## ATLAS SUSY Searches\* - 95% CL Lower Limits December 2017

**ATLAS** Preliminary  $\sqrt{s} = 7, 8, 13 \text{ TeV}$ 

Model	$e, \mu, \tau, \gamma$	Jets	$E_{_{ m T}}^{ m miss}$	$\int \mathcal{L} dt$ [f]	Mass limit	$\sqrt{s} = 7, 8$	TeV $\sqrt{s} = 13 \text{ TeV}$	$\sqrt{s} = 7, 8, 13 \text{ I}$ <b>Reference</b>
$ ilde{q} ilde{q},  ilde{q}  o q  ilde{\chi}^0_{ar{1}}$	0	2-6 jets	Yes	36.1		1.57 TeV	$m(\tilde{\chi}_1^0)$ <200 GeV, $m(1^{\mathrm{st}} \mathrm{gen}. \tilde{q})$ = $m(2^{\mathrm{nd}} \mathrm{gen}. \tilde{q})$	1712.02332
$\tilde{q}\tilde{q}, \tilde{q} \rightarrow q\tilde{\chi}_{1}^{0}$ (compressed)	mono-jet	1-3 jets	Yes	36.1	710 GeV		$m(\tilde{q})$ - $m(\tilde{\chi}_1^0)$ <5 GeV	1711.03301
$\begin{array}{c} q_{\ell}, q \rightarrow q \rightarrow q  \text{(complessed)} \\ \tilde{g}\tilde{g}, \tilde{g} \rightarrow q \tilde{q} \tilde{\chi}_{1}^{0} \\ \tilde{g}\tilde{g}, \tilde{g} \rightarrow q q \tilde{\chi}_{1}^{\pm} \rightarrow q q W^{\pm} \tilde{\chi}_{1}^{0} \\ \tilde{g}\tilde{g}, \tilde{g} \rightarrow q \tilde{q} (\ell \ell) \tilde{\chi}_{1}^{0} \\ \tilde{g}\tilde{g}, \tilde{g} \rightarrow q q W Z \tilde{\chi}_{1}^{0} \\ \tilde{g}\tilde{g}, \tilde{g} \rightarrow q q W Z \tilde{\chi}_{1}^{0} \\ \tilde{g}\tilde{g}, \tilde{g} \rightarrow q q W Z \tilde{\chi}_{1}^{0} \\ \tilde{g}\tilde{g}, \tilde{g} \rightarrow q \tilde{g} W \tilde{g}, \tilde{g} \rightarrow q \tilde{g} W \tilde{g}, \tilde{g} \end{pmatrix}$	0	2-6 jets	Yes	36.1		2.02 TeV		1712.02332
$\tilde{g}\tilde{g},  \tilde{g} \rightarrow qq\tilde{\chi}_{1}^{\pm} \rightarrow qqW^{\pm}\tilde{\chi}_{1}^{0}$	0	2-6 jets	Yes	36.1		2.01 TeV	$m(\tilde{\chi}_{1}^{0})$ <200 GeV, $m(\tilde{\chi}^{\pm})$ =0.5( $m(\tilde{\chi}_{1}^{0})$ + $m(\tilde{g})$ )	1712.02332
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow q\bar{q}(\ell\ell)\tilde{\chi}_1^0$	$ee, \mu\mu$	2 jets	Yes	14.7		1.7 TeV	$m(\tilde{\chi}_1^0)$ <300 GeV,	1611.05791
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow qq(\ell\ell/\nu\nu)\tilde{\chi}_1^0$	3 $e, \mu$	4 jets	-	36.1		1.87 TeV	$m(\tilde{\chi}_1^0)=0 \text{ GeV}$	1706.03731
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow qqWZ\tilde{\chi}_1^0$	0	7-11 jets	Yes	36.1		1.8 TeV	$m({ ilde \chi}_1^0)$ <400 GeV	1708.02794
GMSB ( $\tilde{\ell}$ NLSP)	1-2 $ au$ + 0-1 $\ell$	0-2 jets	Yes	3.2		2.0 TeV		1607.05979
GGM (bino NLSP)	2 γ	-	Yes	36.1		2.15 Te	/ cτ(NLSP)<0.1 mm	ATLAS-CONF-2017-080
GGM (higgsino-bino NLSP)	γ	2 jets	Yes	36.1		2.05 TeV	$m(\tilde{\chi}_1^0)=1700$ GeV, $c\tau(NLSP)<0.1$ mm, $\mu>0$	ATLAS-CONF-2017-080
Gravitino LSP	0	mono-jet	Yes	20.3	cale 865 GeV		$m(\tilde{G}){>}1.8\times10^{-4}~eV,m(\tilde{g}){=}m(\tilde{q}){=}1.5TeV$	1502.01518
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow b\bar{b}\tilde{\chi}_{1}^{0}$	0	3 <i>b</i>	Yes	36.1		1.92 TeV	$m(\tilde{\chi}_1^0)$ <600 GeV	1711.01901
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow t\bar{t}\tilde{\chi}_{1}^{0}$	0-1 e,μ	3 b	Yes	36.1		1.97 TeV	$m(\tilde{\chi}_1^0)$ <200 GeV	1711.01901
$\tilde{b}_1\tilde{b}_1, \tilde{b}_1 \rightarrow b\tilde{\chi}_1^0$	0	2 <i>b</i>	Yes	36.1	950 GeV		$m(\tilde{\chi}_1^0)$ <420 GeV	1708.09266
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	2 $e, \mu$ (SS)	1 <i>b</i>	Yes	36.1	275-700 GeV		$m(\tilde{\chi}_1^0)$ <200 GeV, $m(\tilde{\chi}_1^\pm)$ = $m(\tilde{\chi}_1^0)$ +100 GeV	1706.03731
$\tilde{t}_1 \tilde{t}_1, \tilde{t}_1 \rightarrow b \tilde{\chi}_1^{\pm}$	0-2 $e, \mu$	1-2 <i>b</i>		1.7/13.3	17-170 GeV 200-720 GeV		$m(\tilde{\chi}_1^{\pm}) = 2m(\tilde{\chi}_1^0),  m(\tilde{\chi}_1^0) = 55 \mathrm{GeV}$	1209.2102, ATLAS-CONF-2016-077
$\tilde{t}_1 \tilde{t}_1, \tilde{t}_1 \rightarrow W b \tilde{\chi}_1^0 \text{ or } t \tilde{\chi}_1^0$	$0-2~e,\mu$ $0$	)-2 jets/1-2	<i>b</i> Yes 2	20.3/36.1	90-198 GeV 0.195-1.0 TeV		$m(\tilde{\chi}_1^0)=1 \text{ GeV}$	1506.08616, 1709.04183, 1711.11520
$\tilde{t}_1 \tilde{t}_1, \tilde{t}_1 \rightarrow c \tilde{\chi}_1^0$ $\tilde{t}_1 \tilde{t}_1$ (natural GMSB)	0	mono-jet	Yes	36.1	90-430 GeV		$m(\tilde{t}_1)$ - $m(\tilde{\chi}_1^0)$ =5 GeV	1711.03301
	$2e, \mu(Z)$	1 <i>b</i>	Yes	20.3	150-600 GeV		$m(\tilde{\chi}_1^0)>150\text{GeV}$	1403.5222
$\tilde{t}_2$ $\tilde{t}_2$ , $\tilde{t}_2 \rightarrow \tilde{t}_1 + Z$	$3e, \mu(Z)$	1 <i>b</i>	Yes	36.1	290-790 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}$	1706.03986
$\tilde{t}_2\tilde{t}_2,\tilde{t}_2{ ightarrow}\tilde{t}_1+h$	1-2 $e, \mu$	4 <i>b</i>	Yes	36.1	320-880 GeV		$m(\tilde{\chi}_1^0)=0$ GeV	1706.03986
$\tilde{\ell}_{L,R}\tilde{\ell}_{L,R}, \tilde{\ell} \to \ell \tilde{\chi}_{1}^{0}$ $\tilde{\chi}_{1}^{+}\tilde{\chi}_{1}^{-}, \tilde{\chi}_{1}^{+} \to \tilde{\ell}\nu(\ell\tilde{\nu})$ $\tilde{\chi}_{1}^{+}\tilde{\chi}_{1}^{-}/\tilde{\chi}_{2}^{0}, \tilde{\chi}_{1}^{+} \to \tilde{\tau}\nu(\tau\tilde{\nu}), \tilde{\chi}_{2}^{0} \to \tilde{\tau}\tau(\nu\tilde{\nu})$ $\tilde{\chi}_{1}^{+}\tilde{\chi}_{2}^{0} \to \tilde{\ell}_{L}\nu\tilde{\ell}_{L}\ell(\tilde{\nu}\nu), \ell\tilde{\nu}\tilde{\ell}_{L}\ell(\tilde{\nu}\nu)$	2 e, µ	0	Yes	36.1	90-500 GeV		$m(\widetilde{\chi}_1^0) = 0$	ATLAS-CONF-2017-039
	$2e, \mu$	0	Yes	36.1	750 GeV		$m(\tilde{\chi}_1^0) = 0,  m(\tilde{\ell},  \tilde{\nu}) = 0.5(m(\tilde{\chi}_1^{\pm}) + m(\tilde{\chi}_1^0))$	ATLAS-CONF-2017-039
	2  au	-	Yes	36.1	760 GeV		$m(\tilde{\chi}_1^0) = 0,  m(\tilde{\tau}, \tilde{\nu}) = 0.5(m(\tilde{\chi}_1^{\pm}) + m(\tilde{\chi}_1^0))$	1708.07875
	$3~e,\mu$	0	Yes	36.1	1.13 TeV	$m(\tilde{\chi}_1^{\pm})=r$	$m(\tilde{\chi}_2^0), \; m(\tilde{\chi}_1^0) = 0, \; m(\tilde{\ell}, \tilde{\nu}) = 0.5 (m(\tilde{\chi}_1^{\pm}) + m(\tilde{\chi}_1^0))$	ATLAS-CONF-2017-039
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2-3 $e, \mu$	0-2 jets	Yes	36.1	580 GeV		$m(\tilde{\chi}_1^{\pm})=m(\tilde{\chi}_2^0), m(\tilde{\chi}_1^0)=0, \tilde{\ell} \text{ decoupled}$	ATLAS-CONF-2017-039
$\tilde{\chi}_{1}^{\pm}\tilde{\chi}_{2}^{0} \rightarrow W\tilde{\chi}_{1}^{0}h\tilde{\chi}_{1}^{0}, h \rightarrow b\bar{b}/WW/\tau\tau/\gamma\gamma$	$e, \mu, \gamma$	0-2 b	Yes	20.3	270 GeV		$m(\tilde{\chi}_1^{\pm})=m(\tilde{\chi}_2^{0}), m(\tilde{\chi}_1^{0})=0, \tilde{\ell} \text{ decoupled}$	1501.07110
$\tilde{\chi}_{2}^{0}\tilde{\chi}_{3}^{\tilde{0}}, \tilde{\chi}_{2,3}^{0} \rightarrow \tilde{\ell}_{R}\ell$	$4e, \mu$	0	Yes	20.3	635 GeV	$m(\tilde{\chi}_2^0)=r$	$n(\tilde{\chi}_{3}^{0}), m(\tilde{\chi}_{1}^{0})=0, m(\tilde{\ell}, \tilde{\nu})=0.5(m(\tilde{\chi}_{2}^{0})+m(\tilde{\chi}_{1}^{0}))$	1405.5086
GGM (wino NLSP) weak prod., $\tilde{\chi}_1^0$	$\rightarrow \gamma \tilde{G}$ 1 $e, \mu + \gamma$	-	Yes	20.3	115-370 GeV	` -'	<i>cτ</i> <1 mm	1507.05493
GGM (bino NLSP) weak prod., $\tilde{\chi}_1^0$		-	Yes	36.1	1.06 TeV		<i>c</i> τ<1 mm	ATLAS-CONF-2017-080
Direct $\tilde{\chi}_1^+ \tilde{\chi}_1^-$ prod., long-lived $\tilde{\chi}_1^\pm$	Disapp. trk	1 jet	Yes	36.1	460 GeV		$m(\tilde{\chi}_1^\pm)\text{-}m(\tilde{\chi}_1^0)\sim$ 160 MeV, $\tau(\tilde{\chi}_1^\pm)$ =0.2 ns	1712.02118
Direct $\tilde{\chi}_1^+ \tilde{\chi}_1^-$ prod., long-lived $\tilde{\chi}_1^{\pm}$	dE/dx trk	-	Yes	18.4	495 GeV		$m(\tilde{\chi}_1^{\pm})\text{-}m(\tilde{\chi}_1^0)\sim$ 160 MeV, $\tau(\tilde{\chi}_1^{\pm})<$ 15 ns	1506.05332
Stable, stopped $\tilde{g}$ R-hadron	0	1-5 jets	Yes	27.9	850 GeV		$m(\tilde{\chi}_1^0)$ =100 GeV, 10 $\mu$ s< $\tau(\tilde{g})$ <1000 s	1310.6584
Stable, stopped $\tilde{g}$ R-hadron  Stable $\tilde{g}$ R-hadron  Metastable $\tilde{g}$ R-hadron  Metastable $\tilde{g}$ R-hadron  Metastable $\tilde{g}$ R-hadron  OMOR at the $\tilde{g}$ $\tilde{\chi}^0$	trk	-	-	3.2	1.	1.58 TeV		1606.05129
Metastable $\tilde{g}$ R-hadron	dE/dx trk	-	-	3.2	1.	1.57 TeV	$m(\tilde{\chi}_{1}^{0})=100 \text{ GeV}, \ \tau>10 \text{ ns}$	1604.04520
Metastable $\tilde{g}$ R-hadron, $\tilde{g} \rightarrow qq\tilde{\chi}_1^0$	displ. vtx	-	Yes	32.8		2.37	<b>TeV</b> $\tau(\tilde{g}) = 0.17 \text{ ns, m}(\tilde{\chi}_1^0) = 100 \text{ GeV}$	1710.04901
GMSB, stable $\tilde{\tau}, \tilde{\chi}_1^0 \rightarrow \tilde{\tau}(\tilde{e}, \tilde{\mu}) + \tau(e, \mu)$		-	-	19.1	537 GeV		10 <tanβ<50< td=""><td>1411.6795</td></tanβ<50<>	1411.6795
GMSB, $\tilde{\chi}_1^0 \rightarrow \gamma \tilde{G}$ , long-lived $\tilde{\chi}_1^0$	2 γ	-	Yes	20.3	440 GeV		$1 < \tau(\tilde{\chi}_1^0) < 3$ ns, SPS8 model	1409.5542
$\tilde{g}\tilde{g}, \tilde{\chi}_1^0 \rightarrow eev/e\mu v/\mu\mu v$	displ. ee/eμ/μ	μ -	-	20.3	1.0 TeV		$7 < c\tau(\tilde{\chi}_1^0) < 740 \text{ mm, m}(\tilde{g}) = 1.3 \text{ TeV}$	1504.05162
LFV $pp \rightarrow \tilde{v}_{\tau} + X, \tilde{v}_{\tau} \rightarrow e\mu/e\tau/\mu\tau$	еµ,ет,µт	-	-	3.2		1.9 TeV	$\lambda'_{311}$ =0.11, $\lambda_{132/133/233}$ =0.07	1607.08079
Bilinear RPV CMSSM	2 <i>e</i> , μ (SS)	0-3 b	Yes	20.3	1.45	5 TeV	$m(\tilde{q})=m(\tilde{g}), c\tau_{LSP}<1 \text{ mm}$	1404.2500
$\tilde{\chi}_1^+ \tilde{\chi}_1^-, \tilde{\chi}_1^+ \rightarrow W \tilde{\chi}_1^0, \tilde{\chi}_1^0 \rightarrow eev, e\mu\nu, \mu\mu\nu$	$4e, \mu$	-	Yes	13.3	1.14 TeV		$m(\tilde{\chi}_1^0) > 400 \text{GeV}, \ \lambda_{12k} \neq 0 \ (k = 1, 2)$	ATLAS-CONF-2016-075
$\tilde{\chi}_{1}^{+}\tilde{\chi}_{1}^{-}, \tilde{\chi}_{1}^{+} \rightarrow W \tilde{\chi}_{1}^{0}, \tilde{\chi}_{1}^{0} \rightarrow \tau \tau \nu_{e}, e \tau \nu_{\tau}$ $\tilde{g}\tilde{g}, \tilde{g} \rightarrow q q \tilde{\chi}_{1}^{0}, \tilde{\chi}_{1}^{0} \rightarrow q q q$	$3e, \mu + \tau$	-	Yes	20.3	450 GeV		$m(\tilde{\chi}_1^0) > 0.2 \times m(\tilde{\chi}_1^\pm), \ \lambda_{133} \neq 0$	1405.5086
		-5 large-R j		36.1		1.875 TeV	$m(\tilde{\chi}_1^0)$ =1075 GeV	SUSY-2016-22
$\tilde{g}\tilde{g}, \tilde{g} \to t\bar{t}\tilde{\chi}_1^0, \tilde{\chi}_1^0 \to qqq$		-10 jets/0-4		36.1			$m(\tilde{\chi}_1^0) = 1 \text{ TeV}, \lambda_{112} \neq 0$	1704.08493
$gg, g \rightarrow ti\lambda_1, \lambda_1 \rightarrow qqq$ $\tilde{g}\tilde{g}, \tilde{g} \rightarrow \tilde{t}_1t, \tilde{t}_1 \rightarrow bs$	•	-10 jets/0-4		36.1		1.65 TeV	$m(\tilde{t}_1) = 1 \text{ TeV}, \lambda_{112} \neq 0$ $m(\tilde{t}_1) = 1 \text{ TeV}, \lambda_{323} \neq 0$	1704.08493
$\tilde{t}_1 \tilde{t}_1, \tilde{t}_1 \rightarrow bs$		2 jets + 2		36.7	100-470 GeV 480-610 GeV			1710.07171
$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \to b\ell$	$2e, \mu$	2 b	-	36.1	0.4-1.45	5 TeV	$BR(\tilde{t}_1 \rightarrow be/\mu) > 20\%$	1710.05544
		2 <i>c</i>	Yes	20.3	510 GeV		$m(\tilde{\chi}_1^0)$ <200 GeV	1501.01325

<sup>\*</sup>Only a selection of the available mass limits on new states or phenomena is shown. Many of the limits are based on simplified models, c.f. refs. for the assumptions made.