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Explanation of the ATLAS Z-peaked excess in the NMSSM

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Contents

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A Validation of Monte Carlo simulations

Table 1: Validation table of our implement of atlas_1308_1841, the ATLAS search for the large multi-jets + E_T^{miss} signal in CheckMATE. Numbers in the columns EXP and OUR are the event numbers of different bins obtained by the CMS collaboration and us respectively, and those in the column DIFF represent their relative difference.(Note: In the column 'EXP' and 'OUR', we include the statistical error for the experimental results and our results, respectively.)

Gluino-stop(off-shell), $m_{\tilde{g}} = 1100\text{GeV}$, $m_{\tilde{\chi}_1^0} = 400\text{GeV}$ $N_{raw}^{EXP} = 99998, N_{raw}^{OUR} = 50000$			
	EXP	OUR	DIFF
Trigger(6 jets with $E_T > 45\text{GeV}$)	168.0±0.06	150.95±0.08	-10.15%
Lepton Veto	78.0±0.27	77.17±0.34	-1.07%
'Multi-jet + flavour' stream			
8j50, $\|\eta\| < 2.0$	16.3±0.16	14.47±0.20	-11.23%
& $E_T^{miss}/\sqrt{H_T} > 4.0$	14.1±0.15	12.29±0.19	-12.87%
& 0 bjet	0.85±0.04	0.78±0.05	-7.68%
& 1 bjet	3.0±0.07	2.94±0.09	-1.86%
& $\geq$ 2bjets	11.0±0.13	9.68±0.17	-12.04%
9j50, $\|\eta\| < 2.0$	9.6±0.12	7.84±0.15	-18.30%
& $E_T^{miss}/\sqrt{H_T} > 4.0$	8.0±0.11	6.49±0.14	-18.93%
& 0 bjet	0.33±0.02	0.33±0.03	1.32%
& 1 bjet	1.7±0.05	1.57±0.07	-7.68%
& $\geq$ 2bjets	6.5±0.10	5.29±0.13	-18.59%
$\geq$ 10j50, $\|\eta\| < 2.0$	5.7±0.10	4.51±0.12	-20.81%
& $E_T^{miss}/\sqrt{H_T} > 4.0$	4.7±0.09	3.63±0.10	-22.77%
7j80, $\|\eta\| < 2.0$	7.53±0.11	7.01±0.14	-6.94%
& $E_T^{miss}/\sqrt{H_T} > 4.0$	6.25±0.10	5.70±0.13	-8.79%
& 0 bjet	0.31±0.02	0.26±0.03	-17.46%
& 1 bjet	1.3±0.05	1.42±0.07	8.91%
& $\geq$ 2 bjets	5.1±0.09	4.66±0.12	-8.62%
$\geq$ 8j80, $\|\eta\| < 2.0$	3.2±0.07	3.49±0.10	9.17%
& $E_T^{miss}/\sqrt{H_T} > 4.0$	2.6±0.07	2.83±0.09	8.78%
& 0 bjet	0.13±0.01	0.15±0.02	15.47%
& 1 bjet	0.55±0.03	0.62±0.04	12.28%
& $\geq$ 2 bjets	2.1±0.06	2.34±0.08	11.61%

Table 2: Validation table of our implement of atlas_1308_1841(2).

Gluino-stop(off-shell), $m_{\tilde{g}} = 1100$GeV, $m_{\tilde{\chi}_1^0} = 400$GeV $N_{raw}^{EXP} = 99998, N_{raw}^{OUR} = 50000$			
	EXP	OUR	DIFF
Trigger(6 jets with $E_T > 45$GeV)	168.0±0.06	150.95±0.08	-10.15%
Lepton Veto	78.0±0.27	77.17±0.34	-1.07%
'Multi-jet + M_J^{Σ}' stream			
$\geq$ 8j50, $\|\eta\| < 2.8$	34±0.22	31.81±0.29	-6.44%
& $E_T^{miss}/\sqrt{H_T} > 4.0$	29±0.20	27.05±0.27	-6.73%
& $M_J^{\Sigma} > 340$	19±0.17	18.67±0.24	-1.76%
& $M_J^{\Sigma} > 420$	11±0.13	12.18±0.19	10.75%
$\geq$ 9j50, $\|\eta\| < 2.8$	17±0.16	16.22±0.22	-4.59%
& $E_T^{miss}/\sqrt{H_T} > 4.0$	14±0.15	13.60±0.20	-2.84%
& $M_J^{\Sigma} > 340$	11±0.13	10.51±0.18	-4.46%
& $M_J^{\Sigma} > 420$	7±0.11	7.46±0.15	6.56%
$\geq$ 10j50, $\|\eta\| < 2.8$	6.8±0.11	6.85±0.15	0.74%
& $E_T^{miss}/\sqrt{H_T} > 4.0$	5.6±0.10	5.59±0.13	-0.13%
& $M_J^{\Sigma} > 340$	4.6±0.09	4.77±0.12	3.64%
& $M_J^{\Sigma} > 420$	3.3±0.07	3.69±0.11	11.69%