Validation of ATLAS_2106_01676

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We validated our code for all Signal Regions (SRs) in ATLAS_2106_01676 using CheckMATE-2.0.29. We considered $\tilde{\chi}_1^\pm \tilde{\chi}_2^0$ production. The masses of other charginos and neutralinos apart from the bino-like $\tilde{\chi}_1^0$ and wino-like $\tilde{\chi}_2^0, \tilde{\chi}_1^\pm$ are set to 2.5 TeV, thus leaving kinematically allowed decay: $\tilde{\chi}_1^\pm \to \tilde{\chi}_1^0 W^\pm$, $\tilde{\chi}_2^0 \to \tilde{\chi}_1^0 Z/h$. For the validation of every point, we generated 100000 events using MG5_aMC_v3_2_0. To show the process of events generating, we take $\tilde{\chi}_1^\pm \tilde{\chi}_2^0$ production of $(m_{\tilde{\chi}_1^\pm}/m_{\tilde{\chi}_2^0}, m_{\tilde{\chi}_1^0}) = (300 \text{ GeV}, 200 \text{ GeV})$ as an example.

In the proc_card.dat, we set the following information:

```
import model MSSM_SLHA2 ——modelname
generate p p > n2 x1+, n2 > z > l− l+ n1, x1+ > w+ > l+ vl n1
add process p p > n2 x1−, n2 > z > l− l+ n1, x1− > w− > l− vl~ n1
add process p p > n2 x1+ j j, n2 > z > l− l+ n1, x1+ > w+ > l+ vl n1
add process p p > n2 x1− j j, n2 > l− l+ n1, x1− > w− > l− vl~ n1
```

In the run_card.dat, we set the following information and others are kept default:

```
100000 = nevents ! Number of unweighted events requested.
0 = ickkw              ! 0 no matching, 1 MLM
75.0  =  ktdurham
```

In the param_card.dat, we set the following information and others are kept default:

```
Block mass
1000022  2.000000e+02 # Mneu1
1000023  3.000000e+02 # Mneu2
1000024  3.000000e+02 # Mch1
1000025  −2.50000e+03 # Mneu3
1000037  2.500000e+03 # Mch2
Block nmix  # Neutralino Mixing Matrix^M
1  1      9.86364430E−01   # N_11^M
1  2     −5.31103553E−02   # N_12^M
1  3      1.46433995E−01   # N_13^M
1  4     −5.31186117E−02   # N_14^M
2  1      9.93505358E−02   # N_21^M
2  2      9.44949299E−01   # N_22^M
2  3     −2.69846720E−01   # N_23^M
2  4      1.56150698E−01   # N_24^M
Block umix  # Chargino Mixing Matrix U^M
1  1      9.16834859E−01   # U_11^M
1  2     −3.99266629E−01   # U_12^M
2  1      3.99266629E−01   # U_21^M
2  2      9.16834859E−01   # U_22^M
Block vmix  # Chargino Mixing Matrix V^M
1  1      9.72557835E−01   # V_11^M
1  2     −2.32661249E−01   # V_12^M
2  1      2.32661249E−01   # V_21^M
2  2      9.72557835E−01   # V_22^M
```

In the pythia8_card.dat, we set:

```
Merging:Process = pp>{ch1−,1000015}{ch1+,−1000015}{n2, 1000023}
Merging:mayRemoveDecayProducts=on
```

Table 1: Cutflow validation of ATLAS analysis `atlas_2106_01676` for mass point $m(\tilde{\chi}_1^\pm/\tilde{\chi}_2^0, \tilde{\chi}_1^0) = (300, 200)$ GeV and $m(\tilde{\chi}_1^\pm/\tilde{\chi}_2^0, \tilde{\chi}_1^0) = (600, 100)$ GeV.

Process	$pp \to \tilde{\chi}_2^0\tilde{\chi}_1^\pm, \tilde{\chi}_1^\pm \to W^\pm\tilde{\chi}_1^0, \tilde{\chi}_2^0 \to Z\tilde{\chi}_1^0$			
Point $m(\tilde{\chi}_2^0/\tilde{\chi}_1^\pm, \tilde{\chi}_1^0)$	(300, 200) GeV		(600, 100) GeV	
Generated Events	500,000			
	ATLAS	CheckMATE	ATLAS	CheckMATE
Selection				
$\mathcal{L} \times \sigma \times$ BF	1760	1760	92	92
$\mathcal{L} \times \sigma \times$ BF $\times$ filt.eff	1322	1322	69	69
3 isolated leptons				
lepton $p_T^{1,2,3} > 25,20,10$ GeV	227	221.55	23.9	22.64
$E_T^{miss} > 50$ GeV				
$n_{SFOS} \geq 1$	226	221.55	23.7	22.64
Trigger selection	222	221.55	23.3	22.64
$n_{b-jets} = 0$	209	205.99	21.9	20.92
Resonance veto $m_{\ell\ell} > 12$ GeV	209	205.11	21.9	20.91
$|m_{3\ell} - m_Z| > 15$ GeV	203	196.61	21.7	20.78
$m_{\ell\ell} \in [75, 105]$ GeV	196	187.62	20.1	19.06
$n_{jets} = 0$	76.4	82.99	7.72	7.98
$m_T \in [100, 160]$ GeV	26.7	29.19	0.9	0.97
SR$^{WZ}-1$	20.9	21.25	0.09	0.12
SR$^{WZ}-2$	4.86	6.93	0.11	0.14
SR$^{WZ}-3$	0.78	0.78	0.16	0.15
SR$^{WZ}-4$	0.14	0.23	0.54	0.55
$m_T > 160$ GeV	5.80	5.43	5.11	5.75
SR$^{WZ}-5$	4.64	5.23	0.37	0.5
SR$^{WZ}-6$	0.16	0.10	0.49	0.56
SR$^{WZ}-7$	0	0.07	2.21	2.53
SR$^{WZ}-8$	0	0	2.14	2.15
$n_{jets} > 0, H_T < 200$ GeV	97.5	91.92	9.9	9.07
$m_T \in [100, 160]$ GeV	29.6	32.82	1.19	1.13
SR$^{WZ}-9$	8.75	9.90	0.17	0.18
SR$^{WZ}-10$	3.46	4.45	0.32	0.35
SR$^{WZ}-11$	0.54	0.36	0.15	0.15
SR$^{WZ}-12$	0	0.03	0.38	0.35
$m_T > 160$ GeV	9.50	8.56	6.80	6.45
SR$^{WZ}-13$	7.19	6.70	0.49	0.49
SR$^{WZ}-14$	1.53	1.87	1.37	1.49
SR$^{WZ}-15$	0.09	0	2.77	2.72
SR$^{WZ}-16$	0	0	1.69	1.75
$n_{jets} > 0, H_T > 200$ GeV	22.2	17.33	2.40	2.25
$H_T^{lep} < 350$ GeV	20.9	16.32	0.65	0.51
$m_T > 100$ GeV	10.8	8.29	0.47	0.49
SR$^{WZ}-17$	2.53	2.06	0.02	0.05
SR$^{WZ}-18$	3.12	3.24	0.11	0.13
SR$^{WZ}-19$	1.09	0.56	0.12	0.13
SR$^{WZ}-20$	1.13	0.16	0.13	0.14

Table 2: Cutflow validation of ATLAS analysis `atlas_2106_01676` for mass point $m(\tilde{\chi}_1^\pm/\tilde{\chi}_2^0, \tilde{\chi}_1^0) = (190, 60)$ GeV.

Process	$pp \to \tilde{\chi}_2^0\tilde{\chi}_1^\pm, \tilde{\chi}_1^\pm \to W^\pm\tilde{\chi}_1^0, \tilde{\chi}_2^0 \to h\tilde{\chi}_1^0$	
Point $m(\tilde{\chi}_2^0/\tilde{\chi}_1^\pm, \tilde{\chi}_1^0)$	(190, 60) GeV	
Generated Events	500,000	
	ATLAS	CheckMATE
Selection		
$\mathcal{L} \times \sigma \times \mathrm{BF}$	10927	10927
$\mathcal{L} \times \sigma \times \mathrm{BF} \times \mathrm{filt.eff}$	1174	1174
3 isolated leptons		
lepton $\mathrm{p}_{\mathrm{T}}^{1,2,3} > 25,20,10$ GeV	192	172.23
$\mathrm{E}_{\mathrm{T}}^{\mathrm{miss}} > 50$ GeV		
Trigger selection	186	172.23
$n_{\mathrm{b-jets}} = 0$	171	161.34
$n_{\mathrm{SFOS}} \geq 1$	137	122.22
Resonance veto $m_{\ell\ell} > 12$ GeV	133	114.87
$\lvert m_{3\ell} - m_Z \rvert > 15$ GeV	110	92.51
$m_{\ell\ell} < 75$ GeV	56.2	55.74
$n_{\mathrm{jets}} = 0$ $(\mathbf{SR}_{\mathrm{low-m_{ll}-0j}}^{\mathrm{Wh}})$	22.3	30.30
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{1}$	8.26	11.03
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{2}$	1.57	1.03
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{3}$	0.50	0.59
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{4}$	5.97	6.32
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{5}$	0.64	4.41
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{6}$	2.67	2.5
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{7}$	2.75	4.41
$n_{\mathrm{jets}} > 0, H_{\mathrm{T}} < 200$ GeV $(\mathbf{SR}_{\mathrm{low-m_{ll}-nj}}^{\mathrm{Wh}})$	26.5	22.65
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{8}$	2.95	2.50
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{9}$	5.28	5.00
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{10}$	1.59	2.50
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{11}$	0.63	1.18
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{12}$	5.55	3.23
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{13}$	2.91	3.83
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{14}$	0.68	0.44
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{15}$	5.48	2.65
$\mathbf{SR}_{\mathrm{SFOS}}^{\mathrm{Wh}} - \mathbf{16}$	1.39	1.32
$n_{\mathrm{SFOS}} = 0$	34	38.82
$n_{\mathrm{jets}} = 0$	14.8	22.80
$p_{\mathrm{T}}^{\ell_3} > 15$ GeV	12.2	19.71
$\mathrm{E}_{\mathrm{T}}^{\mathrm{miss}}$ significance > 8	5.36	7.94
$\Delta R_{\mathrm{OS,near}} < 1.2$	4.73	5.74
$n_{\mathrm{jets}} \in [1, 2]$	15.6	14.56
$p_{\mathrm{T}}^{\ell_3} > 20$ GeV	9.4	10.74
$\mathrm{E}_{\mathrm{T}}^{\mathrm{miss}}$ significance > 8	3.91	2.65
$\Delta R_{\mathrm{OS,near}} < 1.0$	2.84	1.18
$\mathbf{SR}_{\mathrm{DFOS}}^{\mathrm{Wh}}$	7.57	6.91

Table 3: Cutflow validation of ATLAS analysis `atlas_2106_01676` for mass point $m(\tilde\chi_1^\pm/\tilde\chi_2^0, \tilde\chi_1^0) = (250, 170)$ GeV.

$\tilde\chi_1^\pm\tilde\chi_2^0 \to WZ\tilde\chi_1^0\tilde\chi_1^0$ wino/bino(+)	m($\tilde\chi_1^\pm/\tilde\chi_2^0, \tilde\chi_1^0$)=(250, 170)GeV											
				ATLAS						CheckMATE		
$\mathcal{L} \times \sigma \times$ BF				3559						3559		
$\mathcal{L} \times \sigma \times$ BF $\times$ filt.eff				1638						1638		
3 isolated leptons				384						434		
b veto				367						408		
Trigger				307						343		
$m_{\ell\ell}, m_{\ell\ell}^{max}$[GeV]	<75			299						204		
		f1	f2		g1	g2			f1	f2	g1	g2
Common cuts $SR_{low\not{E}_T}^{offWZ}$												
$m_{\ell\ell}^{min}$[GeV]	[40, 75]			239						162		
lepton $P_T^{1,2,3}$[GeV]	>15			189						134		
FNP lepton cleaning				146						111		
$m_{\ell\ell}^{max}$[GeV]				146						111		
$m_{\ell\ell}^{min}$[GeV]	[40, 60]	58.2		[60, 75]	87.6				47.2		64.0	
m_{T2}^{100}[GeV]		58.2			87.6				47.2		64.0	
$min\Delta R$		58.2			87.6				47.2		64.0	
Cuts $SR_{low\not{E}_T}^{offWZ}$ − 0j												
$n_{jets}^{PT>30GeV}$	0	34.4		0	52.1				29.5		39.9	
E_T^{miss}[GeV]	<50	15.8		<50	26.6				9.7		15.7	
E_T^{miss}signif	>1.5	13.5		>1.5	22.6				9.7		15.7	
$m_{3\ell}$[GeV]	>100	10.5		>100	21.0				6.7		13.8	
m_T^{minmll}[GeV]	<60	5.92	>90 / 1.57		<60	11.3	>90 / 3.14		2.85	1.4	7.3	2.5
p_T^{lep}/E_T^{miss}	<1.4	5.11	<1.4 / 1.44		<1.4	9.87	<1.4 / 2.99		2.73	1.36	7.1	2.4
Cuts $SR_{low\not{E}_T}^{offWZ}$ − nj												
$n_{jets}^{PT>30GeV}$	>0	23.7		>0	35.4				17.7		24.0	
E_T^{miss}[GeV]	<200	21.2		<200	31.0				15.1		20.0	
E_T^{miss}signif	>3.0	17.9		>3.0	25.2				14.3		18.9	
m_T^{minmll}[GeV]	<60	5.88	>90 / 7.08		<60	8.86	>90 / 10.3		5.2	1.6	6.7	2.6
p_T^{lep}/E_T^{miss}	<1.2	4.35	<1.2 / 6.17		<1.2	7.15	<1.2 / 9.47		4.8	1.4	6.5	2.5
Cuts $SR_{high\not{E}_T}^{offWZ}$ − 0j												
lepton $P_T^{1,2,3}$	[25, 15, 10]			274						202		
$m_{\ell\ell}^{min}$[GeV]	[40, 60]	91.8		[60, 75]	132				71.7		88.9	
m_{T2}^{100}[GeV]	<160	81.8		<175	131				63.6		87.7	
$n_{jets}^{PT>30GeV}$	0	49.6		0	77.9				37.3		53.0	
E_T^{miss}[GeV]	>50	24.5		>50	37.1				23.4		32.5	
E_T^{miss}signif	>3.0	23.4		>3.0	35.5				23.4		32.5	
m_T^{minmll}[GeV]	<70	9.62	>90 / 8.00		<70	14.9	>90 / 12.1		13.1	5.0	16.8	7.6
Cuts $SR_{high\not{E}_T}^{offWZ}$ − nj												
		f			g				f		g	
lepton $P_T^{1,2,3}$	[4.5, 3]			299						205		
$m_{\ell\ell}^{min}$[GeV]	[40, 60]	100		[60, 75]	139				72		89.3	
m_{T2}^{100}[GeV]	<160	89.2		<175	138				64.3		88.0	
$n_{jets}^{PT>30GeV}$	>0	35.6		>0	56.7				26.7		34.8	
E_T^{miss}[GeV]	>200	3.78		>200	7.48				4.21		6.15	
E_T^{miss}signif	>3.0	3.78		>3.0	7.35				4.21		6.15	
p_T^{lep}/E_T^{miss}	<1.0	3.67		<1.0	7.22				4.21		6.15	

Table 4: Cutflow validation of ATLAS analysis `atlas_2106_01676` for mass point $m(\tilde{\chi}_1^\pm/\tilde{\chi}_2^0, \tilde{\chi}_1^0) = (125, 85)$ GeV.

$\tilde{\chi}_1^\pm\tilde{\chi}_2^0 \to WZ\tilde{\chi}_1^0\tilde{\chi}_1^0$ wino/bino(+)	m($\tilde{\chi}_1^\pm/\tilde{\chi}_2^0,\tilde{\chi}_1^0$)=(125, 85)GeV											
	ATLAS								CheckMATE			
	b		c		d		e		b	c	d	e
$\mathcal{L}\times\sigma\times$BF					45634					45634		
$\mathcal{L}\times\sigma\times$BF$\times$filt.eff					16811					16811		
3 isolated leptons					2660					3110		
b veto					2550					2961		
Trigger					1810					2051		
$m_{\ell\ell}, m_{\ell\ell}^{max}$[GeV]	<75				1790					1867		
Common cuts $SR_{low\slashed{E}_T}^{offWZ}$												
$m_{\ell\ell}^{min}$[GeV]	[12, 40]				1700					1755		
lepton $P_T^{1,2,3}$[GeV]	>10				1440					1112		
FNP lepton cleaning					1120					936		
$m_{\ell\ell}^{max}$[GeV]	<60				1020					853		
$m_{\ell\ell}^{min}$[GeV]	[12, 15]	47.0	[15, 20]	119	[20, 30]	406	[30, 40]	452	35.82	88.07	322	432
m_{T2}^{100}[GeV]	<115	19.4	<120	74.7	<130	374		452	17.91	56.02	297.06	432
$\min\Delta R$	<1.6	19.4	<1.6	73.2	<1.6	295		452	17.91	56.02	248.33	432
Cuts $SR_{low\slashed{E}_T}^{offWZ}-0j$												
$n_{jets}^{PT>30GeV}$	0	12.2	0	49.5	0	186	0	291	11.73	42.29	171.05	316
E_T^{miss}[GeV]	<50	11.2	<50	42.9	<50	147	<50	242	10.31	36.13	124.48	255
E_T^{miss}signif	>1.5	8.57	>1.5	34.7	>1.5	123	>1.5	182	9.84	33.76	86.64	201
$m_{3\ell}$[GeV]		8.57		34.7		123		182	9.84	33.76	86.64	201
m_T^{minmll}[GeV]	<50	8.16	<50	32.6	<50	97.8	<60	158	6.06	21.9	54.89	151
p_T^{lep}/E_T^{miss}	<1.1	5.27	<1.1	22.7	<1.1	64.3	<1.3	138	5.58	21.9	39.32	123
Cuts $SR_{low\slashed{E}_T}^{offWZ}-nj$												
$n_{jets}^{PT>30GeV}$	>0	7.2	>0	23.8	>0	110	>0	161	6.18	13.73	77.28	116
E_T^{miss}[GeV]	<200	6.52	<200	21.3	<200	102	<200	150	6.18	13.25	75.36	113
E_T^{miss}signif	>3.0	4.72	>3.0	16.1	>3.0	76.3	>3.0	106	6.18	12.29	60.23	92.92
m_T^{minmll}[GeV]	<50	2.85	<50	10.7	<50	42.9	<60	65.7	1.43	2.81	9.85	22.06
p_T^{lep}/E_T^{miss}	<1.0	2.54	<1.0	10.6	<1.0	36.5	<1.0	59.9	1.43	2.81	9.85	21.6
Cuts $SR_{high\slashed{E}_T}^{offWZ}-0j$												
lepton $P_T^{1,2,3}$	[25, 15, 10]				1170					896		
$m_{\ell\ell}^{min}$[GeV]	[12, 15]	44.0	[15, 20]	120	[20, 30]	422	[30, 40]	541	29.36	84.76	354	442
m_{T2}^{100}[GeV]	<115	19.1	<120	76.3	<130	388	<140	540	14.7	54.56	329	441
$n_{jets}^{PT>30GeV}$	0	11.6	0	49.6	0	239	0	341	9.93	40.29	234	306
E_T^{miss}[GeV]	>50	2.05	>50	10.3	>50	50.8	>50	67.0	1.42	7.62	60.61	72.13
E_T^{miss}signif	>3.0	1.80	>3.0	9.37	>3.0	46.1	>3.0	60.5	1.42	7.62	60.61	71.65
m_T^{minmll}[GeV]	<50	1.74	<50	8.84	<60	43.3	<60	52.4	0	1.89	21.0	23.42
Cuts $SR_{high\slashed{E}_T}^{offWZ}-nj$												
lepton $P_T^{1,2,3}$	[4.5, 3]				1790					1867		
$m_{\ell\ell}^{min}$[GeV]	[12, 15]	83.5	[15, 20]	207	[20, 30]	661	[30, 40]	746	94.63	222.02	744	784
m_{T2}^{100}[GeV]	<115	34.8	<130	131	<120	607	<140	744	45.15	141.84	692	782
$n_{jets}^{PT>30GeV}$	>0	15.8	>0	52.7	>0	252	>0	287	10.86	34.98	195	220
E_T^{miss}[GeV]	>200	2.09	>200	5.85	>200	22.3	>200	24.3	0	1.89	9.57	7.18
E_T^{miss}signif	>3.0	2.09	>3.0	5.85	>3.0	22.3	>3.0	24.1	0	1.89	9.57	7.18
p_T^{lep}/E_T^{miss}	<0.2	1.99	<0.3	5.39	<0.3	14.6	<0.3	13.8	0	1.41	4.3	4.3

Table 5: Cutflow validation of ATLAS analysis `atlas_2106_01676` for mass point $m(\tilde{\chi}_1^\pm/\tilde{\chi}_2^0, \tilde{\chi}_1^0) = (185, 125)$ GeV.

$\tilde{\chi}_1^\pm\tilde{\chi}_2^0 \to WZ\tilde{\chi}_1^0\tilde{\chi}_1^0$ higgsino	m($\tilde{\chi}_2^0, \tilde{\chi}_1^0$)=(185, 125)GeV											
	\multicolumn{8}{c}{ATLAS}								\multicolumn{4}{c}{CheckMATE}			
$\mathcal{L} \times \sigma \times$ BF						3912					3912		
$\mathcal{L} \times \sigma \times$ BF $\times$ filt.eff						1550					1550		
3 isolated leptons						392					409		
b veto						374					388		
Trigger						280					304		
$m_{\ell\ell}, m_{\ell\ell}^{max}$[GeV]	<75					253					281		
		b		c		d		e	b	c	d	e
Common cuts $\mathrm{SR}_{\mathrm{low}\slashed{E}_T}^{\mathrm{offWZ}}$												
$m_{\ell\ell}^{min}$[GeV]	[12, 40]					165					194		
lepton $P_T^{1,2,3}$[GeV]	>10					111					120		
FNP lepton cleaning						85.2					99.9		
$m_{\ell\ell}^{max}$[GeV]	<60					79.3					92.34		
$m_{\ell\ell}^{min}$[GeV]	[12, 15]	3.53	[15, 20]	10.3	[20, 30]	32.6	[30, 40]	32.9	4.58	12.23	34.74	40.79
m_{T2}^{100}[GeV]	<115	0.681	<120	5.61	<130	26.3		32.9	1.41	6.14	29.70	40.79
$\min\Delta R$	<1.6	0.681	<1.6	5.55	<1.6	23.2		32.9	1.41	6.14	27.13	40.79
Cuts $\mathrm{SR}_{\mathrm{low}\slashed{E}_T}^{\mathrm{offWZ}} - 0j$												
$n_{jets}^{PT>30\mathrm{GeV}}$	0	0.534	0	3.84	0	13.3	0	21.3	1.05	4.36	19.31	27.78
E_T^{miss}[GeV]	<50	0.465	<50	2.70	<50	7.47	<50	12.8	0.68	2.43	9.88	14.05
E_T^{miss}signif	>1.5	0.465	>1.5	2.37	>1.5	6.86	>1.5	11.6	0.64	2.26	9.07	12.96
$m_{3\ell}$[GeV]		0.465		2.37		6.86		11.6	0.64	2.26	9.07	12.96
m_T^{minmll}[GeV]	<50	0.411	<50	2.22	<50	5.44	<60	9.46	0.64	2.06	7.78	11.35
p_T^{lep}/E_T^{miss}	<1.1	0.275	<1.1	1.47	<1.1	2.98	<1.3	8.04	0.40	0.85	3.51	8.08
Cuts $\mathrm{SR}_{\mathrm{low}\slashed{E}_T}^{\mathrm{offWZ}} - nj$												
$n_{jets}^{PT>30\mathrm{GeV}}$	>0	0.147	>0	1.71	>0	9.91	>0	11.7	0.36	1.78	7.82	13.00
E_T^{miss}[GeV]	<200	0.122	<200	1.54	<200	8.99	<200	10.3	0.36	1.69	7.62	12.64
E_T^{miss}signif	>3.0	0.083	>3.0	1.11	>3.0	6.84	>3.0	8.33	0.28	1.53	6.56	10.13
m_T^{minmll}[GeV]	<50	0.066	<50	0.886	<50	4.62	<60	5.97	0.24	0.97	4.62	7.02
p_T^{lep}/E_T^{miss}	<1.0	0.066	<1.0	0.783	<1.0	3.64	<1.0	4.53	0.16	0.93	3.52	5.69
Cuts $\mathrm{SR}_{\mathrm{high}\slashed{E}_T}^{\mathrm{offWZ}} - 0j$												
lepton $P_T^{1,2,3}$	[25, 15, 10]					152					156		
$m_{\ell\ell}^{min}$[GeV]	[12, 15]	3.83	[15, 20]	11.5	[20, 30]	36.9	[30, 40]	41.9	4.87	13.17	37.52	47.27
m_{T2}^{100}[GeV]	<115	1.24	<120	6.19	<130	30.5	<140	40.2	1.53	6.91	32.07	45.61
$n_{jets}^{PT>30\mathrm{GeV}}$	0	0.825	0	4.09	0	17.2	0	25.2	1.12	4.82	22.26	30.19
E_T^{miss}[GeV]	>50	0.205	>50	1.75	>50	8.1	>50	11.3	0.44	2.39	11.71	15.29
E_T^{miss}signif	>3.0	0.205	>3.0	1.64	>3.0	7.79	>3.0	11.0	0.44	2.39	11.71	15.29
m_T^{minmll}[GeV]	<50	0.205	<50	1.54	<60	7.39	<60	10.1	0.44	2.23	10.46	13.11
Cuts $\mathrm{SR}_{\mathrm{high}\slashed{E}_T}^{\mathrm{offWZ}} - nj$												
lepton $P_T^{1,2,3}$	[4.5, 3]					253					281		
$m_{\ell\ell}^{min}$[GeV]	[12, 15]	9.76	[15, 20]	24.2	[20, 30]	65.8	[30, 40]	65.5	12.55	29.32	74.62	77.47
m_{T2}^{100}[GeV]	<115	3.04	<130	13.2	<120	54.0	<140	62.1	4.14	15.1	62.99	74.35
$n_{jets}^{PT>30\mathrm{GeV}}$	>0	1.06	>0	4.50	>0	22.0	>0	22.8	1.05	5.16	19.07	24.07
E_T^{miss}[GeV]	>200	0.086	>200	0.613	>200	2.22	>200	2.56	0	0.12	0.48	0.78
E_T^{miss}signif	>3.0	0.086	>3.0	0.513	>3.0	2.22	>3.0	2.56	0	0.12	0.48	0.78
p_T^{lep}/E_T^{miss}	<0.2	0.086	<0.3	0.336	<0.3	1.44	<0.3	1.65	0	0.08	0.28	0.45

7

Table 6: Cutflow validation of ATLAS analysis `atlas_2106_01676` for mass point $m(\tilde\chi_1^\pm/\tilde\chi_2^0, \tilde\chi_1^0) = (100, 40)$ GeV.

$\tilde\chi_1^\pm\tilde\chi_2^0 \to WZ\tilde\chi_1^0\tilde\chi_1^0$ higgsino	$m(\tilde\chi_2^0, \tilde\chi_1^0)$=(100, 40)GeV											
			ATLAS							CheckMATE		
$\mathcal{L}\times\sigma\times$BF		48276								48276		
$\mathcal{L}\times\sigma\times$BF$\times$filt.eff		16084								16084		
3 isolated leptons		3760								4247		
b veto		3620								4027		
Trigger		2620								3165		
$m_{\ell\ell}, m_{\ell\ell}^{max}$[GeV]	<75	2380								2916		
		b		c		d		e	b	c	d	e
Common cuts SR$_{\text{low}\not E_T}^{\text{offWZ}}$												
$m_{\ell\ell}^{min}$[GeV]	[12, 40]	1590								2012		
lepton $P_T^{1,2,3}$[GeV]	>10	1050								1241		
FNP lepton cleaning		820								1037		
$m_{\ell\ell}^{max}$[GeV]	<60	770								958		
$m_{\ell\ell}^{min}$[GeV]	[12, 15]	36.6	[15, 20]	101	[20, 30]	302	[30, 40]	331	47.55	126.89	361	423
m_{T2}^{100}[GeV]	<115	15.6	<120	59.1	<130	262		331	14.65	63.72	308	423
$\min\Delta R$	<1.6	15.6	<1.6	58.6	<1.6	216		331	14.65	63.72	282	423
Cuts SR$_{\text{low}\not E_T}^{\text{offWZ}}-0$j												
$n_{jets}^{PT>30\text{GeV}}$	0	11.5	0	43.7	0	149	0	216	10.86	45.29	200	288
E_T^{miss}[GeV]	<50	10.1	<50	32.9	<50	103	<50	161	7.09	25.17	103	146
E_T^{miss}signif	>1.5	8.03	>1.5	29.2	>1.5	92.6	>1.5	134	6.67	23.49	94.17	135
$m_{3\ell}$[GeV]		8.03		29.2		92.6		134	6.67	23.49	94.17	135
m_T^{minmll}[GeV]	<50	7.41	<50	26.8	<50	80.2	<60	118	6.67	21.40	80.76	118
p_T^{lep}/E_T^{miss}	<1.1	5.94	<1.1	8.0	<1.1	50.4	<1.3	100	4.16	8.82	36.37	83.87
Cuts SR$_{\text{low}\not E_T}^{\text{offWZ}}-$nj												
$n_{jets}^{PT>30\text{GeV}}$	>0	4.12	>0	14.9	>0	67.6	>0	115	3.78	18.43	81.13	135
E_T^{miss}[GeV]	<200	4.12	<200	14.5	<200	64.9	<200	111	3.78	17.59	79.03	131
E_T^{miss}signif	>3.0	2.81	>3.0	10.9	>3.0	45.6	>3.0	76.4	2.95	15.92	68.09	105
m_T^{minmll}[GeV]	<50	1.96	<50	9.16	<50	34.2	<60	60.9	2.52	10.05	47.91	72.83
p_T^{lep}/E_T^{miss}	<1.0	1.68	<1.0	7.34	<1.0	27.6	<1.0	44.4	1.69	9.64	36.57	58.96
Cuts SR$_{\text{high}\not E_T}^{\text{offWZ}}-0$j												
lepton $P_T^{1,2,3}$	[25, 15, 10]	1350								1621		
$m_{\ell\ell}^{min}$[GeV]	[12, 15]	37.1	[15, 20]	102	[20, 30]	313	[30, 40]	396	50.53	137	389	491
m_{T2}^{100}[GeV]	<115	16.1	<120	63.0	<130	269	<140	382	15.89	71.76	333	473
$n_{jets}^{PT>30\text{GeV}}$	0	11.8	0	46.6	0	184	0	252	11.67	50.00	231	313
E_T^{miss}[GeV]	>50	1.23	>50	16.7	>50	68.2	>50	75.9	4.6	24.77	122	159
E_T^{miss}signif	>3.0	1.13	>3.0	16.2	>3.0	65.0	>3.0	72.5	4.6	24.77	122	159
m_T^{minmll}[GeV]	<50	1.13	<50	16.2	<60	62.8	<60	68.5	4.6	23.11	109	136
Cuts SR$_{\text{high}\not E_T}^{\text{offWZ}}-$nj												
lepton $P_T^{1,2,3}$	[4.5, 3]	2380								2916		
$m_{\ell\ell}^{min}$[GeV]	[12, 15]	99.4	[15, 20]	233	[20, 30]	621	[30, 40]	640	130	304	774	804
m_{T2}^{100}[GeV]	<115	42.4	<130	140	<120	537	<140	617	43.01	157	654	772
$n_{jets}^{PT>30\text{GeV}}$	>0	12.0	>0	37.0	>0	162	>0	200	10.89	53.57	198	250
E_T^{miss}[GeV]	>200	0.376	>200	1.07	>200	7.12	>200	7.30	0	1.27	5.02	8.04
E_T^{miss}signif	>3.0	0.376	>3.0	1.07	>3.0	6.95	>3.0	7.30	0	1.27	5.02	8.04
p_T^{lep}/E_T^{miss}	<0.2	0.146	<0.3	0.771	<0.3	4.37	<0.3	3.07	0	0.84	2.92	4.65