficiency factor is included to account for these effects.*

References

[1] Search for direct production of the top squark in the all-hadronic ttbar + etmiss final state in 21 fb-1 of p-pcollisions at sqrt(s)=8 tev with the atlas detector, Tech. Rep. ATLAS-CONF-2013-024, CERN, Geneva (Mar 2013).

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