

ATLAS SUSY Searches* - 95% CL Lower Limits

Status: July 2015

ATLAS Preliminary

√s = 7, 8 TeV

Model		e, μ, τ, γ	Jets	E_T^{miss}	$\int \mathcal{L} dt [\text{fb}^{-1}]$	Mass limit		$\sqrt{s} = 7 \text{ TeV}$	$\sqrt{s} = 8 \text{ TeV}$	Reference
Inclusive Searches	MSUGRA/CMSSM	0-3 e, μ /1-2 τ	2-10 jets/3 b	Yes	20.3	\tilde{q}, \tilde{g}	1.8 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	20.3	\tilde{q}	850 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}, m(\text{1}^{\text{st}} \text{ gen. } \tilde{q})=m(\text{2}^{\text{nd}} \text{ gen. } \tilde{q})$	1405.7875
	$\tilde{q}\tilde{q}, \tilde{q}\rightarrow q\tilde{\chi}_1^0$ (compressed)	mono-jet	1-3 jets	Yes	20.3	\tilde{q}	100-440 GeV		$m(\tilde{q})-m(\tilde{\chi}_1^0)<10 \text{ GeV}$	1507.05525
	$\tilde{q}\tilde{q}, \tilde{q}\rightarrow q(\ell\ell/\ell\nu/\nu\nu)\tilde{\chi}_1^0$	2 e, μ (off-Z)	2 jets	Yes	20.3	\tilde{q}	780 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}$	1503.03290
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow q\tilde{q}\tilde{\chi}_1^0$	0	2-6 jets	Yes	20.3	\tilde{g}	1.33 TeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}$	1405.7875
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow qq\tilde{\chi}_1^\pm\rightarrow qqW^\pm\tilde{\chi}_1^0$	0-1 e, μ	2-6 jets	Yes	20	\tilde{g}	1.26 TeV		$m(\tilde{\chi}_1^0)<300 \text{ GeV}, m(\tilde{\chi}^\pm)=0.5(m(\tilde{\chi}_1^0)+m(\tilde{g}))$	1507.05525
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow qq(\ell\ell/\ell\nu/\nu\nu)\tilde{\chi}_1^0$	2 e, μ	0-3 jets	-	20	\tilde{g}	1.32 TeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}$	1501.03555
	GMSB ($\tilde{\ell}$ NLSP)	1-2 τ + 0-1 ℓ	0-2 jets	Yes	20.3	\tilde{g}	1.6 TeV		$\tan\beta>20$	1407.0603
	GGM (bino NLSP)	2 γ	-	Yes	20.3	\tilde{g}	1.29 TeV		$c\tau(\text{NLSP})<0.1 \text{ mm}$	1507.05493
	GGM (higgsino-bino NLSP)	γ	1 b	Yes	20.3	\tilde{g}	1.3 TeV		$m(\tilde{\chi}_1^0)<900 \text{ GeV}, c\tau(\text{NLSP})<0.1 \text{ mm}, \mu<0$	1507.05493
GGM (higgsino-bino NLSP)	γ	2 jets	Yes	20.3	\tilde{g}	1.25 TeV		$m(\tilde{\chi}_1^0)<850 \text{ GeV}, c\tau(\text{NLSP})<0.1 \text{ mm}, \mu>0$	1507.05493	
GGM (higgsino NLSP)	2 e, μ (Z)	2 jets	Yes	20.3	\tilde{g}	850 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	20.1	\tilde{g}	1.25 TeV		$m(\tilde{\chi}_1^0)<400 \text{ GeV}$	1407.0600
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow t\bar{t}\tilde{\chi}_1^0$	0	7-10 jets	Yes	20.3	\tilde{g}	1.1 TeV		$m(\tilde{\chi}_1^0)<350 \text{ GeV}$	1308.1841
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow t\bar{t}\tilde{\chi}_1^\pm$	0-1 e, μ	3 b	Yes	20.1	\tilde{g}	1.34 TeV		$m(\tilde{\chi}_1^0)<400 \text{ GeV}$	1407.0600
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow b\bar{t}\tilde{\chi}_1^\pm$	0-1 e, μ	3 b	Yes	20.1	\tilde{g}	1.3 TeV		$m(\tilde{\chi}_1^0)<300 \text{ GeV}$	1407.0600
3 rd gen. squarks direct production	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1\rightarrow b\tilde{\chi}_1^\pm$	0	2 b	Yes	20.1	\tilde{b}_1	100-620 GeV		$m(\tilde{\chi}_1^0)<90 \text{ GeV}$	1308.2631
	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1\rightarrow t\tilde{\chi}_1^\pm$	2 e, μ (SS)	0-3 b	Yes	20.3	\tilde{b}_1	275-440 GeV		$m(\tilde{\chi}_1^\pm)=2 m(\tilde{\chi}_1^0)$	1404.2500
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\rightarrow b\tilde{\chi}_1^\pm$	1-2 e, μ	1-2 b	Yes	4.7/20.3	\tilde{t}_1	110-167 GeV	230-460 GeV	$m(\tilde{\chi}_1^\pm)=2m(\tilde{\chi}_1^0), m(\tilde{\chi}_1^0)=55 \text{ GeV}$	1209.2102, 1407.0583
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\rightarrow Wb\tilde{\chi}_1^0$ or $t\tilde{\chi}_1^0$	0-2 e, μ	0-2 jets/1-2 b	Yes	20.3	\tilde{t}_1	90-191 GeV	210-700 GeV	$m(\tilde{\chi}_1^0)=1 \text{ GeV}$	1506.08616
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\rightarrow c\tilde{\chi}_1^0$	0	mono-jet/ c -tag	Yes	20.3	\tilde{t}_1	90-240 GeV		$m(\tilde{t}_1)-m(\tilde{\chi}_1^0)<85 \text{ GeV}$	1407.0608
	$\tilde{t}_1\tilde{t}_1$ (natural GMSB)	2 e, μ (Z)	1 b	Yes	20.3	\tilde{t}_1	150-580 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	20.3	\tilde{t}_2	290-600 GeV		$m(\tilde{\chi}_1^0)<200 \text{ GeV}$	1403.5222
	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	$\tilde{\ell}$	90-325 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}$
$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^\pm\rightarrow\ell\nu(\ell\bar{\nu})$		2 e, μ	0	Yes	20.3	$\tilde{\chi}_1^\pm$	140-465 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}, m(\tilde{\ell}, \tilde{\nu})=0.5(m(\tilde{\chi}_1^\pm)+m(\tilde{\chi}_1^0))$	1403.5294
$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^\pm\rightarrow\tau\nu(\tau\bar{\nu})$		2 τ	-	Yes	20.3	$\tilde{\chi}_1^\pm$	100-350 GeV		$m(\tilde{\chi}_1^0)=0 \text{ GeV}, m(\tilde{\tau}, \tilde{\nu})=0.5(m(\tilde{\chi}_1^\pm)+m(\tilde{\chi}_1^0))$	1407.0350
$\tilde{\chi}_1^\pm\tilde{\chi}_2^0\rightarrow\tilde{\ell}_L\nu\tilde{\ell}_L(\tilde{\nu}\bar{\nu}), \ell\bar{\nu}\tilde{\ell}_L\ell(\tilde{\nu}\bar{\nu})$		3 e, μ	0	Yes	20.3	$\tilde{\chi}_1^\pm, \tilde{\chi}_2^0$	700 GeV		$m(\tilde{\chi}_1^\pm)=m(\tilde{\chi}_2^0), m(\tilde{\chi}_1^0)=0, m(\tilde{\ell}, \tilde{\nu})=0.5(m(\tilde{\chi}_1^\pm)+m(\tilde{\chi}_1^0))$	1402.7029
$\tilde{\chi}_1^\pm\tilde{\chi}_2^0\rightarrow W\tilde{\chi}_1^0Z\tilde{\chi}_1^0$		2-3 e, μ	0-2 jets	Yes	20.3	$\tilde{\chi}_1^\pm, \tilde{\chi}_2^0$	420 GeV		$m(\tilde{\chi}_1^\pm)=m(\tilde{\chi}_2^0), m(\tilde{\chi}_1^0)=0, \text{sleptons decoupled}$	1403.5294, 1402.7029
$\tilde{\chi}_1^\pm\tilde{\chi}_2^0\rightarrow W\tilde{\chi}_1^0h\tilde{\chi}_1^0$		e, μ, γ	0-2 b	Yes	20.3	$\tilde{\chi}_1^\pm, \tilde{\chi}_2^0$	250 GeV		$m(\tilde{\chi}_1^\pm)=m(\tilde{\chi}_2^0), m(\tilde{\chi}_1^0)=0, \text{sleptons decoupled}$	1501.07110
$\tilde{\chi}_2^0\tilde{\chi}_3^0, \tilde{\chi}_{2,3}^0\rightarrow\tilde{\ell}_R\ell$		4 e, μ	0	Yes	20.3	$\tilde{\chi}_{2,3}^0$	620 GeV		$m(\tilde{\chi}_2^0)=m(\tilde{\chi}_3^0), m(\tilde{\chi}_1^0)=0, m(\tilde{\ell}, \tilde{\nu})=0.5(m(\tilde{\chi}_2^0)+m(\tilde{\chi}_1^0))$	1405.5086
GGM (wino NLSP) weak prod.		1 $e, \mu + \gamma$	-	Yes	20.3	\tilde{W}	124-361 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	20.3	$\tilde{\chi}_1^\pm$	270 GeV		$m(\tilde{\chi}_1^\pm)-m(\tilde{\chi}_1^0)\sim 160 \text{ MeV}, \tau(\tilde{\chi}_1^\pm)=0.2 \text{ ns}$
	Direct $\tilde{\chi}_1^+\tilde{\chi}_1^-$ prod., long-lived $\tilde{\chi}_1^\pm$	dE/dx trk	-	Yes	18.4	$\tilde{\chi}_1^\pm$	482 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}	832 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	-	-	19.1	\tilde{g}	1.27 TeV			1411.6795
	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	$\tilde{\chi}_1^0$	435 GeV		$2<\tau(\tilde{\chi}_1^0)<3 \text{ ns}, \text{SPS8 model}$	1409.5542
	$\tilde{g}\tilde{g}, \tilde{\chi}_1^0\rightarrow ee\nu/e\mu\nu/\mu\mu\nu$	displ. $ee/e\mu/\mu\mu$	-	-	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 $pp\rightarrow\tilde{\nu}_\tau+X, \tilde{\nu}_\tau\rightarrow e\mu/e\tau/\mu\tau$	$e\mu, e\tau, \mu\tau$	-	-	20.3	$\tilde{\nu}_\tau$	1.7 TeV		$\lambda'_{311}=0.11, \lambda_{132/133/233}=0.07$	1503.04430
	Billinear RPV CMSSM	2 e, μ (SS)	0-3 b	Yes	20.3	\tilde{q}, \tilde{g}	1.35 TeV		$m(\tilde{q})=m(\tilde{g}), c\tau_{LS}<1 \text{ mm}$	1404.2500
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^\pm\rightarrow W\tilde{\chi}_1^0, \tilde{\chi}_1^0\rightarrow ee\tilde{\nu}_\mu, e\mu\tilde{\nu}_e$	4 e, μ	-	Yes	20.3	$\tilde{\chi}_1^\pm$	750 GeV		$m(\tilde{\chi}_1^0)>0.2\times m(\tilde{\chi}_1^\pm), \lambda_{121}\neq 0$	1405.5086
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^\pm\rightarrow W\tilde{\chi}_1^0, \tilde{\chi}_1^0\rightarrow\tau\tau\tilde{\nu}_e, e\tau\tilde{\nu}_\tau$	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
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow qqq$	0	6-7 jets	-	20.3	\tilde{g}	917 GeV		$\text{BR}(t)=\text{BR}(b)=\text{BR}(c)=0\%$	1502.05686
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow q\tilde{\chi}_1^0, \tilde{\chi}_1^0\rightarrow qqq$	0	6-7 jets	-	20.3	\tilde{g}	870 GeV		$m(\tilde{\chi}_1^0)=600 \text{ GeV}$	1502.05686
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow\tilde{t}_1t, \tilde{t}_1\rightarrow bs$	2 e, μ (SS)	0-3 b	Yes	20.3	\tilde{g}	850 GeV			1404.250
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\rightarrow bs$	0	2 jets + 2 b	-	20.3	\tilde{t}_1	100-308 GeV			ATLAS-CONF-2015-026
$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\rightarrow b\ell$	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}	490 GeV		$m(\tilde{\chi}_1^0)<200 \text{ GeV}$	1501.01325

10⁻¹

1

Mass scale [TeV]

*Only a selection of the available mass limits on new states or phenomena is shown. All limits quoted are observed minus 1σ theoretical signal cross section uncertainty.