

ATLAS SUSY Searches* - 95% CL Lower Limits

Status: March 2017

ATLAS Preliminary

$\sqrt{s} = 7, 8, 13$ TeV

Model		e, μ, τ, γ	Jets	E_T^{miss}	$\int \mathcal{L} \, d t [\text{fb}^{-1}]$	Mass limit		$\sqrt{s} = 7, 8 \text{ TeV}$	$\sqrt{s} = 13 \text{ TeV}$	Reference
Inclusive Searches	MSUGRA/CMSSM	0-3 e, μ /1-2 τ	2-10 jets/3 b	Yes	20.3	\tilde{q}, \tilde{g}	1.85 TeV		$m(\tilde{q})=m(\tilde{g})$	1507.05525
	$\tilde{q}\tilde{q}, \tilde{q} \rightarrow q\tilde{\chi}_1^0$	0	2-6 jets	Yes	36.1	\tilde{q}	1.57 TeV		$m(\tilde{\chi}_1^0) < 200 \text{ GeV}, m(1^{\text{st}} \text{ gen. } \tilde{q})=m(2^{\text{nd}} \text{ gen. } \tilde{q})$	ATLAS-CONF-2017-022
	$\tilde{q}\tilde{q}, \tilde{q} \rightarrow q\tilde{\chi}_1^0$ (compressed)	mono-jet	1-3 jets	Yes	3.2	\tilde{q}	608 GeV		$m(\tilde{q})-m(\tilde{\chi}_1^0) < 5 \text{ GeV}$	1604.07773
	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow q\tilde{q}\tilde{\chi}_1^0$	0	2-6 jets	Yes	36.1	\tilde{g}	2.02 TeV		$m(\tilde{\chi}_1^0) < 200 \text{ GeV}$	ATLAS-CONF-2017-022
	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow q\tilde{q}\tilde{\chi}_1^\pm \rightarrow q\tilde{q}W^\pm\tilde{\chi}_1^0$	0	2-6 jets	Yes	36.1	\tilde{g}	2.01 TeV		$m(\tilde{\chi}_1^0) < 200 \text{ GeV}, m(\tilde{\chi}^\pm)=0.5(m(\tilde{\chi}_1^0)+m(\tilde{g}))$	ATLAS-CONF-2017-022
	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow q\tilde{q}(\ell\ell/\nu\nu)\tilde{\chi}_1^0$	3 e, μ	4 jets	-	13.2	\tilde{g}	1.7 TeV		$m(\tilde{\chi}_1^0) < 400 \text{ GeV}$	ATLAS-CONF-2016-037
	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow q\tilde{q}WZ\tilde{\chi}_1^0$	2 e, μ (SS)	0-3 jets	Yes	13.2	\tilde{g}	1.6 TeV		$m(\tilde{\chi}_1^0) < 500 \text{ GeV}$	ATLAS-CONF-2016-037
	GMSB ($\tilde{\ell}$ NLSP)	1-2 τ + 0-1 ℓ	0-2 jets	Yes	3.2	\tilde{g}	2.0 TeV			1607.05979
	GGM (bino NLSP)	2 γ	-	Yes	3.2	\tilde{g}	1.65 TeV		$c\tau(\text{NLSP}) < 0.1 \text{ mm}$	1606.09150
	GGM (higgsino-bino NLSP)	γ	1 b	Yes	20.3	\tilde{g}	1.37 TeV		$m(\tilde{\chi}_1^0) < 950 \text{ GeV}, c\tau(\text{NLSP}) < 0.1 \text{ mm}, \mu < 0$	1507.05493
	GGM (higgsino-bino NLSP)	γ	2 jets	Yes	13.3	\tilde{g}	1.8 TeV		$m(\tilde{\chi}_1^0) > 680 \text{ GeV}, c\tau(\text{NLSP}) < 0.1 \text{ mm}, \mu > 0$	ATLAS-CONF-2016-066
	GGM (higgsino NLSP)	2 e, μ (Z)	2 jets	Yes	20.3	\tilde{g}	900 GeV		$m(\text{NLSP}) > 430 \text{ GeV}$	1503.03290
Gravitino LSP	0	mono-jet	Yes	20.3	$F^{1/2}$ scale	865 GeV		$m(\tilde{G}) > 1.8 \times 10^{-4} \text{ eV}, m(\tilde{g})=m(\tilde{q})=1.5 \text{ TeV}$	1502.01518	
3 rd gen. \tilde{g} med.	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow b\bar{b}\tilde{\chi}_1^0$	0	3 b	Yes	36.1	\tilde{g}	1.92 TeV		$m(\tilde{\chi}_1^0) < 600 \text{ GeV}$	ATLAS-CONF-2017-021
	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow t\bar{t}\tilde{\chi}_1^0$	0-1 e, μ	3 b	Yes	36.1	\tilde{g}	1.97 TeV		$m(\tilde{\chi}_1^0) < 200 \text{ GeV}$	ATLAS-CONF-2017-021
	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow b\bar{t}\tilde{\chi}_1^\pm$	0-1 e, μ	3 b	Yes	20.1	\tilde{g}	1.37 TeV		$m(\tilde{\chi}_1^0) < 300 \text{ GeV}$	1407.0600
3 rd gen. squarks direct production	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1 \rightarrow b\tilde{\chi}_1^0$	0	2 b	Yes	3.2	\tilde{b}_1	840 GeV		$m(\tilde{\chi}_1^0) < 100 \text{ GeV}$	1606.08772
	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1 \rightarrow t\tilde{\chi}_1^\pm$	2 e, μ (SS)	1 b	Yes	13.2	\tilde{b}_1	325-685 GeV		$m(\tilde{\chi}_1^0) < 150 \text{ GeV}, m(\tilde{\chi}_1^\pm)=m(\tilde{\chi}_1^0)+100 \text{ GeV}$	ATLAS-CONF-2016-037
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \rightarrow b\tilde{\chi}_1^\pm$	0-2 e, μ	1-2 b	Yes	4.7/13.3	\tilde{t}_1	117-170 GeV	200-720 GeV	$m(\tilde{\chi}_1^\pm)=2m(\tilde{\chi}_1^0), m(\tilde{\chi}_1^0)=55 \text{ GeV}$	1209.2102, ATLAS-CONF-2016-077
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \rightarrow Wb\tilde{\chi}_1^0$ or $t\tilde{\chi}_1^0$	0-2 e, μ	0-2 jets/1-2 b	Yes	20.3	\tilde{t}_1	90-198 GeV	205-950 GeV	$m(\tilde{\chi}_1^0)=1 \text{ GeV}$	1506.08616, ATLAS-CONF-2017-020
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \rightarrow c\tilde{\chi}_1^0$	0	mono-jet	Yes	3.2	\tilde{t}_1	90-323 GeV		$m(\tilde{t}_1)-m(\tilde{\chi}_1^0)=5 \text{ GeV}$	1604.07773
	$\tilde{t}_1\tilde{t}_1$ (natural GMSB)	2 e, μ (Z)	1 b	Yes	20.3	\tilde{t}_1	150-600 GeV		$m(\tilde{\chi}_1^0) > 150 \text{ GeV}$	1403.5222
	$\tilde{t}_2\tilde{t}_2, \tilde{t}_2 \rightarrow \tilde{t}_1 + Z$	3 e, μ (Z)	1 b	Yes	36.1	\tilde{t}_2	290-790 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}$	ATLAS-CONF-2017-019
	$\tilde{t}_2\tilde{t}_2, \tilde{t}_2 \rightarrow \tilde{t}_1 + h$	1-2 e, μ	4 b	Yes	36.1	\tilde{t}_2	320-880 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}$	ATLAS-CONF-2017-019
EW direct	$\tilde{\ell}_{L,R}\tilde{\ell}_{L,R}, \tilde{\ell} \rightarrow \ell\tilde{\chi}_1^0$	2 e, μ	0	Yes	20.3	$\tilde{\ell}$	90-335 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}$	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^\pm \rightarrow \tilde{\ell}\nu(\ell\bar{\nu})$	2 e, μ	0	Yes	13.3	$\tilde{\chi}_1^\pm$	640 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}, m(\tilde{\ell}, \bar{\nu})=0.5(m(\tilde{\chi}_1^\pm)+m(\tilde{\chi}_1^0))$	ATLAS-CONF-2016-096
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^\pm \rightarrow \tilde{\tau}\nu(\tau\bar{\nu})$	2 τ	-	Yes	14.8	$\tilde{\chi}_1^\pm$	580 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}, m(\tilde{\tau}, \bar{\nu})=0.5(m(\tilde{\chi}_1^\pm)+m(\tilde{\chi}_1^0))$	ATLAS-CONF-2016-093
	$\tilde{\chi}_1^\pm\tilde{\chi}_2^0 \rightarrow \tilde{\ell}_L\nu\tilde{\ell}_L(\ell\bar{\nu})$, $\ell\bar{\nu}\tilde{\ell}_L\ell(\bar{\nu}\nu)$	3 e, μ	0	Yes	13.3	$\tilde{\chi}_1^\pm, \tilde{\chi}_2^0$	1.0 TeV		$m(\tilde{\chi}_1^\pm)=m(\tilde{\chi}_2^0), m(\tilde{\chi}_1^0)=0, m(\tilde{\ell}, \bar{\nu})=0.5(m(\tilde{\chi}_1^\pm)+m(\tilde{\chi}_1^0))$	ATLAS-CONF-2016-096
	$\tilde{\chi}_1^\pm\tilde{\chi}_2^0 \rightarrow W\tilde{\chi}_1^0Z\tilde{\chi}_1^0$	2-3 e, μ	0-2 jets	Yes	20.3	$\tilde{\chi}_1^\pm, \tilde{\chi}_2^0$	425 GeV		$m(\tilde{\chi}_1^\pm)=m(\tilde{\chi}_2^0), m(\tilde{\chi}_1^0)=0, \tilde{\ell}$ decoupled	1403.5294, 1402.7029
	$\tilde{\chi}_1^\pm\tilde{\chi}_2^0 \rightarrow W\tilde{\chi}_1^0h\tilde{\chi}_1^0$, $h \rightarrow b\bar{b}/WW/\tau\tau/\gamma\gamma$	e, μ, γ	0-2 b	Yes	20.3	$\tilde{\chi}_1^\pm, \tilde{\chi}_2^0$	270 GeV		$m(\tilde{\chi}_1^\pm)=m(\tilde{\chi}_2^0), m(\tilde{\chi}_1^0)=0, \tilde{\ell}$ decoupled	1501.07110
	$\tilde{\chi}_2^0\tilde{\chi}_3^0, \tilde{\chi}_2^0 \rightarrow \tilde{\ell}_R\ell$	4 e, μ	0	Yes	20.3	$\tilde{\chi}_{2,3}^0$	635 GeV		$m(\tilde{\chi}_2^0)=m(\tilde{\chi}_3^0), m(\tilde{\chi}_1^0)=0, m(\tilde{\ell}, \bar{\nu})=0.5(m(\tilde{\chi}_2^0)+m(\tilde{\chi}_1^0))$	1405.5086
	GGM (wino NLSP) weak prod.	1 $e, \mu + \gamma$	-	Yes	20.3	\tilde{W}	115-370 GeV		$c\tau < 1 \text{ mm}$	1507.05493
	GGM (bino NLSP) weak prod.	2 γ	-	Yes	20.3	\tilde{W}	590 GeV		$c\tau < 1 \text{ mm}$	1507.05493
Long-lived particles	Direct $\tilde{\chi}_1^+\tilde{\chi}_1^-$ prod., long-lived $\tilde{\chi}_1^\pm$	Disapp. trk	1 jet	Yes	36.1	$\tilde{\chi}_1^\pm$	430 GeV		$m(\tilde{\chi}_1^\pm)-m(\tilde{\chi}_1^0) \sim 160 \text{ MeV}, \tau(\tilde{\chi}_1^\pm)=0.2 \text{ ns}$	ATLAS-CONF-2017-017
	Direct $\tilde{\chi}_1^+\tilde{\chi}_1^-$ prod., long-lived $\tilde{\chi}_1^\pm$	dE/dx trk	-	Yes	18.4	$\tilde{\chi}_1^\pm$	495 GeV		$m(\tilde{\chi}_1^\pm)-m(\tilde{\chi}_1^0) \sim 160 \text{ MeV}, \tau(\tilde{\chi}_1^\pm) < 15 \text{ ns}$	1506.05332
	Stable, stopped \tilde{g} R-hadron	0	1-5 jets	Yes	27.9	\tilde{g}	850 GeV		$m(\tilde{\chi}_1^0)=100 \text{ GeV}, 10 \mu\text{s} < \tau(\tilde{g}) < 1000 \text{ s}$	1310.6584
	Stable \tilde{g} R-hadron	trk	-	-	3.2	\tilde{g}	1.58 TeV			1606.05129
	Metastable \tilde{g} R-hadron	dE/dx trk	-	-	3.2	\tilde{g}	1.57 TeV		$m(\tilde{\chi}_1^0)=100 \text{ GeV}, \tau > 10 \text{ ns}$	1604.04520
	GMSB, stable $\tilde{\tau}, \tilde{\chi}_1^0 \rightarrow \tilde{\tau}(\tilde{e}, \tilde{\mu}) + \tau(e, \mu)$	1-2 μ	-	-	19.1	$\tilde{\chi}_1^0$	537 GeV		$10 < \tan\beta < 50$	1411.6795
	GMSB, $\tilde{\chi}_1^0 \rightarrow \gamma\tilde{G}$, long-lived $\tilde{\chi}_1^0$	2 γ	-	Yes	20.3	$\tilde{\chi}_1^0$	440 GeV		$1 < \tau(\tilde{\chi}_1^0) < 3 \text{ ns}$, SPS8 model	1409.5542
	$\tilde{g}\tilde{g}, \tilde{\chi}_1^0 \rightarrow e\bar{e}\nu/e\mu\nu/\mu\mu\nu$	displ. $e\bar{e}/e\mu/\mu\mu$	-	-	20.3	$\tilde{\chi}_1^0$	1.0 TeV		$7 < c\tau(\tilde{\chi}_1^0) < 740 \text{ mm}, m(\tilde{g})=1.3 \text{ TeV}$	1504.05162
	GGM $\tilde{g}\tilde{g}, \tilde{\chi}_1^0 \rightarrow Z\tilde{G}$	displ. vtx + jets	-	-	20.3	$\tilde{\chi}_1^0$	1.0 TeV		$6 < c\tau(\tilde{\chi}_1^0) < 480 \text{ mm}, m(\tilde{g})=1.1 \text{ TeV}$	1504.05162
	RPV	LFV $pp \rightarrow \tilde{\nu}_\tau + X, \tilde{\nu}_\tau \rightarrow e\mu/e\tau/\mu\tau$	$e\mu, e\tau, \mu\tau$	-	-	3.2	$\tilde{\nu}_\tau$	1.9 TeV		$\lambda_{111}^2=0.11, \lambda_{132/133/233}=0.07$
Bilinear RPV CMSSM		2 e, μ (SS)	0-3 b	Yes	20.3	\tilde{q}, \tilde{g}	1.45 TeV		$m(\tilde{q})=m(\tilde{g}), c\tau_{LSP} < 1 \text{ mm}$	1404.2500
$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^\pm \rightarrow W\tilde{\chi}_1^0, \tilde{\chi}_1^0 \rightarrow e\bar{e}\nu, e\mu\nu, \mu\mu\nu$		4 e, μ	-	Yes	13.3	$\tilde{\chi}_1^\pm$	1.14 TeV		$m(\tilde{\chi}_1^0) > 400 \text{ GeV}, \lambda_{12k} \neq 0$ ($k = 1, 2$)	ATLAS-CONF-2016-075
$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^\pm \rightarrow W\tilde{\chi}_1^0, \tilde{\chi}_1^0 \rightarrow \tau\tau\nu_e, e\tau\nu_\tau$		3 $e, \mu + \tau$	-	Yes	20.3	$\tilde{\chi}_1^\pm$	450 GeV		$m(\tilde{\chi}_1^0) > 0.2 \times m(\tilde{\chi}_1^\pm), \lambda_{133} \neq 0$	1405.5086
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow q\tilde{q}q$		0	4-5 large- R jets	-	14.8	\tilde{g}	1.08 TeV		$\text{BR}(t)=\text{BR}(b)=\text{BR}(c)=0\%$	ATLAS-CONF-2016-057
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow q\tilde{q}\tilde{\chi}_1^0, \tilde{\chi}_1^0 \rightarrow q\tilde{q}q$		0	4-5 large- R jets	-	14.8	\tilde{g}	1.55 TeV		$m(\tilde{\chi}_1^0)=800 \text{ GeV}$	ATLAS-CONF-2016-057
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow t\bar{t}\tilde{\chi}_1^0, \tilde{\chi}_1^0 \rightarrow q\tilde{q}q$		1 e, μ	8-10 jets/0-4 b	-	36.1	\tilde{g}	2.1 TeV		$m(\tilde{\chi}_1^0)=1 \text{ TeV}, \lambda_{112} \neq 0$	ATLAS-CONF-2017-013
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow \tilde{t}_1\tilde{t}_1, \tilde{t}_1 \rightarrow b\tilde{s}$		1 e, μ	8-10 jets/0-4 b	-	36.1	\tilde{g}	1.65 TeV		$m(\tilde{t}_1)=1 \text{ TeV}, \lambda_{323} \neq 0$	ATLAS-CONF-2017-013
$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \rightarrow b\tilde{s}$		0	2 jets + 2 b	-	15.4	\tilde{t}_1	410 GeV	450-510 GeV		ATLAS-CONF-2016-022, ATLAS-CONF-2016-084
$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \rightarrow b\bar{\ell}$		2 e, μ	2 b	-	20.3	\tilde{t}_1	0.4-1.0 TeV		$\text{BR}(\tilde{t}_1 \rightarrow b\ell/\mu) > 20\%$	ATLAS-CONF-2015-015
Other	Scalar charm, $\tilde{c} \rightarrow c\tilde{\chi}_1^0$	0	2 c	Yes	20.3	\tilde{c}	510 GeV		$m(\tilde{\chi}_1^0) < 200 \text{ GeV}$	1501.01325

*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.

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Mass scale [TeV]