SUSY searches with the ATLAS detector

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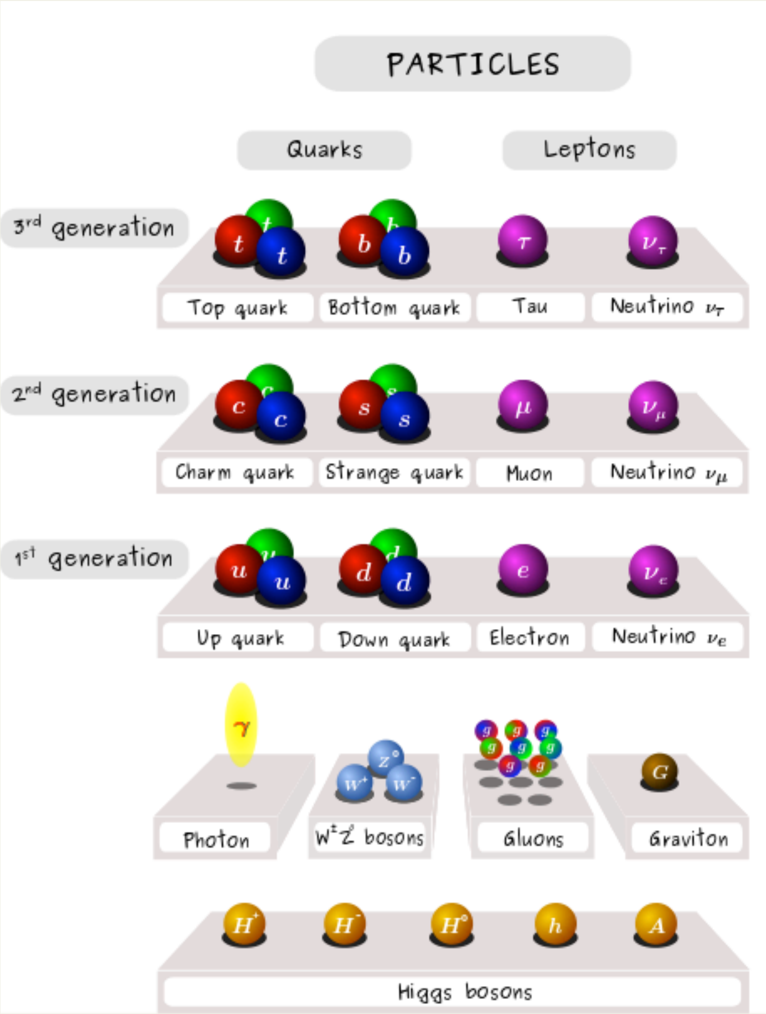
ATLAS SUSY SEARCHES OVERVIEW

Supersymmetry

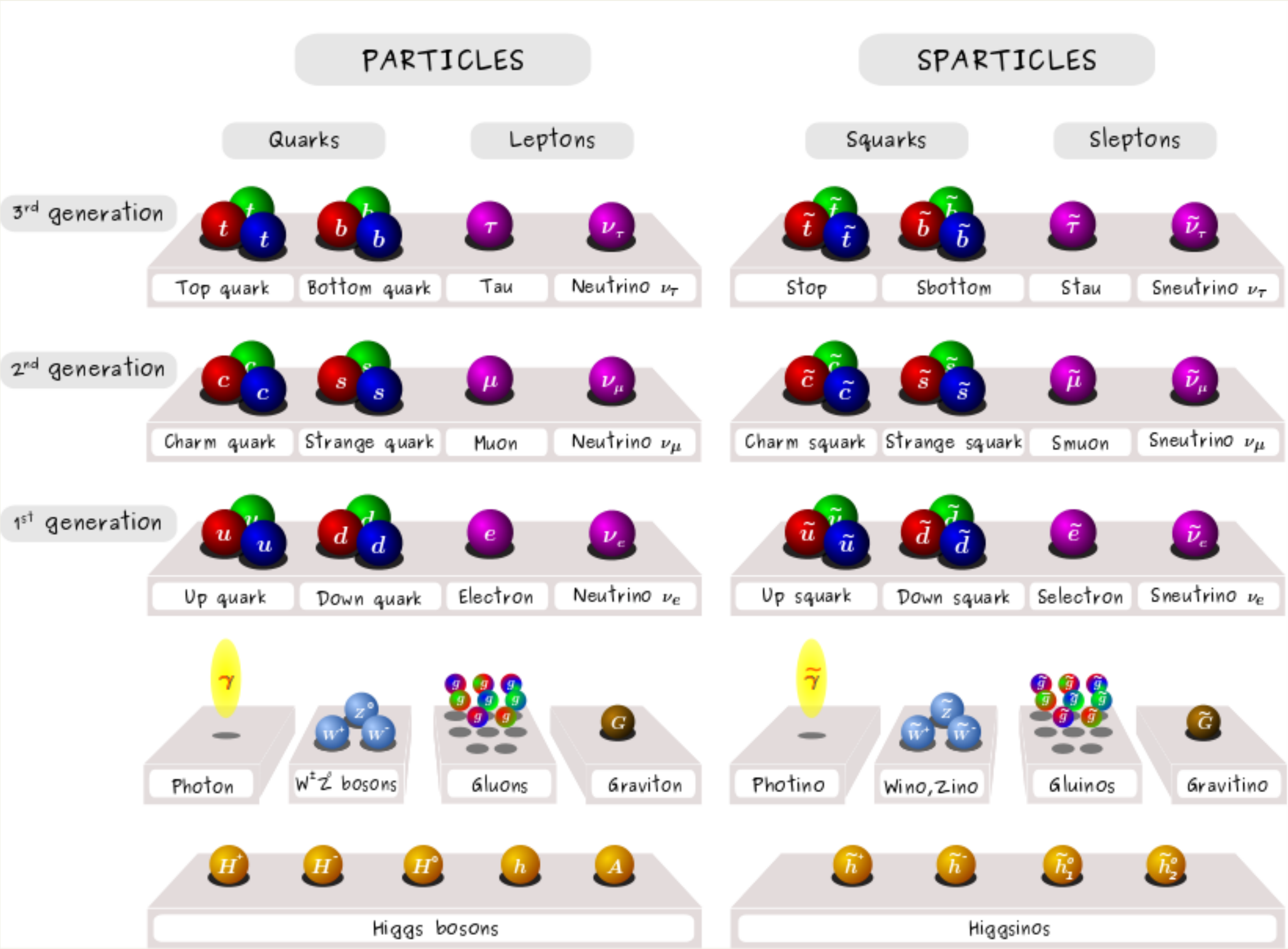
Standard Model



Source: 3

Supersymmetry

Standard Model



Supersymmetry

Source: 3

ATLAS SUSY Searches* - 95% CL Lower Limits

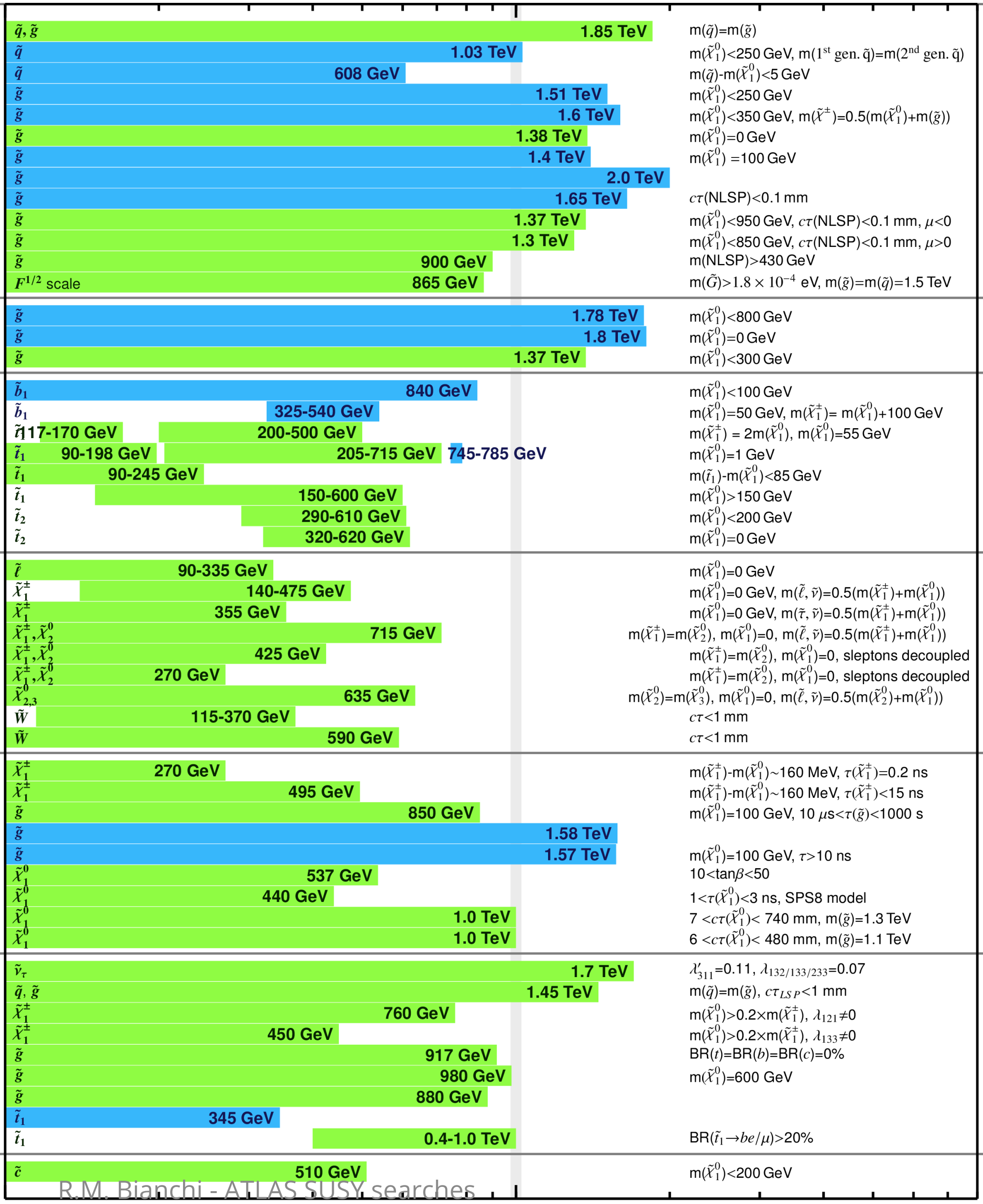
Status: July 2016

ATLAS Preliminary

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

🟩 $\sqrt{s}$ = 7, 8 TeV

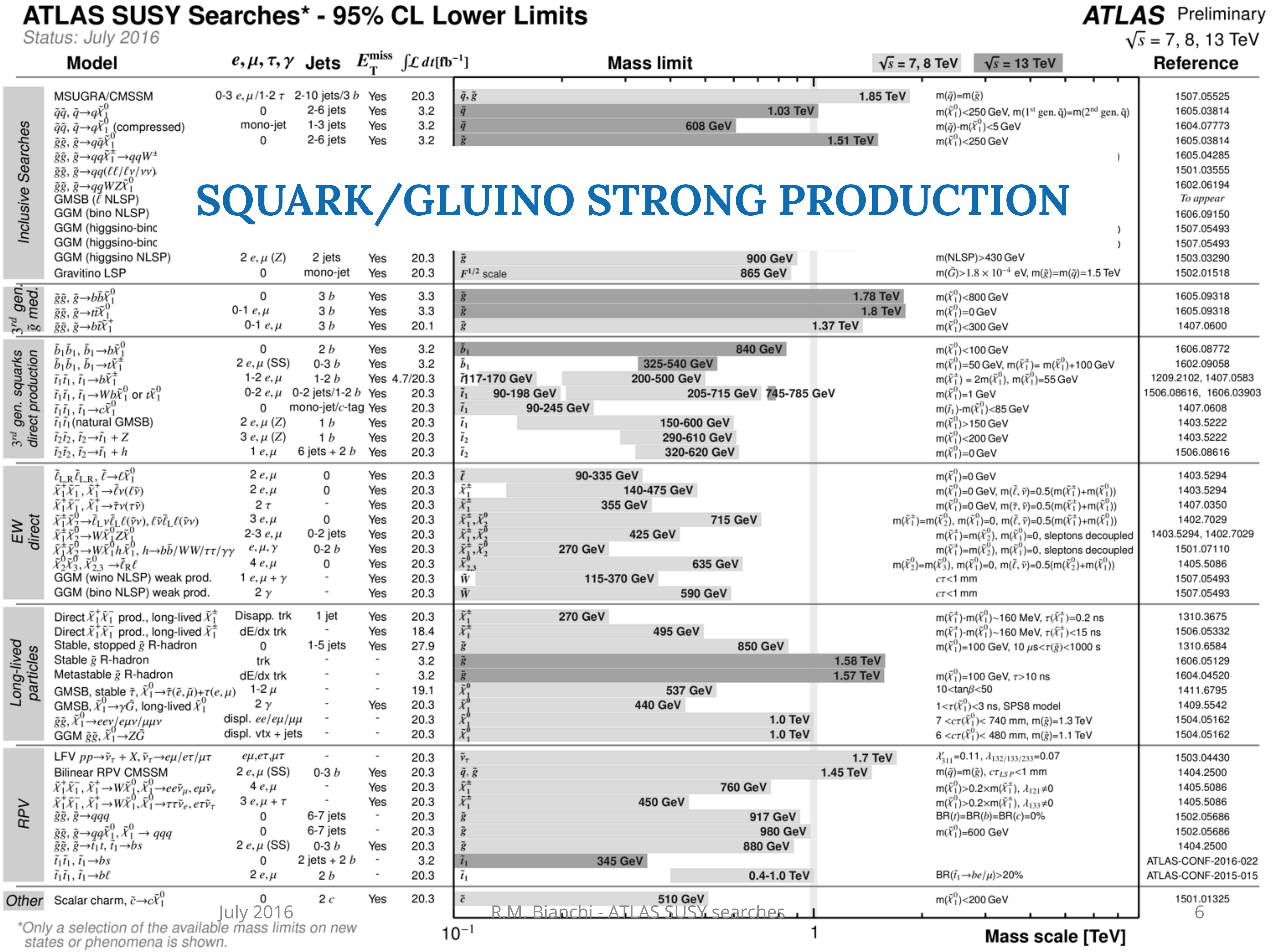
🟦 $\sqrt{s}$ = 13 TeV



	Model	e, μ, τ, γ	Jets	E_T^{miss}	$\int \mathcal{L}\, dt[\mathrm{fb}^{-1}]$	Mass limit			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	3.2	$\tilde{q}$	🟦 1.03 TeV	$m(\tilde{\chi}_1^0)$<250 GeV, m(1^{st} gen. $\tilde{q}$)=m(2^{nd} gen. $\tilde{q}$)	1605.03814
	$\tilde{q}\tilde{q}$, $\tilde{q}\rightarrow q\tilde{\chi}_1^0$ (compressed)	mono-jet	1-3 jets	Yes	3.2	$\tilde{q}$	🟦 608 GeV	$m(\tilde{q})$-$m(\tilde{\chi}_1^0)$<5 GeV	1604.07773
	$\tilde{g}\tilde{g}$, $\tilde{g}\rightarrow q\bar{q}\tilde{\chi}_1^0$	0	2-6 jets	Yes	3.2	$\tilde{g}$	🟦 1.51 TeV	$m(\tilde{\chi}_1^0)$<250 GeV	1605.03814
	$\tilde{g}\tilde{g}$, $\tilde{g}\rightarrow qq\tilde{\chi}_1^{\pm}\rightarrow qqW^{\pm}\tilde{\chi}_1^0$	1 e,μ	2-6 jets	Yes	3.3	$\tilde{g}$	🟦 1.6 TeV	$m(\tilde{\chi}_1^0)$<350 GeV, $m(\tilde{\chi}^{\pm})$=0.5($m(\tilde{\chi}_1^0)$+$m(\tilde{g})$)	1605.04285
	$\tilde{g}\tilde{g}$, $\tilde{g}\rightarrow qq(\ell\ell/\ell\nu/\nu\nu)\tilde{\chi}_1^0$	2 e,μ	0-3 jets	-	20	$\tilde{g}$	🟩 1.38 TeV	$m(\tilde{\chi}_1^0)$=0 GeV	1501.03555
	$\tilde{g}\tilde{g}$, $\tilde{g}\rightarrow qqWZ\tilde{\chi}_1^0$	0	7-10 jets	Yes	3.2	$\tilde{g}$	🟦 1.4 TeV	$m(\tilde{\chi}_1^0)$ =100 GeV	1602.06194
	GMSB ($\tilde{\ell}$ NLSP)	1-2 τ + 0-1 ℓ	0-2 jets	Yes	3.2	$\tilde{g}$	🟦 2.0 TeV		*To appear*
	GGM (bino NLSP)	2 γ	-	Yes	3.2	$\tilde{g}$	🟦 1.65 TeV	$c\tau$(NLSP)<0.1 mm	1606.09150
	GGM (higgsino-bino NLSP)	γ	1 b	Yes	20.3	$\tilde{g}$	🟩 1.37 TeV	$m(\tilde{\chi}_1^0)$<950 GeV, $c\tau$(NLSP)<0.1 mm, μ<0	1507.05493
	GGM (higgsino-bino NLSP)	γ	2 jets	Yes	20.3	$\tilde{g}$	🟩 1.3 TeV	$m(\tilde{\chi}_1^0)$<850 GeV, $c\tau$(NLSP)<0.1 mm, μ>0	1507.05493
	GGM (higgsino NLSP)	2 e,μ (Z)	2 jets	Yes	20.3	$\tilde{g}$	🟩 900 GeV	m(NLSP)>430 GeV	1503.03290
	Gravitino LSP	0	mono-jet	Yes	20.3	$F^{1/2}$ scale	🟩 865 GeV	$m(\tilde{G})>1.8\times10^{-4}$ eV, $m(\tilde{g})=m(\tilde{q})$=1.5 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	3.3	$\tilde{g}$	🟦 1.78 TeV	$m(\tilde{\chi}_1^0)$<800 GeV	1605.09318
	$\tilde{g}\tilde{g}$, $\tilde{g}\rightarrow t\bar{t}\tilde{\chi}_1^0$	0-1 e,μ	3 b	Yes	3.3	$\tilde{g}$	🟦 1.8 TeV	$m(\tilde{\chi}_1^0)$=0 GeV	1605.09318
	$\tilde{g}\tilde{g}$, $\tilde{g}\rightarrow b\bar{t}\tilde{\chi}_1^+$	0-1 e,μ	3 b	Yes	20.1	$\tilde{g}$	🟩 1.37 TeV	$m(\tilde{\chi}_1^0)$<300 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 GeV	1606.08772
	$\tilde{b}_1\tilde{b}_1$, $\tilde{b}_1\rightarrow t\tilde{\chi}_1^{\pm}$	2 e,μ (SS)	0-3 b	Yes	3.2	$\tilde{b}_1$	🟦 325-540 GeV	$m(\tilde{\chi}_1^0)$=50 GeV, $m(\tilde{\chi}_1^{\pm})$= $m(\tilde{\chi}_1^0)$+100 GeV	1602.09058
	$\tilde{t}_1\tilde{t}_1$, $\tilde{t}_1\rightarrow b\tilde{\chi}_1^{\pm}$	1-2 e,μ	1-2 b	Yes	4.7/20.3	$\tilde{t}_1$	🟩 117-170 GeV 🟩 200-500 GeV	$m(\tilde{\chi}_1^{\pm})$ = 2$m(\tilde{\chi}_1^0)$, $m(\tilde{\chi}_1^0)$=55 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	$\tilde{t}_1$	🟩 90-198 GeV 🟩 205-715 GeV 🟦 745-785 GeV	$m(\tilde{\chi}_1^0)$=1 GeV	1506.08616, 1606.03903
	$\tilde{t}_1\tilde{t}_1$, $\tilde{t}_1\rightarrow c\tilde{\chi}_1^0$	0	mono-jet/c-tag	Yes	20.3	$\tilde{t}_1$	🟩 90-245 GeV	$m(\tilde{t}_1)$-$m(\tilde{\chi}_1^0)$<85 GeV	1407.0608
	$\tilde{t}_1\tilde{t}_1$(natural GMSB)	2 e,μ (Z)	1 b	Yes	20.3	$\tilde{t}_1$	🟩 150-600 GeV	$m(\tilde{\chi}_1^0)$>150 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	$\tilde{t}_2$	🟩 290-610 GeV	$m(\tilde{\chi}_1^0)$<200 GeV	1403.5222
	$\tilde{t}_2\tilde{t}_2$, $\tilde{t}_2\rightarrow\tilde{t}_1+h$	1 e,μ	6 jets + 2 b	Yes	20.3	$\tilde{t}_2$	🟩 320-620 GeV	$m(\tilde{\chi}_1^0)$=0 GeV	1506.08616
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 GeV	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-$, $\tilde{\chi}_1^+\rightarrow\tilde{\ell}\nu(\ell\tilde{\nu})$	2 e,μ	0	Yes	20.3	$\tilde{\chi}_1^{\pm}$	🟩 140-475 GeV	$m(\tilde{\chi}_1^0)$=0 GeV, $m(\tilde{\ell},\tilde{\nu})$=0.5($m(\tilde{\chi}_1^{\pm})$+$m(\tilde{\chi}_1^0)$)	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-$, $\tilde{\chi}_1^+\rightarrow\tilde{\tau}\nu(\tau\tilde{\nu})$	2 τ	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$	🟩 355 GeV	$m(\tilde{\chi}_1^0)$=0 GeV, $m(\tilde{\tau},\tilde{\nu})$=0.5($m(\tilde{\chi}_1^{\pm})$+$m(\tilde{\chi}_1^0)$)	1407.0350
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\rightarrow\tilde{\ell}_L\nu\tilde{\ell}_L\ell(\tilde{\nu}\nu), \ell\tilde{\nu}\tilde{\ell}_L\ell(\tilde{\nu}\nu)$	3 e,μ	0	Yes	20.3	$\tilde{\chi}_1^{\pm}, \tilde{\chi}_2^0$	🟩 715 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
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\rightarrow W\tilde{\chi}_1^0 Z\tilde{\chi}_1^0$	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, sleptons decoupled	1403.5294, 1402.7029
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\rightarrow W\tilde{\chi}_1^0 h\tilde{\chi}_1^0$, $h\rightarrow b\bar{b}/WW/\tau\tau/\gamma\gamma$	e,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, 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	$\tilde{\chi}_{2,3}^0$	🟩 635 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	$\tilde{W}$	🟩 115-370 GeV	$c\tau$<1 mm	1507.05493
	GGM (bino NLSP) weak prod.	2 γ	-	Yes	20.3	$\tilde{W}$	🟩 590 GeV	$c\tau$<1 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	$m(\tilde{\chi}_1^{\pm})$-$m(\tilde{\chi}_1^0)$~160 MeV, $\tau(\tilde{\chi}_1^{\pm})$=0.2 ns	1310.3675
	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	$m(\tilde{\chi}_1^{\pm})$-$m(\tilde{\chi}_1^0)$~160 MeV, $\tau(\tilde{\chi}_1^{\pm})$<15 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 GeV, 10 μs<$\tau(\tilde{g})$<1000 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 GeV, τ>10 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<tanβ<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 ns, 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 mm, $m(\tilde{g})$=1.3 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 mm, $m(\tilde{g})$=1.1 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	λ'_{311}=0.11, $\lambda_{132/133/233}$=0.07	1503.04430
	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 mm	1404.2500
	$\tilde{\chi}_1^+\tilde{\chi}_1^-$, $\tilde{\chi}_1^+\rightarrow W\tilde{\chi}_1^0, \tilde{\chi}_1^0\rightarrow ee\tilde{\nu}_\mu, e\mu\tilde{\nu}_e$	4 e,μ	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$	🟩 760 GeV	$m(\tilde{\chi}_1^0)$>0.2×$m(\tilde{\chi}_1^{\pm})$, $\lambda_{121}\neq0$	1405.5086
	$\tilde{\chi}_1^+\tilde{\chi}_1^-$, $\tilde{\chi}_1^+\rightarrow W\tilde{\chi}_1^0, \tilde{\chi}_1^0\rightarrow\tau\tau\tilde{\nu}_e, e\tau\tilde{\nu}_\tau$	3 $e,\mu+\tau$	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$	🟩 450 GeV	$m(\tilde{\chi}_1^0)$>0.2×$m(\tilde{\chi}_1^{\pm})$, $\lambda_{133}\neq0$	1405.5086
	$\tilde{g}\tilde{g}$, $\tilde{g}\rightarrow qqq$	0	6-7 jets	-	20.3	$\tilde{g}$	🟩 917 GeV	BR(t)=BR(b)=BR(c)=0%	1502.05686
	$\tilde{g}\tilde{g}$, $\tilde{g}\rightarrow qq\tilde{\chi}_1^0$, $\tilde{\chi}_1^0\rightarrow qqq$	0	6-7 jets	-	20.3	$\tilde{g}$	🟩 980 GeV	$m(\tilde{\chi}_1^0)$=600 GeV	1502.05686
	$\tilde{g}\tilde{g}$, $\tilde{g}\rightarrow\tilde{t}_1 t$, $\tilde{t}_1\rightarrow bs$	2 e,μ (SS)	0-3 b	Yes	20.3	$\tilde{g}$	🟩 880 GeV		1404.2500
	$\tilde{t}_1\tilde{t}_1$, $\tilde{t}_1\rightarrow bs$	0	2 jets + 2 b	-	3.2	$\tilde{t}_1$	🟦 345 GeV		ATLAS-CONF-2016-022
	$\tilde{t}_1\tilde{t}_1$, $\tilde{t}_1\rightarrow b\ell$	2 e,μ	2 b	-	20.3	$\tilde{t}_1$	🟩 0.4-1.0 TeV	BR($\tilde{t}_1\rightarrow be/\mu$)>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 GeV	1501.01325

*Only a selection of the available mass limits on new states or phenomena is shown.

SQUARK/GLUINO STRONG PRODUCTION



ATLAS SUSY Searches* - 95% CL Lower Limits

Status: July 2016

ATLAS Preliminary

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

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

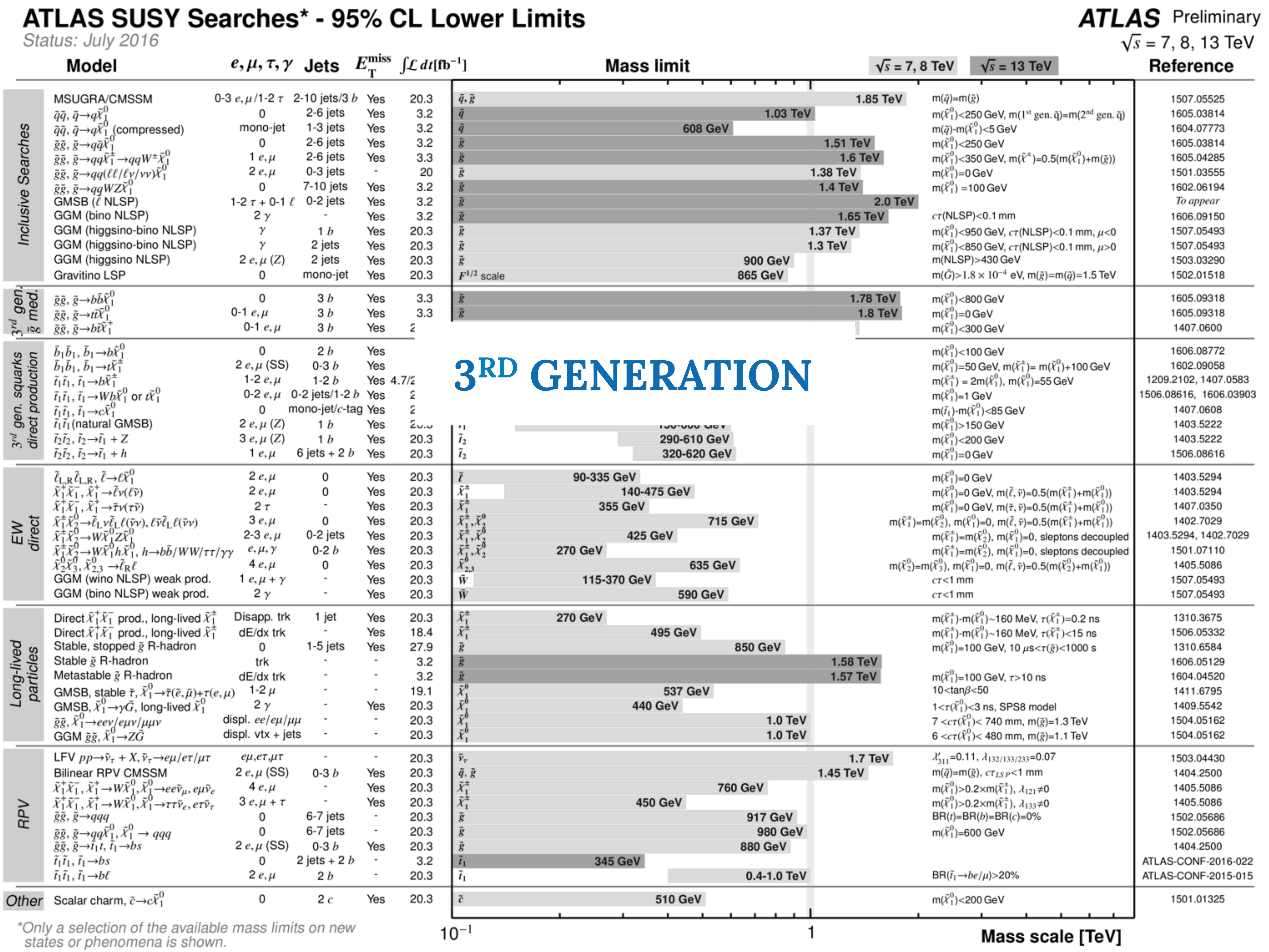
$\sqrt{s}$ = 13 TeV

	Model	e,μ,τ,γ	Jets	E_T^{miss}	$\int\mathcal{L}\,dt[fb^{-1}]$	Mass limit		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
	$\tilde{q}\tilde{q}, \tilde{q}\to q\tilde{\chi}_1^0$	0	2-6 jets	Yes	3.2	$\tilde{q}$ 1.03 TeV	m($\tilde{\chi}_1^0$)<250 GeV, m(1^{st} gen. $\tilde{q}$)=m(2^{nd} gen. $\tilde{q}$)	1605.03814
	$\tilde{q}\tilde{q}, \tilde{q}\to q\tilde{\chi}_1^0$ (compressed)	mono-jet	1-3 jets	Yes	3.2	$\tilde{q}$ 608 GeV	m($\tilde{q}$)-m($\tilde{\chi}_1^0$)<5 GeV	1604.07773
	$\tilde{g}\tilde{g}, \tilde{g}\to q\bar{q}\tilde{\chi}_1^0$	0	2-6 jets	Yes	3.2	$\tilde{g}$ 1.51 TeV	m($\tilde{\chi}_1^0$)<250 GeV	1605.03814
	$\tilde{g}\tilde{g}, \tilde{g}\to qq\tilde{\chi}_1^{\pm}\to qqW^{\pm}$						)	1605.04285
	$\tilde{g}\tilde{g}, \tilde{g}\to qq(\ell\ell/\ell\nu/\nu\nu)$							1501.03555
	$\tilde{g}\tilde{g}, \tilde{g}\to qqWZ\tilde{\chi}_1^0$							1602.06194
	GMSB ($\tilde{\ell}$ NLSP)							*To appear*
	GGM (bino NLSP)							1606.09150
	GGM (higgsino-bino						)	1507.05493
	GGM (higgsino-bino						)	1507.05493
	GGM (higgsino NLSP)	2 e,μ (Z)	2 jets	Yes	20.3	$\tilde{g}$ 900 GeV	m(NLSP)>430 GeV	1503.03290
	Gravitino LSP	0	mono-jet	Yes	20.3	$F^{1/2}$ scale 865 GeV	m($\tilde{G}$)>1.8×10^{-4} eV, m($\tilde{g}$)=m($\tilde{q}$)=1.5 TeV	1502.01518
3^{rd} gen. $\tilde{g}$ med.	$\tilde{g}\tilde{g}, \tilde{g}\to b\bar{b}\tilde{\chi}_1^0$	0	3 b	Yes	3.3	$\tilde{g}$ 1.78 TeV	m($\tilde{\chi}_1^0$)<800 GeV	1605.09318
	$\tilde{g}\tilde{g}, \tilde{g}\to t\bar{t}\tilde{\chi}_1^0$	0-1 e,μ	3 b	Yes	3.3	$\tilde{g}$ 1.8 TeV	m($\tilde{\chi}_1^0$)=0 GeV	1605.09318
	$\tilde{g}\tilde{g}, \tilde{g}\to b\bar{t}\tilde{\chi}_1^+$	0-1 e,μ	3 b	Yes	20.1	$\tilde{g}$ 1.37 TeV	m($\tilde{\chi}_1^0$)<300 GeV	1407.0600
3^{rd} gen. squarks direct production	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1\to b\tilde{\chi}_1^0$	0	2 b	Yes	3.2	$\tilde{b}_1$ 840 GeV	m($\tilde{\chi}_1^0$)<100 GeV	1606.08772
	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1\to t\tilde{\chi}_1^{\pm}$	2 e,μ (SS)	0-3 b	Yes	3.2	$\tilde{b}_1$ 325-540 GeV	m($\tilde{\chi}_1^0$)=50 GeV, m($\tilde{\chi}_1^{\pm}$)= m($\tilde{\chi}_1^0$)+100 GeV	1602.09058
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to b\tilde{\chi}_1^{\pm}$	1-2 e,μ	1-2 b	Yes	4.7/20.3	$\tilde{t}_1$ 117-170 GeV 200-500 GeV	m($\tilde{\chi}_1^{\pm}$) = 2m($\tilde{\chi}_1^0$), m($\tilde{\chi}_1^0$)=55 GeV	1209.2102, 1407.0583
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to Wb\tilde{\chi}_1^0$ 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 205-715 GeV 745-785 GeV	m($\tilde{\chi}_1^0$)=1 GeV	1506.08616, 1606.03903
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to c\tilde{\chi}_1^0$	0	mono-jet/c-tag	Yes	20.3	$\tilde{t}_1$ 90-245 GeV	m($\tilde{t}_1$)-m($\tilde{\chi}_1^0$)<85 GeV	1407.0608
	$\tilde{t}_1\tilde{t}_1$ (natural GMSB)	2 e,μ (Z)	1 b	Yes	20.3	$\tilde{t}_1$ 150-600 GeV	m($\tilde{\chi}_1^0$)>150 GeV	1403.5222
	$\tilde{t}_2\tilde{t}_2, \tilde{t}_2\to\tilde{t}_1+Z$	3 e,μ (Z)	1 b	Yes	20.3	$\tilde{t}_2$ 290-610 GeV	m($\tilde{\chi}_1^0$)<200 GeV	1403.5222
	$\tilde{t}_2\tilde{t}_2, \tilde{t}_2\to\tilde{t}_1+h$	1 e,μ	6 jets + 2 b	Yes	20.3	$\tilde{t}_2$ 320-620 GeV	m($\tilde{\chi}_1^0$)=0 GeV	1506.08616
EW direct	$\tilde{\ell}_{L,R}\tilde{\ell}_{L,R}, \tilde{\ell}\to\ell\tilde{\chi}_1^0$	2 e,μ	0	Yes	20.3	$\tilde{\ell}$ 90-335 GeV	m($\tilde{\chi}_1^0$)=0 GeV	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\to\tilde{\ell}\nu(\ell\tilde{\nu})$	2 e,μ	0	Yes	20.3	$\tilde{\chi}_1^{\pm}$ 140-475 GeV	m($\tilde{\chi}_1^0$)=0 GeV, m($\tilde{\ell},\tilde{\nu}$)=0.5(m($\tilde{\chi}_1^{\pm}$)+m($\tilde{\chi}_1^0$))	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\to\tilde{\tau}\nu(\tau\tilde{\nu})$	2 τ	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$ 355 GeV	m($\tilde{\chi}_1^0$)=0 GeV, m($\tilde{\tau},\tilde{\nu}$)=0.5(m($\tilde{\chi}_1^{\pm}$)+m($\tilde{\chi}_1^0$))	1407.0350
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\to\tilde{\ell}_L\nu\tilde{\ell}_L\ell(\tilde{\nu}\nu), \ell\tilde{\nu}\tilde{\ell}_L\ell(\tilde{\nu}\nu)$	3 e,μ	0	Yes	20.3	$\tilde{\chi}_1^{\pm},\tilde{\chi}_2^0$ 715 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
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\to W\tilde{\chi}_1^0 Z\tilde{\chi}_1^0$	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, sleptons decoupled	1403.5294, 1402.7029
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\to W\tilde{\chi}_1^0 h\tilde{\chi}_1^0, h\to b\bar{b}/WW/\tau\tau/\gamma\gamma$	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, sleptons decoupled	1501.07110
	$\tilde{\chi}_2^0\tilde{\chi}_3^0, \tilde{\chi}_{2,3}^0\to\tilde{\ell}_R\ell$	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($\tilde{\ell},\tilde{\nu}$)=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	$\tilde{W}$ 115-370 GeV	$c\tau$<1 mm	1507.05493
	GGM (bino NLSP) weak prod.	2 γ	-	Yes	20.3	$\tilde{W}$ 590 GeV	$c\tau$<1 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($\tilde{\chi}_1^0$)~160 MeV, τ($\tilde{\chi}_1^{\pm}$)=0.2 ns	1310.3675
	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($\tilde{\chi}_1^0$)~160 MeV, τ($\tilde{\chi}_1^{\pm}$)<15 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 GeV, 10 μs<τ($\tilde{g}$)<1000 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 GeV, τ>10 ns	1604.04520
	GMSB, stable $\tilde{\tau}, \tilde{\chi}_1^0\to\tilde{\tau}(\tilde{e},\tilde{\mu})+\tau(e,\mu)$	1-2 μ	-	-	19.1	$\tilde{\chi}_1^0$ 537 GeV	10<tanβ<50	1411.6795
	GMSB, $\tilde{\chi}_1^0\to\gamma\tilde{G}$, long-lived $\tilde{\chi}_1^0$	2 γ	-	Yes	20.3	$\tilde{\chi}_1^0$ 440 GeV	1<τ($\tilde{\chi}_1^0$)<3 ns, SPS8 model	1409.5542
	$\tilde{g}\tilde{g}, \tilde{\chi}_1^0\to ee\nu/e\mu\nu/\mu\mu\nu$	displ. $ee/e\mu/\mu\mu$	-	-	20.3	$\tilde{\chi}_1^0$ 1.0 TeV	7 <$c\tau$($\tilde{\chi}_1^0$)< 740 mm, m($\tilde{g}$)=1.3 TeV	1504.05162
	GGM $\tilde{g}\tilde{g}, \tilde{\chi}_1^0\to Z\tilde{G}$	displ. vtx + jets	-	-	20.3	$\tilde{\chi}_1^0$ 1.0 TeV	6 <$c\tau$($\tilde{\chi}_1^0$)< 480 mm, m($\tilde{g}$)=1.1 TeV	1504.05162
RPV	LFV $pp\to\tilde{\nu}_\tau+X, \tilde{\nu}_\tau\to e\mu/e\tau/\mu\tau$	$e\mu,e\tau,\mu\tau$	-	-	20.3	$\tilde{\nu}_\tau$ 1.7 TeV	λ'_{311}=0.11, $\lambda_{132/133/233}$=0.07	1503.04430
	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 mm	1404.2500
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\to W\tilde{\chi}_1^0, \tilde{\chi}_1^0\to ee\tilde{\nu}_\mu, e\mu\tilde{\nu}_e$	4 e,μ	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$ 760 GeV	m($\tilde{\chi}_1^0$)>0.2×m($\tilde{\chi}_1^{\pm}$), $\lambda_{121}\neq0$	1405.5086
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\to W\tilde{\chi}_1^0, \tilde{\chi}_1^0\to\tau\tau\tilde{\nu}_e, e\tau\tilde{\nu}_\tau$	3 $e,\mu+\tau$	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$ 450 GeV	m($\tilde{\chi}_1^0$)>0.2×m($\tilde{\chi}_1^{\pm}$), $\lambda_{133}\neq0$	1405.5086
	$\tilde{g}\tilde{g}, \tilde{g}\to qqq$	0	6-7 jets	-	20.3	$\tilde{g}$ 917 GeV	BR(t)=BR(b)=BR(c)=0%	1502.05686
	$\tilde{g}\tilde{g}, \tilde{g}\to qq\tilde{\chi}_1^0, \tilde{\chi}_1^0\to qqq$	0	6-7 jets	-	20.3	$\tilde{g}$ 980 GeV	m($\tilde{\chi}_1^0$)=600 GeV	1502.05686
	$\tilde{g}\tilde{g}, \tilde{g}\to\tilde{t}_1 t, \tilde{t}_1\to bs$	2 e,μ (SS)	0-3 b	Yes	20.3	$\tilde{g}$ 880 GeV		1404.2500
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to bs$	0	2 jets + 2 b	-	3.2	$\tilde{t}_1$ 345 GeV		ATLAS-CONF-2016-022
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to b\ell$	2 e,μ	2 b	-	20.3	$\tilde{t}_1$ 0.4-1.0 TeV	BR($\tilde{t}_1\to be/\mu$)>20%	ATLAS-CONF-2015-015
Other	Scalar charm, $\tilde{c}\to c\tilde{\chi}_1^0$	0	2 c	Yes	20.3	$\tilde{c}$ 510 GeV	m($\tilde{\chi}_1^0$)<200 GeV	1501.01325

10^{-1} 1 **Mass scale [TeV]**

*Only a selection of the available mass limits on new states or phenomena is shown.

3RD GENERATION



ATLAS SUSY Searches* - 95% CL Lower Limits

Status: July 2016

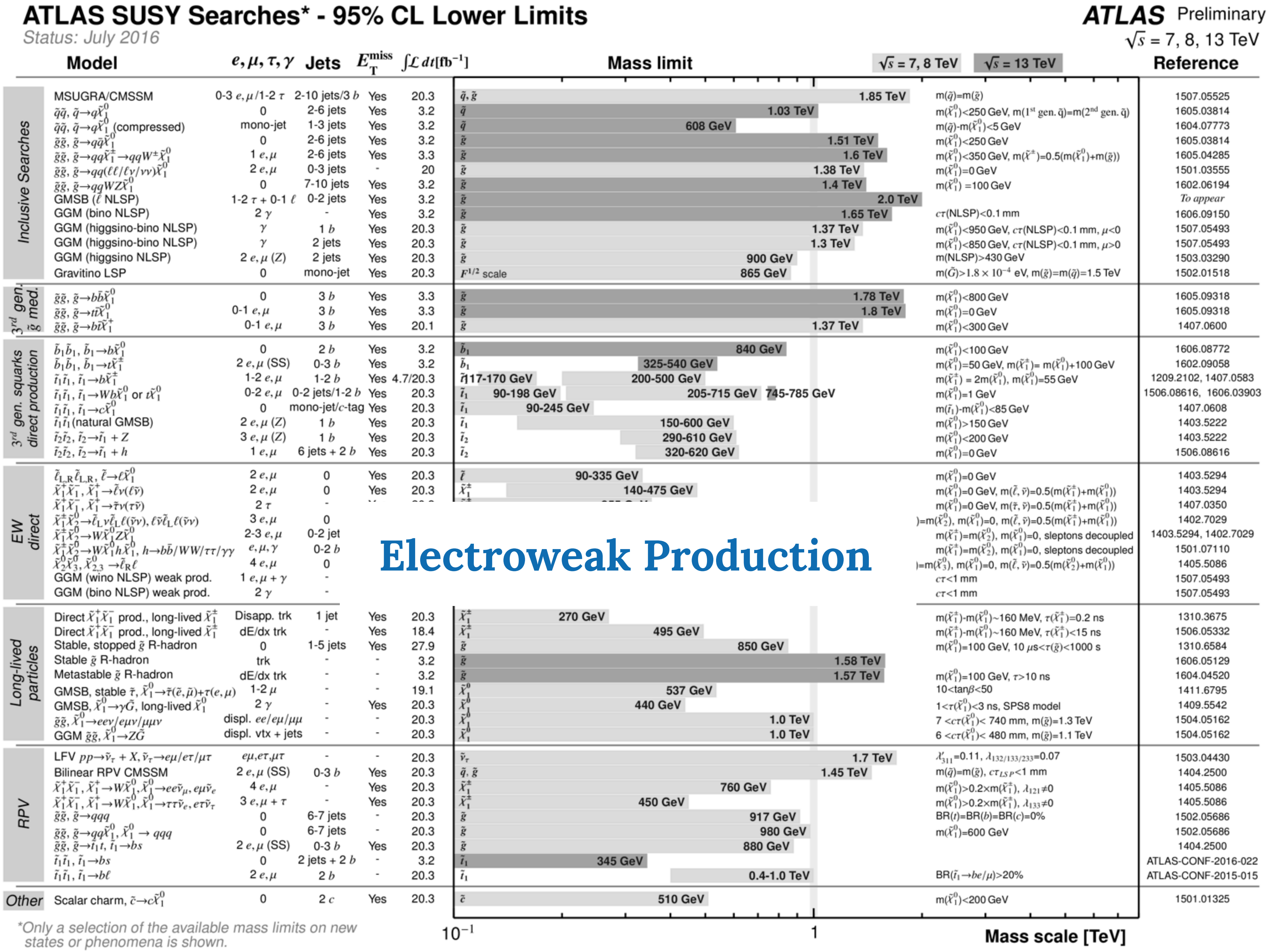
ATLAS Preliminary

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

	Model	e, μ, τ, γ	Jets	E_T^{miss}	$\int \mathcal{L}\, dt[fb^{-1}]$	Mass limit		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	3.2	$\tilde{q}$ 1.03 TeV	$m(\tilde{\chi}_1^0)$<250 GeV, m(1st gen. $\tilde{q}$)=m(2nd gen. $\tilde{q}$)	1605.03814
	$\tilde{q}\tilde{q}, \tilde{q}\rightarrow q\tilde{\chi}_1^0$ (compressed)	mono-jet	1-3 jets	Yes	3.2	$\tilde{q}$ 608 GeV	$m(\tilde{q})-m(\tilde{\chi}_1^0)$<5 GeV	1604.07773
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow q\bar{q}\tilde{\chi}_1^0$	0	2-6 jets	Yes	3.2	$\tilde{g}$ 1.51 TeV	$m(\tilde{\chi}_1^0)$<250 GeV	1605.03814
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow qq\tilde{\chi}_1^{\pm}\rightarrow qqW^{\pm}\tilde{\chi}_1^0$	1 e, μ	2-6 jets	Yes	3.3	$\tilde{g}$ 1.6 TeV	$m(\tilde{\chi}_1^0)$<350 GeV, $m(\tilde{\chi}^{\pm})=0.5(m(\tilde{\chi}_1^0)+m(\tilde{g}))$	1605.04285
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow qq(\ell\ell/\ell\nu/\nu\nu)\tilde{\chi}_1^0$	2 e, μ	0-3 jets	-	20	$\tilde{g}$ 1.38 TeV	$m(\tilde{\chi}_1^0)$=0 GeV	1501.03555
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow qqWZ\tilde{\chi}_1^0$	0	7-10 jets	Yes	3.2	$\tilde{g}$ 1.4 TeV	$m(\tilde{\chi}_1^0)$ =100 GeV	1602.06194
	GMSB ($\tilde{\ell}$ NLSP)	1-2 τ + 0-1 ℓ	0-2 jets	Yes	3.2	$\tilde{g}$ 2.0 TeV		*To appear*
	GGM (bino NLSP)	2 γ	-	Yes	3.2	$\tilde{g}$ 1.65 TeV	$c\tau$(NLSP)<0.1 mm	1606.09150
	GGM (higgsino-bino NLSP)	γ	1 b	Yes	20.3	$\tilde{g}$ 1.37 TeV	$m(\tilde{\chi}_1^0)$<950 GeV, $c\tau$(NLSP)<0.1 mm, μ<0	1507.05493
	GGM (higgsino-bino NLSP)	γ	2 jets	Yes	20.3	$\tilde{g}$ 1.3 TeV	$m(\tilde{\chi}_1^0)$<850 GeV, $c\tau$(NLSP)<0.1 mm, μ>0	1507.05493
	GGM (higgsino NLSP)	2 e, μ (Z)	2 jets	Yes	20.3	$\tilde{g}$ 900 GeV	m(NLSP)>430 GeV	1503.03290
	Gravitino LSP	0	mono-jet	Yes	20.3	$F^{1/2}$ scale 865 GeV	$m(\tilde{G})>1.8\times10^{-4}$ eV, $m(\tilde{g})=m(\tilde{q})$=1.5 TeV	1502.01518
3rd gen. $\tilde{g}$ med.	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow b\bar{b}\tilde{\chi}_1^0$	0	3 b	Yes	3.3	$\tilde{g}$ 1.78 TeV	$m(\tilde{\chi}_1^0)$<800 GeV	1605.09318
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow t\bar{t}\tilde{\chi}_1^0$	0-1 e, μ	3 b	Yes	3.3	$\tilde{g}$ 1.8 TeV	$m(\tilde{\chi}_1^0)$=0 GeV	1605.09318
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow b\bar{t}\tilde{\chi}_1^+$	0-1 e, μ	3 b	Yes	2		$m(\tilde{\chi}_1^0)$<300 GeV	1407.0600
3rd gen. squarks direct production	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1\rightarrow b\tilde{\chi}_1^0$	0	2 b	Yes			$m(\tilde{\chi}_1^0)$<100 GeV	1606.08772
	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1\rightarrow t\tilde{\chi}_1^{\pm}$	2 e, μ (SS)	0-3 b	Yes			$m(\tilde{\chi}_1^0)$=50 GeV, $m(\tilde{\chi}_1^{\pm})=m(\tilde{\chi}_1^0)$+100 GeV	1602.09058
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\rightarrow b\tilde{\chi}_1^{\pm}$	1-2 e, μ	1-2 b	Yes	4.7/2		$m(\tilde{\chi}_1^{\pm})$ = 2$m(\tilde{\chi}_1^0)$, $m(\tilde{\chi}_1^0)$=55 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	2		$m(\tilde{\chi}_1^0)$=1 GeV	1506.08616, 1606.03903
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\rightarrow c\tilde{\chi}_1^0$	0	mono-jet/c-tag	Yes	2		$m(\tilde{t}_1)-m(\tilde{\chi}_1^0)$<85 GeV	1407.0608
	$\tilde{t}_1\tilde{t}_1$(natural GMSB)	2 e, μ (Z)	1 b	Yes	20.3	$\tilde{t}_1$ 150-600 GeV	$m(\tilde{\chi}_1^0)$>150 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	$\tilde{t}_2$ 290-610 GeV	$m(\tilde{\chi}_1^0)$<200 GeV	1403.5222
	$\tilde{t}_2\tilde{t}_2, \tilde{t}_2\rightarrow\tilde{t}_1+h$	1 e, μ	6 jets + 2 b	Yes	20.3	$\tilde{t}_2$ 320-620 GeV	$m(\tilde{\chi}_1^0)$=0 GeV	1506.08616
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 GeV	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\rightarrow\tilde{\ell}\nu(\ell\tilde{\nu})$	2 e, μ	0	Yes	20.3	$\tilde{\chi}_1^{\pm}$ 140-475 GeV	$m(\tilde{\chi}_1^0)$=0 GeV, $m(\tilde{\ell}, \tilde{\nu})=0.5(m(\tilde{\chi}_1^{\pm})+m(\tilde{\chi}_1^0))$	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\rightarrow\tilde{\tau}\nu(\tau\tilde{\nu})$	2 τ	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$ 355 GeV	$m(\tilde{\chi}_1^0)$=0 GeV, $m(\tilde{\tau}, \tilde{\nu})=0.5(m(\tilde{\chi}_1^{\pm})+m(\tilde{\chi}_1^0))$	1407.0350
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\rightarrow\tilde{\ell}_L\nu\tilde{\ell}_L\ell(\tilde{\nu}\nu), \ell\tilde{\nu}\tilde{\ell}_L\ell(\tilde{\nu}\nu)$	3 e, μ	0	Yes	20.3	$\tilde{\chi}_1^{\pm}, \tilde{\chi}_2^0$ 715 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
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\rightarrow W\tilde{\chi}_1^0 Z\tilde{\chi}_1^0$	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, sleptons decoupled	1403.5294, 1402.7029
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\rightarrow W\tilde{\chi}_1^0 h\tilde{\chi}_1^0, h\rightarrow b\bar{b}/WW/\tau\tau/\gamma\gamma$	e, 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, 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	$\tilde{\chi}_{2,3}^0$ 635 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, μ + γ	-	Yes	20.3	$\tilde{W}$ 115-370 GeV	$c\tau$<1 mm	1507.05493
	GGM (bino NLSP) weak prod.	2 γ	-	Yes	20.3	$\tilde{W}$ 590 GeV	$c\tau$<1 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	$m(\tilde{\chi}_1^{\pm})-m(\tilde{\chi}_1^0)$~160 MeV, $\tau(\tilde{\chi}_1^{\pm})$=0.2 ns	1310.3675
	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	$m(\tilde{\chi}_1^{\pm})-m(\tilde{\chi}_1^0)$~160 MeV, $\tau(\tilde{\chi}_1^{\pm})$<15 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 GeV, 10 μs<$\tau(\tilde{g})$<1000 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 GeV, τ>10 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<tanβ<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 ns, SPS8 model	1409.5542
	$\tilde{g}\tilde{g}, \tilde{\chi}_1^0\rightarrow eev/e\mu\nu/\mu\mu\nu$	displ. $ee/e\mu/\mu\mu$	-	-	20.3	$\tilde{\chi}_1^0$ 1.0 TeV	7 <$c\tau(\tilde{\chi}_1^0)$< 740 mm, $m(\tilde{g})$=1.3 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 mm, $m(\tilde{g})$=1.1 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	λ'_{311}=0.11, $\lambda_{132/133/233}$=0.07	1503.04430
	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 mm	1404.2500
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\rightarrow W\tilde{\chi}_1^0, \tilde{\chi}_1^0\rightarrow ee\tilde{\nu}_\mu, e\mu\tilde{\nu}_e$	4 e, μ	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$ 760 GeV	$m(\tilde{\chi}_1^0)$>0.2×$m(\tilde{\chi}_1^{\pm})$, $\lambda_{121}\neq0$	1405.5086
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\rightarrow W\tilde{\chi}_1^0, \tilde{\chi}_1^0\rightarrow\tau\tau\tilde{\nu}_e, e\tau\tilde{\nu}_\tau$	3 e, μ + τ	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$ 450 GeV	$m(\tilde{\chi}_1^0)$>0.2×$m(\tilde{\chi}_1^{\pm})$, $\lambda_{133}\neq0$	1405.5086
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow qqq$	0	6-7 jets	-	20.3	$\tilde{g}$ 917 GeV	BR(t)=BR(b)=BR(c)=0%	1502.05686
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow qq\tilde{\chi}_1^0, \tilde{\chi}_1^0\rightarrow qqq$	0	6-7 jets	-	20.3	$\tilde{g}$ 980 GeV	$m(\tilde{\chi}_1^0)$=600 GeV	1502.05686
	$\tilde{g}\tilde{g}, \tilde{g}\rightarrow\tilde{t}_1 t, \tilde{t}_1\rightarrow bs$	2 e, μ (SS)	0-3 b	Yes	20.3	$\tilde{g}$ 880 GeV		1404.2500
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\rightarrow bs$	0	2 jets + 2 b	-	3.2	$\tilde{t}_1$ 345 GeV		ATLAS-CONF-2016-022
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\rightarrow b\ell$	2 e, μ	2 b	-	20.3	$\tilde{t}_1$ 0.4-1.0 TeV	BR($\tilde{t}_1\rightarrow be/\mu$)>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 GeV	1501.01325

*Only a selection of the available mass limits on new states or phenomena is shown.

Electroweak Production



ATLAS SUSY Searches* - 95% CL Lower Limits

Status: July 2016

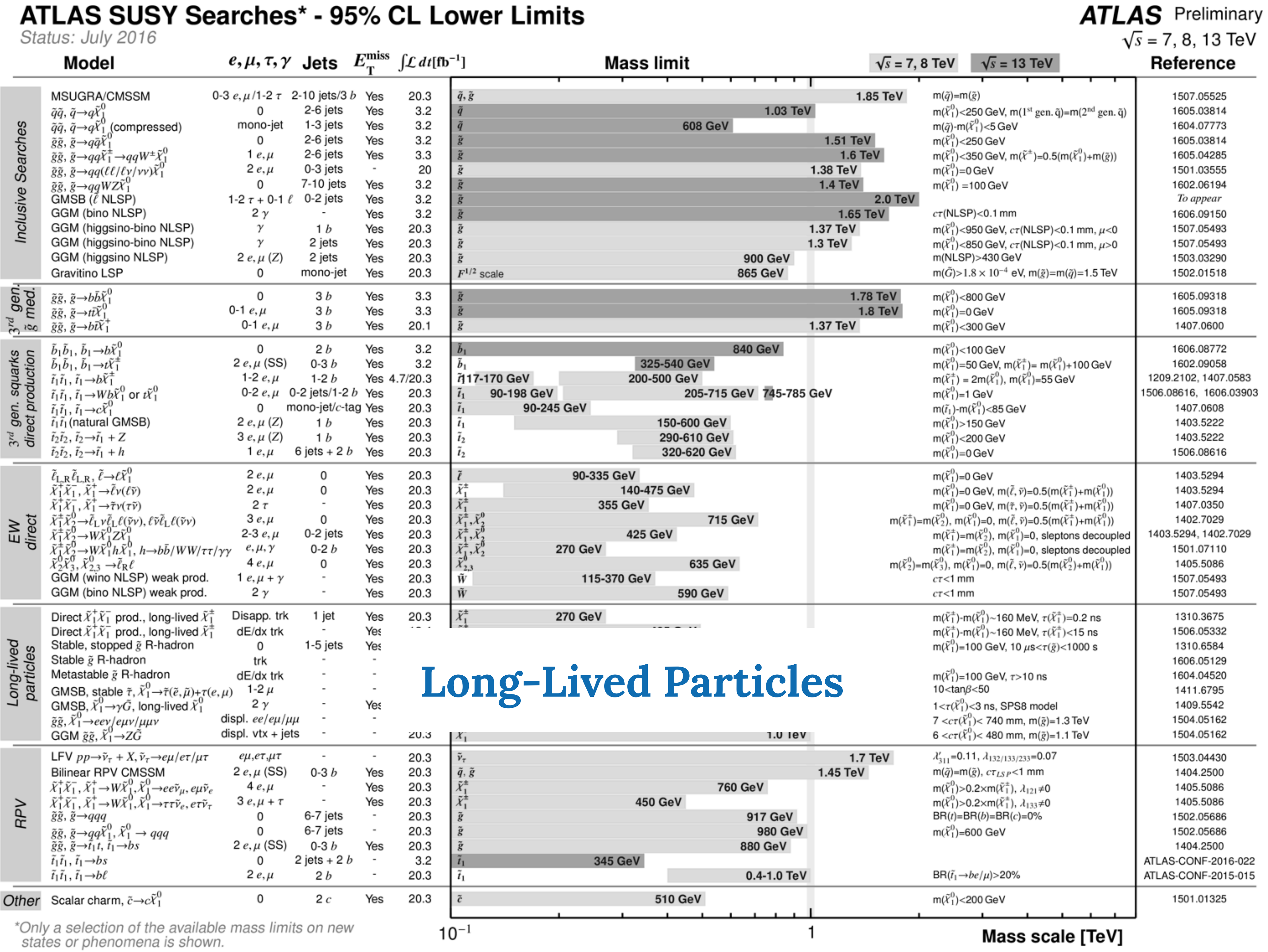
ATLAS Preliminary

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

	Model	e, μ, τ, γ	Jets	E_T^{miss}	$\int \mathcal{L}\, dt[\mathrm{fb}^{-1}]$	Mass limit			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
	$\tilde{q}\tilde{q}, \tilde{q}\to q\tilde{\chi}_1^0$	0	2-6 jets	Yes	3.2	$\tilde{q}$	1.03 TeV	m($\tilde{\chi}_1^0$)<250 GeV, m(1st gen. $\tilde{q}$)=m(2nd gen. $\tilde{q}$)	1605.03814
	$\tilde{q}\tilde{q}, \tilde{q}\to q\tilde{\chi}_1^0$ (compressed)	mono-jet	1-3 jets	Yes	3.2	$\tilde{q}$	608 GeV	m($\tilde{q}$)-m($\tilde{\chi}_1^0$)<5 GeV	1604.07773
	$\tilde{g}\tilde{g}, \tilde{g}\to q\bar{q}\tilde{\chi}_1^0$	0	2-6 jets	Yes	3.2	$\tilde{g}$	1.51 TeV	m($\tilde{\chi}_1^0$)<250 GeV	1605.03814
	$\tilde{g}\tilde{g}, \tilde{g}\to qq\tilde{\chi}_1^\pm\to qqW^\pm\tilde{\chi}_1^0$	1 e,μ	2-6 jets	Yes	3.3	$\tilde{g}$	1.6 TeV	m($\tilde{\chi}_1^0$)<350 GeV, m($\tilde{\chi}^\pm$)=0.5(m($\tilde{\chi}_1^0$)+m($\tilde{g}$))	1605.04285
	$\tilde{g}\tilde{g}, \tilde{g}\to qq(\ell\ell/\ell\nu/\nu\nu)\tilde{\chi}_1^0$	2 e,μ	0-3 jets	-	20	$\tilde{g}$	1.38 TeV	m($\tilde{\chi}_1^0$)=0 GeV	1501.03555
	$\tilde{g}\tilde{g}, \tilde{g}\to qqWZ\tilde{\chi}_1^0$	0	7-10 jets	Yes	3.2	$\tilde{g}$	1.4 TeV	m($\tilde{\chi}_1^0$) =100 GeV	1602.06194
	GMSB ($\tilde{\ell}$ NLSP)	1-2 τ + 0-1 ℓ	0-2 jets	Yes	3.2	$\tilde{g}$	2.0 TeV		*To appear*
	GGM (bino NLSP)	2 γ	-	Yes	3.2	$\tilde{g}$	1.65 TeV	$c\tau$(NLSP)<0.1 mm	1606.09150
	GGM (higgsino-bino NLSP)	γ	1 b	Yes	20.3	$\tilde{g}$	1.37 TeV	m($\tilde{\chi}_1^0$)<950 GeV, $c\tau$(NLSP)<0.1 mm, μ<0	1507.05493
	GGM (higgsino-bino NLSP)	γ	2 jets	Yes	20.3	$\tilde{g}$	1.3 TeV	m($\tilde{\chi}_1^0$)<850 GeV, $c\tau$(NLSP)<0.1 mm, μ>0	1507.05493
	GGM (higgsino NLSP)	2 e,μ (Z)	2 jets	Yes	20.3	$\tilde{g}$	900 GeV	m(NLSP)>430 GeV	1503.03290
	Gravitino LSP	0	mono-jet	Yes	20.3	$F^{1/2}$ scale	865 GeV	m($\tilde{G}$)>1.8×10^{-4} eV, m($\tilde{g}$)=m($\tilde{q}$)=1.5 TeV	1502.01518
3rd gen. $\tilde{g}$ med.	$\tilde{g}\tilde{g}, \tilde{g}\to b\bar{b}\tilde{\chi}_1^0$	0	3 b	Yes	3.3	$\tilde{g}$	1.78 TeV	m($\tilde{\chi}_1^0$)<800 GeV	1605.09318
	$\tilde{g}\tilde{g}, \tilde{g}\to t\bar{t}\tilde{\chi}_1^0$	0-1 e,μ	3 b	Yes	3.3	$\tilde{g}$	1.8 TeV	m($\tilde{\chi}_1^0$)=0 GeV	1605.09318
	$\tilde{g}\tilde{g}, \tilde{g}\to b\bar{t}\tilde{\chi}_1^+$	0-1 e,μ	3 b	Yes	20.1	$\tilde{g}$	1.37 TeV	m($\tilde{\chi}_1^0$)<300 GeV	1407.0600
3rd gen. squarks direct production	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1\to b\tilde{\chi}_1^0$	0	2 b	Yes	3.2	$\tilde{b}_1$	840 GeV	m($\tilde{\chi}_1^0$)<100 GeV	1606.08772
	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1\to t\tilde{\chi}_1^\pm$	2 e,μ (SS)	0-3 b	Yes	3.2	$\tilde{b}_1$	325-540 GeV	m($\tilde{\chi}_1^0$)=50 GeV, m($\tilde{\chi}_1^\pm$)= m($\tilde{\chi}_1^0$)+100 GeV	1602.09058
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to b\tilde{\chi}_1^\pm$	1-2 e,μ	1-2 b	Yes	4.7/20.3	$\tilde{t}_1$	117-170 GeV 200-500 GeV	m($\tilde{\chi}_1^\pm$) = 2m($\tilde{\chi}_1^0$), m($\tilde{\chi}_1^0$)=55 GeV	1209.2102, 1407.0583
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to Wb\tilde{\chi}_1^0$ 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 205-715 GeV 745-785 GeV	m($\tilde{\chi}_1^0$)=1 GeV	1506.08616, 1606.03903
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to c\tilde{\chi}_1^0$	0	mono-jet/c-tag	Yes	20.3	$\tilde{t}_1$	90-245 GeV	m($\tilde{t}_1$)-m($\tilde{\chi}_1^0$)<85 GeV	1407.0608
	$\tilde{t}_1\tilde{t}_1$ (natural GMSB)	2 e,μ (Z)	1 b	Yes	20.3	$\tilde{t}_1$	150-600 GeV	m($\tilde{\chi}_1^0$)>150 GeV	1403.5222
	$\tilde{t}_2\tilde{t}_2, \tilde{t}_2\to\tilde{t}_1 + Z$	3 e,μ (Z)	1 b	Yes	20.3	$\tilde{t}_2$	290-610 GeV	m($\tilde{\chi}_1^0$)<200 GeV	1403.5222
	$\tilde{t}_2\tilde{t}_2, \tilde{t}_2\to\tilde{t}_1 + h$	1 e,μ	6 jets + 2 b	Yes	20.3	$\tilde{t}_2$	320-620 GeV	m($\tilde{\chi}_1^0$)=0 GeV	1506.08616
EW direct	$\tilde{\ell}_{L,R}\tilde{\ell}_{L,R}, \tilde{\ell}\to\ell\tilde{\chi}_1^0$	2 e,μ	0	Yes	20.3	$\tilde{\ell}$	90-335 GeV	m($\tilde{\chi}_1^0$)=0 GeV	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\to\tilde{\ell}\nu(\ell\tilde{\nu})$	2 e,μ	0	Yes	20.3	$\tilde{\chi}_1^\pm$	140-475 GeV	m($\tilde{\chi}_1^0$)=0 GeV, m($\tilde{\ell}, \tilde{\nu}$)=0.5(m($\tilde{\chi}_1^\pm$)+m($\tilde{\chi}_1^0$))	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\to\tilde{\tau}\nu(\tau\tilde{\nu})$	2 τ	-					m($\tilde{\chi}_1^0$)=0 GeV, m($\tilde{\tau}, \tilde{\nu}$)=0.5(m($\tilde{\chi}_1^\pm$)+m($\tilde{\chi}_1^0$))	1407.0350
	$\tilde{\chi}_1^\pm\tilde{\chi}_2^0\to\tilde{\ell}_L\nu\tilde{\ell}_L\ell(\tilde{\nu}\nu), \ell\tilde{\nu}\tilde{\ell}_L\ell(\tilde{\nu}\nu)$	3 e,μ	0					)=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
	$\tilde{\chi}_1^\pm\tilde{\chi}_2^0\to W\tilde{\chi}_1^0 Z\tilde{\chi}_1^0$	2-3 e,μ	0-2 jet					m($\tilde{\chi}_1^\pm$)=m($\tilde{\chi}_2^0$), m($\tilde{\chi}_1^0$)=0, sleptons decoupled	1403.5294, 1402.7029
	$\tilde{\chi}_1^\pm\tilde{\chi}_2^0\to W\tilde{\chi}_1^0 h\tilde{\chi}_1^0, h\to b\bar{b}/WW/\tau\tau/\gamma\gamma$	e,μ,γ	0-2 b					m($\tilde{\chi}_1^\pm$)=m($\tilde{\chi}_2^0$), m($\tilde{\chi}_1^0$)=0, sleptons decoupled	1501.07110
	$\tilde{\chi}_2^0\tilde{\chi}_3^0, \tilde{\chi}_{2,3}^0\to\tilde{\ell}_R\ell$	4 e,μ	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,μ + γ	-					$c\tau$<1 mm	1507.05493
	GGM (bino NLSP) weak prod.	2 γ	-					$c\tau$<1 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($\tilde{\chi}_1^0$)~160 MeV, τ($\tilde{\chi}_1^\pm$)=0.2 ns	1310.3675
	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($\tilde{\chi}_1^0$)~160 MeV, τ($\tilde{\chi}_1^\pm$)<15 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 GeV, 10 μs<τ($\tilde{g}$)<1000 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 GeV, τ>10 ns	1604.04520
	GMSB, stable $\tilde{\tau}, \tilde{\chi}_1^0\to\tilde{\tau}(\tilde{e},\tilde{\mu})+\tau(e,\mu)$	1-2 μ	-	-	19.1	$\tilde{\chi}_1^0$	537 GeV	10<tanβ<50	1411.6795
	GMSB, $\tilde{\chi}_1^0\to\gamma\tilde{G}$, long-lived $\tilde{\chi}_1^0$	2 γ	-	Yes	20.3	$\tilde{\chi}_1^0$	440 GeV	1<τ($\tilde{\chi}_1^0$)<3 ns, SPS8 model	1409.5542
	$\tilde{g}\tilde{g}, \tilde{\chi}_1^0\to ee\nu/e\mu\nu/\mu\mu\nu$	displ. $ee/e\mu/\mu\mu$	-	-	20.3	$\tilde{\chi}_1^0$	1.0 TeV	7 <$c\tau$($\tilde{\chi}_1^0$)< 740 mm, m($\tilde{g}$)=1.3 TeV	1504.05162
	GGM $\tilde{g}\tilde{g}, \tilde{\chi}_1^0\to Z\tilde{G}$	displ. vtx + jets	-	-	20.3	$\tilde{\chi}_1^0$	1.0 TeV	6 <$c\tau$($\tilde{\chi}_1^0$)< 480 mm, m($\tilde{g}$)=1.1 TeV	1504.05162
RPV	LFV $pp\to\tilde{\nu}_\tau + X, \tilde{\nu}_\tau\to e\mu/e\tau/\mu\tau$	$e\mu,e\tau,\mu\tau$	-	-	20.3	$\tilde{\nu}_\tau$	1.7 TeV	λ'_{311}=0.11, $\lambda_{132/133/233}$=0.07	1503.04430
	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 mm	1404.2500
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\to W\tilde{\chi}_1^0, \tilde{\chi}_1^0\to ee\tilde{\nu}_\mu, e\mu\tilde{\nu}_e$	4 e,μ	-	Yes	20.3	$\tilde{\chi}_1^\pm$	760 GeV	m($\tilde{\chi}_1^0$)>0.2×m($\tilde{\chi}_1^\pm$), $\lambda_{121}\neq0$	1405.5086
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+\to W\tilde{\chi}_1^0, \tilde{\chi}_1^0\to\tau\tau\tilde{\nu}_e, e\tau\tilde{\nu}_\tau$	3 e,μ + τ	-	Yes	20.3	$\tilde{\chi}_1^\pm$	450 GeV	m($\tilde{\chi}_1^0$)>0.2×m($\tilde{\chi}_1^\pm$), $\lambda_{133}\neq0$	1405.5086
	$\tilde{g}\tilde{g}, \tilde{g}\to qqq$	0	6-7 jets	-	20.3	$\tilde{g}$	917 GeV	BR(t)=BR(b)=BR(c)=0%	1502.05686
	$\tilde{g}\tilde{g}, \tilde{g}\to qq\tilde{\chi}_1^0, \tilde{\chi}_1^0\to qqq$	0	6-7 jets	-	20.3	$\tilde{g}$	980 GeV	m($\tilde{\chi}_1^0$)=600 GeV	1502.05686
	$\tilde{g}\tilde{g}, \tilde{g}\to\tilde{t}_1 t, \tilde{t}_1\to bs$	2 e,μ (SS)	0-3 b	Yes	20.3	$\tilde{g}$	880 GeV		1404.2500
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to bs$	0	2 jets + 2 b	-	3.2	$\tilde{t}_1$	345 GeV		ATLAS-CONF-2016-022
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to b\ell$	2 e,μ	2 b	-	20.3	$\tilde{t}_1$	0.4-1.0 TeV	BR($\tilde{t}_1\to be/\mu$)>20%	ATLAS-CONF-2015-015
Other	Scalar charm, $\tilde{c}\to c\tilde{\chi}_1^0$	0	2 c	Yes	20.3	$\tilde{c}$	510 GeV	m($\tilde{\chi}_1^0$)<200 GeV	1501.01325

*Only a selection of the available mass limits on new states or phenomena is shown.

Long-Lived Particles



ATLAS SUSY Searches* - 95% CL Lower Limits

Status: July 2016

ATLAS Preliminary

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

	Model	e, μ, τ, γ	Jets	E_T^{miss}	$\int \mathcal{L}\, dt[\mathrm{fb}^{-1}]$	Mass limit		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
	$\tilde{q}\tilde{q}, \tilde{q}\to q\tilde{\chi}^0_1$	0	2-6 jets	Yes	3.2	$\tilde{q}$ 1.03 TeV	$m(\tilde{\chi}^0_1)<250$ GeV, m(1st gen. $\tilde{q}$)=m(2nd gen. $\tilde{q}$)	1605.03814
	$\tilde{q}\tilde{q}, \tilde{q}\to q\tilde{\chi}^0_1$ (compressed)	mono-jet	1-3 jets	Yes	3.2	$\tilde{q}$ 608 GeV	$m(\tilde{q})-m(\tilde{\chi}^0_1)<5$ GeV	1604.07773
	$\tilde{g}\tilde{g}, \tilde{g}\to q\bar{q}\tilde{\chi}^0_1$	0	2-6 jets	Yes	3.2	$\tilde{g}$ 1.51 TeV	$m(\tilde{\chi}^0_1)<250$ GeV	1605.03814
	$\tilde{g}\tilde{g}, \tilde{g}\to qq\tilde{\chi}^{\pm}_1\to qqW^{\pm}\tilde{\chi}^0_1$	1 e,μ	2-6 jets	Yes	3.3	$\tilde{g}$ 1.6 TeV	$m(\tilde{\chi}^0_1)<350$ GeV, $m(\tilde{\chi}^{\pm})=0.5(m(\tilde{\chi}^0_1)+m(\tilde{g}))$	1605.04285
	$\tilde{g}\tilde{g}, \tilde{g}\to qq(\ell\ell/\ell\nu/\nu\nu)\tilde{\chi}^0_1$	2 e,μ	0-3 jets	-	20	$\tilde{g}$ 1.38 TeV	$m(\tilde{\chi}^0_1)=0$ GeV	1501.03555
	$\tilde{g}\tilde{g}, \tilde{g}\to qqWZ\tilde{\chi}^0_1$	0	7-10 jets	Yes	3.2	$\tilde{g}$ 1.4 TeV	$m(\tilde{\chi}^0_1)$ =100 GeV	1602.06194
	GMSB ($\tilde{\ell}$ NLSP)	1-2 τ + 0-1 ℓ	0-2 jets	Yes	3.2	$\tilde{g}$ 2.0 TeV		*To appear*
	GGM (bino NLSP)	2 γ	-	Yes	3.2	$\tilde{g}$ 1.65 TeV	$c\tau$(NLSP)<0.1 mm	1606.09150
	GGM (higgsino-bino NLSP)	γ	1 b	Yes	20.3	$\tilde{g}$ 1.37 TeV	$m(\tilde{\chi}^0_1)<950$ GeV, $c\tau$(NLSP)<0.1 mm, $\mu<0$	1507.05493
	GGM (higgsino-bino NLSP)	γ	2 jets	Yes	20.3	$\tilde{g}$ 1.3 TeV	$m(\tilde{\chi}^0_1)<850$ GeV, $c\tau$(NLSP)<0.1 mm, $\mu>0$	1507.05493
	GGM (higgsino NLSP)	2 e,μ (Z)	2 jets	Yes	20.3	$\tilde{g}$ 900 GeV	m(NLSP)>430 GeV	1503.03290
	Gravitino LSP	0	mono-jet	Yes	20.3	$F^{1/2}$ scale 865 GeV	$m(\tilde{G})>1.8\times10^{-4}$ eV, $m(\tilde{g})=m(\tilde{q})=1.5$ TeV	1502.01518
3rd gen. $\tilde{g}$ med.	$\tilde{g}\tilde{g}, \tilde{g}\to b\bar{b}\tilde{\chi}^0_1$	0	3 b	Yes	3.3	$\tilde{g}$ 1.78 TeV	$m(\tilde{\chi}^0_1)<800$ GeV	1605.09318
	$\tilde{g}\tilde{g}, \tilde{g}\to t\bar{t}\tilde{\chi}^0_1$	0-1 e,μ	3 b	Yes	3.3	$\tilde{g}$ 1.8 TeV	$m(\tilde{\chi}^0_1)=0$ GeV	1605.09318
	$\tilde{g}\tilde{g}, \tilde{g}\to b\bar{t}\tilde{\chi}^+_1$	0-1 e,μ	3 b	Yes	20.1	$\tilde{g}$ 1.37 TeV	$m(\tilde{\chi}^0_1)<300$ GeV	1407.0600
3rd gen. squarks direct production	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1\to b\tilde{\chi}^0_1$	0	2 b	Yes	3.2	$\tilde{b}_1$ 840 GeV	$m(\tilde{\chi}^0_1)<100$ GeV	1606.08772
	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1\to t\tilde{\chi}^{\pm}_1$	2 e,μ (SS)	0-3 b	Yes	3.2	$\tilde{b}_1$ 325-540 GeV	$m(\tilde{\chi}^0_1)=50$ GeV, $m(\tilde{\chi}^{\pm}_1)=m(\tilde{\chi}^0_1)+100$ GeV	1602.09058
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to b\tilde{\chi}^{\pm}_1$	1-2 e,μ	1-2 b	Yes	4.7/20.3	$\tilde{t}_1$ 117-170 GeV 200-500 GeV	$m(\tilde{\chi}^{\pm}_1) = 2m(\tilde{\chi}^0_1)$, $m(\tilde{\chi}^0_1)=55$ GeV	1209.2102, 1407.0583
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to Wb\tilde{\chi}^0_1$ or $t\tilde{\chi}^0_1$	0-2 e,μ	0-2 jets/1-2 b	Yes	20.3	$\tilde{t}_1$ 90-198 GeV 205-715 GeV 745-785 GeV	$m(\tilde{\chi}^0_1)=1$ GeV	1506.08616, 1606.03903
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to c\tilde{\chi}^0_1$	0	mono-jet/c-tag	Yes	20.3	$\tilde{t}_1$ 90-245 GeV	$m(\tilde{t}_1)-m(\tilde{\chi}^0_1)<85$ GeV	1407.0608
	$\tilde{t}_1\tilde{t}_1$ (natural GMSB)	2 e,μ (Z)	1 b	Yes	20.3	$\tilde{t}_1$ 150-600 GeV	$m(\tilde{\chi}^0_1)>150$ GeV	1403.5222
	$\tilde{t}_2\tilde{t}_2, \tilde{t}_2\to\tilde{t}_1 + Z$	3 e,μ (Z)	1 b	Yes	20.3	$\tilde{t}_2$ 290-610 GeV	$m(\tilde{\chi}^0_1)<200$ GeV	1403.5222
	$\tilde{t}_2\tilde{t}_2, \tilde{t}_2\to\tilde{t}_1 + h$	1 e,μ	6 jets + 2 b	Yes	20.3	$\tilde{t}_2$ 320-620 GeV	$m(\tilde{\chi}^0_1)=0$ GeV	1506.08616
EW direct	$\tilde{\ell}_{L,R}\tilde{\ell}_{L,R}, \tilde{\ell}\to\ell\tilde{\chi}^0_1$	2 e,μ	0	Yes	20.3	$\tilde{\ell}$ 90-335 GeV	$m(\tilde{\chi}^0_1)=0$ GeV	1403.5294
	$\tilde{\chi}^+_1\tilde{\chi}^-_1, \tilde{\chi}^+_1\to\tilde{\ell}\nu(\ell\tilde{\nu})$	2 e,μ	0	Yes	20.3	$\tilde{\chi}^{\pm}_1$ 140-475 GeV	$m(\tilde{\chi}^0_1)=0$ GeV, $m(\tilde{\ell},\tilde{\nu})=0.5(m(\tilde{\chi}^{\pm}_1)+m(\tilde{\chi}^0_1))$	1403.5294
	$\tilde{\chi}^+_1\tilde{\chi}^-_1, \tilde{\chi}^+_1\to\tilde{\tau}\nu(\tau\tilde{\nu})$	2 τ	-	Yes	20.3	$\tilde{\chi}^{\pm}_1$ 355 GeV	$m(\tilde{\chi}^0_1)=0$ GeV, $m(\tilde{\tau},\tilde{\nu})=0.5(m(\tilde{\chi}^{\pm}_1)+m(\tilde{\chi}^0_1))$	1407.0350
	$\tilde{\chi}^{\pm}_1\tilde{\chi}^0_2\to\tilde{\ell}_L\nu\tilde{\ell}_L\ell(\tilde{\nu}\nu), \ell\tilde{\nu}\tilde{\ell}_L\ell(\tilde{\nu}\nu)$	3 e,μ	0	Yes	20.3	$\tilde{\chi}^{\pm}_1, \tilde{\chi}^0_2$ 715 GeV	$m(\tilde{\chi}^{\pm}_1)=m(\tilde{\chi}^0_2)$, $m(\tilde{\chi}^0_1)=0$, $m(\tilde{\ell},\tilde{\nu})=0.5(m(\tilde{\chi}^{\pm}_1)+m(\tilde{\chi}^0_1))$	1402.7029
	$\tilde{\chi}^{\pm}_1\tilde{\chi}^0_2\to W\tilde{\chi}^0_1 Z\tilde{\chi}^0_1$	2-3 e,μ	0-2 jets	Yes	20.3	$\tilde{\chi}^{\pm}_1, \tilde{\chi}^0_2$ 425 GeV	$m(\tilde{\chi}^{\pm}_1)=m(\tilde{\chi}^0_2)$, $m(\tilde{\chi}^0_1)=0$, sleptons decoupled	1403.5294, 1402.7029
	$\tilde{\chi}^{\pm}_1\tilde{\chi}^0_2\to W\tilde{\chi}^0_1 h\tilde{\chi}^0_1, h\to b\bar{b}/WW/\tau\tau/\gamma\gamma$	e,μ,γ	0-2 b	Yes	20.3	$\tilde{\chi}^{\pm}_1, \tilde{\chi}^0_2$ 270 GeV	$m(\tilde{\chi}^{\pm}_1)=m(\tilde{\chi}^0_2)$, $m(\tilde{\chi}^0_1)=0$, sleptons decoupled	1501.07110
	$\tilde{\chi}^0_2\tilde{\chi}^0_3, \tilde{\chi}^0_{2,3}\to\tilde{\ell}_R\ell$	4 e,μ	0	Yes	20.3	$\tilde{\chi}^0_{2,3}$ 635 GeV	$m(\tilde{\chi}^0_2)=m(\tilde{\chi}^0_3)$, $m(\tilde{\chi}^0_1)=0$, $m(\tilde{\ell},\tilde{\nu})=0.5(m(\tilde{\chi}^0_2)+m(\tilde{\chi}^0_1))$	1405.5086
	GGM (wino NLSP) weak prod.	1 e,μ + γ	-	Yes	20.3	$\tilde{W}$ 115-370 GeV	$c\tau<1$ mm	1507.05493
	GGM (bino NLSP) weak prod.	2 γ	-	Yes	20.3	$\tilde{W}$ 590 GeV	$c\tau<1$ mm	1507.05493
Long-lived particles	Direct $\tilde{\chi}^+_1\tilde{\chi}^-_1$ prod., long-lived $\tilde{\chi}^{\pm}_1$	Disapp. trk	1 jet	Yes	20.3	$\tilde{\chi}^{\pm}_1$ 270 GeV	$m(\tilde{\chi}^{\pm}_1)-m(\tilde{\chi}^0_1)\sim160$ MeV, $\tau(\tilde{\chi}^{\pm}_1)=0.2$ ns	1310.3675
	Direct $\tilde{\chi}^+_1\tilde{\chi}^-_1$ prod., long-lived $\tilde{\chi}^{\pm}_1$	dE/dx trk	-	Yes			$m(\tilde{\chi}^{\pm}_1)-m(\tilde{\chi}^0_1)\sim160$ MeV, $\tau(\tilde{\chi}^{\pm}_1)<15$ ns	1506.05332
	Stable, stopped $\tilde{g}$ R-hadron	0	1-5 jets	Yes			$m(\tilde{\chi}^0_1)=100$ GeV, 10 μs$<\tau(\tilde{g})<1000$ s	1310.6584
	Stable $\tilde{g}$ R-hadron	trk	-	-				1606.05129
	Metastable $\tilde{g}$ R-hadron	dE/dx trk	-	-			$m(\tilde{\chi}^0_1)=100$ GeV, $\tau>10$ ns	1604.04520
	GMSB, stable $\tilde{\tau}, \tilde{\chi}^0_1\to\tilde{\tau}(\tilde{e},\tilde{\mu})+\tau(e,\mu)$	1-2 μ	-	-			10<tanβ<50	1411.6795
	GMSB, $\tilde{\chi}^0_1\to\gamma\tilde{G}$, long-lived $\tilde{\chi}^0_1$	2 γ	-	Yes			$1<\tau(\tilde{\chi}^0_1)<3$ ns, SPS8 model	1409.5542
	$\tilde{g}\tilde{g}, \tilde{\chi}^0_1\to ee\nu/e\mu\nu/\mu\mu\nu$	displ. $ee/e\mu/\mu\mu$	-	-			$7 <c\tau(\tilde{\chi}^0_1)< 740$ mm, $m(\tilde{g})=1.3$ TeV	1504.05162
	GGM $\tilde{g}\tilde{g}, \tilde{\chi}^0_1\to Z\tilde{G}$	displ. vtx + jets	-	-	20.3	$\tilde{\chi}^0_1$ 1.0 TeV	$6 <c\tau(\tilde{\chi}^0_1)< 480$ mm, $m(\tilde{g})=1.1$ TeV	1504.05162
RPV	LFV $pp\to\tilde{\nu}_\tau + X, \tilde{\nu}_\tau\to e\mu/e\tau/\mu\tau$	$e\mu,e\tau,\mu\tau$	-	-	20.3	$\tilde{\nu}_\tau$ 1.7 TeV	$\lambda'_{311}=0.11$, $\lambda_{132/133/233}=0.07$	1503.04430
	Bilinear RPV CMSSM	2 e,μ (SS)	0-3 b	Yes	20.3	$\tilde{q}, \tilde{g}$ 1.45 TeV	$m(\tilde{q})=m(\tilde{g})$, $c\tau_{LSP}<1$ mm	1404.2500
	$\tilde{\chi}^+_1\tilde{\chi}^-_1, \tilde{\chi}^+_1\to W\tilde{\chi}^0_1, \tilde{\chi}^0_1\to ee\tilde{\nu}_\mu, e\mu\tilde{\nu}_e$	4 e,μ	-	Yes	20.3	$\tilde{\chi}^{\pm}_1$ 760 GeV	$m(\tilde{\chi}^0_1)>0.2\times m(\tilde{\chi}^{\pm}_1)$, $\lambda_{121}\neq0$	1405.5086
	$\tilde{\chi}^+_1\tilde{\chi}^-_1, \tilde{\chi}^+_1\to W\tilde{\chi}^0_1, \tilde{\chi}^0_1\to\tau\tau\tilde{\nu}_e, e\tau\tilde{\nu}_\tau$	3 e,μ + τ	-	Yes	20.3	$\tilde{\chi}^{\pm}_1$ 450 GeV	$m(\tilde{\chi}^0_1)>0.2\times m(\tilde{\chi}^{\pm}_1)$, $\lambda_{133}\neq0$	1405.5086
	$\tilde{g}\tilde{g}, \tilde{g}\to qqq$	0	6-7 jets	-	20.3	$\tilde{g}$ 917 GeV	BR(t)=BR(b)=BR(c)=0%	1502.05686
	$\tilde{g}\tilde{g}, \tilde{g}\to qq\tilde{\chi}^0_1, \tilde{\chi}^0_1\to qqq$	0	6-7 jets	-	20.3	$\tilde{g}$ 980 GeV	$m(\tilde{\chi}^0_1)=600$ GeV	1502.05686
	$\tilde{g}\tilde{g}, \tilde{g}\to\tilde{t}_1 t, \tilde{t}_1\to bs$	2 e,μ (SS)	0-3 b	Yes	20.3	$\tilde{g}$ 880 GeV		1404.2500
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to bs$	0	2 jets + 2 b	-	3.2	$\tilde{t}_1$ 345 GeV		ATLAS-CONF-2016-022
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1\to b\ell$	2 e,μ	2 b	-	20.3	$\tilde{t}_1$ 0.4-1.0 TeV	BR($\tilde{t}_1\to be/\mu$)>20%	ATLAS-CONF-2015-015
Other	Scalar charm, $\tilde{c}\to c\tilde{\chi}^0_1$	0	2 c	Yes	20.3	$\tilde{c}$ 510 GeV	$m(\tilde{\chi}^0_1)<200$ GeV	1501.01325

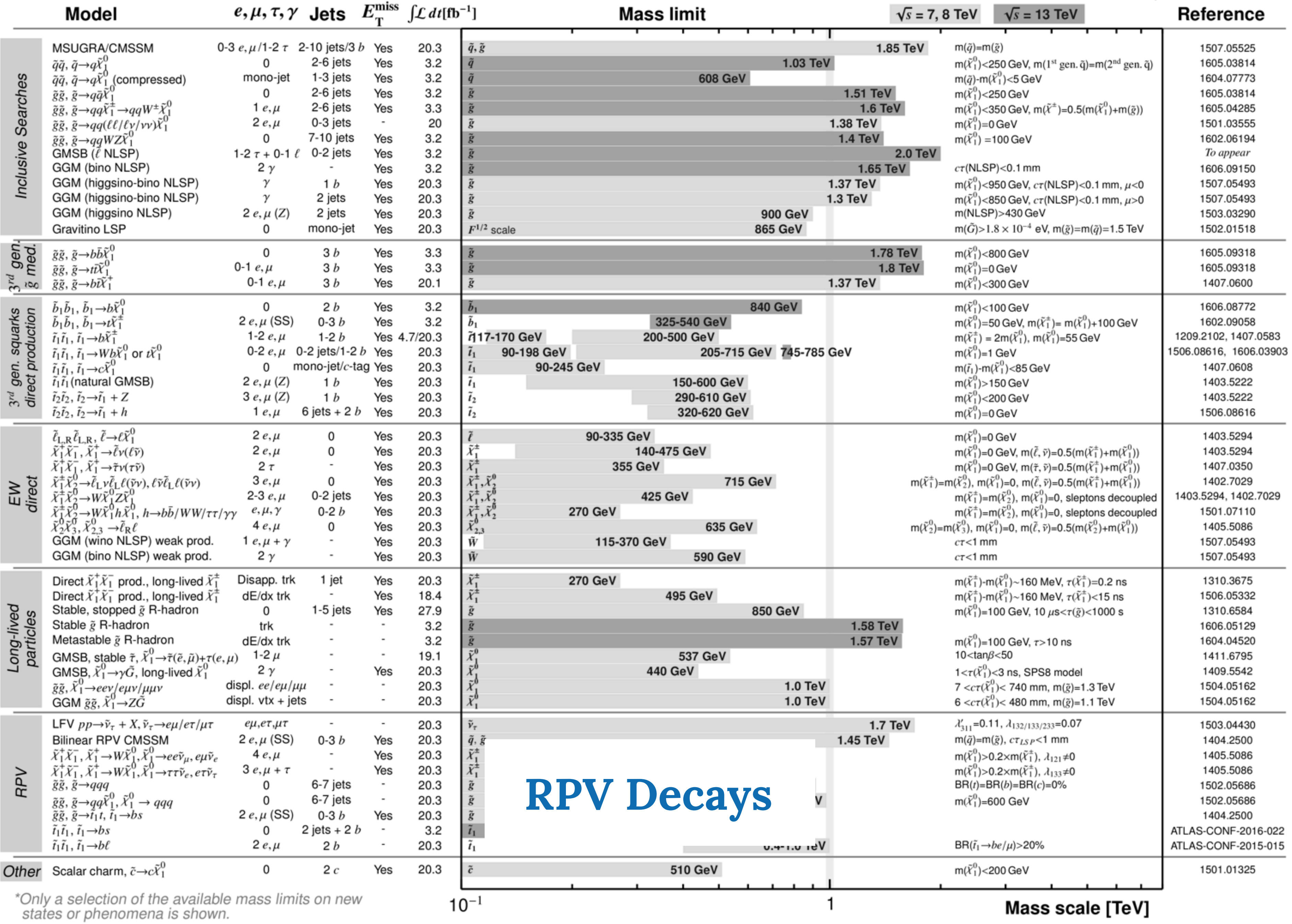
*Only a selection of the available mass limits on new states or phenomena is shown.

ATLAS SUSY Searches* - 95% CL Lower Limits

Status: July 2016

ATLAS Preliminary

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



	Model	e,μ,τ,γ	Jets	E_T^{miss}	$\int\mathcal{L}\,dt[\mathrm{fb}^{-1}]$	Mass limit		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
	$\tilde{q}\tilde{q}$, $\tilde{q}\to q\tilde{\chi}_1^0$	0	2-6 jets	Yes	3.2	$\tilde{q}$ 1.03 TeV	m($\tilde{\chi}_1^0$)<250 GeV, m(1^{st} gen. $\tilde{q}$)=m(2^{nd} gen. $\tilde{q}$)	1605.03814
	$\tilde{q}\tilde{q}$, $\tilde{q}\to q\tilde{\chi}_1^0$ (compressed)	mono-jet	1-3 jets	Yes	3.2	$\tilde{q}$ 608 GeV	m($\tilde{q}$)-m($\tilde{\chi}_1^0$)<5 GeV	1604.07773
	$\tilde{g}\tilde{g}$, $\tilde{g}\to q\bar{q}\tilde{\chi}_1^0$	0	2-6 jets	Yes	3.2	$\tilde{g}$ 1.51 TeV	m($\tilde{\chi}_1^0$)<250 GeV	1605.03814
	$\tilde{g}\tilde{g}$, $\tilde{g}\to qq\tilde{\chi}_1^{\pm}\to qqW^{\pm}\tilde{\chi}_1^0$	1 e,μ	2-6 jets	Yes	3.3	$\tilde{g}$ 1.6 TeV	m($\tilde{\chi}_1^0$)<350 GeV, m($\tilde{\chi}^{\pm}$)=0.5(m($\tilde{\chi}_1^0$)+m($\tilde{g}$))	1605.04285
	$\tilde{g}\tilde{g}$, $\tilde{g}\to qq(\ell\ell/\ell\nu/\nu\nu)\tilde{\chi}_1^0$	2 e,μ	0-3 jets	-	20	$\tilde{g}$ 1.38 TeV	m($\tilde{\chi}_1^0$)=0 GeV	1501.03555
	$\tilde{g}\tilde{g}$, $\tilde{g}\to qqWZ\tilde{\chi}_1^0$	0	7-10 jets	Yes	3.2	$\tilde{g}$ 1.4 TeV	m($\tilde{\chi}_1^0$) =100 GeV	1602.06194
	GMSB ($\tilde{\ell}$ NLSP)	1-2 τ + 0-1 ℓ	0-2 jets	Yes	3.2	$\tilde{g}$ 2.0 TeV		*To appear*
	GGM (bino NLSP)	2 γ	-	Yes	3.2	$\tilde{g}$ 1.65 TeV	$c\tau$(NLSP)<0.1 mm	1606.09150
	GGM (higgsino-bino NLSP)	γ	1 b	Yes	20.3	$\tilde{g}$ 1.37 TeV	m($\tilde{\chi}_1^0$)<950 GeV, $c\tau$(NLSP)<0.1 mm, μ<0	1507.05493
	GGM (higgsino-bino NLSP)	γ	2 jets	Yes	20.3	$\tilde{g}$ 1.3 TeV	m($\tilde{\chi}_1^0$)<850 GeV, $c\tau$(NLSP)<0.1 mm, μ>0	1507.05493
	GGM (higgsino NLSP)	2 e,μ (Z)	2 jets	Yes	20.3	$\tilde{g}$ 900 GeV	m(NLSP)>430 GeV	1503.03290
	Gravitino LSP	0	mono-jet	Yes	20.3	$F^{1/2}$ scale 865 GeV	m($\tilde{G}$)>1.8×10^{-4} eV, m($\tilde{g}$)=m($\tilde{q}$)=1.5 TeV	1502.01518
3^{rd} gen. $\tilde{g}$ med.	$\tilde{g}\tilde{g}$, $\tilde{g}\to b\bar{b}\tilde{\chi}_1^0$	0	3 b	Yes	3.3	$\tilde{g}$ 1.78 TeV	m($\tilde{\chi}_1^0$)<800 GeV	1605.09318
	$\tilde{g}\tilde{g}$, $\tilde{g}\to t\bar{t}\tilde{\chi}_1^0$	0-1 e,μ	3 b	Yes	3.3	$\tilde{g}$ 1.8 TeV	m($\tilde{\chi}_1^0$)=0 GeV	1605.09318
	$\tilde{g}\tilde{g}$, $\tilde{g}\to b\bar{t}\tilde{\chi}_1^+$	0-1 e,μ	3 b	Yes	20.1	$\tilde{g}$ 1.37 TeV	m($\tilde{\chi}_1^0$)<300 GeV	1407.0600
3^{rd} gen. squarks direct production	$\tilde{b}_1\tilde{b}_1$, $\tilde{b}_1\to b\tilde{\chi}_1^0$	0	2 b	Yes	3.2	$\tilde{b}_1$ 840 GeV	m($\tilde{\chi}_1^0$)<100 GeV	1606.08772
	$\tilde{b}_1\tilde{b}_1$, $\tilde{b}_1\to t\tilde{\chi}_1^{\pm}$	2 e,μ (SS)	0-3 b	Yes	3.2	$\tilde{b}_1$ 325-540 GeV	m($\tilde{\chi}_1^0$)=50 GeV, m($\tilde{\chi}_1^{\pm}$)= m($\tilde{\chi}_1^0$)+100 GeV	1602.09058
	$\tilde{t}_1\tilde{t}_1$, $\tilde{t}_1\to b\tilde{\chi}_1^{\pm}$	1-2 e,μ	1-2 b	Yes	4.7/20.3	$\tilde{t}_1$ 117-170 GeV 200-500 GeV	m($\tilde{\chi}_1^{\pm}$) = 2m($\tilde{\chi}_1^0$), m($\tilde{\chi}_1^0$)=55 GeV	1209.2102, 1407.0583
	$\tilde{t}_1\tilde{t}_1$, $\tilde{t}_1\to Wb\tilde{\chi}_1^0$ 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 205-715 GeV 745-785 GeV	m($\tilde{\chi}_1^0$)=1 GeV	1506.08616, 1606.03903
	$\tilde{t}_1\tilde{t}_1$, $\tilde{t}_1\to c\tilde{\chi}_1^0$	0	mono-jet/c-tag	Yes	20.3	$\tilde{t}_1$ 90-245 GeV	m($\tilde{t}_1$)-m($\tilde{\chi}_1^0$)<85 GeV	1407.0608
	$\tilde{t}_1\tilde{t}_1$ (natural GMSB)	2 e,μ (Z)	1 b	Yes	20.3	$\tilde{t}_1$ 150-600 GeV	m($\tilde{\chi}_1^0$)>150 GeV	1403.5222
	$\tilde{t}_2\tilde{t}_2$, $\tilde{t}_2\to\tilde{t}_1+Z$	3 e,μ (Z)	1 b	Yes	20.3	$\tilde{t}_2$ 290-610 GeV	m($\tilde{\chi}_1^0$)<200 GeV	1403.5222
	$\tilde{t}_2\tilde{t}_2$, $\tilde{t}_2\to\tilde{t}_1+h$	1 e,μ	6 jets + 2 b	Yes	20.3	$\tilde{t}_2$ 320-620 GeV	m($\tilde{\chi}_1^0$)=0 GeV	1506.08616
EW direct	$\tilde{\ell}_{L,R}\tilde{\ell}_{L,R}$, $\tilde{\ell}\to\ell\tilde{\chi}_1^0$	2 e,μ	0	Yes	20.3	$\tilde{\ell}$ 90-335 GeV	m($\tilde{\chi}_1^0$)=0 GeV	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-$, $\tilde{\chi}_1^+\to\tilde{\ell}\nu(\ell\tilde{\nu})$	2 e,μ	0	Yes	20.3	$\tilde{\chi}_1^{\pm}$ 140-475 GeV	m($\tilde{\chi}_1^0$)=0 GeV, m($\tilde{\ell},\tilde{\nu}$)=0.5(m($\tilde{\chi}_1^{\pm}$)+m($\tilde{\chi}_1^0$))	1403.5294
	$\tilde{\chi}_1^+\tilde{\chi}_1^-$, $\tilde{\chi}_1^+\to\tilde{\tau}\nu(\tau\tilde{\nu})$	2 τ	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$ 355 GeV	m($\tilde{\chi}_1^0$)=0 GeV, m($\tilde{\tau},\tilde{\nu}$)=0.5(m($\tilde{\chi}_1^{\pm}$)+m($\tilde{\chi}_1^0$))	1407.0350
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\to\tilde{\ell}_L\nu\tilde{\ell}_L\ell(\tilde{\nu}\nu)$, $\ell\tilde{\nu}\tilde{\ell}_L\ell(\tilde{\nu}\nu)$	3 e,μ	0	Yes	20.3	$\tilde{\chi}_1^{\pm},\tilde{\chi}_2^0$ 715 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
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\to W\tilde{\chi}_1^0Z\tilde{\chi}_1^0$	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, sleptons decoupled	1403.5294, 1402.7029
	$\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0\to W\tilde{\chi}_1^0h\tilde{\chi}_1^0$, $h\to b\bar{b}/WW/\tau\tau/\gamma\gamma$	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, sleptons decoupled	1501.07110
	$\tilde{\chi}_2^0\tilde{\chi}_3^0$, $\tilde{\chi}_{2,3}^0\to\tilde{\ell}_R\ell$	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($\tilde{\ell},\tilde{\nu}$)=0.5(m($\tilde{\chi}_2^0$)+m($\tilde{\chi}_1^0$))	1405.5086
	GGM (wino NLSP) weak prod.	1 e,μ + γ	-	Yes	20.3	$\tilde{W}$ 115-370 GeV	$c\tau$<1 mm	1507.05493
	GGM (bino NLSP) weak prod.	2 γ	-	Yes	20.3	$\tilde{W}$ 590 GeV	$c\tau$<1 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($\tilde{\chi}_1^0$)~160 MeV, τ($\tilde{\chi}_1^{\pm}$)=0.2 ns	1310.3675
	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($\tilde{\chi}_1^0$)~160 MeV, τ($\tilde{\chi}_1^{\pm}$)<15 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 GeV, 10 μs<τ($\tilde{g}$)<1000 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 GeV, τ>10 ns	1604.04520
	GMSB, stable $\tilde{\tau}$, $\tilde{\chi}_1^0\to\tilde{\tau}(\tilde{e},\tilde{\mu})+\tau(e,\mu)$	1-2 μ	-	-	19.1	$\tilde{\chi}_1^0$ 537 GeV	10<tanβ<50	1411.6795
	GMSB, $\tilde{\chi}_1^0\to\gamma\tilde{G}$, long-lived $\tilde{\chi}_1^0$	2 γ	-	Yes	20.3	$\tilde{\chi}_1^0$ 440 GeV	1<τ($\tilde{\chi}_1^0$)<3 ns, SPS8 model	1409.5542
	$\tilde{g}\tilde{g}$, $\tilde{\chi}_1^0\to ee\nu/e\mu\nu/\mu\mu\nu$	displ. $ee/e\mu/\mu\mu$	-	-	20.3	$\tilde{\chi}_1^0$ 1.0 TeV	7 <$c\tau$($\tilde{\chi}_1^0$)< 740 mm, m($\tilde{g}$)=1.3 TeV	1504.05162
	GGM $\tilde{g}\tilde{g}$, $\tilde{\chi}_1^0\to Z\tilde{G}$	displ. vtx + jets	-	-	20.3	$\tilde{\chi}_1^0$ 1.0 TeV	6 <$c\tau$($\tilde{\chi}_1^0$)< 480 mm, m($\tilde{g}$)=1.1 TeV	1504.05162
RPV	LFV $pp\to\tilde{\nu}_\tau+X$, $\tilde{\nu}_\tau\to e\mu/e\tau/\mu\tau$	$e\mu$,$e\tau$,$\mu\tau$	-	-	20.3	$\tilde{\nu}_\tau$ 1.7 TeV	λ'_{311}=0.11, $\lambda_{132/133/233}$=0.07	1503.04430
	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 mm	1404.2500
	$\tilde{\chi}_1^+\tilde{\chi}_1^-$, $\tilde{\chi}_1^+\to W\tilde{\chi}_1^0$, $\tilde{\chi}_1^0\to ee\tilde{\nu}_\mu, e\mu\tilde{\nu}_e$	4 e,μ	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$	m($\tilde{\chi}_1^0$)>0.2×m($\tilde{\chi}_1^{\pm}$), $\lambda_{121}\neq0$	1405.5086
	$\tilde{\chi}_1^+\tilde{\chi}_1^-$, $\tilde{\chi}_1^+\to W\tilde{\chi}_1^0$, $\tilde{\chi}_1^0\to\tau\tau\tilde{\nu}_e, e\tau\tilde{\nu}_\tau$	3 e,μ + τ	-	Yes	20.3	$\tilde{\chi}_1^{\pm}$	m($\tilde{\chi}_1^0$)>0.2×m($\tilde{\chi}_1^{\pm}$), $\lambda_{133}\neq0$	1405.5086
	$\tilde{g}\tilde{g}$, $\tilde{g}\to qqq$	0	6-7 jets	-	20.3	$\tilde{g}$	BR(t)=BR(b)=BR(c)=0%	1502.05686
	$\tilde{g}\tilde{g}$, $\tilde{g}\to qq\tilde{\chi}_1^0$, $\tilde{\chi}_1^0\to qqq$	0	6-7 jets	-	20.3	$\tilde{g}$ V	m($\tilde{\chi}_1^0$)=600 GeV	1502.05686
	$\tilde{g}\tilde{g}$, $\tilde{g}\to\tilde{t}_1t$, $\tilde{t}_1\to bs$	2 e,μ (SS)	0-3 b	Yes	20.3	$\tilde{g}$		1404.2500
	$\tilde{t}_1\tilde{t}_1$, $\tilde{t}_1\to bs$	0	2 jets + 2 b	-	3.2	$\tilde{t}_1$		ATLAS-CONF-2016-022
	$\tilde{t}_1\tilde{t}_1$, $\tilde{t}_1\to b\ell$	2 e,μ	2 b	-	20.3	$\tilde{t}_1$ 0.4-1.0 TeV	BR($\tilde{t}_1\to be/\mu$)>20%	ATLAS-CONF-2015-015
Other	Scalar charm, $\tilde{c}\to c\tilde{\chi}_1^0$	0	2 c	Yes	20.3	$\tilde{c}$ 510 GeV	m($\tilde{\chi}_1^0$)<200 GeV	1501.01325

*Only a selection of the available mass limits on new states or phenomena is shown.

RPV Decays

ATLAS SUSY results

- **~50 SUSY searches** in ATLAS, many updated to Run 2 data ($\sqrt{s}$ = 13 TeV) already
- All ATLAS SUSY Results:
  - *https://twiki.cern.ch/twiki/bin/view/AtlasPublic/SupersymmetryPublicResults*
- Many recent ATLAS SUSY results have been presented in the past few weeks:
  - **LHCP2016** – *https://indico.cern.ch/event/442390/*
  - **HSQCD2016** - *http://hepd.pnpi.spb.ru/~hsqcd/index.shtml*
  - **SUSY2016** - *http://indico.cern.ch/event/443176/*
- **In the following** I will focus only on **4 of the very latest ATLAS SUSY results**

Analysis	*arXiv*
LLP (pixel+Tile)	1606.05129
Di-photons: $\gamma\gamma$ + MET	1606.09150
ll (Z) + jets + MET	ATLAS-CONF-2015-082
taus + jets + MET	(to appear soon)

All analyses presented
here use
3.2 fb^{-1} @ $\sqrt{s}$=13 TeV
LHC Run 2 data
collected in **2015**

Search for heavy long-lived charged R-hadrons with the ATLAS detector in 3.2 fb^{-1} of proton–proton collision data at $\sqrt{s}$ = 13 TeV

arXiv: **1606.05129**

LLP (PIXEL + CALO)

LLP - Intro

- gluinos/squarks production can produce ***R-hadrons***: **composite colorless** states of squarks/gluinos + SM quarks/gluons
- ***R-hadrons* at LHC** are expected:
  - To be heavy, hence **slow**, with velocity β = v/c < 1
  - To have a ionisation energy loss dE/dx larger than any SM particle
  - To be able to change charge when interacting with the detector material

- This search for *R-hadrons* uses information from the **pixel tracking detector** and the **hadronic calorimeter**, omitting the Muon Spectrometer, to be sensitive to scenarios where *R-hadrons* decay or turn neutral before arriving in the Muon system

- The search uses ***dE/dx*** and **velocity** measurements to infer the **mass**:
  - ***Pixel***, ***dE/dx*** and ***βγ*** with an inverted Bethe-Bloch 5 parameters function
  - ***Calorimeter***, ***β*** with Time-Of-Flight from calo cells information

$$m_{\beta\gamma} = p/\beta\gamma$$

Object selection

R-hadron candidate track:

≥ 7 silicon detector hits

≥ 2 calorimeter clusters used to measure dE/dx

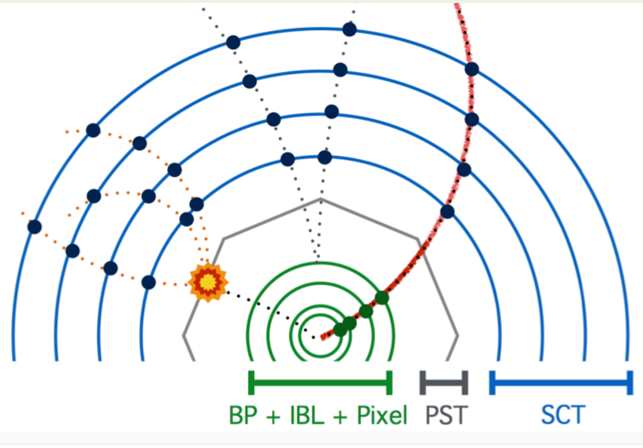
$p_T > 50\ GeV$

$\Delta R \geq 0.3,$ w.r.t. any jet with: $p_T > 50\ GeV,$ anti-$k_t,\ R = 0.4$

$p < 6.5\ TeV$ (unphysical tracks)

$|z_0^{PV} sin(\theta)| \leq 0.5\ mm$ (Z coordinate w.r.t. the PV)

$|d_0| \leq 2.0\ mm$ (IP closest traverse impact parameter)



Cosmic rays rejection:

tracks rejected when a *similar specular track* is observed

Z->muons rejection:

tracks rejected if m_{inv} in [81, 101] GeV

Observable-quality cut:

tracks rejected if $\sigma_\beta < 0.12$

Event selection

Online selection: $E_T^{miss} > 70$ GeV **trigger**, from calo input only
(signal eff. ~ 32%-50%)

Offline selection:

- Primary Vertex: at least 2 tracks with $p_T > 400$ MeV
- At least one *R-hadron* candidate

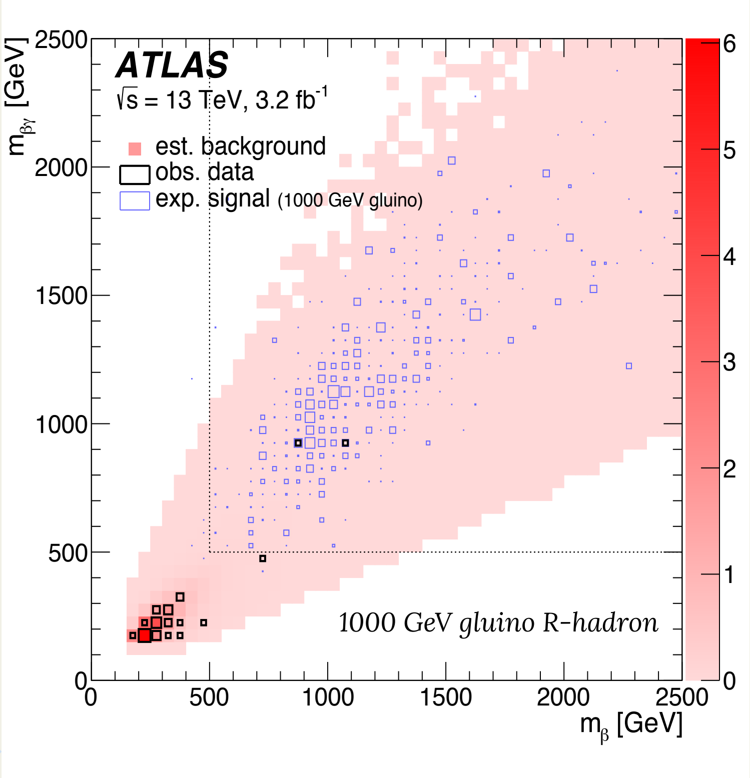
Final signal selection:

$$p_T > 200\ GeV$$

$$\beta < 0.75$$

$$\beta\gamma < \begin{cases} 1.35, & \text{for } m_{R-had} \leq 1.4\ TeV \\ 1.15, & \text{for } m_{R-had} > 1.4\ TeV \end{cases}$$

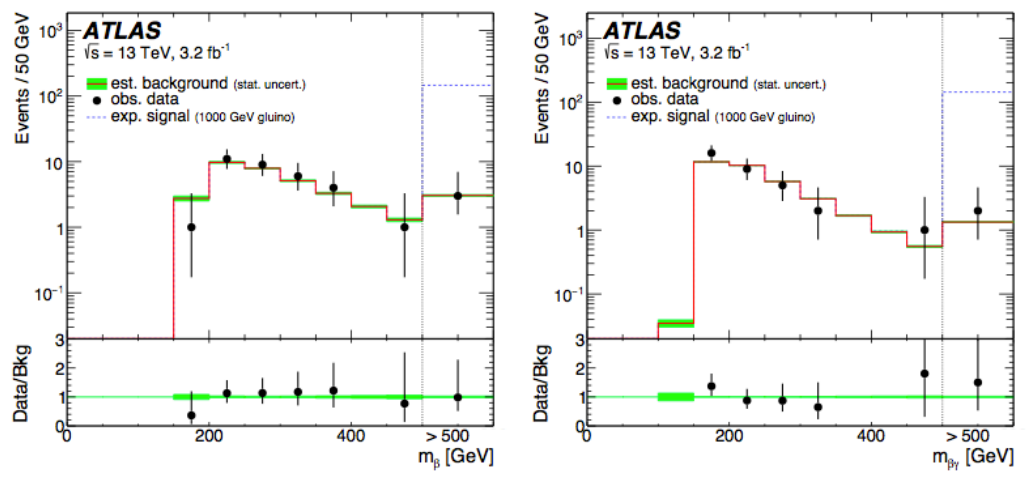
Signal region: defined in the plane m_{β}-$m_{\beta\gamma}$

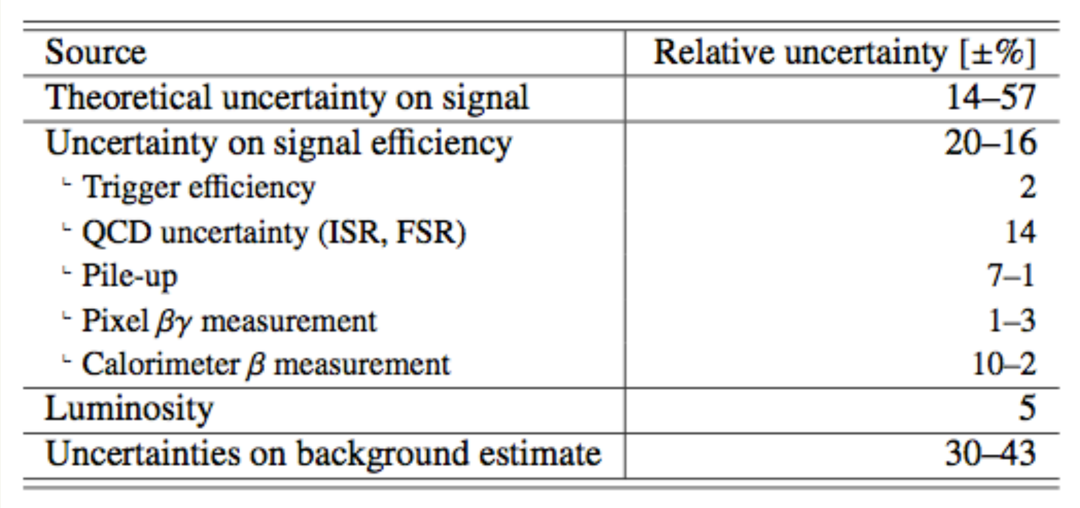


2 events pass final selection, but no statistically significant excess observed

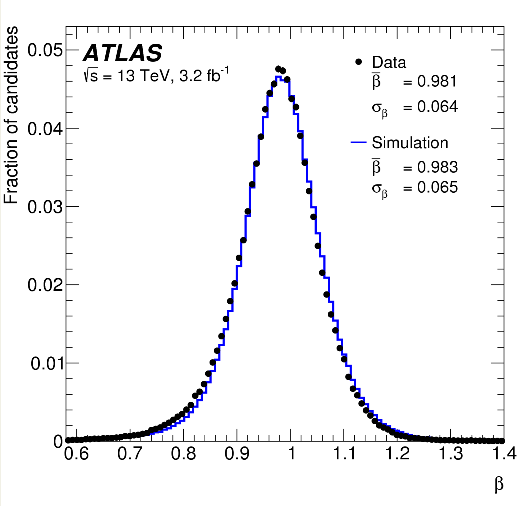
Background and uncertainties

- The background is evaluated in a data-driven manner:
- randomly picked momentum, β and βγ values are sampled from probability distribution functions (pdf) determined from data, to yield mass distributions estimating the background

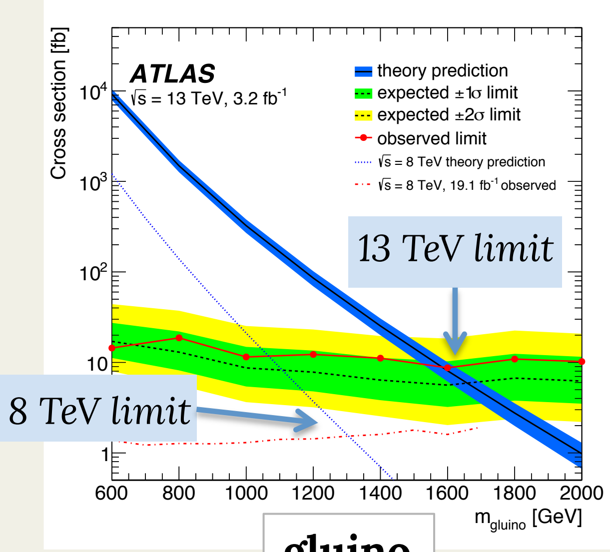




Source	Relative uncertainty [±%]
Theoretical uncertainty on signal	14–57
Uncertainty on signal efficiency	20–16
└ Trigger efficiency	2
└ QCD uncertainty (ISR, FSR)	14
└ Pile-up	7–1
└ Pixel $\beta\gamma$ measurement	1–3
└ Calorimeter β measurement	10–2
Luminosity	5
Uncertainties on background estimate	30–43



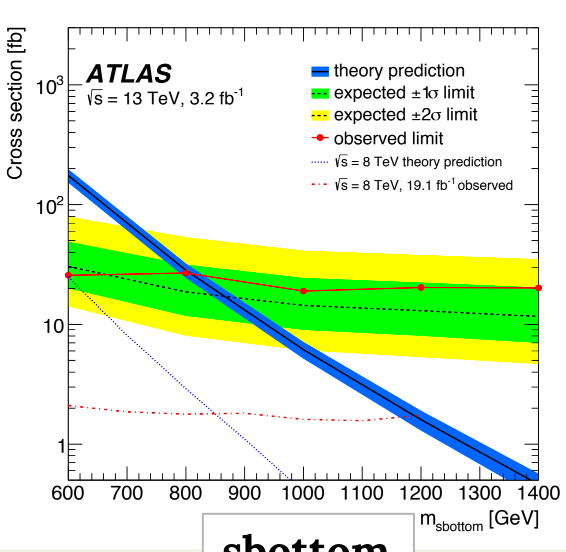
LLP Results



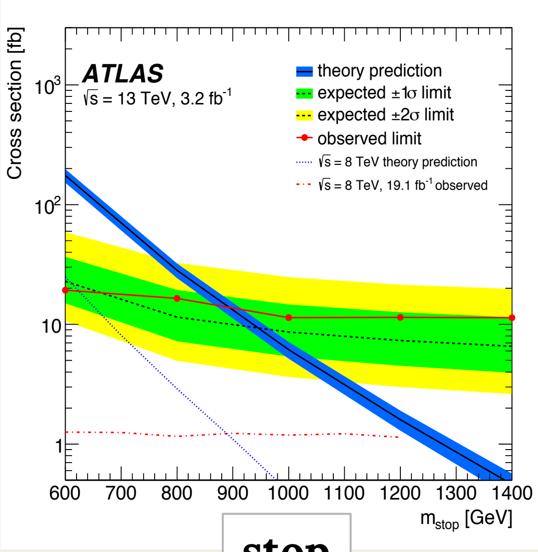
13 TeV limit

8 TeV limit

gluino



sbottom



stop

Selection efficiency:

- 9% - 15% for *gluino* and *stop R-hadrons*
- 6% - 8% for *sbottom R-hadrons*

95% CL exclusion limits:

- **gluino** masses up to **1580** GeV
- **sbottoms** up to **805** GeV
- **stops** up to **890** GeV

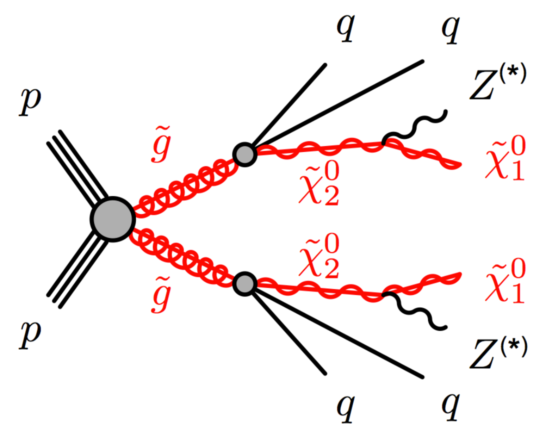
A search for supersymmetry in events containing a leptonically decaying Z boson, jets and missing transverse momentum in $\sqrt{s} = 13$ TeV pp collisions with the ATLAS detector

CDS: ATLAS-CONF-2015-082

LL (Z) + JETS + MET

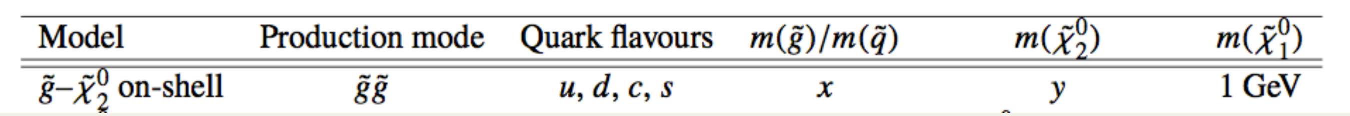
Intro

- The “on-shell Z” search targets pair-production of squarks/gluinos, with:
  - 2 same-flavor opposite-sign (SFOS) leptons (e/μ) in final states
  - di-lepton invariant mass compatible with the Z mass



“on-shell Z” channel
($m_{ll} \sim m_Z$)

- Simplified model



Model	Production mode	Quark flavours	$m(\tilde{g})/m(\tilde{q})$	$m(\tilde{\chi}_2^0)$	$m(\tilde{\chi}_1^0)$
$\tilde{g}$–$\tilde{\chi}_2^0$ on-shell	$\tilde{g}\tilde{g}$	u, d, c, s	x	y	1 GeV

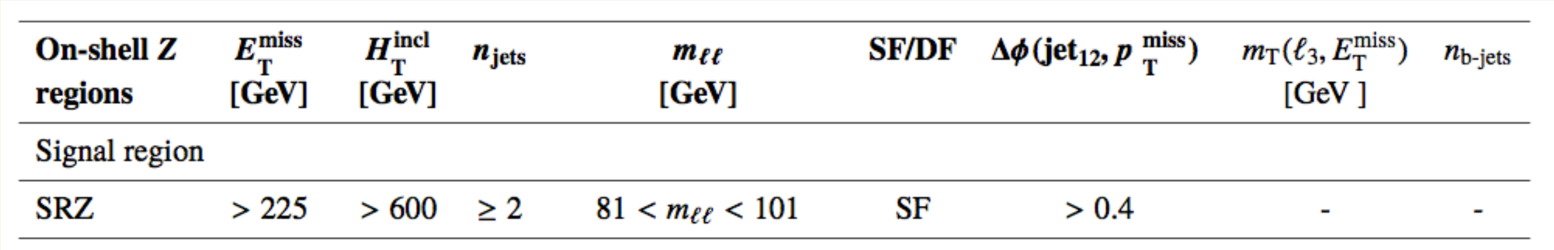
- Signals generated over 2-D grid, varying the gluino/squark mass (*x axis*) and the X^0_2, X^0_1 neutralino masses (*y axis*)

- All other sparticles decoupled

Event selection and bkg estimation

- Signal region (SR)

(see backup slides for Control (CR) and validation (VR) regions)



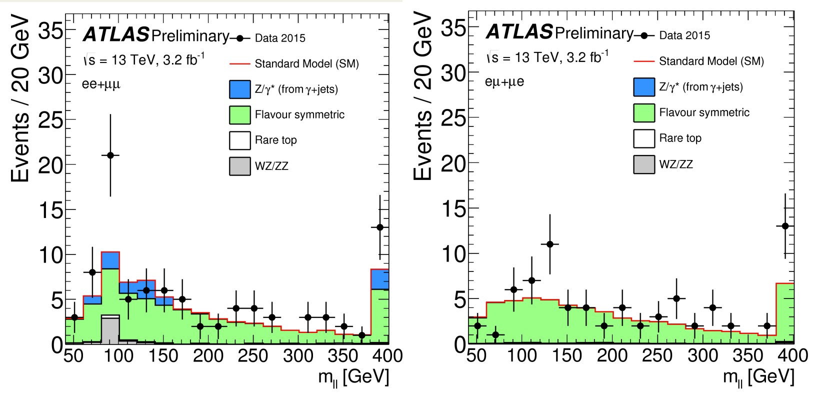
On-shell Z regions	E_T^{miss} [GeV]	H_T^{incl} [GeV]	n_{jets}	$m_{\ell\ell}$ [GeV]	SF/DF	$\Delta\phi(\text{jet}_{12}, p_T^{\text{miss}})$	$m_T(\ell_3, E_T^{\text{miss}})$ [GeV]	$n_{b\text{-jets}}$
Signal region								
SRZ	> 225	> 600	≥ 2	$81 < m_{\ell\ell} < 101$	SF	> 0.4	-	-

- Dominant bkg in SRs is the “flavour-symmetric” (FS), where the 2 leptons come from independent decays. It is dominated by: *ttbar* (50-70%), WW, ZZ, Zττ The FS bkg is 60-90% of the total bkg. It is data-driven (DD) estimated using control samples of *e*μ events
- Z/γ+*jets* is small but can mimic signal. It is DD estimated with γ+*jets* events
- WZ/ZZ diboson production is 5-20% bkf of SRZ and 30% of “edge” SRs. It is estimated MC simulation, after validation in dedicated 3*l* (WZ) and 4*l* (ZZ) VRs
- Other rare bkgs (*ttW*, *ttZ*, *ttWW*) are MC estimated

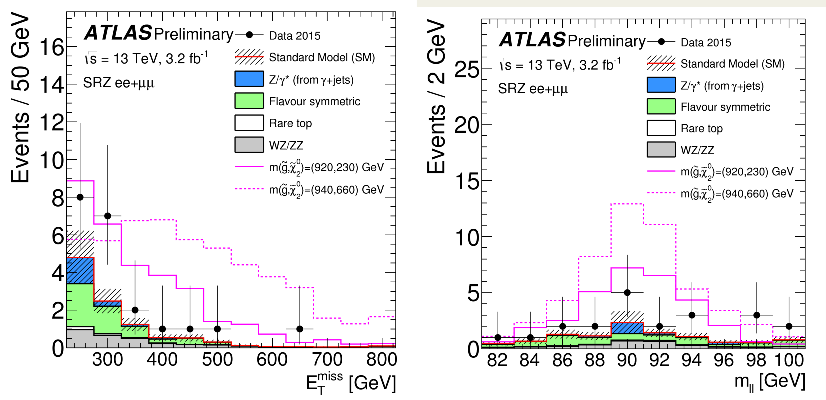
(see backup slides for syst. uncertainties)

ll+jets+MET – “Z” results

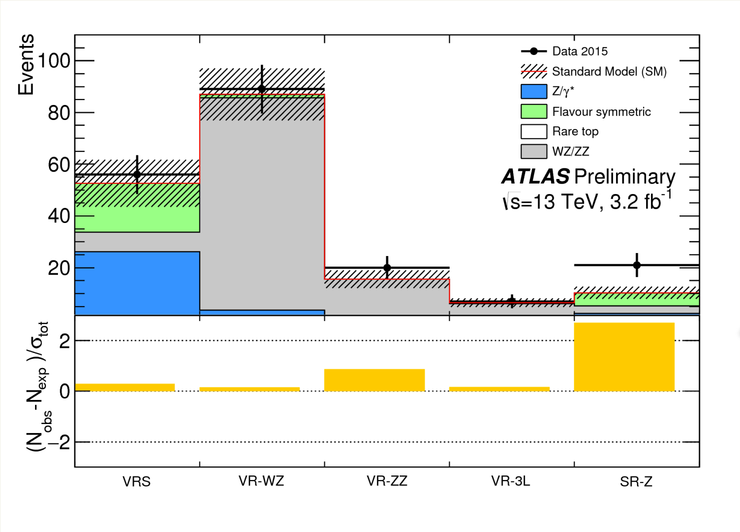
Dilepton invariant mass over full m_{ll} range



Kinetic variables in the SR range *(example)*



- Agreement in *off*-Z region
- Excess for $m_{ll} \sim m_Z$

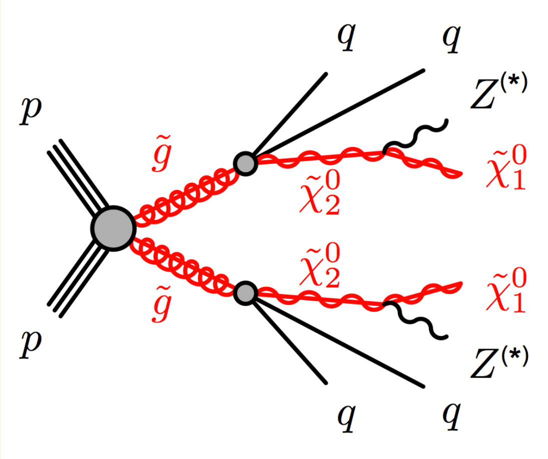


SRs/VRs summary plot

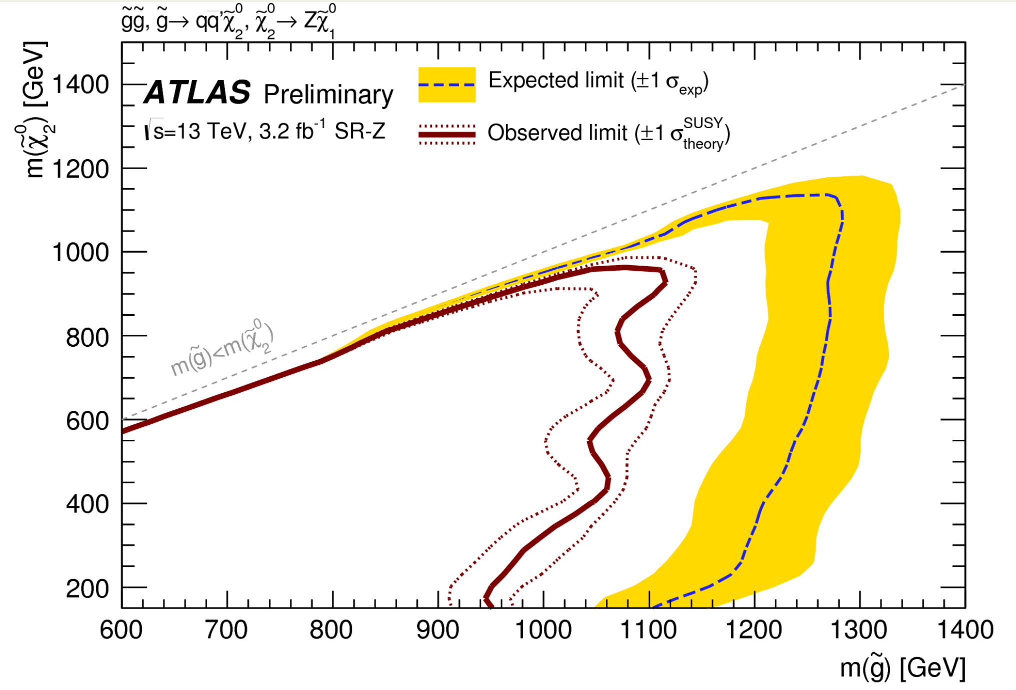
- SRZ: significance of 2.2 σ

Results interpretation – "on-shell *Z*" search

The results are interpreted in the context of the simplified model



m_g-$m\mathrm{X}^0{}_2$ plane



$\boldsymbol{m_g > 1.1}$ **TeV**, for $m(\mathrm{X}^0{}_2)$ = 700 GeV

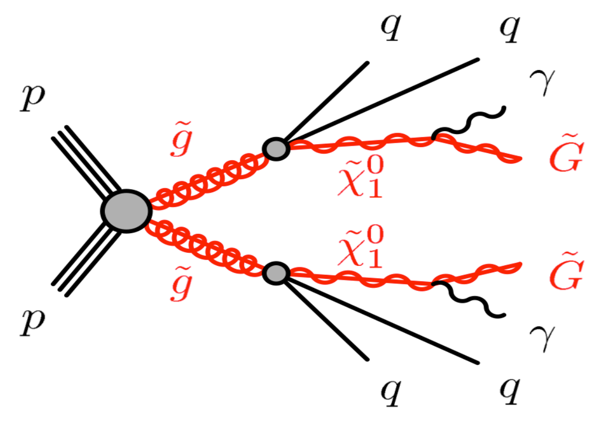
Search for supersymmetry in a final state containing two photons and missing transverse momentum in $\sqrt{s}$ = 13 TeV pp collisions at the LHC using the ATLAS detector

arXiv: 1606.09150

DIPHOTON + MET

Di-photon - Intro

- Results interpreted in the context of general gauge mediation (**GGM**) SUSY model → **Gravitino G** with m_G << 1 GeV is the **LSP**
- In this **model-dependent search** we take m_g (*gluino*) and m_X (*neutralino*) as free parameters, with the $m_X < m_g$ constraint. All other SUSY masses are decoupled (> LHC scale)
- Also, we assume ***R-parity* conservation**, and the *bino*-like neutralino X^0_1 as the NLSP, which decays to the G + SM *particles* , with high probability of γ + G
- The X^0_1 BR ratio to γ + G is 100% for $m_X \rightarrow 0$ and tends to $\cos^2\theta_W$ for $m_X >> m_Z$, with the remainder of the X^0_1 sample decaying to Z + G. The **photonic channel dominates**.
- In the end we get a long decay chain with **2 photons + E_t^{miss}**

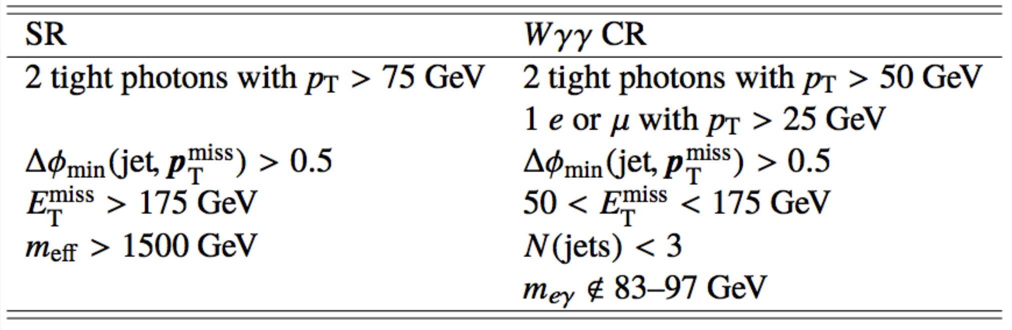


Di-photon - Event selection

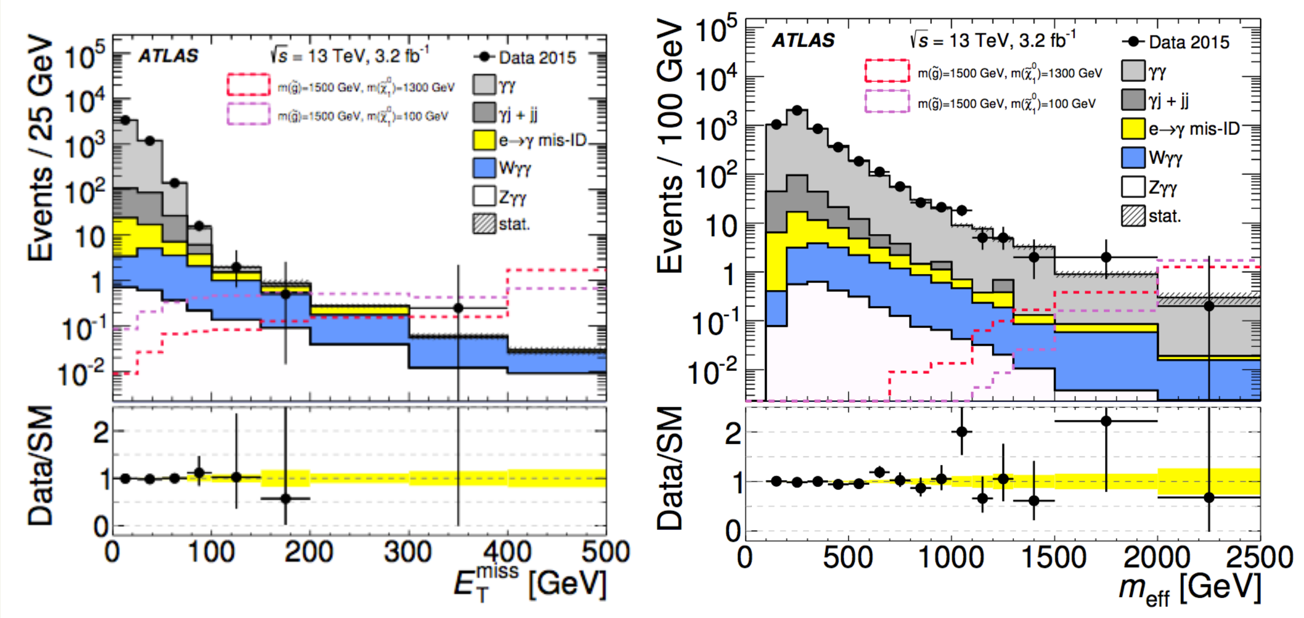
- **Online selection**: di-photon trigger, $p_T > 50$ GeV
- **Offline selection**:

  + beam, cosmic rays and detector noise cleaning cuts

  (objects selection in backup)



SR	$W\gamma\gamma$ CR
2 tight photons with $p_T > 75$ GeV	2 tight photons with $p_T > 50$ GeV
	1 e or μ with $p_T > 25$ GeV
$\Delta\phi_{\min}(\text{jet}, \boldsymbol{p}_T^{\text{miss}}) > 0.5$	$\Delta\phi_{\min}(\text{jet}, \boldsymbol{p}_T^{\text{miss}}) > 0.5$
$E_T^{\text{miss}} > 175$ GeV	$50 < E_T^{\text{miss}} < 175$ GeV
$m_{\text{eff}} > 1500$ GeV	$N(\text{jets}) < 3$
	$m_{e\gamma} \notin 83\text{–}97$ GeV



Signal Region (SR):

- One SR for all gluino/neutralino mass points
- optimized on E_T^{miss}, m_{eff} and p^{γ} on 2 benchmark points:

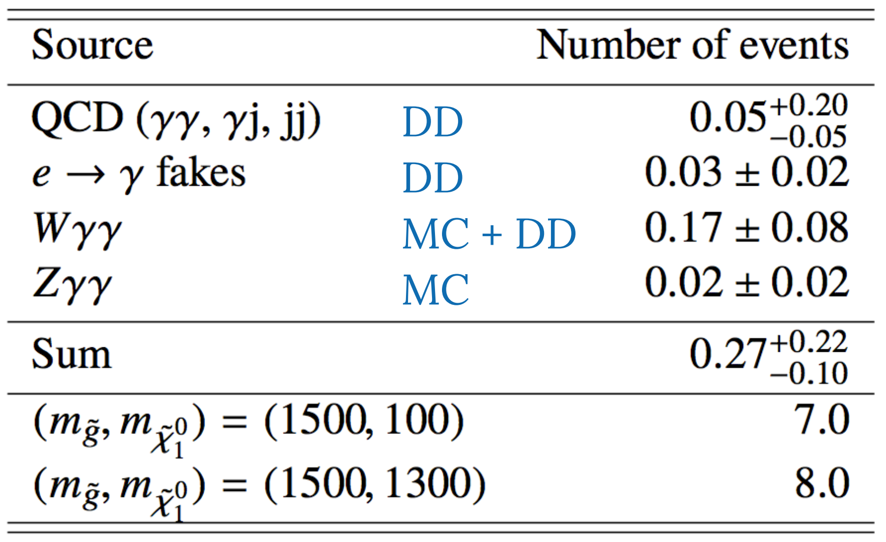
  $(m_g, m_X) = (1500,1300)$

  $(m_g, m_X) = (1500,100)$

Background and uncertainties

Main bkg sources:

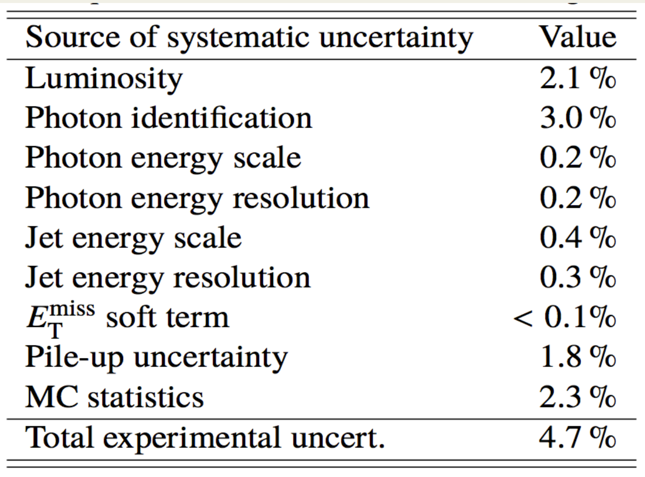
- QCD bkg:
  - real di-photon+jets
  - “jet-faking” events
- “electron-faking” bkg from W,Z, ttbar, with misidentified *e* as photon
- “irreducible” from $W\gamma\gamma$ and $Z\gamma\gamma$
- estimated with data-driven **(DD)** and simulation-based **(MC)** methods



Source		Number of events
QCD ($\gamma\gamma$, γj, jj)	DD	$0.05^{+0.20}_{-0.05}$
$e \rightarrow \gamma$ fakes	DD	0.03 ± 0.02
$W\gamma\gamma$	MC + DD	0.17 ± 0.08
$Z\gamma\gamma$	MC	0.02 ± 0.02
Sum		$0.27^{+0.22}_{-0.10}$
$(m_{\tilde{g}}, m_{\tilde{\chi}^0_1}) = (1500, 100)$		7.0
$(m_{\tilde{g}}, m_{\tilde{\chi}^0_1}) = (1500, 1300)$		8.0

Uncertainties:

- GGM signal acceptances and efficiencies estimated using MC simulation over the gluino–bino parameter space
- Photon reco/ID efficiency estimated with DD methods

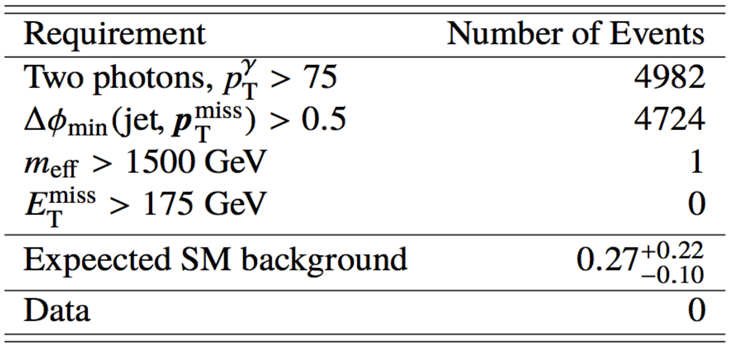


Source of systematic uncertainty	Value
Luminosity	2.1 %
Photon identification	3.0 %
Photon energy scale	0.2 %
Photon energy resolution	0.2 %
Jet energy scale	0.4 %
Jet energy resolution	0.3 %
$E_{\mathrm{T}}^{\mathrm{miss}}$ soft term	< 0.1%
Pile-up uncertainty	1.8 %
MC statistics	2.3 %
Total experimental uncert.	4.7 %

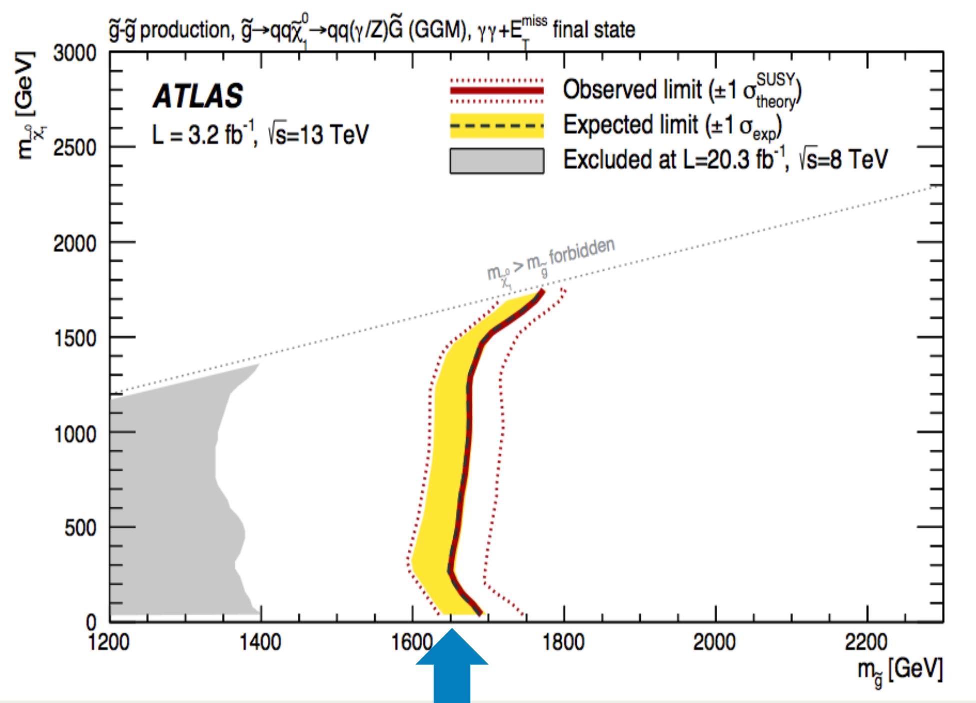
Di-photon - Results

- After full selection applied, no events are observed in the SR, to be compared to the SM expectation value of 0.27

- Upper limits on SR events set, using the profile likelihood and CLs prescriptions



Requirement	Number of Events
Two photons, $p_T^{\gamma} > 75$	4982
$\Delta\phi_{\min}(\text{jet}, \boldsymbol{p}_T^{\text{miss}}) > 0.5$	4724
$m_{\text{eff}} > 1500$ GeV	1
$E_T^{\text{miss}} > 175$ GeV	0
Expeected SM background	$0.27^{+0.22}_{-0.10}$
Data	0



New Physics visible σ:

With 3.2 fb-1, 95% CL upper limit on model-independent visible $\sigma_{NP}=0.93\ fb$

GGM model limit:

m_g > 1650 GeV

mass of GGM degenerate octet of gluino states

independent of the mass of the lighter *bino*-like neutralino

Search for squarks and gluinos in events with hadronically-decaying tau leptons, jets and missing transverse momentum in proton–proton collisions at $\sqrt{s}$ = 13 TeV recorded with the ATLAS detector

arXiv: (soon)

Check in few days on:
https://twiki.cern.ch/twiki/bin/view/AtlasPublic/SupersymmetryPublicResults

SUSY IN TAUS

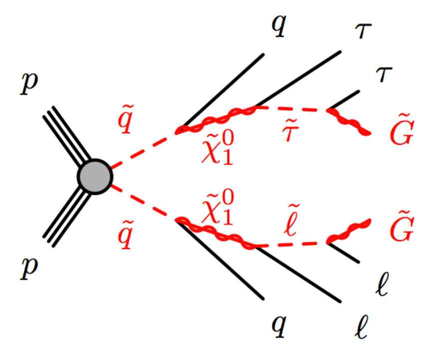
SUSY in taus - Intro

Two exclusive final states are considered:

- 1 tau
- ≥ 2 taus

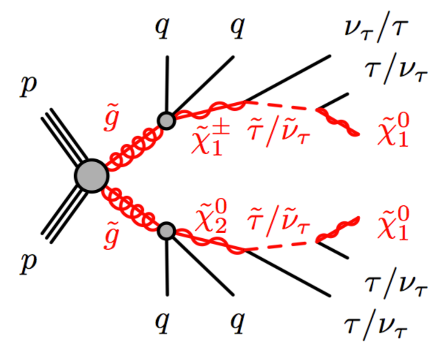
Results are interpreted in the context of two models:

- gauge-mediated supersymmetry breaking (GMSB)
- simplified model of gluino-pair production with tau-rich cascade



(a) GMSB

GMSB probed as
f(Λ,tan β)
M_{mes} = 250 TeV,
N_5 = 3, sign(μ) = 1 and
C_{grav} = 1
NLSP = τ_1
Prompt decay of NLSP



(b) Simplified model

m(gluino) and $m(X_1^0)$ are free parameters

No excess over the SM prediction is observed in the data, in kinematic distributions. So upper limits are set at 95% CL.

The search substantially improves on previous limits

Selection criteria & variables

Online selection: E_T^{miss} trigger

Discriminating variables:

- Transverse mass:

$$m_T^{\ell} \equiv m_T(\ell, \vec{p}_T^{\,\mathrm{miss}}) = \sqrt{2 p_T^{\ell} E_T^{\mathrm{miss}} (1 - \cos \Delta\phi(\ell, \vec{p}_T^{\,\mathrm{miss}}))}$$

- H_T (Total visible transverse energy):

$$H_T = \sum p_T^{\mathrm{taus}} + \sum p_T^{\mathrm{jets}}$$

- E_T^{miss}
- Effective mass $m_{eff} = H_T + E_t^{miss}$
- Stransverse mass:

$$m_{T2}^{\tau\tau} = \sqrt{\min_{\vec{p}_T^{\,a} + \vec{p}_T^{\,b} = \vec{p}_T^{\,\mathrm{miss}}} \left(\max \left[m_T^2(\tau_1, \vec{p}_T^{\,a}), m_T^2(\tau_2, \vec{p}_T^{\,b}) \right] \right)}$$

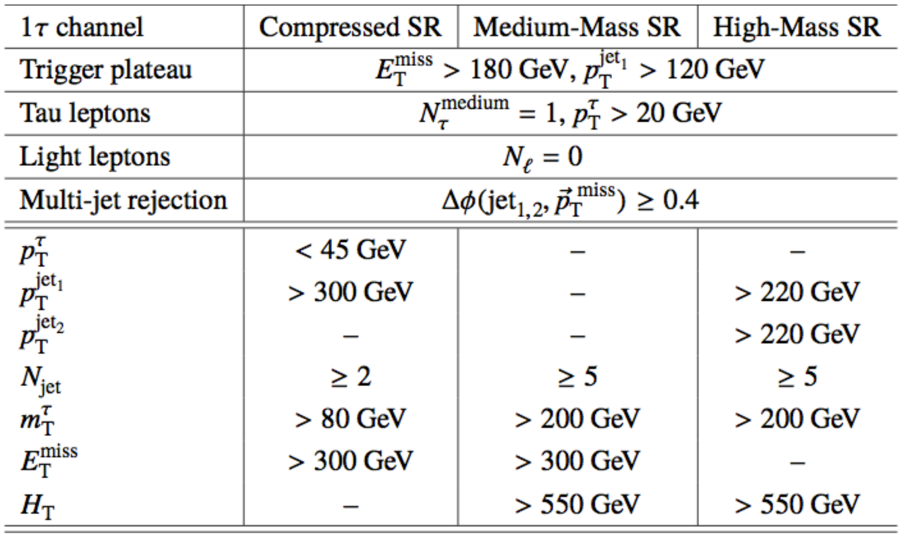
- Sum of transverse masses:

$$m_T^{\mathrm{sum}} = m_T^{\tau_1} + m_T^{\tau_2} + \sum m_T^{\mathrm{jets}}$$

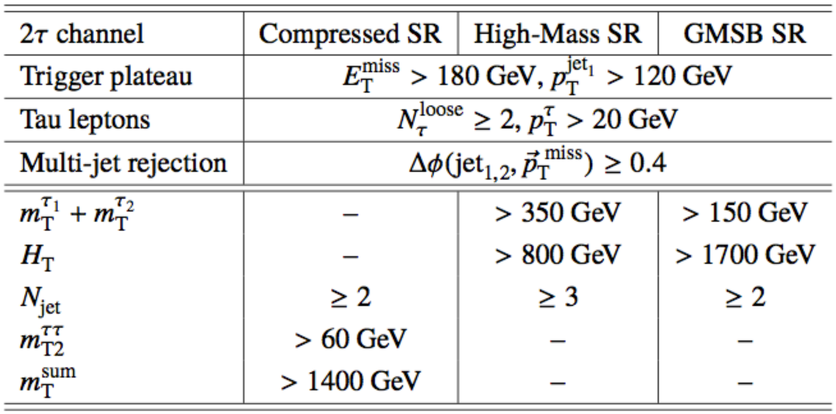
- Total number of jets, N_{jet}
- Number of b-tagged jets, $N_{b\text{-}jet}$

gluino-LSP mass splitting

| < 100 GeV | 500-900 GeV | > 1200 GeV



1τ channel	Compressed SR	Medium-Mass SR	High-Mass SR
Trigger plateau	$E_T^{\mathrm{miss}} > 180$ GeV, $p_T^{\mathrm{jet}_1} > 120$ GeV		
Tau leptons	$N_\tau^{\mathrm{medium}} = 1$, $p_T^\tau > 20$ GeV		
Light leptons	$N_\ell = 0$		
Multi-jet rejection	$\Delta\phi(\mathrm{jet}_{1,2}, \vec{p}_T^{\,\mathrm{miss}}) \geq 0.4$		
p_T^τ	< 45 GeV	–	–
$p_T^{\mathrm{jet}_1}$	> 300 GeV	–	> 220 GeV
$p_T^{\mathrm{jet}_2}$	–	–	> 220 GeV
N_{jet}	≥ 2	≥ 5	≥ 5
m_T^τ	> 80 GeV	> 200 GeV	> 200 GeV
E_T^{miss}	> 300 GeV	> 300 GeV	–
H_T	–	> 550 GeV	> 550 GeV



2τ channel	Compressed SR	High-Mass SR	GMSB SR
Trigger plateau	$E_T^{\mathrm{miss}} > 180$ GeV, $p_T^{\mathrm{jet}_1} > 120$ GeV		
Tau leptons	$N_\tau^{\mathrm{loose}} \geq 2$, $p_T^\tau > 20$ GeV		
Multi-jet rejection	$\Delta\phi(\mathrm{jet}_{1,2}, \vec{p}_T^{\,\mathrm{miss}}) \geq 0.4$		
$m_T^{\tau_1} + m_T^{\tau_2}$	–	> 350 GeV	> 150 GeV
H_T	–	> 800 GeV	> 1700 GeV
N_{jet}	≥ 2	≥ 3	≥ 2
$m_{T2}^{\tau\tau}$	> 60 GeV	–	–
m_T^{sum}	> 1400 GeV	–	–

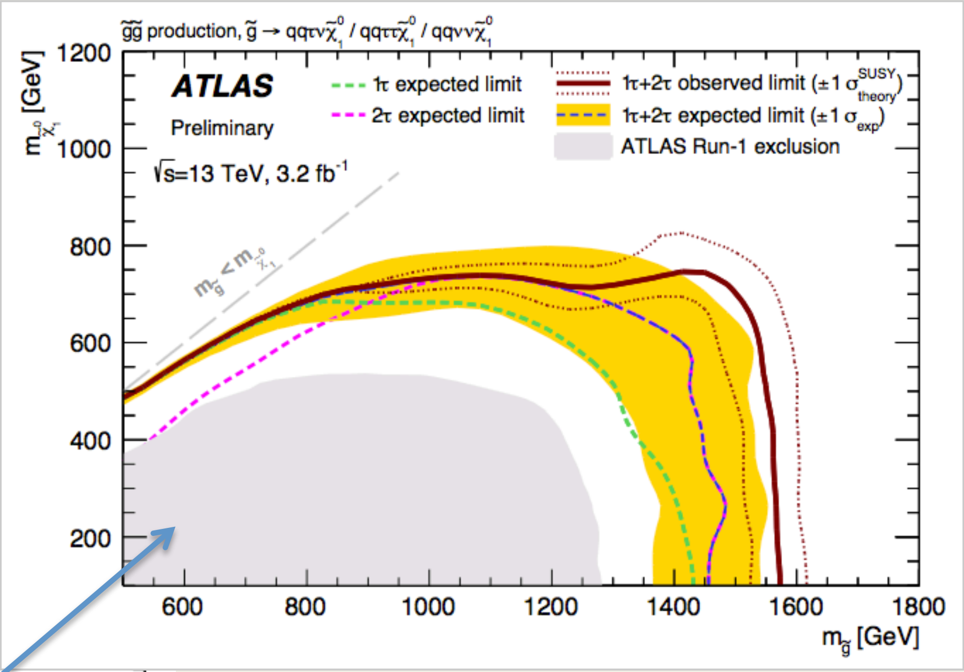
Results

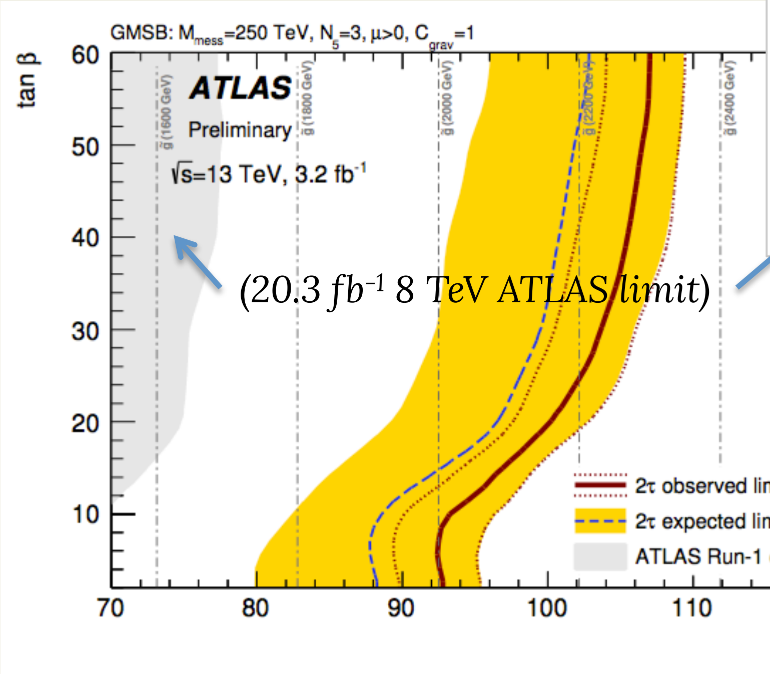
- (m_g, m_X) simplified model

$m_g > 1.57$ TeV , for m_X~100 GeV

$m_X > 700$ GeV , for $800 < m_g <$ 1500 GeV

$m_X > 750$ GeV , for m_g~1400 GeV





(20.3 fb^{-1} 8 TeV ATLAS limit)

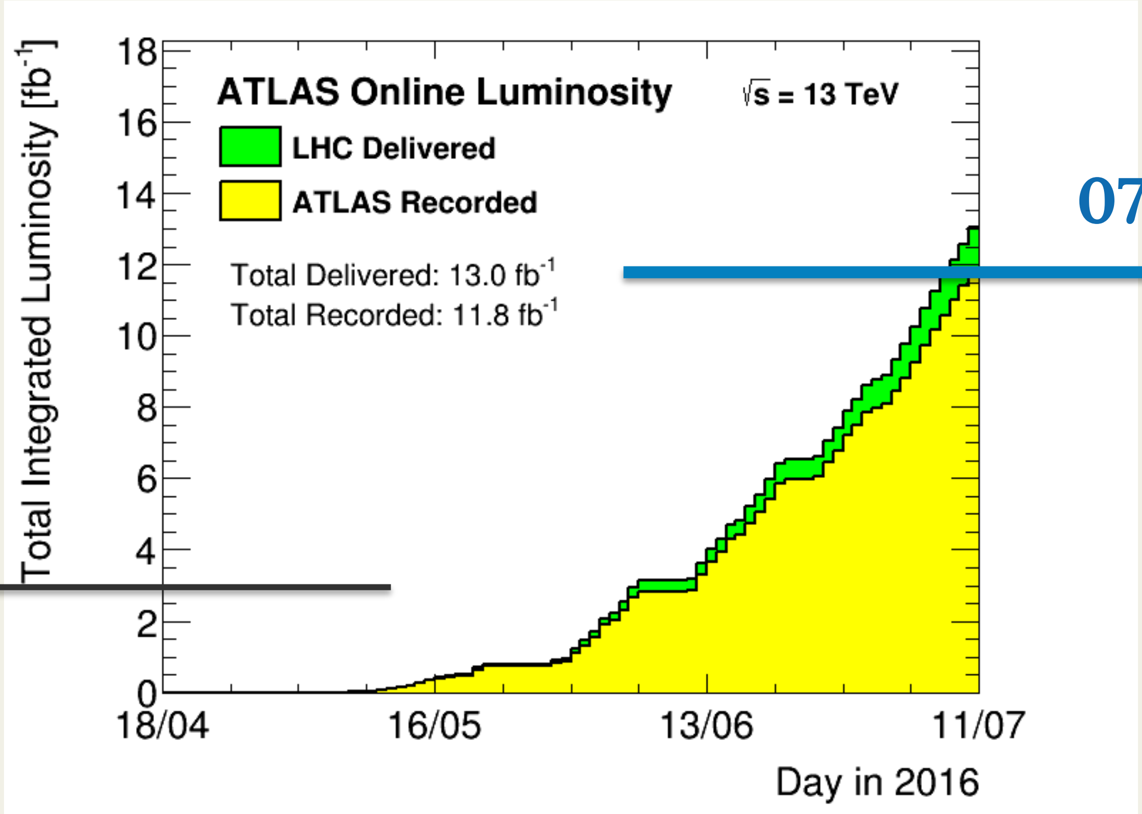
- (Λ, *tan*β) GMSB model

Small tanβ: $\Lambda > 92$ TeV → $m_g > 2.05$ TeV
Large tanβ: $\Lambda > 107$ TeV → $m_g > 2.32$ TeV

95%CL

More data to explore...

There are many searches still ongoing...



07/2016

2015

...and new data to analyze!

ATLAS Public results

- **Public results portal:**
  - https://twiki.cern.ch/twiki/bin/view/AtlasPublic/WebHome

- **Luminosity / Data:**
  - https://twiki.cern.ch/twiki/bin/view/AtlasPublic/LuminosityPublicResultsRun2

- **SUSY:**
  - https://twiki.cern.ch/twiki/bin/view/AtlasPublic/SupersymmetryPublicResults

BACKUP SLIDES

SUSY search variables

E_t^{miss}

- In SUSY searches, final states typically include undetectable objects (SUSY *LSP*), which causes a momentum imbalance in the event
- Thus we often require events to have a quite large E_T^{miss}
- E_T^{miss} in ATLAS computed as negative vector sum of E_T from calibrated electrons, muons, photons and jet candidates, combined with all remaining tracks associated to the primary vertex but not associated to those objects

E_T^{miss} *“soft term”*

- to account for soft energy in the event that is not associated with any of the selected objects

H_T

- H_T is the total visible transverse energy, as the scalar sum of the transverse momenta of the photons, leptons and jets in the event

m_{eff}

- The “effective mass”, as the sum of H_T and E_t^{miss}:

$$M_{eff} = \sum_k |p_{T\,k}| + E_T^{miss} = H_T + E_T^{miss}$$

jet-p_T^{miss} separation

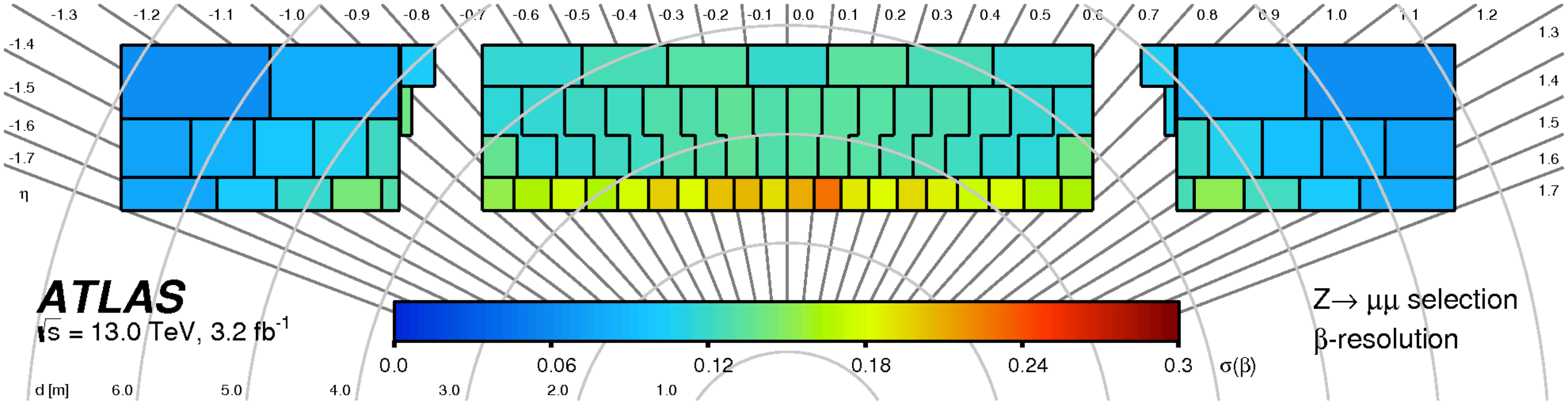
- The difference between the phi angle (transversal) of a jet and the p_T^{miss}, used to suppress mismeasured jets

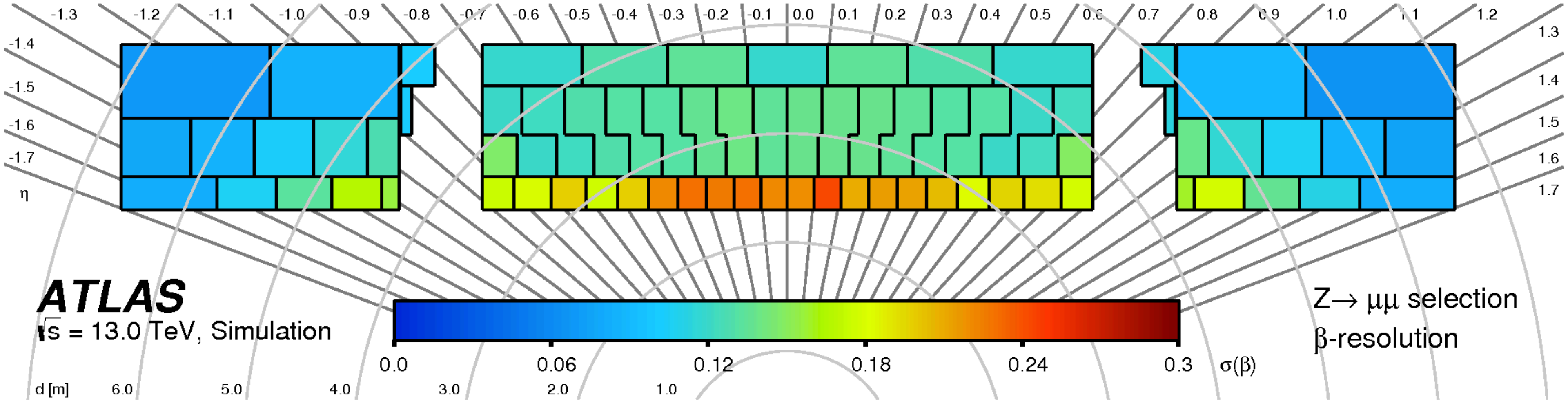
LLP ANALYSIS BACKUP SLIDES

Calo information

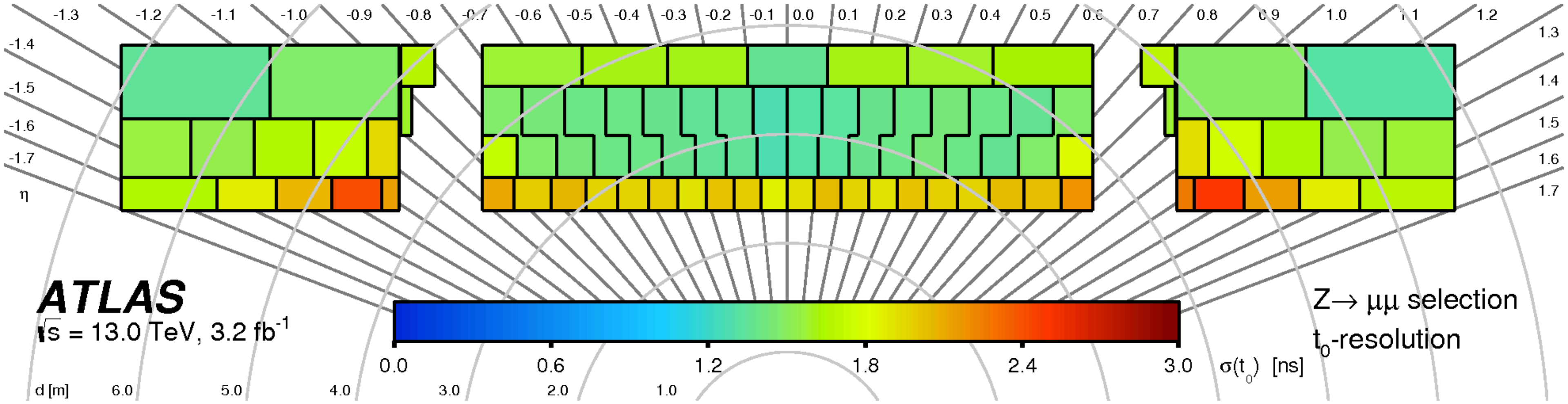
- ATLAS Calorimeter: 3 radial layers in Barrel + 3 radial layers in each end cap
- β is estimated from time-of-flight measurements based on timing and distance information from calo cells crossed by the extrapolated track
- To reduce detector noise only cells with $\mathbf{E_{min}=500\ MeV}$ are considered
- Time resolution depends on cells and layer type and calibrations have been applied
- Final resolution:
  - Single cell-time resolution: 1.3 ns at large radii up to 2.5 ns at small radii
  - β resolution: 0.06 to 0.23

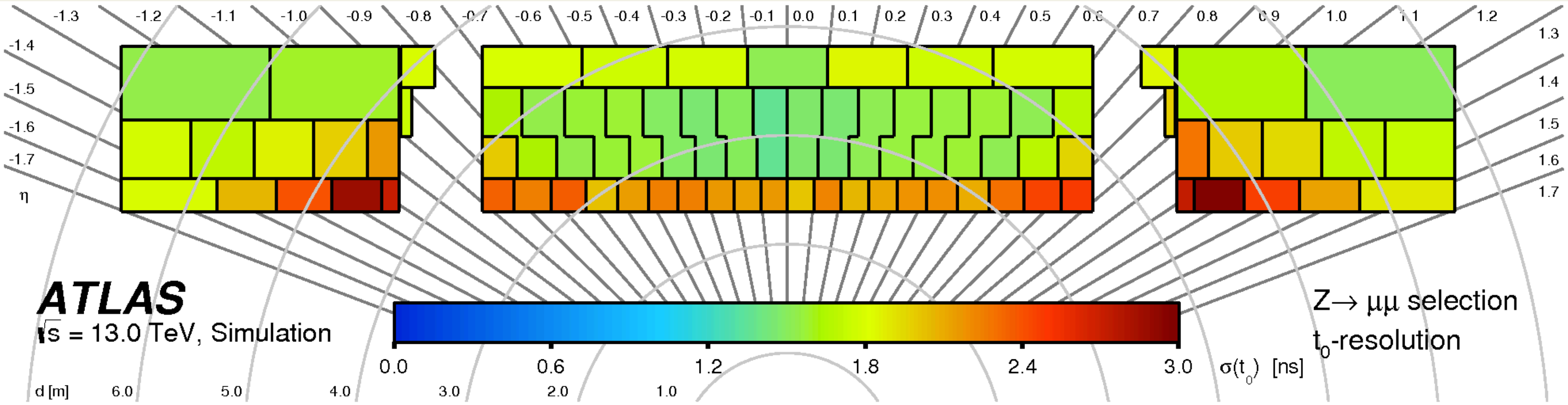
Calorimeter Beta resolution





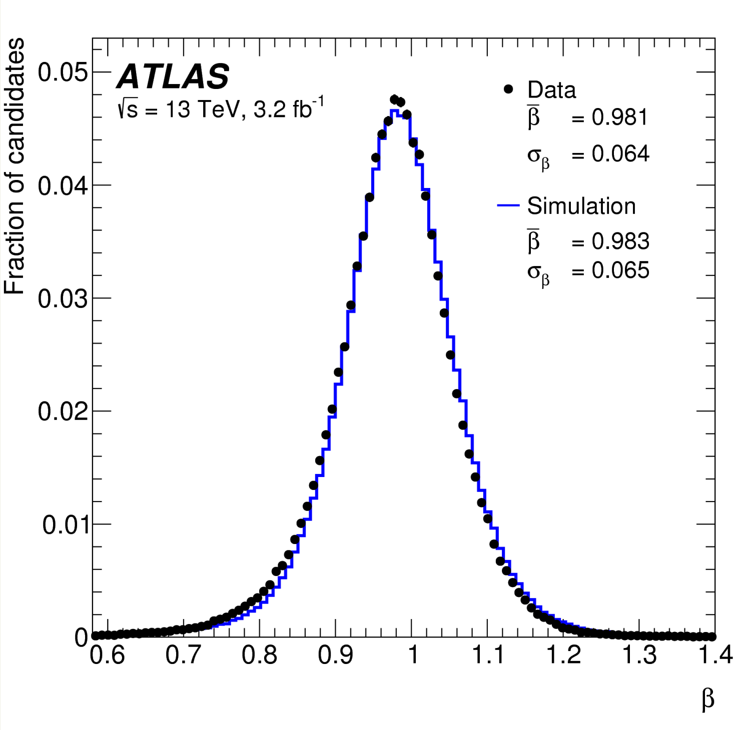
Calorimeter Time resolution





Timing studies and control sample

- For timing studies a control sample of Z->μμ events in data and simulation is used
- The expected β distro:
  - for background, it is taken from data
  - for *R-hadrons*, it is from simulation
- Very good agreement between data and simulation with control sample,
- --> this supports the usage of simulated beta distribution for *R-hadrons*



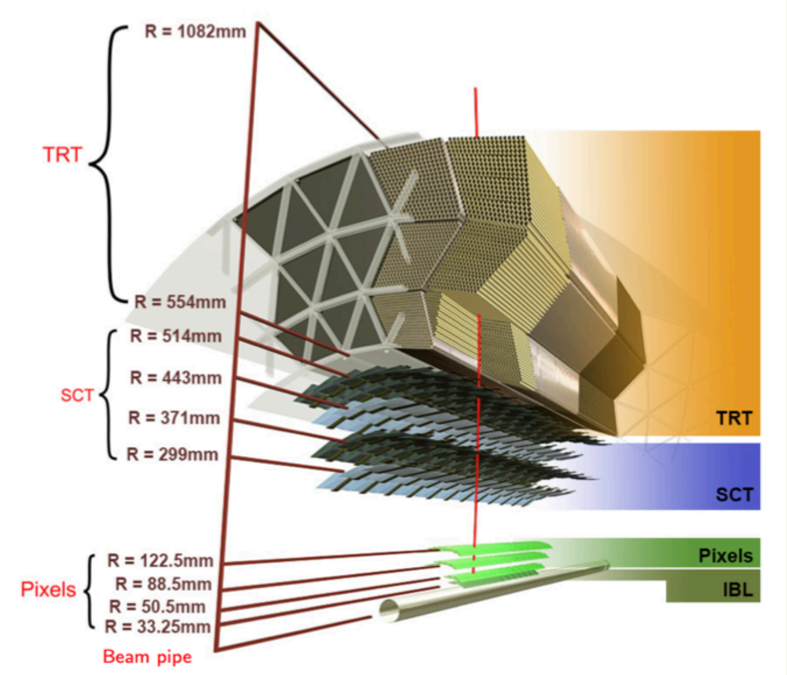
Calorimeter time resolution calibration

- Calibrations:
  - Compared to the 8TeV analysis, here the distance of flight is computed by taking eta and path length, instead of cell centers --> more accurate β measurement on high-eta cells (negligible on central cells)
  - A cell-time smearing applied in simulation to match data cell-time resolution
  - Corrections for late-arriving particles are applied, from simulated samples

dE/dx measurement with Pixel

- Pixel consists of 3 similar layers + the inner IBL
- A neural network algorithm is used to cluster single pixel charges
- For each cluster a dE/dx is estimated, then an overall dE/dx measure is calculated
- **Mean dE/dx** = 1.12 MeV g^{-1} cm^2 (RMS=0.13)
- ==> beta gamma by inverting the Bethe-Block relation:

  $m = p / \beta\gamma$



R-hadrons signal

m_g = 600 – 2000 GeV (gluino) $m_{b/t}$ = 600 – 1400 GeV (sbottom/stop)

- Masses of other SUSY particles are set at very high values for LHC to ensure their contribution to production cross section is negligible

- For a given *sparticle* mass the production cross section for **gluino** *R-hadrons* is typically **an order of magnitude higher** than for **bottom**-squark and **top**-squark *R-hadrons*.

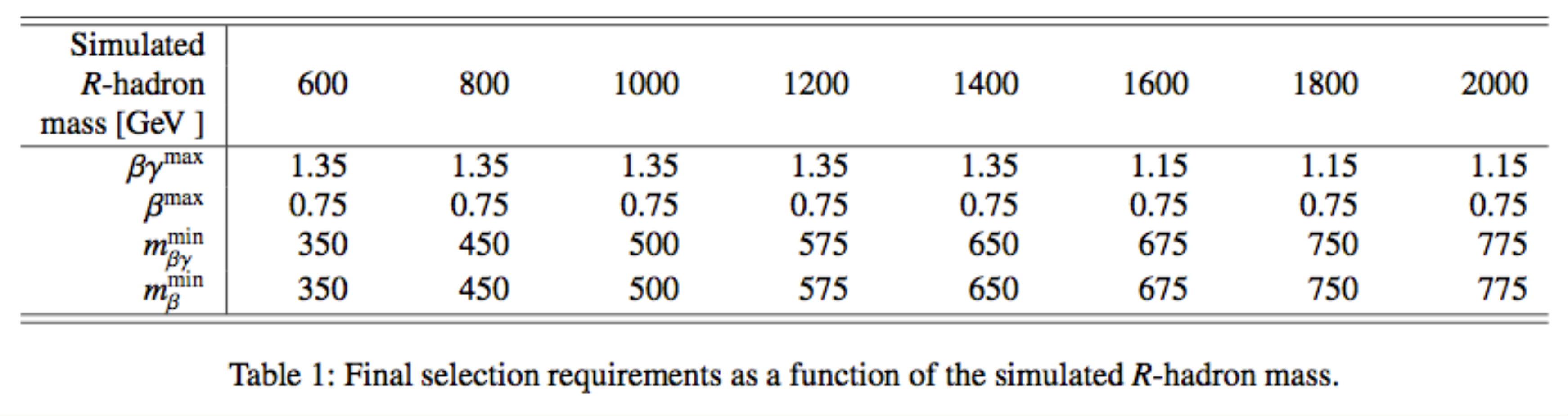
- The **probability** for a gluino to form a **gluon–gluino bound state** is assumed, based on a colour-octet model, to be **10%**

R-hadrons signal

m_g = 600 – 2000 GeV (*gluino*) $m_{b/t}$ = 600 – 1400 GeV (*sbottom/stop*)

- Pair production of gluinos and squarks simulated with **Pythia** + **AUET2B** (*underlying event*) + **CTEQ6L1** (*PDF*) + **specialized hadronization routines** to get *R-hadrons*
- GEANT4 **full detector simulation** with *gluino/squark R-hadron* interaction based on Regge model (*hep-ph*/0908.1868): moderate *R-hadron* interaction with the detector, with typical calorimeter deposit of 10 GeV
- Corrections for **QCD radiative effects** are applied to get ISR jets in final states.

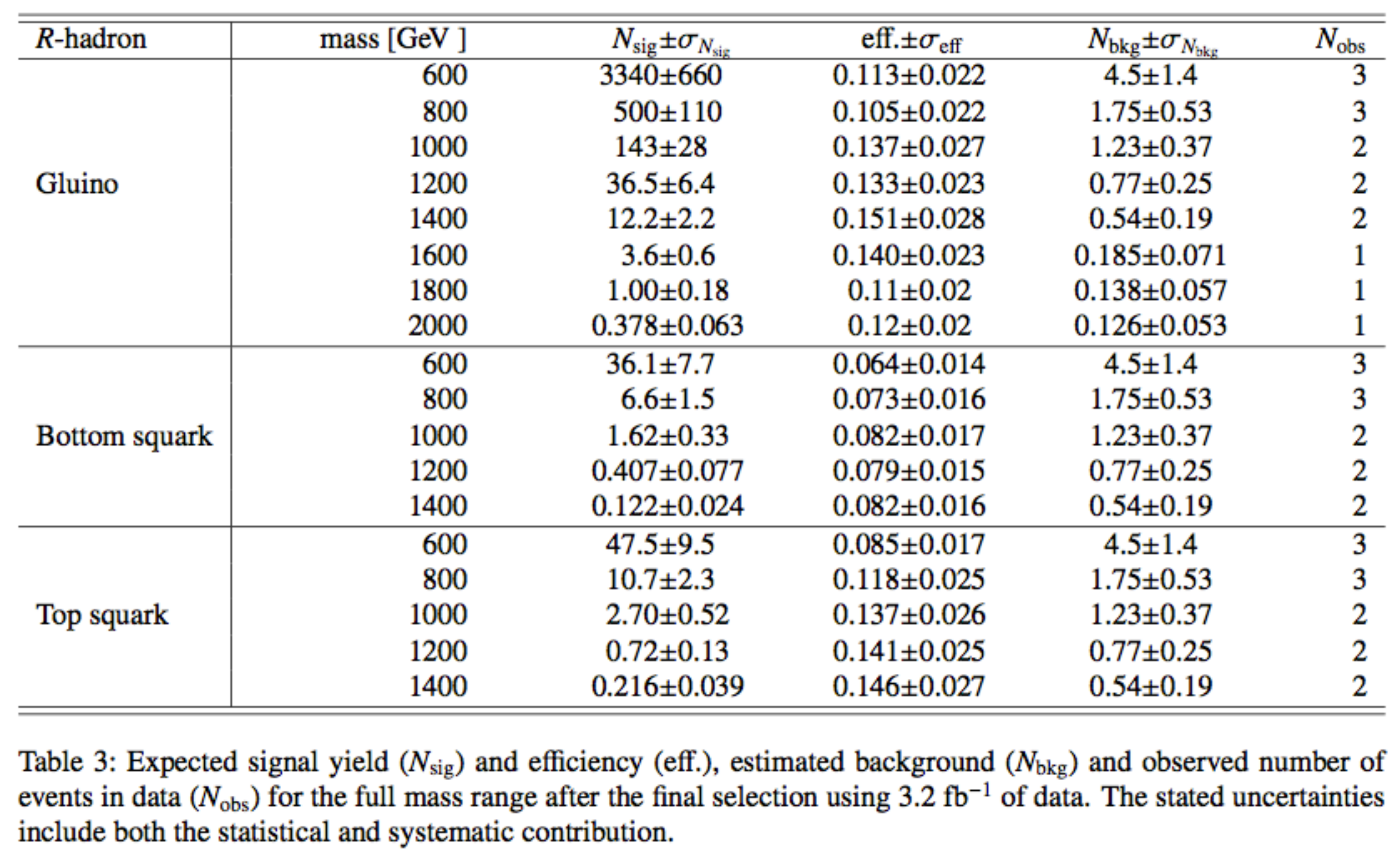
R-hadron selection cuts



Simulated *R*-hadron mass [GeV]	600	800	1000	1200	1400	1600	1800	2000
$\beta\gamma^{\max}$	1.35	1.35	1.35	1.35	1.35	1.15	1.15	1.15
$\beta^{\max}$	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
$m_{\beta\gamma}^{\min}$	350	450	500	575	650	675	750	775
$m_{\beta}^{\min}$	350	450	500	575	650	675	750	775

Table 1: Final selection requirements as a function of the simulated *R*-hadron mass.

R-hadrons signals and event yields



R-hadron	mass [GeV]	$N_{\mathrm{sig}}\pm\sigma_{N_{\mathrm{sig}}}$	eff.$\pm\sigma_{\mathrm{eff}}$	$N_{\mathrm{bkg}}\pm\sigma_{N_{\mathrm{bkg}}}$	N_{obs}
Gluino	600	3340±660	0.113±0.022	4.5±1.4	3
	800	500±110	0.105±0.022	1.75±0.53	3
	1000	143±28	0.137±0.027	1.23±0.37	2
	1200	36.5±6.4	0.133±0.023	0.77±0.25	2
	1400	12.2±2.2	0.151±0.028	0.54±0.19	2
	1600	3.6±0.6	0.140±0.023	0.185±0.071	1
	1800	1.00±0.18	0.11±0.02	0.138±0.057	1
	2000	0.378±0.063	0.12±0.02	0.126±0.053	1
Bottom squark	600	36.1±7.7	0.064±0.014	4.5±1.4	3
	800	6.6±1.5	0.073±0.016	1.75±0.53	3
	1000	1.62±0.33	0.082±0.017	1.23±0.37	2
	1200	0.407±0.077	0.079±0.015	0.77±0.25	2
	1400	0.122±0.024	0.082±0.016	0.54±0.19	2
Top squark	600	47.5±9.5	0.085±0.017	4.5±1.4	3
	800	10.7±2.3	0.118±0.025	1.75±0.53	3
	1000	2.70±0.52	0.137±0.026	1.23±0.37	2
	1200	0.72±0.13	0.141±0.025	0.77±0.25	2
	1400	0.216±0.039	0.146±0.027	0.54±0.19	2

Table 3: Expected signal yield (N_{sig}) and efficiency (eff.), estimated background (N_{bkg}) and observed number of events in data (N_{obs}) for the full mass range after the final selection using 3.2 fb^{-1} of data. The stated uncertainties include both the statistical and systematic contribution.

Z (LL) + JETS +MET BACKUP

ll+jets+MET- Object selection

Offline selection:

Primary Vertex: the vertex with the largest $\Sigma\, p_T^2$, over all tracks $p_T > 400$ MeV

Two selections: "*baseline*" (*a*) to select objects used in Etmiss computation, and the more stringent "*signal*" (*b*) to select jets and leptons in final selection

Electrons: (*b*)

- from PV, isolated, $p_T > 25$ GeV, $|\eta| < 2.47$
- $|z_0 \sin\theta| < 0.5$ mm from PV, $|d_0/\sigma_{d0}| < 5$ (PV and IP closeness requirements)
- Efficiency: 70% for $p_T \sim 25$ GeV, up to 99% for $p_T > 200$ GeV

Muons (*b*):

- from PV, isolated, $p_T > 25$ GeV, $|\eta| < 2.4$, $|z_0 \sin\theta| < 0.5$ mm, $|d_0/\sigma_{d0}| < 3$
- Efficiency: 95 % for $p_T \sim 25$ GeV, up to 99% for $p_T > 60$ GeV

Jets (*b*):

- anti-k_t , R=0.4, from *topo* clusters; $p_T > 30$ GeV, $|\eta| < 2.5$; *b*-jet tagger: MV2C20 NN algorithm

Photons (*b*):

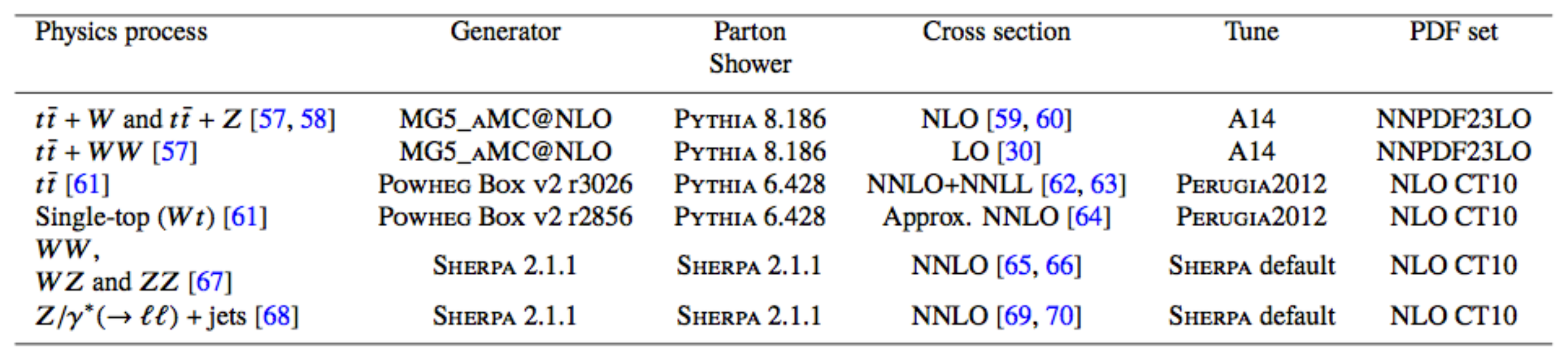
- isolated, $p_T > 37$ GeV, $|\eta| < 2.37$ (and outside $1.37 < |\eta| < 1.52$)

E_T^{miss} calculation includes the "soft term"

Pile-up correction and overlap removal applied

Signal and SM simulation

SM background:



Physics process	Generator	Parton Shower	Cross section	Tune	PDF set
$t\bar{t}+W$ and $t\bar{t}+Z$ [57, 58]	MG5_aMC@NLO	Pythia 8.186	NLO [59, 60]	A14	NNPDF23LO
$t\bar{t}+WW$ [57]	MG5_aMC@NLO	Pythia 8.186	LO [30]	A14	NNPDF23LO
$t\bar{t}$ [61]	Powheg Box v2 r3026	Pythia 6.428	NNLO+NNLL [62, 63]	Perugia2012	NLO CT10
Single-top (Wt) [61]	Powheg Box v2 r2856	Pythia 6.428	Approx. NNLO [64]	Perugia2012	NLO CT10
WW, WZ and ZZ [67]	Sherpa 2.1.1	Sherpa 2.1.1	NNLO [65, 66]	Sherpa default	NLO CT10
$Z/\gamma^{*}(\rightarrow \ell\ell)+\text{jets}$ [68]	Sherpa 2.1.1	Sherpa 2.1.1	NNLO [69, 70]	Sherpa default	NLO CT10

- Full simulation with Geant4

SUSY signal samples:

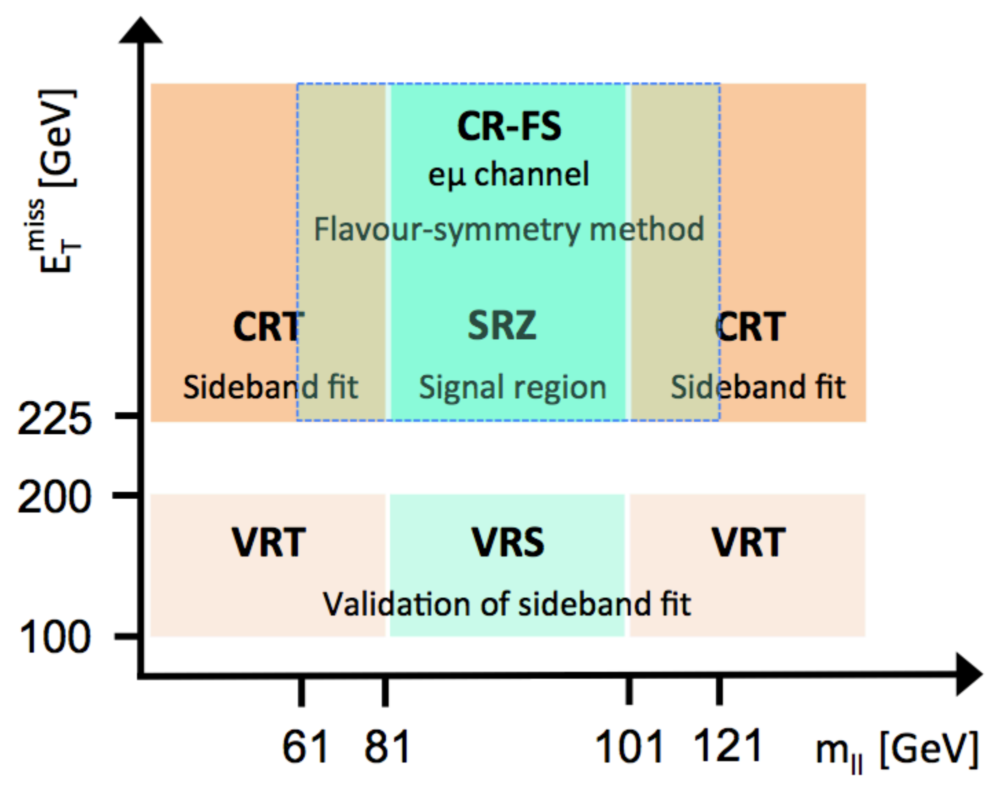
SUSY signals	MG5_aMC@NLO	Pythia 8.186	LO	A14	NNPDF2.3LO

- Up to one additional parton in the matrix element
- EvtGen is used to simulate *bottom/charm* hadron decays
- Fast simulation

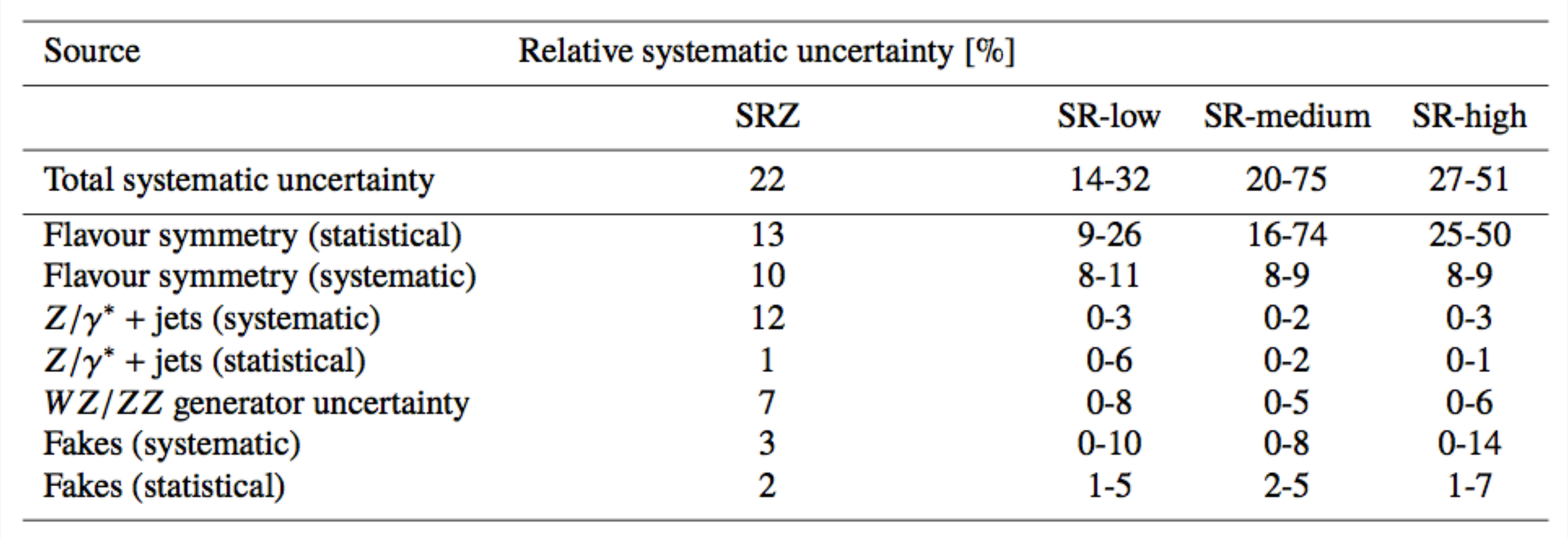
LL+jets+MET – Event selection regions

“on-shell Z” channel
($m_{ll} \sim m_Z$)

- m_{ll} – E_T^{miss} plane



LL+jets+MET - Uncertanties

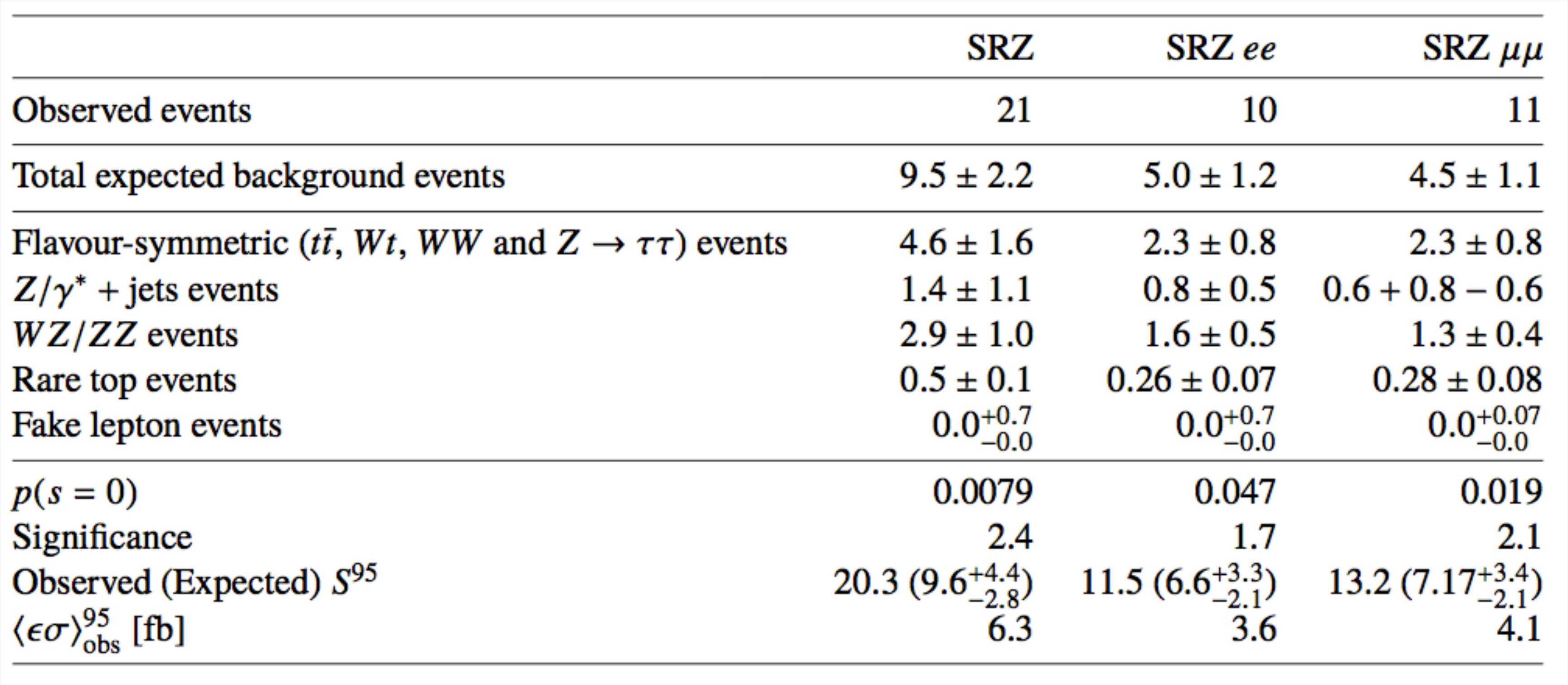


Source	Relative systematic uncertainty [%]			
	SRZ	SR-low	SR-medium	SR-high
Total systematic uncertainty	22	14-32	20-75	27-51
Flavour symmetry (statistical)	13	9-26	16-74	25-50
Flavour symmetry (systematic)	10	8-11	8-9	8-9
$Z/\gamma^* +$ jets (systematic)	12	0-3	0-2	0-3
$Z/\gamma^* +$ jets (statistical)	1	0-6	0-2	0-1
WZ/ZZ generator uncertainty	7	0-8	0-5	0-6
Fakes (systematic)	3	0-10	0-8	0-14
Fakes (statistical)	2	1-5	2-5	1-7

- Luminosity: 2.1 % on 2015 data
- Other corrections are also evaluated and taken into account. Among them: JES, JER, pileup, E_T^{miss} "*soft term*" resolution, lepton reconstruction and efficiency and trigger

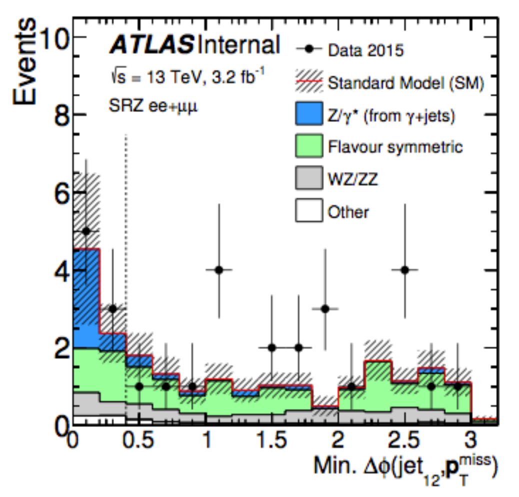
LL+jets+Met – “Z” Results - I

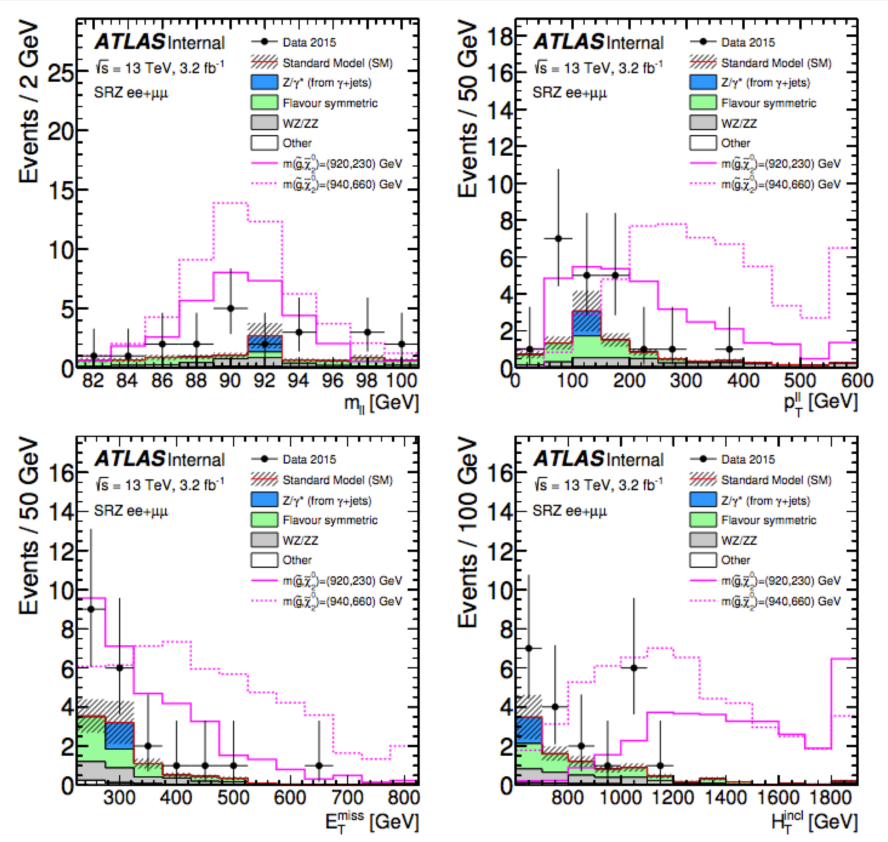
- Event yields

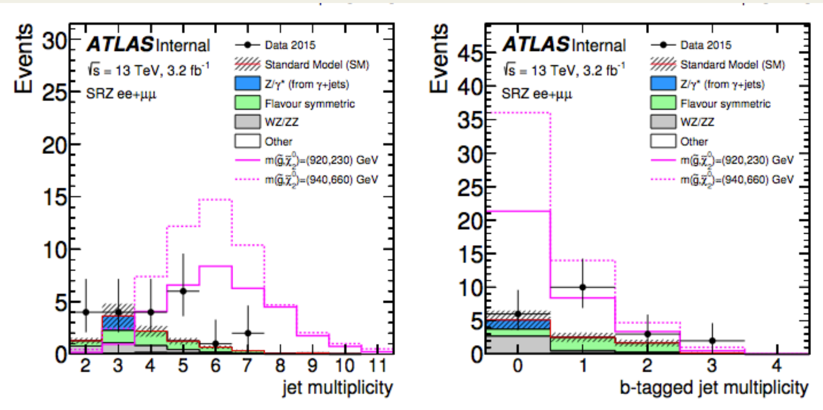


	SRZ	SRZ ee	SRZ $\mu\mu$
Observed events	21	10	11
Total expected background events	9.5 ± 2.2	5.0 ± 1.2	4.5 ± 1.1
Flavour-symmetric ($t\bar{t}$, Wt, WW and $Z \rightarrow \tau\tau$) events	4.6 ± 1.6	2.3 ± 0.8	2.3 ± 0.8
Z/γ^{*} + jets events	1.4 ± 1.1	0.8 ± 0.5	$0.6 + 0.8 - 0.6$
WZ/ZZ events	2.9 ± 1.0	1.6 ± 0.5	1.3 ± 0.4
Rare top events	0.5 ± 0.1	0.26 ± 0.07	0.28 ± 0.08
Fake lepton events	$0.0^{+0.7}_{-0.0}$	$0.0^{+0.7}_{-0.0}$	$0.0^{+0.07}_{-0.0}$
$p(s = 0)$	0.0079	0.047	0.019
Significance	2.4	1.7	2.1
Observed (Expected) S^{95}	$20.3\ (9.6^{+4.4}_{-2.8})$	$11.5\ (6.6^{+3.3}_{-2.1})$	$13.2\ (7.17^{+3.4}_{-2.1})$
$\langle\epsilon\sigma\rangle^{95}_{\mathrm{obs}}$ [fb]	6.3	3.6	4.1

LL+jets+Met – "Z" Results - II





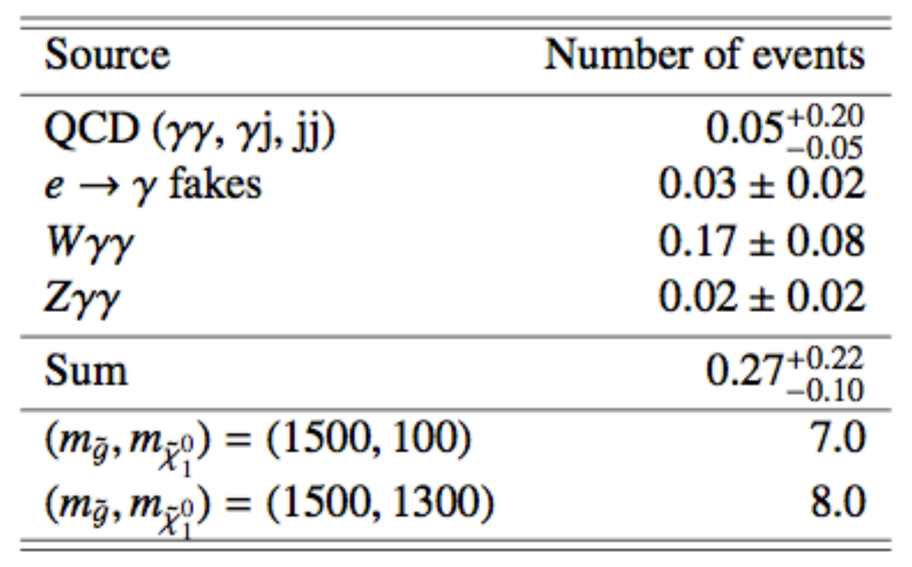


DIPHOTON BACKUP

Di-photon - Object selection

Offline selection:

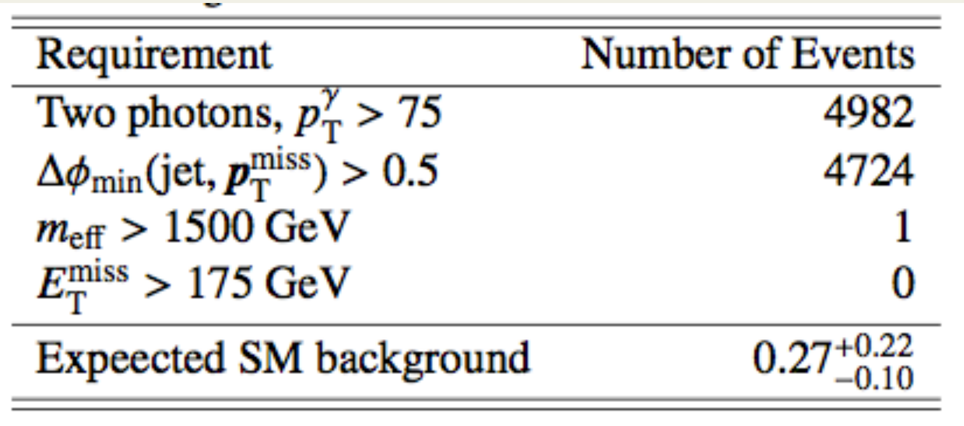
- Primary Vertex: the vertex with the largest Σp_T, and at least 2 tracks with $p_T > 400$ MeV
- Photons:
  - isolated, $p_T > 25$ GeV, $|\eta| < 2.37$ (and outside $1.37 < |\eta| < 1.52$)
  - overlap-removal (ΔR=0.4): electron retained
- Electrons: from PV, $p_T > 25$ GeV, $|\eta| < 2.37$ (and outside $1.37 < |\eta| < 1.52$)
- Muons: from PV, $p_T > 25$ GeV, $|\eta| < 2.7$
- Jets:
  - anti-k_t , R=0.4, $p_T > 40$ GeV, $|\eta| < 2.8$
  - Overlap removal: photon-jet->photon retained; electron-jet->electron (R<0.2) or jet (R<0.4) retained; muon-jet->jet retained
- Pile-up correction applied



Source	Number of events
QCD ($\gamma\gamma$, γj, jj)	$0.05^{+0.20}_{-0.05}$
$e \rightarrow \gamma$ fakes	0.03 ± 0.02
$W\gamma\gamma$	0.17 ± 0.08
$Z\gamma\gamma$	0.02 ± 0.02
Sum	$0.27^{+0.22}_{-0.10}$
$(m_{\tilde{g}}, m_{\tilde{\chi}_1^0}) = (1500, 100)$	7.0
$(m_{\tilde{g}}, m_{\tilde{\chi}_1^0}) = (1500, 1300)$	8.0

Estimated background events

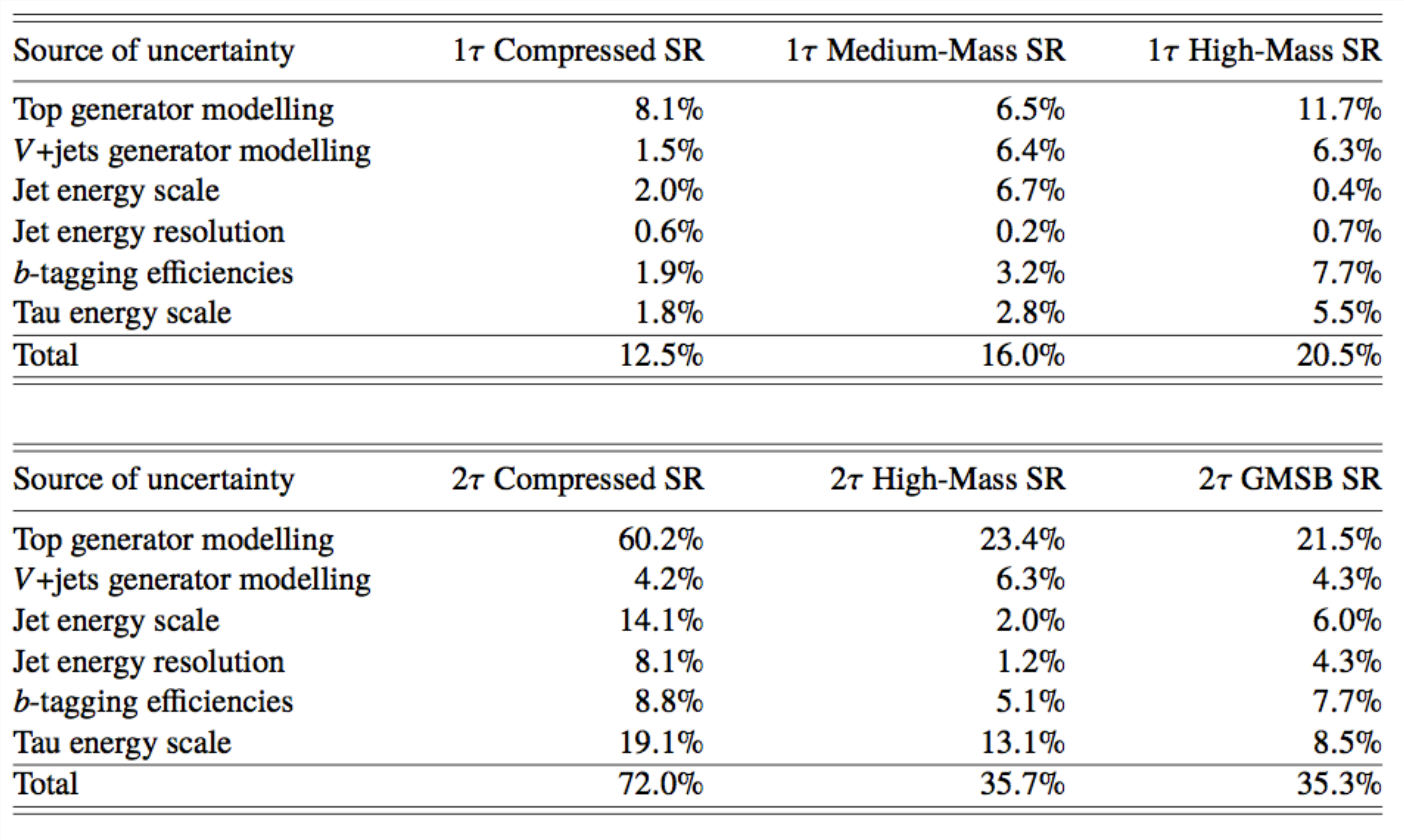
Final selected events



Requirement	Number of Events
Two photons, $p_T^\gamma > 75$	4982
$\Delta\phi_{\min}(\text{jet}, \boldsymbol{p}_T^{\text{miss}}) > 0.5$	4724
$m_{\text{eff}} > 1500$ GeV	1
$E_T^{\text{miss}} > 175$ GeV	0
Expeccted SM background	$0.27^{+0.22}_{-0.10}$

SUSY IN TAUS BACKUP

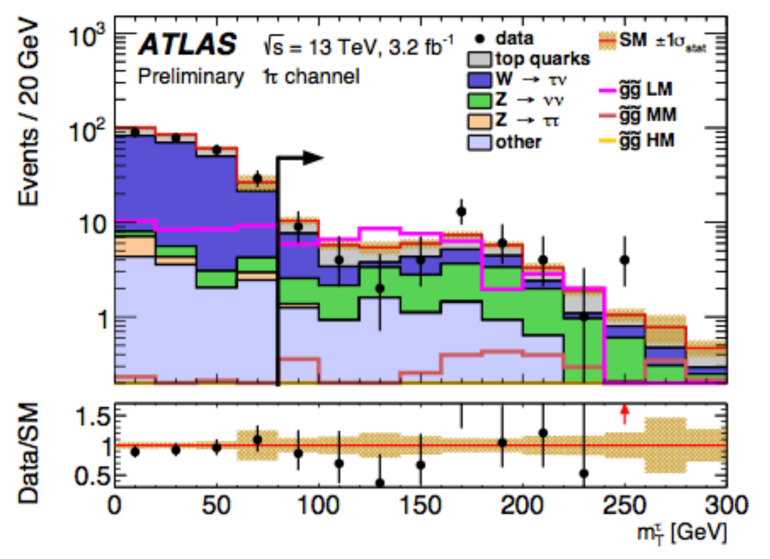
Uncertainties



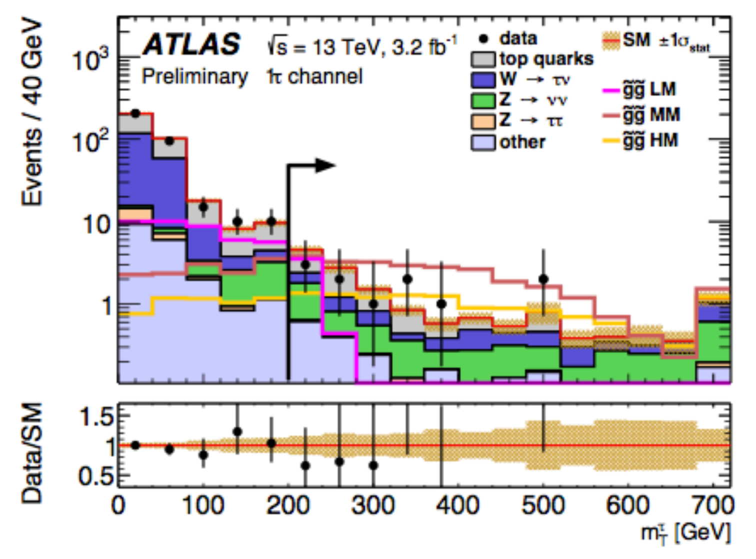
Source of uncertainty	1τ Compressed SR	1τ Medium-Mass SR	1τ High-Mass SR
Top generator modelling	8.1%	6.5%	11.7%
V+jets generator modelling	1.5%	6.4%	6.3%
Jet energy scale	2.0%	6.7%	0.4%
Jet energy resolution	0.6%	0.2%	0.7%
b-tagging efficiencies	1.9%	3.2%	7.7%
Tau energy scale	1.8%	2.8%	5.5%
Total	12.5%	16.0%	20.5%

Source of uncertainty	2τ Compressed SR	2τ High-Mass SR	2τ GMSB SR
Top generator modelling	60.2%	23.4%	21.5%
V+jets generator modelling	4.2%	6.3%	4.3%
Jet energy scale	14.1%	2.0%	6.0%
Jet energy resolution	8.1%	1.2%	4.3%
b-tagging efficiencies	8.8%	5.1%	7.7%
Tau energy scale	19.1%	13.1%	8.5%
Total	72.0%	35.7%	35.3%

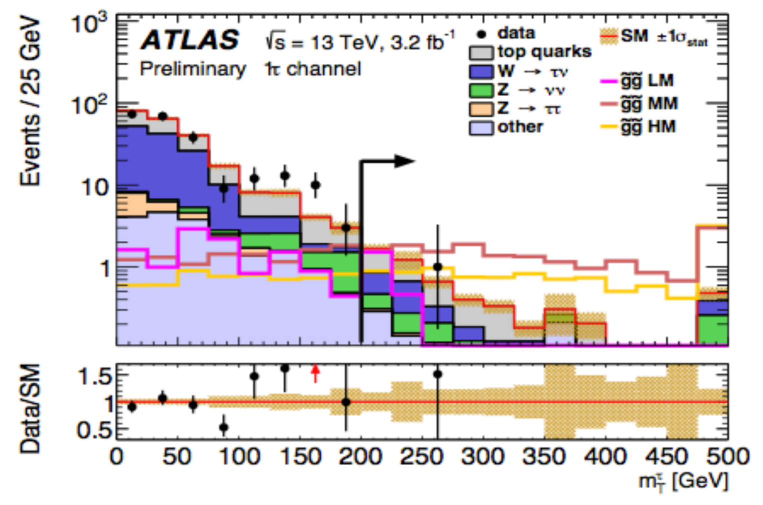
Results – 1τ kinematic distros



Compressed SR

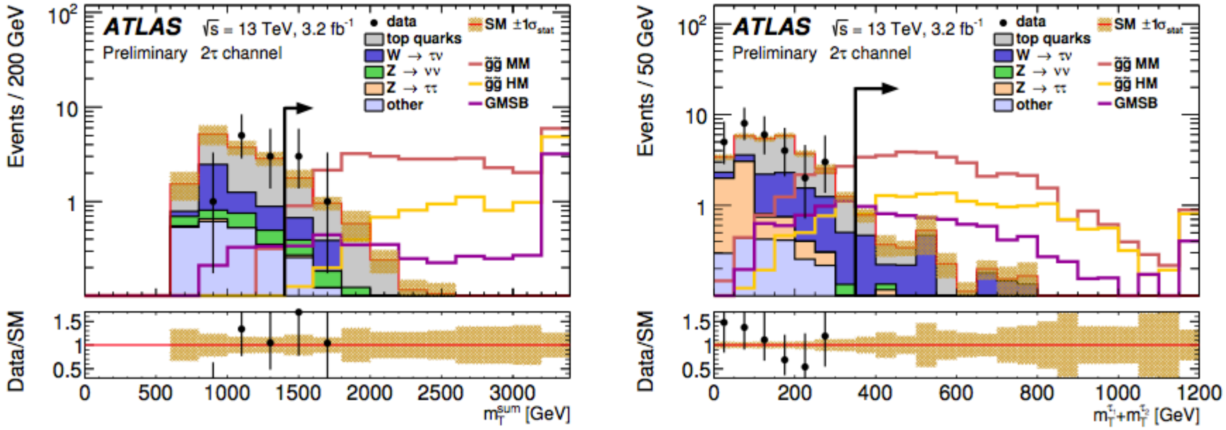


Medium-mass SR



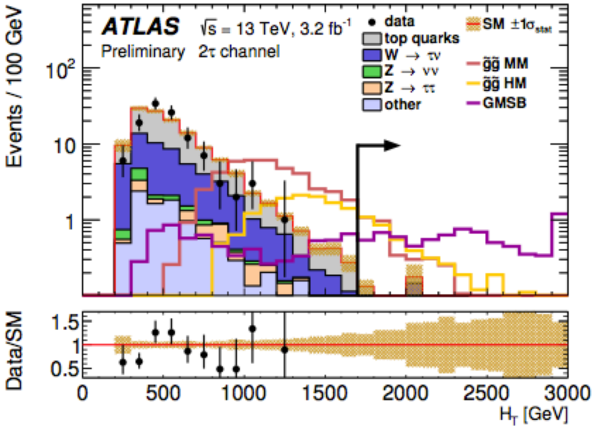
High-mass SR

Results – 2τ kinematic distros



(a) $m_{\mathrm{T}}^{\mathrm{sum}}$ distribution for the Compressed SR selection of the 2τ channel without the $m_{\mathrm{T}}^{\mathrm{sum}} > 1400$ GeV requirement

(b) $m_{\mathrm{T}}^{\tau_1} + m_{\mathrm{T}}^{\tau_2}$ distribution for the High-Mass SR selection of the 2τ channel without the $m_{\mathrm{T}}^{\tau_1} + m_{\mathrm{T}}^{\tau_2} > 350$ GeV requirement

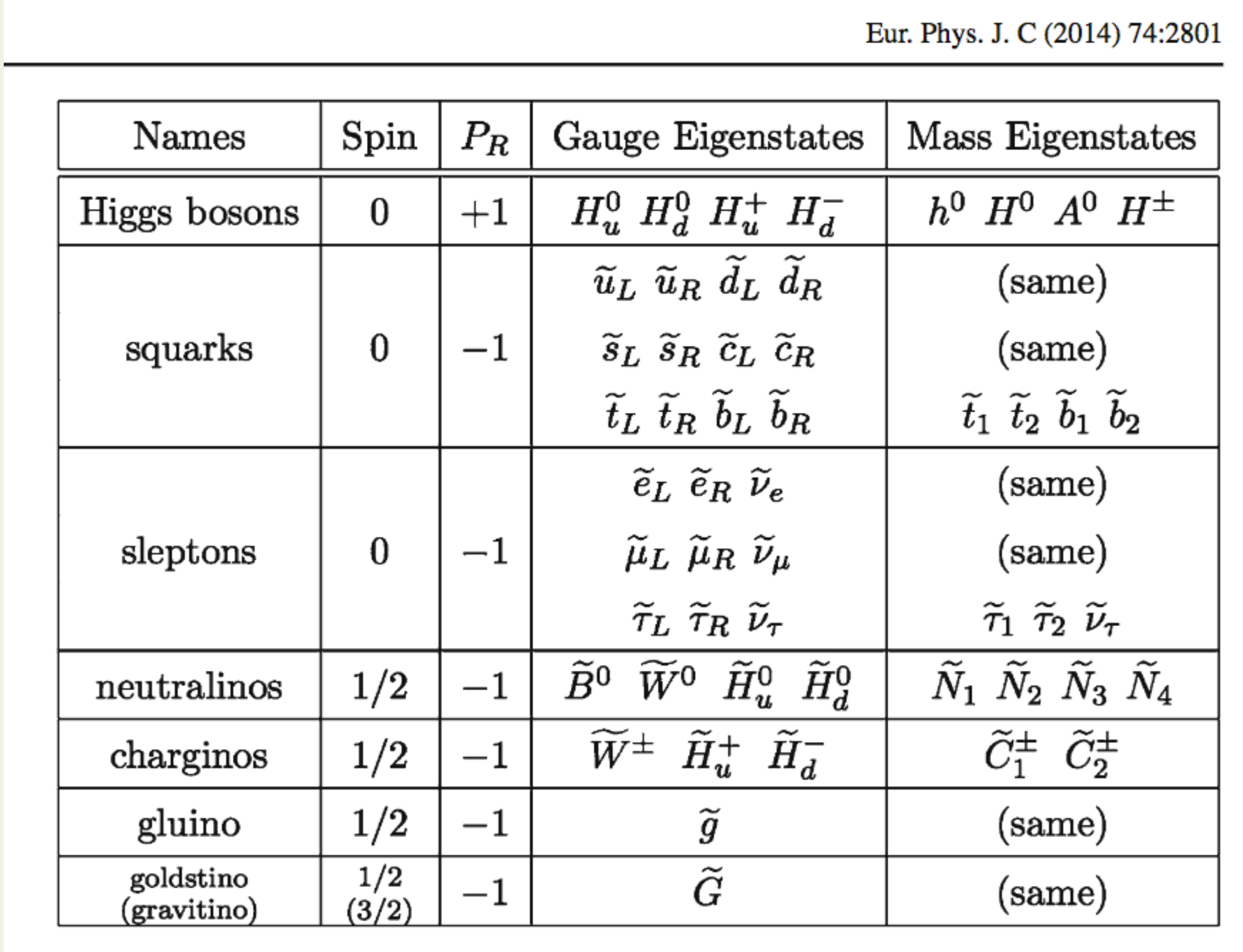


(c) H_{T} distribution for the GMSB SR selection of the 2τ channel without the $H_{\mathrm{T}} > 1700$ GeV requirement

OTHER BACKUP SLIDES

A SUSY PRIMER

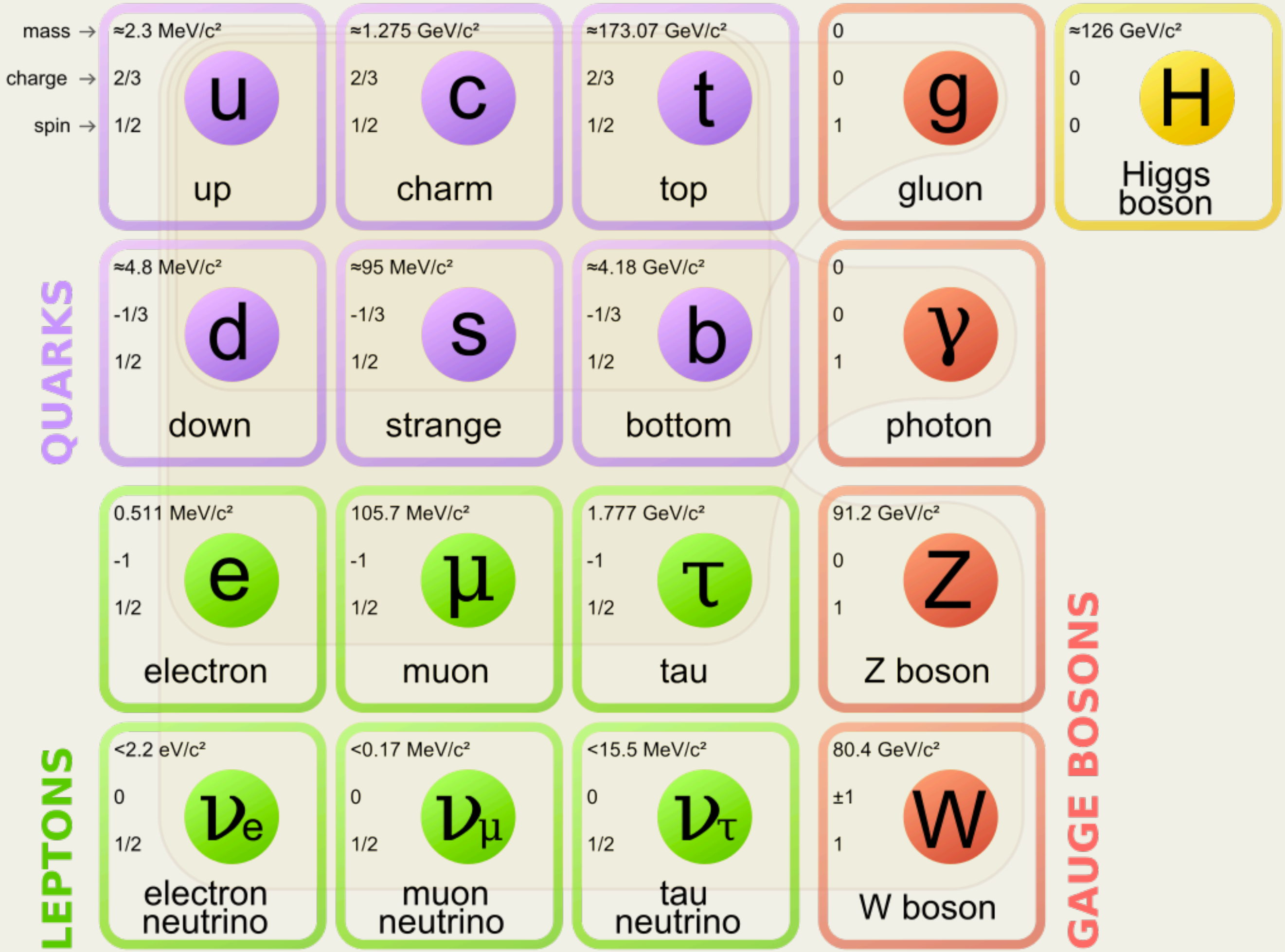
SUSY Primer



Eur. Phys. J. C (2014) 74:2801

Names	Spin	P_R	Gauge Eigenstates	Mass Eigenstates
Higgs bosons	0	+1	$H_u^0\ H_d^0\ H_u^+\ H_d^-$	$h^0\ H^0\ A^0\ H^\pm$
squarks	0	−1	$\tilde{u}_L\ \tilde{u}_R\ \tilde{d}_L\ \tilde{d}_R$ $\tilde{s}_L\ \tilde{s}_R\ \tilde{c}_L\ \tilde{c}_R$ $\tilde{t}_L\ \tilde{t}_R\ \tilde{b}_L\ \tilde{b}_R$	(same) (same) $\tilde{t}_1\ \tilde{t}_2\ \tilde{b}_1\ \tilde{b}_2$
sleptons	0	−1	$\tilde{e}_L\ \tilde{e}_R\ \tilde{\nu}_e$ $\tilde{\mu}_L\ \tilde{\mu}_R\ \tilde{\nu}_\mu$ $\tilde{\tau}_L\ \tilde{\tau}_R\ \tilde{\nu}_\tau$	(same) (same) $\tilde{\tau}_1\ \tilde{\tau}_2\ \tilde{\nu}_\tau$
neutralinos	1/2	−1	$\tilde{B}^0\ \ \tilde{W}^0\ \ \tilde{H}_u^0\ \ \tilde{H}_d^0$	$\tilde{N}_1\ \tilde{N}_2\ \tilde{N}_3\ \tilde{N}_4$
charginos	1/2	−1	$\tilde{W}^\pm\ \ \tilde{H}_u^+\ \ \tilde{H}_d^-$	$\tilde{C}_1^\pm\ \ \tilde{C}_2^\pm$
gluino	1/2	−1	$\tilde{g}$	(same)
goldstino (gravitino)	1/2 (3/2)	−1	$\tilde{G}$	(same)

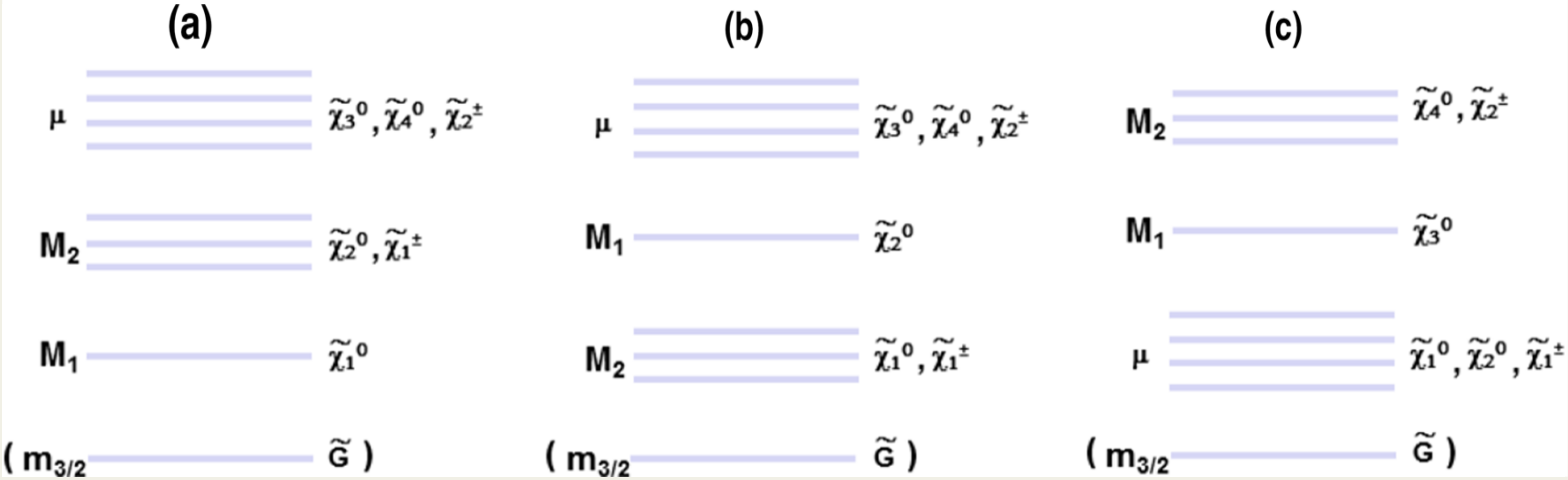
Standard Model



mass → charge → spin →	≈2.3 MeV/c^2 2/3 1/2 u up	≈1.275 GeV/c^2 2/3 1/2 c charm	≈173.07 GeV/c^2 2/3 1/2 t top	0 0 1 g gluon	≈126 GeV/c^2 0 0 H Higgs boson	
QUARKS	≈4.8 MeV/c^2 -1/3 1/2 d down	≈95 MeV/c^2 -1/3 1/2 s strange	≈4.18 GeV/c^2 -1/3 1/2 b bottom	0 0 1 γ photon		
	0.511 MeV/c^2 -1 1/2 e electron	105.7 MeV/c^2 -1 1/2 μ muon	1.777 GeV/c^2 -1 1/2 τ tau	91.2 GeV/c^2 0 1 Z Z boson		
LEPTONS	<2.2 eV/c^2 0 1/2 ν_e electron neutrino	<0.17 MeV/c^2 0 1/2 ν_μ muon neutrino	<15.5 MeV/c^2 0 1/2 ν_τ tau neutrino	80.4 GeV/c^2 ±1 1 W W boson		**GAUGE BOSONS**

Neutralino X_0^1 scenarios

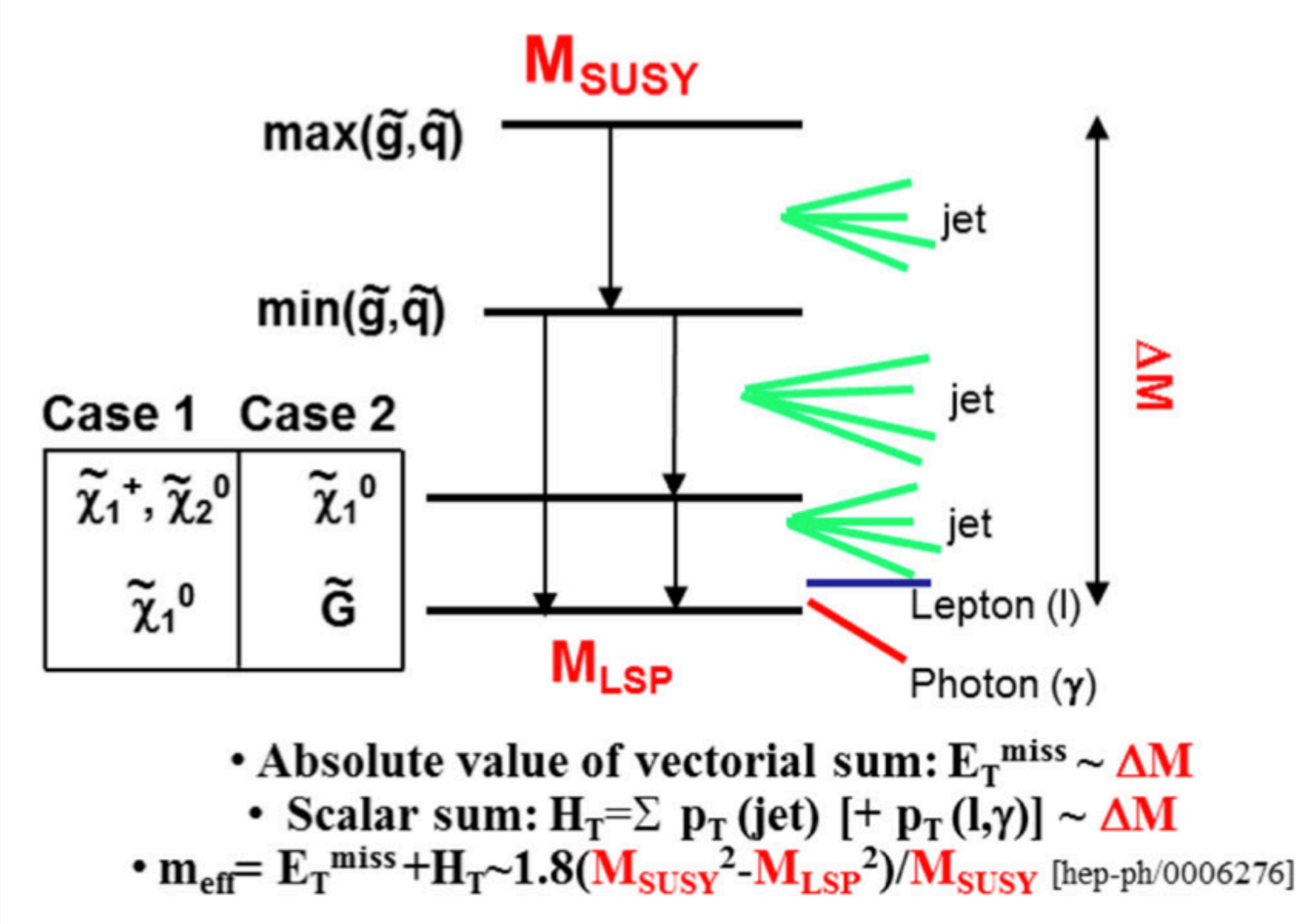
- 3 typical scenarios for the lightest Neutralino X_0^1



Bino-like **Wino-like** **Higgsino-like**

Ref: 1

SUSY decay chain

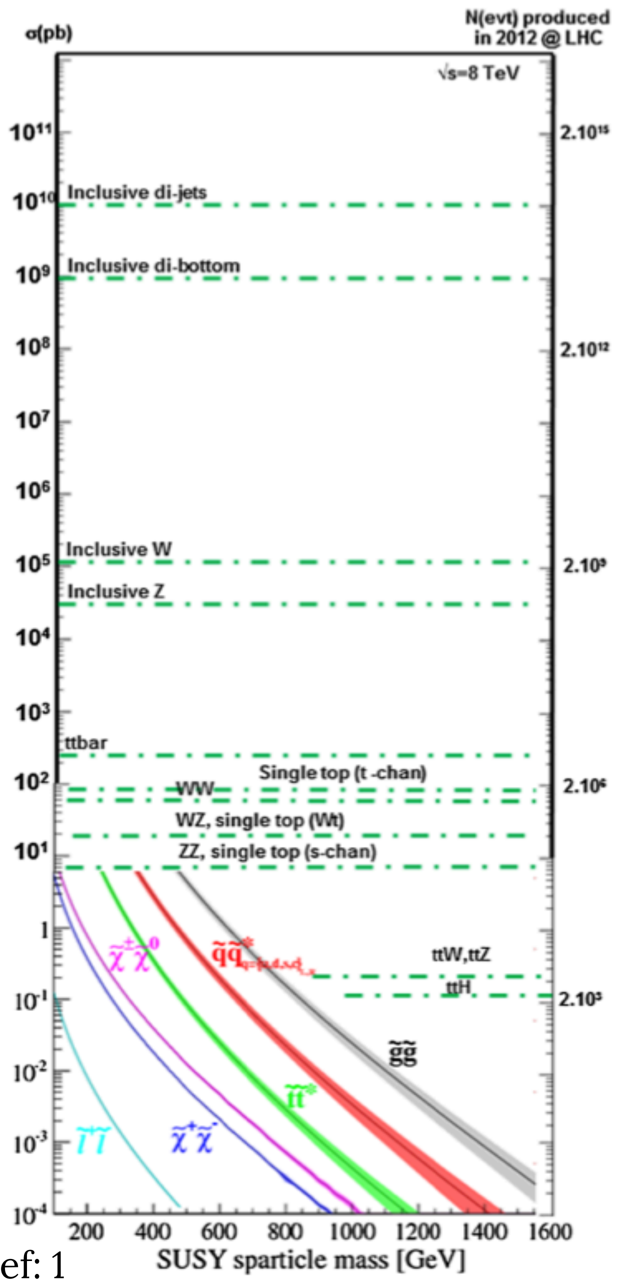


- Absolute value of vectorial sum: $E_T^{miss} \sim \Delta M$
- Scalar sum: $H_T = \Sigma\ p_T(\text{jet})\ [+\ p_T(l,\gamma)] \sim \Delta M$
- $m_{eff} = E_T^{miss} + H_T \sim 1.8(M_{SUSY}^2 - M_{LSP}^2)/M_{SUSY}$ [hep-ph/0006276]

Ref: 1

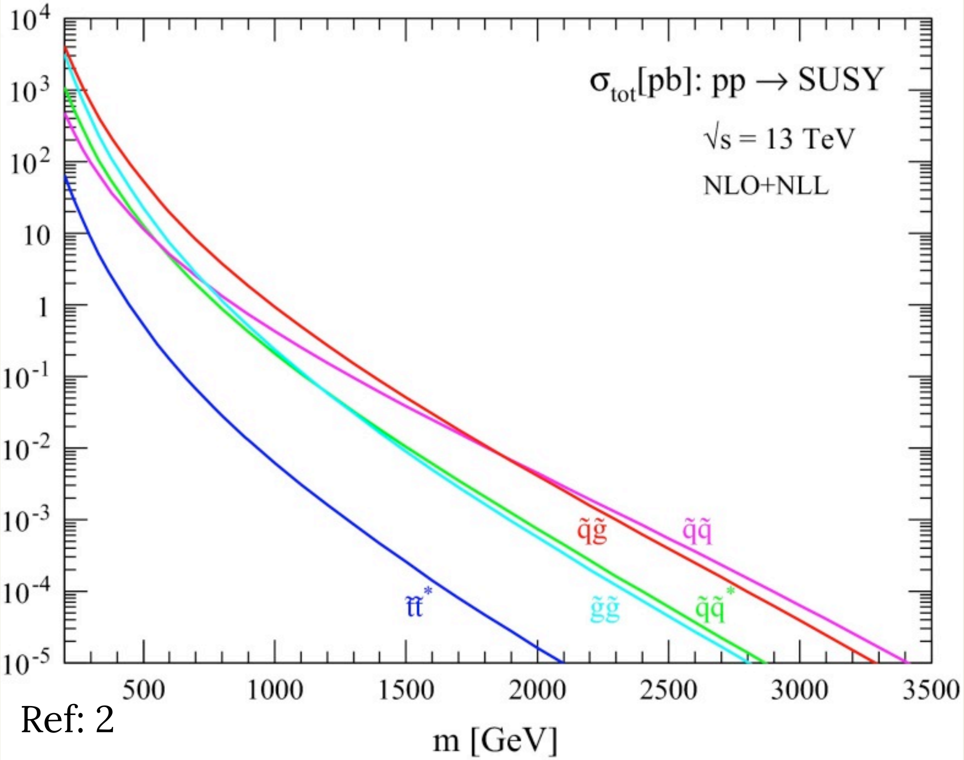
SUSY cross sections

8 TeV



Ref: 1

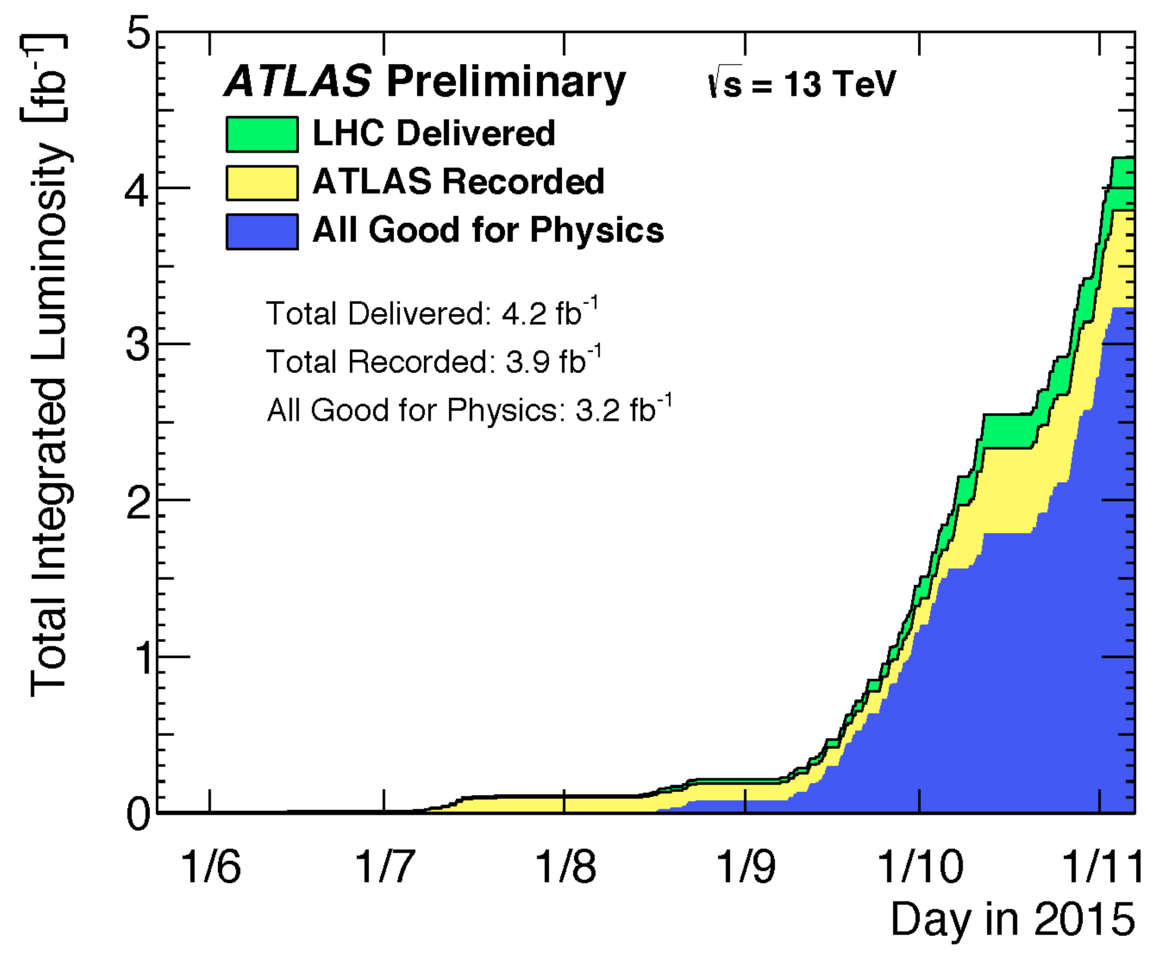
13 TeV



Ref: 2

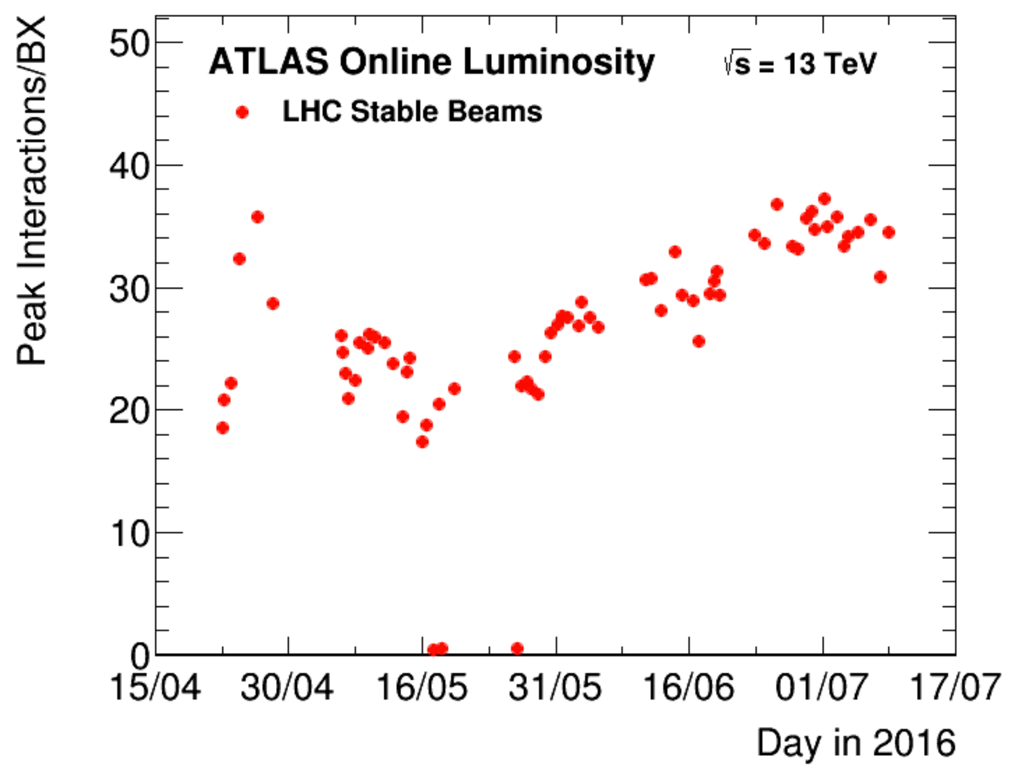
ATLAS DATA AND LINKS

2015 ATLAS data



2016 ATLAS Pile-up

number of
interactions per
beam crossing
(***pile-up***)



Non-ATLAS references

1. *I. Melzer-Pellmann, P. Pralavorio*, DOI: 10.1140/epjc/s10052-014-2801-y
2. *Borschensky et al.*, DOI: 10.1140/epjc/s10052-014-3174-y
3. *Claire David*, http://davidc.web.cern.ch/davidc/index.php?id=research.