Validation of the MadAnalysis 5 implementation of ATLAS-SUSY-16-07

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September 3, 2018

Abstract

In this note we summarise our validation of the ATLAS search for squarks and gluinos in final states with jets and missing transverse momentum using $36\,\mathrm{fb}^{-1}$ at $\sqrt{s} = 13$ TeV.

1 Description of the analysis

In this note we describe the validation of the implementation in `MadAnalysis5` (MA5) framework [1–3] of the ATLAS 2 to 6 jets+Missing Transverse Energy (MET) analysis presented in [4]. We have used the version MA5 1.6 jointly with the standard `Delphes3` program [5] inside the MA5 framework for detector simulation. For validation we compare our results againts three benchmarks provided by ATLAS available on [4] under the section "data points". The hard scattering events have been generated with the `MadGraph5_aMC@NLO` MonteCarlo event simulator [6] (v2.6.1), then PYTHIA 8 (v8.230) for matching those events to parton shower and hadronisation [7]. The delphes card used for the detector simulation is the same as the one used for the recasting of ATLAS-SUSY-2015-06[1].
The ATLAS multijet search relies on an integrated luminosity of 36.1 fb^{-1} of LHC proton-proton collisions at a center of mass of 13 TeV. Two different approaches are used in this search: an Meff-base and a Recursive Jigsaw reconstruction technique (RJR). We only implemented the Meff-based strategy since not enough information is available for the RJR technique (although we acknowledge gratefully the ATLAS collaboration to provide a snippet of the implementation but difficult to use out of the box). The Meff-based strategy contains 22 inclusive signal regions (SRs) covering jet multiplicities ranging from two to six, with signal jets having $p_T > 50$ GeV and the missing energy of the event must be larger than 250 GeV. Events are further discarded if a baseline electron or muon with $p_T > 7$ GeV remains. Some of the SRs require the same jet multiplicity, but are distinguished by increasing background rejection through cuts in variables like the p_T of the leading jets, $\Delta\phi$ between jets and MET and the effective mass variable M_{eff}

[1] also available on the PAD page of MA5 `http://madanalysis.irmp.ucl.ac.be/wiki/PublicAnalysisDatabase`

among others. In the Meff-based search strategy, two additional SRs are defined using larger-radius jets. Although we tried our best to reproduce the official results of ATLAS (thanks to their great help) we could not reach an acceptable level of agreement. Thus, these two signal regions (dubbed 2jB-1600 and 2jB-2400) are not implemented in the current version of the analysis.

2 Simulation details

To validate the implementation of the analysis, we have considered the three MSSM benchmarks for which ATLAS provided a cutflow table and compared against our own results. The benchmarks are define by:

- Gluino pair production with $m_{\text{gluino}} = 2000$ GeV and $m_{\tilde{\chi}_1^0} = 0$ GeV.
- Squark pair production (1^{st} and 2^{nd} generation) with $m_{\text{squark}} = 1200$ GeV and $m_{\tilde{\chi}_1^0} = 600$ GeV.
- Squark pair production (1^{st} and 2^{nd} generation) with $m_{\text{squark}} = 1500$ GeV and $m_{\tilde{\chi}_1^0} = 0$ GeV.

where $m_{\text{gluino}}, m_{\text{squark}}, m_{\tilde{\chi}_1^0}$ are the masses of the gluino, squarks and lightest supersymmetric particle (LSP). The rest of the supersymmetric (SUSY) spectrum is decoupled from this set. We have generated the matrix elements up to two extra jets. The CKKW-L merging scheme [8, 9] was applied with a scale parameter that was set to a quarter of the mass of the gluino for $\tilde{g}\tilde{g}$ production or of the squark mass otherwise. The A14 tune [10] was used for initial/final state radiation and underlying-event parameters together with the NNPDF2.3 LO [11–14] parton distribution function (PDF) set. The pythia code we used is based on the `main89ckkwl.cmnd` input file (see [16] for more details). Finally we simulate the detector response with `Delphe3` with the same delphes card that was used for ATLAS-SUSY-2015-06 and can be found at `http://madanalysis.irmp.ucl.ac.be/wiki/PublicAnalysisDatabase`.

3 Results

The comparison between the ATLAS official results and the MA5 ones can be found in the Tables below. The raw number of events generated is normalised to the cross section times luminosity. We use the tabulated NLO+NLL tabulated cross sections from [15] for the 13 TeV $\tilde{g}\tilde{g}$ production with squarks decoupled and the 13 TeV $\tilde{q}\tilde{q}$ production with gluinos (and stops) decoupled[2]. The ATLAS collaboration has not provided cutflows for the $5j-2000$ and $5j-2600$. Nevertheless we display our results for these two SR anyway for the sake of completeness.

[2]Actually, since we only produced 1^{st} and 2^{nd} generation squarks (and not the sbottom as in [15]) we multiplied the cross section by 0.8.

4 $\tilde{g} \rightarrow q\bar{q}\tilde{\chi}_1^0$ (2000/0)

$\tilde{g} \rightarrow q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $2j - 1200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	-8.2%	31.6	31.6
$N_j \geq 2$	32.5	-0.0%	31.6	-0.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	19.9	-38.8%	19.0	-39.9%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	15.1	-24.1%	14.3	-24.7%
$p_T(j_2) > 250$ GeV	14.8	-2.0%	14.1	-1.4%
$\|\eta(\text{jets})\| < 0.8$	8.0	-45.9%	7.51	-46.7%
$E_T^{\text{miss}}/\sqrt{H_T} > 14$ GeV$^{1/2}$	5.3	-33.8%	5.13	-31.7%
$m_{\text{eff}}(\text{incl.}) > 1200$ GeV	5.3	-0.0%	5.13	-0.0%

Table 1: Cutflow for the benchmark point $\tilde{g} \rightarrow q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $2j - 1200$.

$\tilde{g} \rightarrow q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $2j - 1600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	-8.2%	31.6	31.6
$N_j \geq 2$	32.5	-0.0%	31.6	-0.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	19.9	-38.8%	19.0	-39.9%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	15.1	-24.1%	14.3	-24.7%
$p_T(j_2) > 300$ GeV	14.5	-4.0%	13.8	-3.5%
$\|\eta(\text{jets})\| < 1.2$	12.0	-17.2%	11.4	-17.4%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	5.9	-50.8%	5.74	-49.6%
$m_{\text{eff}}(\text{incl.}) > 1600$ GeV	5.9	-0.0%	5.74	-0.0%

Table 2: Cutflow for the benchmark point $\tilde{g} \rightarrow q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $2j - 1600$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $2j - 2000$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	-8.2%	31.6	31.6
$N_j \geq 2$	32.5	-0.0%	31.6	-0.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	19.9	-38.8%	19.0	-39.9%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	15.1	-24.1%	14.3	-24.7%
$p_T(j_2) > 350$ GeV	13.9	-7.9%	13.2	-7.7%
$\lvert\eta(\text{jets})\rvert < 1.2$	11.7	-15.8%	11.1	-15.9%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	5.7	-51.3%	5.54	-50.1%
$m_{\text{eff}}(\text{incl.}) > 2000$ GeV	5.7	-0.0%	5.54	-0.0%

Table 3: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $2j - 2000$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $2j - 2100$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	-8.2%	31.6	31.6
$N_j \geq 2$	32.5	-0.0%	31.6	-0.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	26.3	-19.1%	25.2	-20.3%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	22.9	-12.9%	22.0	-12.7%
$p_T(j_1) > 600$ GeV	20.5	-10.5%	19.8	-10.0%
$E_T^{\text{miss}}/\sqrt{H_T} > 26$ GeV$^{1/2}$	3.5	-82.9%	3.48	-82.4%
$m_{\text{eff}}(\text{incl.}) > 2100$ GeV	3.5	-0.0%	3.47	-0.3%

Table 4: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $2j - 2100$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $2j - 2400$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	−8.2%	31.6	31.6
$N_j \geq 2$	32.5	−0.0%	31.6	−0.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	19.9	−38.8%	19.0	−39.9%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	15.1	−24.1%	14.3	−24.7%
$p_T(j_2) > 350$ GeV	13.9	−7.9%	13.2	−7.7%
$\lvert\eta(\text{jets})\rvert < 1.2$	11.7	−15.8%	11.1	−15.9%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	5.7	−51.3%	5.54	−50.1%
$m_{\text{eff}}(\text{incl.}) > 2400$ GeV	5.6	−1.8%	5.44	−1.8%

Table 5: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $2j - 2400$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $2j - 2800$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	−8.2%	31.6	31.6
$N_j \geq 2$	32.5	−0.0%	31.6	−0.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	19.9	−38.8%	19.0	−39.9%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	15.1	−24.1%	14.3	−24.7%
$p_T(j_2) > 350$ GeV	13.9	−7.9%	13.2	−7.7%
$\lvert\eta(\text{jets})\rvert < 1.2$	11.7	−15.8%	11.1	−15.9%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	5.7	−51.3%	5.54	−50.1%
$m_{\text{eff}}(\text{incl.}) > 2800$ GeV	5.1	−10.5%	4.94	−10.8%

Table 6: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $2j - 2800$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $2j - 3600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	−8.2%	31.6	31.6
$N_j \geq 2$	32.5	−0.0%	31.6	−0.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	19.9	−38.8%	19.0	−39.9%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	15.1	−24.1%	14.3	−24.7%
$p_T(j_2) > 350$ GeV	13.9	−7.9%	13.2	−7.7%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	6.9	−50.4%	6.7	−49.2%
$m_{\text{eff}}(\text{incl.}) > 3600$ GeV	2.7	−60.9%	2.6	−61.2%

Table 7: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $2j - 3600$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $3j - 1300$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	−8.2%	31.6	31.6
$N_j \geq 2$	32.5	−0.0%	31.6	−0.0%
$N_j \geq 3$	32.4	−0.3%	31.0	−1.9%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	26.2	−19.1%	25.1	−19.0%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	22.9	−12.6%	21.9	−12.7%
$p_T(j_1) > 700$ GeV	18.0	−21.4%	17.4	−20.5%
$E_T^{\text{miss}}/\sqrt{H_T} > 16$ GeV$^{1/2}$	9.2	−48.9%	7.65	−56.0%
$m_{\text{eff}}(\text{incl.}) > 1300$ GeV	9.2	−0.0%	7.65	−0.0%

Table 8: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $3j - 1300$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $4j - 1000$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	−8.2%	31.6	31.6
$N_j \geq 2$	32.5	−0.0%	31.6	−0.0%
$N_j \geq 4$	31.0	−4.6%	29.8	−5.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	25.0	−19.4%	24.1	−19.1%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	18.8	−24.8%	18.2	−24.5%
$p_T(j_4) > 100$ GeV	16.6	−11.7%	16.3	−10.4%
$\lvert\eta(\text{jets})\rvert < 1.2$	7.9	−52.4%	7.95	−51.2%
Aplanarity > 0.04	5.4	−31.6%	5.52	−30.6%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.30$	1.9	−64.8%	2.02	−63.4%
$m_{\text{eff}}(\text{incl.}) > 1000$ GeV	1.9	−0.0%	2.02	−0.0%

Table 9: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $4j - 1000$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $4j - 1400$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	−8.2%	31.6	31.6
$N_j \geq 2$	32.5	−0.0%	31.6	−0.0%
$N_j \geq 4$	31.0	−4.6%	29.8	−5.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	25.0	−19.4%	24.1	−19.1%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	18.8	−24.8%	18.2	−24.5%
$p_T(j_4) > 100$ GeV	16.6	−11.7%	16.3	−10.4%
$\lvert\eta(\text{jets})\rvert < 2.0$	15.1	−9.0%	14.9	−8.6%
Aplanarity > 0.04	10.2	−32.5%	10.1	−32.2%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.25$	5.7	−44.1%	5.73	−43.3%
$m_{\text{eff}}(\text{incl.}) > 1400$ GeV	5.7	−0.0%	5.73	−0.0%

Table 10: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $4j - 1400$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $4j - 1800$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	-8.2%	31.6	31.6
$N_j \geq 2$	32.5	-0.0%	31.6	-0.0%
$N_j \geq 4$	31.0	-4.6%	29.8	-5.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	25.0	-19.4%	24.1	-19.1%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	18.8	-24.8%	18.2	-24.5%
$p_T(j_4) > 100$ GeV	16.6	-11.7%	16.3	-10.4%
$\lvert\eta(\text{jets})\rvert < 2.0$	15.1	-9.0%	14.9	-8.6%
Aplanarity > 0.04	10.2	-32.5%	10.1	-32.2%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.25$	5.7	-44.1%	5.73	-43.3%
$m_{\text{eff}}(\text{incl.}) > 1800$ GeV	5.7	-0.0%	5.69	-0.7%

Table 11: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $4j - 1800$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $4j - 2200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	-8.2%	31.6	31.6
$N_j \geq 2$	32.5	-0.0%	31.6	-0.0%
$N_j \geq 4$	31.0	-4.6%	29.8	-5.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	25.0	-19.4%	24.1	-19.1%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	18.8	-24.8%	18.2	-24.5%
$p_T(j_4) > 100$ GeV	16.6	-11.7%	16.3	-10.4%
$\lvert\eta(\text{jets})\rvert < 2.0$	15.1	-9.0%	14.9	-8.6%
Aplanarity > 0.04	10.2	-32.5%	10.1	-32.2%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.25$	5.7	-44.1%	5.73	-43.3%
$m_{\text{eff}}(\text{incl.}) > 2200$ GeV	5.6	-1.8%	5.55	-3.1%

Table 12: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $4j - 2200$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $4j - 2600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	-8.2%	31.6	31.6
$N_j \geq 2$	32.5	-0.0%	31.6	-0.0%
$N_j \geq 4$	31.0	-4.6%	29.8	-5.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	25.0	-19.4%	24.1	-19.1%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	18.8	-24.8%	18.2	-24.5%
$p_T(j_4) > 150$ GeV	14.1	-25.0%	13.9	-23.6%
$\lvert\eta(\text{jets})\rvert < 2.0$	13.0	-7.8%	13.1	-5.8%
Aplanarity > 0.04	9.2	-29.2%	9.21	-29.7%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.20$	6.6	-28.3%	6.64	-27.9%
$m_{\text{eff}}(\text{incl.}) > 2600$ GeV	6.0	-9.1%	6.0	-9.6%

Table 13: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $4j - 2600$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $4j - 3000$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	-8.2%	31.6	31.6
$N_j \geq 2$	32.5	-0.0%	31.6	-0.0%
$N_j \geq 4$	31.0	-4.6%	29.8	-5.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	25.0	-19.4%	24.1	-19.1%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	18.8	-24.8%	18.2	-24.5%
$p_T(j_4) > 150$ GeV	14.1	-25.0%	13.9	-23.6%
$\lvert\eta(\text{jets})\rvert < 2.0$	13.0	-7.8%	13.1	-5.8%
Aplanarity > 0.04	9.2	-29.2%	9.21	-29.7%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.20$	6.6	-28.3%	6.64	-27.9%
$m_{\text{eff}}(\text{incl.}) > 3000$ GeV	5.0	-24.2%	5.01	-24.5%

Table 14: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $4j - 3000$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $5j - 1600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	−8.2%	31.6	31.6
$N_j \geq 2$	32.5	−0.0%	31.6	−0.0%
$N_j \geq 5$	23.6	−27.4%	22.5	−28.8%
$\Delta\phi(\mathrm{jet}_{1,2,(3)}, E_T^{\mathrm{miss}})_{\mathrm{min}} > 0.4$	19.1	−19.1%	18.2	−19.1%
Aplanarity > 0.08	8.0	−58.1%	6.35	−65.1%
$E_T^{\mathrm{miss}}/m_{\mathrm{eff}}(5j) > 0.15$	6.8	−15.0%	5.49	−13.5%
$m_{\mathrm{eff}}(\mathrm{incl.}) > 1600$ GeV	6.8	−0.0%	5.47	−0.4%

Table 15: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $5j - 1600$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $5j - 1700$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	−8.2%	31.6	31.6
$N_j \geq 2$	32.5	−0.0%	31.6	−0.0%
$N_j \geq 5$	23.6	−27.4%	22.5	−28.8%
$\Delta\phi(\mathrm{jet}_{1,2,(3)}, E_T^{\mathrm{miss}})_{\mathrm{min}} > 0.4$	19.1	−19.1%	18.2	−19.1%
$\Delta\phi(\mathrm{jet}_{i>3})_{\mathrm{min}} > 0.2$	16.1	−15.7%	15.4	−15.4%
$p_T(j_1) > 700$ GeV	12.4	−23.0%	12.0	−22.1%
$E_T^{\mathrm{miss}}/m_{\mathrm{eff}}(5j) > 0.30$	3.8	−69.4%	3.56	−70.3%
$m_{\mathrm{eff}}(\mathrm{incl.}) > 1700$ GeV	3.8	−0.0%	3.56	−0.0%

Table 16: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $5j - 1700$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $5j-2000$		
cut	# events (scaled to σ and $\mathcal{L}$)	relative change
Initial number of events	35.4	35.4
Preselection cuts	32.5	-8.2%
$N_j \geq 2$	32.5	-0.0%
$N_j \geq 5$	23.6	-27.4%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	19.1	-19.1%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	13.6	-28.8%
$E_T^{\text{miss}}/\sqrt{H_T} > 15$ GeV$^{1/2}$	7.6	-44.1%
$m_{\text{eff}}(\text{incl.}) > 2000$ GeV	7.5	-1.3%

Table 17: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $5j-2000$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $5j-2600$		
cut	# events (scaled to σ and $\mathcal{L}$)	relative change
Initial number of events	35.4	35.4
Preselection cuts	32.5	-8.2%
$N_j \geq 2$	32.5	-0.0%
$N_j \geq 5$	23.6	-27.4%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	14.5	-38.6%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	10.2	-29.7%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	5.0	-51.0%
$m_{\text{eff}}(\text{incl.}) > 2600$ GeV	4.6	-8.0%

Table 18: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $5j-2600$.

cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $6j - 1200$				
Initial number of events	35.4	35.4		
Preselection cuts	32.5	−8.2%	31.6	31.6
$N_j \geq 2$	32.5	−0.0%	31.6	−0.0%
$N_j \geq 6$	14.1	−56.6%	13.3	−57.9%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	11.4	−19.1%	10.8	−18.8%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	9.2	−19.3%	8.73	−19.2%
$\lvert\eta(\text{jets})\rvert < 2.0$	6.8	−26.1%	6.66	−23.7%
$E_T^{\text{miss}}/m_{\text{eff}}(6j) > 0.25$	3.2	−52.9%	3.02	−54.7%
$m_{\text{eff}}(\text{incl.}) > 1200$ GeV	3.2	−0.0%	3.02	−0.0%

Table 19: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $6j - 1200$.

cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $6j - 1800$				
Initial number of events	35.4	35.4		
Preselection cuts	32.5	−8.2%	31.6	31.6
$N_j \geq 2$	32.5	−0.0%	31.6	−0.0%
$N_j \geq 6$	14.1	−56.6%	13.3	−57.9%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	11.4	−19.1%	10.8	−18.8%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	9.2	−19.3%	8.73	−19.2%
$p_T(j_6) > 100$ GeV	3.6	−60.9%	3.45	−60.5%
$\lvert\eta(\text{jets})\rvert < 2.0$	2.8	−22.2%	2.81	−18.6%
Aplanarity > 0.04	2.3	−17.9%	2.32	−17.4%
$E_T^{\text{miss}}/m_{\text{eff}}(6j) > 0.20$	1.4	−39.1%	1.33	−42.7%
$m_{\text{eff}}(\text{incl.}) > 1800$ GeV	1.4	−0.0%	1.32	−0.8%

Table 20: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $6j - 1800$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $6j-2200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	-8.2%	31.6	31.6
$N_j \geq 2$	32.5	-0.0%	31.6	-0.0%
$N_j \geq 6$	14.1	-56.6%	13.3	-57.9%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	11.4	-19.1%	10.8	-18.8%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	9.2	-19.3%	8.73	-19.2%
$p_T(j_6) > 100$ GeV	3.6	-60.9%	3.45	-60.5%
Aplanarity > 0.08	1.9	-47.2%	1.74	-49.6%
$E_T^{\text{miss}}/m_{\text{eff}}(6j) > 0.20$	1.2	-36.8%	1.05	-39.7%
$m_{\text{eff}}(\text{incl.}) > 2200$ GeV	1.2	-0.0%	1.04	-1.0%

Table 21: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $6j-2200$.

$\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) cutflow for SR $6j-2600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	35.4	35.4		
Preselection cuts	32.5	-8.2%	31.6	31.6
$N_j \geq 2$	32.5	-0.0%	31.6	-0.0%
$N_j \geq 6$	14.1	-56.6%	13.3	-57.9%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	11.4	-19.1%	10.8	-18.8%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	9.2	-19.3%	8.73	-19.2%
$p_T(j_6) > 100$ GeV	3.6	-60.9%	3.45	-60.5%
Aplanarity > 0.08	1.9	-47.2%	1.74	-49.6%
METtoMeff6015	1.6	-15.8%	1.39	-20.1%
$m_{\text{eff}}(\text{incl.}) > 2600$ GeV	1.5	-6.3%	1.29	-7.2%

Table 22: Cutflow for the benchmark point $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ (2000/0) in the Signal Region $6j-2600$.

5 $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600)

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $2j - 1200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	-18.3%	376	376
$N_j \geq 2$	378.9	-1.4%	373	-100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	303.0	-20.0%	293.0	-21.4%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	289.3	-4.5%	279.0	-4.8%
$p_T(j_2) > 250$ GeV	181.5	-35.8%	180.0	-35.5%
$\lvert\eta(\text{jets})\rvert < 0.8$	85.8	-52.7%	83.7	-53.5%
$E_T^{\text{miss}}/\sqrt{H_T} > 14$ GeV$^{1/2}$	61.7	-28.1%	60.5	-27.7%
$m_{\text{eff}}(\text{incl.}) > 1200$ GeV	60.6	-1.8%	59.0	-2.5%

Table 23: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $2j - 1200$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $2j - 1600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	-18.3%	376	376
$N_j \geq 2$	378.9	-1.4%	373	-100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	303.0	-20.0%	293.0	-21.4%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	289.3	-4.5%	279.0	-4.8%
$p_T(j_2) > 300$ GeV	137.1	-48.9%	138.0	-50.5%
$\lvert\eta(\text{jets})\rvert < 1.2$	108.1	-21.2%	109	-21.0%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	53.6	-50.4%	55.8	-48.8%
$m_{\text{eff}}(\text{incl.}) > 1600$ GeV	45.3	-15.5%	45.4	-18.6%

Table 24: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $2j - 1600$.

cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $2j - 2000$				
Initial number of events	470.3	470.3		
Preselection cuts	384.1	-18.3%	376	376
$N_j \geq 2$	378.9	-1.4%	373	-100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	303.0	-20.0%	293.0	-21.4%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	289.3	-4.5%	279.0	-4.8%
$p_T(j_2) > 350$ GeV	97.4	-60.2%	99.7	-64.3%
$\lvert\eta(\text{jets})\rvert < 1.2$	79.9	-18.0%	81.7	-18.1%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	35.1	-56.1%	38.1	-53.4%
$m_{\text{eff}}(\text{incl.}) > 2000$ GeV	15.7	-55.3%	16.7	-56.2%

Table 25: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $2j - 2000$.

cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $2j - 2100$				
Initial number of events	470.3	470.3		
Preselection cuts	384.1	-18.3%	376	376
$N_j \geq 2$	378.9	-1.4%	373	-100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	342.2	-9.7%	331.0	-11.3%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	334.2	-2.3%	322.0	-2.7%
$p_T(j_1) > 600$ GeV	108.4	-67.6%	106.0	-67.1%
$E_T^{\text{miss}}/\sqrt{H_T} > 26$ GeV$^{1/2}$	22.5	-79.2%	22.3	-79.0%
$m_{\text{eff}}(\text{incl.}) > 2100$ GeV	10.9	-51.6%	9.3	-58.3%

Table 26: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $2j - 2100$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $2j - 2400$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	303.0	−20.0%	293.0	−21.4%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	289.3	−4.5%	279.0	−4.8%
$p_T(j_2) > 350$ GeV	97.4	−66.3%	99.7	−64.3%
$\|\eta(\text{jets})\| < 1.2$	79.9	−18.0%	81.7	−18.1%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	35.1	−56.1%	38.1	−53.4%
$m_{\text{eff}}(\text{incl.}) > 2400$ GeV	6.3	−82.1%	6.22	−83.7%

Table 27: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $2j - 2400$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $2j - 2800$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	303.0	−20.0%	293.0	−21.4%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	289.3	−4.5%	279.0	−4.8%
$p_T(j_2) > 350$ GeV	97.4	−66.3%	99.7	−64.3%
$\|\eta(\text{jets})\| < 1.2$	79.9	−18.0%	81.7	−18.1%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	35.1	−56.1%	38.1	−53.4%
$m_{\text{eff}}(\text{incl.}) > 2800$ GeV	2.4	−93.2%	2.23	−94.1%

Table 28: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $2j - 2800$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $2j - 3600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	-18.3%	376	376
$N_j \geq 2$	378.9	-1.4%	373	-100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	303.0	-20.0%	293.0	-21.4%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	289.3	-4.5%	279.0	-4.8%
$p_T(j_2) > 350$ GeV	97.4	-66.3%	99.7	-64.3%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	43.3	-55.5%	46.2	-53.7%
$m_{\text{eff}}(\text{incl.}) > 3600$ GeV	0.4	-99.1%	0.347	-99.2%

Table 29: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $2j - 3600$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $3j - 1300$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	-18.3%	376	376
$N_j \geq 2$	378.9	-1.4%	373	-100.0%
$N_j \geq 3$	278.8	-26.4%	262.0	-29.8%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	245.8	-11.8%	231.0	-11.8%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	237.9	-3.2%	222.0	-3.9%
$p_T(j_1) > 700$ GeV	41.8	-82.4%	40.2	-81.9%
$E_T^{\text{miss}}/\sqrt{H_T} > 16$ GeV$^{1/2}$	25.2	-39.7%	20.3	-49.5%
$m_{\text{eff}}(\text{incl.}) > 1300$ GeV	25.2	-0.0%	20.3	-0.0%

Table 30: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $3j - 1300$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $4j - 1000$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$N_j \geq 4$	147.0	−61.2%	134	−100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	129.6	−11.8%	119.0	−11.2%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	113.2	−12.7%	102.0	−14.3%
$p_T(j_4) > 100$ GeV	40.5	−64.2%	39.2	−61.6%
$\lvert\eta(\text{jets})\rvert < 1.2$	11.3	−72.1%	12.5	−68.1%
Aplanarity > 0.04	6.9	−38.9%	8.39	−32.9%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.30$	4.5	−34.8%	5.13	−38.9%
$m_{\text{eff}}(\text{incl.}) > 1000$ GeV	4.5	−0.0%	5.13	−0.0%

Table 31: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $4j - 1000$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $4j - 1400$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$N_j \geq 4$	147.0	−61.2%	134	−100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	129.6	−11.8%	119.0	−11.2%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	113.2	−12.7%	102.0	−14.3%
$p_T(j_4) > 100$ GeV	40.5	−64.2%	39.2	−61.6%
$\lvert\eta(\text{jets})\rvert < 2.0$	30.5	−24.7%	30.6	−21.9%
Aplanarity > 0.04	18.5	−39.3%	19.5	−36.3%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.25$	15.1	−18.4%	15.4	−21.0%
$m_{\text{eff}}(\text{incl.}) > 1400$ GeV	13.7	−9.3%	13.9	−9.7%

Table 32: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $4j - 1400$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $4j-1800$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	-18.3%	376	376
$N_j \geq 2$	378.9	-1.4%	373	-100.0%
$N_j \geq 4$	147.0	-61.2%	134	-100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	129.6	-11.8%	119.0	-11.2%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	113.2	-12.7%	102.0	-14.3%
$p_T(j_4) > 100$ GeV	40.5	-64.2%	39.2	-61.6%
$\lvert\eta(\text{jets})\rvert < 2.0$	30.5	-24.7%	30.6	-21.9%
Aplanarity > 0.04	18.5	-39.3%	19.5	-36.3%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.25$	15.1	-18.4%	15.4	-21.0%
$m_{\text{eff}}(\text{incl.}) > 1800$ GeV	9.4	-37.7%	9.17	-40.5%

Table 33: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $4j-1800$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $4j-2200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	-18.3%	376	376
$N_j \geq 2$	378.9	-1.4%	373	-100.0%
$N_j \geq 4$	147.0	-61.2%	134	-100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	129.6	-11.8%	119.0	-11.2%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	113.2	-12.7%	102.0	-14.3%
$p_T(j_4) > 100$ GeV	40.5	-64.2%	39.2	-61.6%
$\lvert\eta(\text{jets})\rvert < 2.0$	30.5	-24.7%	30.6	-21.9%
Aplanarity > 0.04	18.5	-39.3%	19.5	-36.3%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.25$	15.1	-18.4%	15.4	-21.0%
$m_{\text{eff}}(\text{incl.}) > 2200$ GeV	4.7	-68.9%	4.37	-71.6%

Table 34: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $4j-2200$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $4j - 2600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$N_j \geq 4$	147.0	−61.2%	134	−100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	129.6	−11.8%	119.0	−11.2%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	113.2	−12.7%	102.0	−14.3%
$p_T(j_4) > 150$ GeV	15.2	−86.6%	15.4	−84.9%
$\lvert\eta(\text{jets})\rvert < 2.0$	12.2	−19.7%	12.5	−18.8%
Aplanarity > 0.04	8.1	−33.6%	8.93	−28.6%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.20$	7.2	−11.1%	7.92	−11.3%
$m_{\text{eff}}(\text{incl.}) > 2600$ GeV	1.7	−76.4%	1.74	−78.0%

Table 35: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $4j - 2600$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $4j - 3000$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$N_j \geq 4$	147.0	−61.2%	134	−100.0%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	129.6	−11.8%	119.0	−11.2%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	113.2	−12.7%	102.0	−14.3%
$p_T(j_4) > 150$ GeV	15.2	−86.6%	15.4	−84.9%
$\lvert\eta(\text{jets})\rvert < 2.0$	12.2	−19.7%	12.5	−18.8%
Aplanarity > 0.04	8.1	−33.6%	8.93	−28.6%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.20$	7.2	−11.1%	7.92	−11.3%
$m_{\text{eff}}(\text{incl.}) > 3000$ GeV	0.7	−90.3%	0.489	−93.8%

Table 36: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $4j - 3000$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $5j-1600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$N_j \geq 5$	58.0	−84.7%	53.3	−85.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	51.0	−12.1%	47.1	−11.6%
Aplanarity > 0.08	15.1	−70.4%	12.7	−73.0%
$E_T^{\text{miss}}/m_{\text{eff}}(5j) > 0.15$	14.9	−1.3%	12.4	−2.4%
$m_{\text{eff}}(\text{incl.}) > 1600$ GeV	10.9	−26.8%	9.3	−25.0%

Table 37: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $5j-1600$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $5j-1700$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$N_j \geq 5$	58.0	−84.7%	53.3	−85.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	51.0	−12.1%	47.1	−11.6%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	46.2	−9.4%	42.1	−10.6%
$p_T(j_1) > 700$ GeV	7.2	−84.4%	7.4	−82.4%
$E_T^{\text{miss}}/m_{\text{eff}}(5j) > 0.30$	3.3	−54.2%	3.27	−55.8%
$m_{\text{eff}}(\text{incl.}) > 1700$ GeV	3.3	−0.0%	3.25	−0.6%

Table 38: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $5j-1700$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $5j - 2000$		
cut	# events (scaled to σ and $\mathcal{L}$)	relative change
Initial number of events	470.3	470.3
Preselection cuts	384.1	-18.3%
$N_j \geq 2$	378.9	-1.4%
$N_j \geq 5$	58.0	-84.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	51.0	-12.1%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	41.3	-19.0%
$E_T^{\text{miss}}/\sqrt{H_T} > 15\ \text{GeV}^{1/2}$	25.7	-37.8%
$m_{\text{eff}}(\text{incl.}) > 2000$ GeV	10.8	-58.0%

Table 39: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $5j - 2000$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $5j - 2600$		
cut	# events (scaled to σ and $\mathcal{L}$)	relative change
Initial number of events	470.3	470.3
Preselection cuts	384.1	-18.3%
$N_j \geq 2$	378.9	-1.4%
$N_j \geq 5$	58.0	-84.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	43.7	-24.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	35.5	-18.8%
$E_T^{\text{miss}}/\sqrt{H_T} > 18\ \text{GeV}^{1/2}$	17.7	-50.1%
$m_{\text{eff}}(\text{incl.}) > 2600$ GeV	2.0	-88.7%

Table 40: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $5j - 2600$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $6j - 1200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$N_j \geq 6$	18.4	−95.1%	17.9	−95.2%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	16.1	−12.5%	15.6	−12.8%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	14.1	−12.4%	13.1	−16.0%
$\|\eta(\text{jets})\| < 2.0$	7.6	−46.1%	7.34	−44.0%
$E_T^{\text{miss}}/m_{\text{eff}}(6j) > 0.25$	5.7	−25.0%	5.21	−29.0%
$m_{\text{eff}}(\text{incl.}) > 1200$ GeV	5.6	−1.8%	5.08	−2.5%

Table 41: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $6j - 1200$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $6j - 1800$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$N_j \geq 6$	18.4	−95.1%	17.9	−95.2%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	16.1	−12.5%	15.6	−12.8%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	14.1	−12.4%	13.1	−16.0%
$p_T(j_6) > 100$ GeV	1.5	−89.4%	1.65	−87.4%
$\|\eta(\text{jets})\| < 2.0$	0.9	−40.0%	1.07	−35.2%
Aplanarity > 0.04	0.8	−11.1%	0.916	−14.4%
$E_T^{\text{miss}}/m_{\text{eff}}(6j) > 0.20$	0.5	−37.5%	0.652	−28.8%
$m_{\text{eff}}(\text{incl.}) > 1800$ GeV	0.5	−0.0%	0.513	−21.3%

Table 42: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $6j - 1800$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $6j - 2200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$N_j \geq 6$	18.4	−95.1%	17.9	−95.2%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	16.1	−12.5%	15.6	−12.8%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	14.1	−12.4%	13.1	−16.0%
$p_T(j_6) > 100$ GeV	1.5	−89.4%	1.65	−87.4%
Aplanarity > 0.08	0.8	−46.7%	0.921	−44.2%
$E_T^{\text{miss}}/m_{\text{eff}}(6j) > 0.20$	0.7	−12.5%	0.674	−26.8%
$m_{\text{eff}}(\text{incl.}) > 2200$ GeV	0.4	−42.9%	0.366	−45.7%

Table 43: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $6j - 2200$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) cutflow for SR $6j - 2600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	470.3	470.3		
Preselection cuts	384.1	−18.3%	376	376
$N_j \geq 2$	378.9	−1.4%	373	−100.0%
$N_j \geq 6$	18.4	−95.1%	17.9	−95.2%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	16.1	−12.5%	15.6	−12.8%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	14.1	−12.4%	13.1	−16.0%
$p_T(j_6) > 100$ GeV	1.5	−89.4%	1.65	−87.4%
Aplanarity > 0.08	0.8	−46.7%	0.921	−44.2%
METtoMeff6015	0.8	−0.0%	0.891	−3.3%
$m_{\text{eff}}(\text{incl.}) > 2600$ GeV	0.2	−75.0%	0.373	−58.1%

Table 44: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1200/600) in the Signal Region $6j - 2600$.

6 $\tilde{q} \rightarrow q\tilde{\chi}_1^0$ (1500/0)

$\tilde{q} \rightarrow q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $2j - 1200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	-7.6%	68.4	68.4
$N_j \geq 2$	68.9	-1.1%	67.9	-0.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	53.6	-22.2%	51.8	-23.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	50.3	-6.2%	48.9	-5.6%
$p_T(j_2) > 250$ GeV	43.1	-14.3%	42.4	-13.3%
$\lvert\eta(\text{jets})\rvert < 0.8$	19.6	-54.5%	18.9	-55.4%
$E_T^{\text{miss}}/\sqrt{H_T} > 14$ GeV$^{1/2}$	16.0	-18.4%	15.7	-16.9%
$m_{\text{eff}}(\text{incl.}) > 1200$ GeV	16.0	-0.0%	15.7	-0.0%

Table 45: Cutflow for the benchmark point $\tilde{q} \rightarrow q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $2j - 1200$.

$\tilde{q} \rightarrow q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $2j - 1600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	-7.6%	68.4	68.4
$N_j \geq 2$	68.9	-1.1%	67.9	-0.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	53.6	-22.2%	51.8	-23.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	50.3	-6.2%	48.9	-5.6%
$p_T(j_2) > 300$ GeV	39.5	-21.5%	38.9	-20.4%
$\lvert\eta(\text{jets})\rvert < 1.2$	30.2	-23.5%	29.1	-25.2%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	21.3	-29.5%	20.6	-29.2%
$m_{\text{eff}}(\text{incl.}) > 1600$ GeV	21.2	-0.5%	20.4	-1.0%

Table 46: Cutflow for the benchmark point $\tilde{q} \rightarrow q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $2j - 1600$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $2j - 2000$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	53.6	−22.2%	51.8	−23.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	50.3	−6.2%	48.9	−5.6%
$p_T(j_2) > 350$ GeV	35.4	−29.6%	34.9	−28.6%
$\lvert\eta(\text{jets})\rvert < 1.2$	27.9	−21.2%	26.9	−22.9%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	19.4	−30.5%	18.8	−30.1%
$m_{\text{eff}}(\text{incl.}) > 2000$ GeV	18.5	−4.6%	17.6	−6.4%

Table 47: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $2j - 2000$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $2j - 2100$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	61.4	−10.9%	59.5	−12.4%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	59.2	−3.6%	57.7	−3.0%
$p_T(j_1) > 600$ GeV	46.8	−20.9%	45.5	−21.1%
$E_T^{\text{miss}}/\sqrt{H_T} > 26$ GeV$^{1/2}$	21.2	−54.7%	20.7	−54.5%
$m_{\text{eff}}(\text{incl.}) > 2100$ GeV	20.0	−5.7%	19.2	−7.2%

Table 48: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $2j - 2100$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $2j-2400$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	-7.6%	68.4	68.4
$N_j \geq 2$	68.9	-1.1%	67.9	-0.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	53.6	-22.2%	51.8	-23.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	50.3	-6.2%	48.9	-5.6%
$p_T(j_2) > 350$ GeV	35.4	-28.0%	34.9	-28.6%
$\lvert\eta(\text{jets})\rvert < 1.2$	27.9	-21.2%	26.9	-22.9%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	19.4	-30.5%	18.8	-30.1%
$m_{\text{eff}}(\text{incl.}) > 2400$ GeV	15.6	-19.6%	14.3	-23.9%

Table 49: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $2j-2400$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $2j-2800$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	-7.6%	68.4	68.4
$N_j \geq 2$	68.9	-1.1%	67.9	-0.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	53.6	-22.2%	51.8	-23.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	50.3	-6.2%	48.9	-5.6%
$p_T(j_2) > 350$ GeV	35.4	-28.0%	34.9	-28.6%
$\lvert\eta(\text{jets})\rvert < 1.2$	27.9	-21.2%	26.9	-22.9%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	19.4	-30.5%	18.8	-30.1%
$m_{\text{eff}}(\text{incl.}) > 2800$ GeV	10.4	-46.4%	9.22	-51.0%

Table 50: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $2j-2800$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $2j - 3600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	53.6	−22.2%	51.8	−23.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	50.3	−6.2%	48.9	−5.6%
$p_T(j_2) > 350$ GeV	35.4	−28.0%	34.9	−28.6%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	24.7	−30.2%	24.3	−30.4%
$m_{\text{eff}}(\text{incl.}) > 3600$ GeV	2.2	−91.1%	2.09	−91.4%

Table 51: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $2j - 3600$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $3j - 1300$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 3$	52.6	−23.7%	50.1	−26.2%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	45.9	−12.7%	44.0	−12.2%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	43.8	−4.6%	42.2	−4.1%
$p_T(j_1) > 700$ GeV	27.5	−37.2%	26.5	−37.2%
$p_T(j_2) > 50$ GeV	27.5	−0.0%	26.5	−0.0%
$p_T(j_3) > 50$ GeV	27.5	−0.0%	26.5	−0.0%
$E_T^{\text{miss}}/\sqrt{H_T} > 16$ GeV$^{1/2}$	21.0	−23.6%	18.1	−31.7%
$m_{\text{eff}}(\text{incl.}) > 1300$ GeV	21.0	−0.0%	18.1	−0.0%

Table 52: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $3j - 1300$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $4j - 1000$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 4$	30.2	−56.2%	28.2	−58.5%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	26.5	−12.3%	24.9	−11.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	22.5	−15.1%	21.5	−13.7%
$p_T(j_4) > 100$ GeV	9.8	−56.4%	9.84	−54.2%
$\lvert\eta(\text{jets})\rvert < 1.2$	3.3	−66.3%	2.95	−70.0%
Aplanarity > 0.04	1.6	−51.5%	1.52	−48.5%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.30$	1.1	−31.3%		
$m_{\text{eff}}(\text{incl.}) > 1000$ GeV	1.1	−0.0%	0.964	−36.6%

Table 53: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $4j - 1000$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $4j - 1400$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 4$	30.2	−56.2%	28.2	−58.5%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	26.5	−12.3%	24.9	−11.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	22.5	−15.1%	21.5	−13.7%
$p_T(j_4) > 100$ GeV	9.8	−56.4%	9.84	−54.2%
$\lvert\eta(\text{jets})\rvert < 2.0$	7.7	−21.4%	7.79	−20.8%
Aplanarity > 0.04	3.8	−50.6%	4.0	−48.7%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.25$	3.1	−18.4%	3.25	−18.8%
$m_{\text{eff}}(\text{incl.}) > 1400$ GeV	3.1	−0.0%	3.23	−0.6%

Table 54: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $4j - 1400$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $4j - 1800$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 4$	30.2	−56.2%	28.2	−58.5%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	26.5	−12.3%	24.9	−11.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	22.5	−15.1%	21.5	−13.7%
$p_T(j_4) > 100$ GeV	9.8	−56.4%	9.84	−54.2%
$\lvert\eta(\text{jets})\rvert < 2.0$	7.7	−21.4%	7.79	−20.8%
Aplanarity > 0.04	3.8	−50.6%	4.0	−48.7%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.25$	3.1	−18.4%	3.25	−18.8%
$m_{\text{eff}}(\text{incl.}) > 1800$ GeV	3.0	−3.2%	3.03	−6.8%

Table 55: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $4j - 1800$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $4j - 2200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 4$	30.2	−56.2%	28.2	−58.5%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	26.5	−12.3%	24.9	−11.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	22.5	−15.1%	21.5	−13.7%
$p_T(j_4) > 100$ GeV	9.8	−56.4%	9.84	−54.2%
$\lvert\eta(\text{jets})\rvert < 2.0$	7.7	−21.4%	7.79	−20.8%
Aplanarity > 0.04	3.8	−50.6%	4.0	−48.7%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.25$	3.1	−18.4%	3.25	−18.8%
$m_{\text{eff}}(\text{incl.}) > 2200$ GeV	2.6	−16.1%	2.6	−20.0%

Table 56: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $4j - 2200$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $4j - 2600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 4$	30.2	−56.2%	28.2	−58.5%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	26.5	−12.3%	24.9	−11.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	22.5	−15.1%	21.5	−13.7%
$p_T(j_4) > 150$ GeV	4.5	−80.0%	4.7	−78.1%
$\lvert\eta(\text{jets})\rvert < 2.0$	3.7	−17.8%	3.97	−15.5%
Aplanarity > 0.04	2.2	−40.5%	2.43	−38.8%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.20$	2.0	−9.1%	2.16	−11.1%
$m_{\text{eff}}(\text{incl.}) > 2600$ GeV	1.3	−35.0%	1.46	−32.4%

Table 57: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $4j - 2600$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $4j - 3000$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 4$	30.2	−56.2%	28.2	−58.5%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	26.5	−12.3%	24.9	−11.7%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	22.5	−15.1%	21.5	−13.7%
$p_T(j_4) > 150$ GeV	4.5	−80.0%	4.7	−78.1%
$\lvert\eta(\text{jets})\rvert < 2.0$	3.7	−17.8%	3.97	−15.5%
Aplanarity > 0.04	2.2	−40.5%	2.43	−38.8%
$E_T^{\text{miss}}/m_{\text{eff}}(4j) > 0.20$	2.0	−9.1%	2.16	−11.1%
$m_{\text{eff}}(\text{incl.}) > 3000$ GeV	0.9	−55.0%	0.942	−56.4%

Table 58: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $4j - 3000$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $5j-1600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 5$	13.6	−80.3%	12.5	−81.6%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	12.0	−11.8%	11.0	−12.0%
Aplanarity > 0.08	2.8	−76.7%	2.67	−75.7%
$E_T^{\text{miss}}/m_{\text{eff}}(5j) > 0.15$	2.7	−3.6%	2.59	−3.0%
$m_{\text{eff}}(\text{incl.}) > 1600$ GeV	2.7	−0.0%	2.45	−5.4%

Table 59: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $5j-1600$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $5j-1700$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 5$	13.6	−80.3%	12.5	−81.6%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	12.0	−11.8%	11.0	−12.0%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	10.6	−11.7%	9.85	−10.5%
$p_T(j_1) > 700$ GeV	6.0	−43.4%	5.48	−44.4%
$p_T(j_4) > 50$ GeV	6.0	−0.0%	5.48	−0.0%
$p_T(j_5) > 50$ GeV	6.0	−0.0%	5.48	−0.0%
$E_T^{\text{miss}}/m_{\text{eff}}(5j) > 0.30$	3.8	−36.7%	3.31	−39.6%
$m_{\text{eff}}(\text{incl.}) > 1700$ GeV	3.8	−0.0%	3.3	−0.3%

Table 60: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $5j-1700$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $5j - 2000$		
cut	# events (scaled to σ and $\mathcal{L}$)	relative change
Initial number of events	75.4	75.4
Preselection cuts	69.7	−7.6%
$N_j \geq 2$	68.9	−1.1%
$N_j \geq 5$	13.6	−80.3%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	12.0	−11.8%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	9.3	−22.5%
$E_T^{\text{miss}}/\sqrt{H_T} > 15$ GeV$^{1/2}$	7.1	−23.7%
$m_{\text{eff}}(\text{incl.}) > 2000$ GeV	6.3	−11.3%

Table 61: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $5j - 2000$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $5j - 2600$		
cut	# events (scaled to σ and $\mathcal{L}$)	relative change
Initial number of events	75.4	75.4
Preselection cuts	69.7	−7.6%
$N_j \geq 2$	68.9	−1.1%
$N_j \geq 5$	13.6	−80.3%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.8$	10.2	−25.0%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.4$	8.0	−21.6%
$E_T^{\text{miss}}/\sqrt{H_T} > 18$ GeV$^{1/2}$	5.6	−30.0%
$m_{\text{eff}}(\text{incl.}) > 2600$ GeV	3.4	−39.3%

Table 62: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $5j - 2600$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $6j - 1200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 6$	4.9	−92.9%	4.81	−92.9%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	4.3	−12.2%	4.24	−11.9%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	3.6	−16.3%	3.68	−13.2%
$\lvert\eta(\text{jets})\rvert < 2.0$	2.2	−38.9%	2.27	−38.3%
$E_T^{\text{miss}}/m_{\text{eff}}(6j) > 0.25$	1.7	−22.7%	1.68	−26.0%
$m_{\text{eff}}(\text{incl.}) > 1200$ GeV	1.7	−0.0%	1.68	−0.0%

Table 63: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $6j - 1200$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $6j - 1800$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 6$	4.9	−92.9%	4.81	−92.9%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	4.3	−12.2%	4.24	−11.9%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	3.6	−16.3%	3.68	−13.2%
$p_T(j_6) > 100$ GeV	0.5	−86.1%	0.487	−86.8%
$\lvert\eta(\text{jets})\rvert < 2.0$	0.4	−20.0%	0.341	−30.0%
Aplanarity > 0.04	0.3	−25.0%	0.261	−23.5%
$E_T^{\text{miss}}/m_{\text{eff}}(6j) > 0.20$	0.2	−33.3%	0.226	−13.4%
$m_{\text{eff}}(\text{incl.}) > 1800$ GeV	0.2	−0.0%	0.219	−3.1%

Table 64: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $6j - 1800$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $6j-2200$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 6$	4.9	−92.9%	4.81	−92.9%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	4.3	−12.2%	4.24	−11.9%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	3.6	−16.3%	3.68	−13.2%
$p_T(j_6) > 100$ GeV	0.5	−86.1%	0.487	−86.8%
Aplanarity > 0.08	0.2	−60.0%	0.215	−55.9%
$E_T^{\text{miss}}/m_{\text{eff}}(6j) > 0.20$	0.2	−0.0%	0.19	−11.6%
$m_{\text{eff}}(\text{incl.}) > 2200$ GeV	0.2	−0.0%	0.167	−12.1%

Table 65: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $6j - 2200$.

$\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) cutflow for SR $6j-2600$				
cut	# events (scaled to σ and $\mathcal{L}$)	relative change	# events (official)	relative change (official)
Initial number of events	75.4	75.4		
Preselection cuts	69.7	−7.6%	68.4	68.4
$N_j \geq 2$	68.9	−1.1%	67.9	−0.7%
$N_j \geq 6$	4.9	−92.9%	4.81	−92.9%
$\Delta\phi(\text{jet}_{1,2,(3)}, E_T^{\text{miss}})_{\text{min}} > 0.4$	4.3	−12.2%	4.24	−11.9%
$\Delta\phi(\text{jet}_{i>3})_{\text{min}} > 0.2$	3.6	−16.3%	3.68	−13.2%
$p_T(j_6) > 100$ GeV	0.5	−86.1%	0.487	−86.8%
Aplanarity > 0.08	0.2	−60.0%	0.215	−55.9%
METtoMeff6015	0.2	−0.0%	0.206	−4.2%
$m_{\text{eff}}(\text{incl.}) > 2600$ GeV	0.2	−0.0%	0.161	−21.8%

Table 66: Cutflow for the benchmark point $\tilde{q} \to q\tilde{\chi}_1^0$ (1500/0) in the Signal Region $6j - 2600$.

7 Conclusions

We have validated our implementation of the ATLAS SUSY 16 07 multijet analysis presented in [4] within the `MadAnalysis5` framework. We compared our results against 3 benchmarks provided by the ATLAS collaboration. 90% of our results are below 20% relative difference with the ATLAS results. Largest discrepancies are found in cutflows with very low final number of events. Thus, we consider the implementation of the analysis as validated.

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