New ATLAS results in SUSY searches for 3rd generation squarks and ElectroWeak production

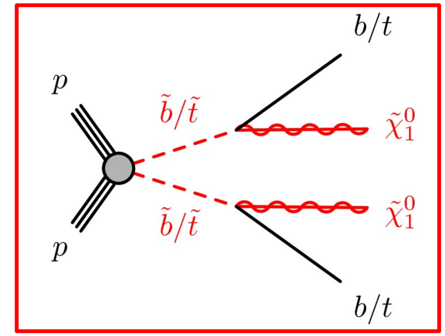
Claire David
on behalf of the ATLAS collaboration
University of Victoria

SUSY in ATLAS: 3rd generation squark production

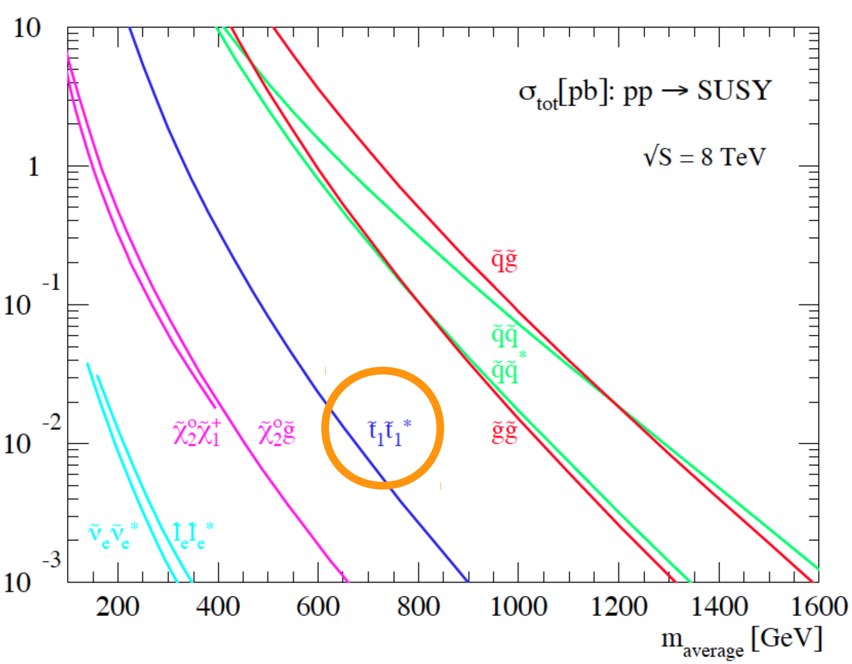
Motivations

SUSY models conserving R-Parity
⇓
Lightest Supersymmetric Particle (LSP) **stable**
⇓
Event with large Missing Transverse Momentum
(E_T^{miss})

SUSY natural spectrum
⇓
light 3rd generation squarks
⇓
m_{stop} < 1 TeV , light sbottom



Sbottom/stop production: different decay modes depending on mass hierarchy.



Wide range of final states and models:

Direct sbottom production

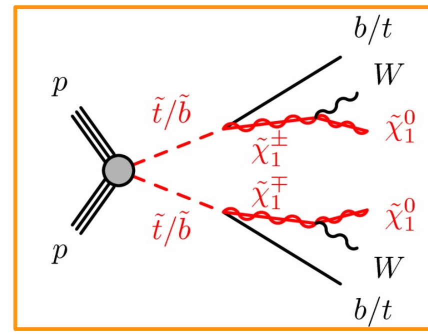
$\tilde{b}_1 \rightarrow b\tilde{\chi}_1^0$ | $\tilde{b}_1 \rightarrow b\tilde{\chi}_2^0$ | $\tilde{b}_1 \rightarrow t\tilde{\chi}_1^\pm$

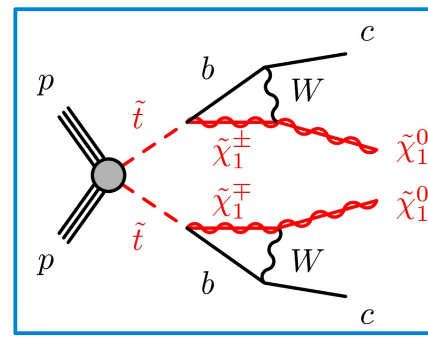
Direct stop production

$\tilde{t} \rightarrow t\tilde{\chi}_1^0$ | $\tilde{t} \rightarrow b\tilde{\chi}_1^\pm$

$\tilde{t} \rightarrow c\tilde{\chi}_1^0$ | $\tilde{t} \rightarrow Wb\tilde{\chi}_1^0$

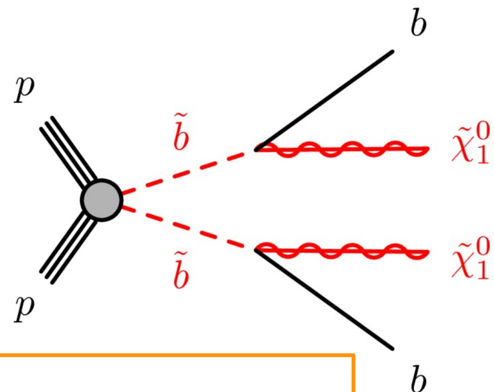
↳ First time in ATLAS!





Direct sbottom production $\tilde{b}_1 \rightarrow b\tilde{\chi}_1^0$ 1308.2631

Model	Sbottom lightest squark direct pair production	
Final states	E_T^{miss} > 150 GeV + 2 high p_T leading *b*-jets	
2 SR	**large Δm** → 2 leading *b*-jets	**small Δm** → 1st jet ISR, 2 *b*-jets*
Main bkgd	W/Z+jets (Z → νν)	W/Z+jets, top quark (5 to 20%)
3 + 2 CR	2 same-flavor lep ⇒ Z → νν reconstruction	
	1 lep ⇒ W + jets estimation	1 lep ⇒ top bkgd estimation
	2 diff-flavor lep ⇒ top bkgd	

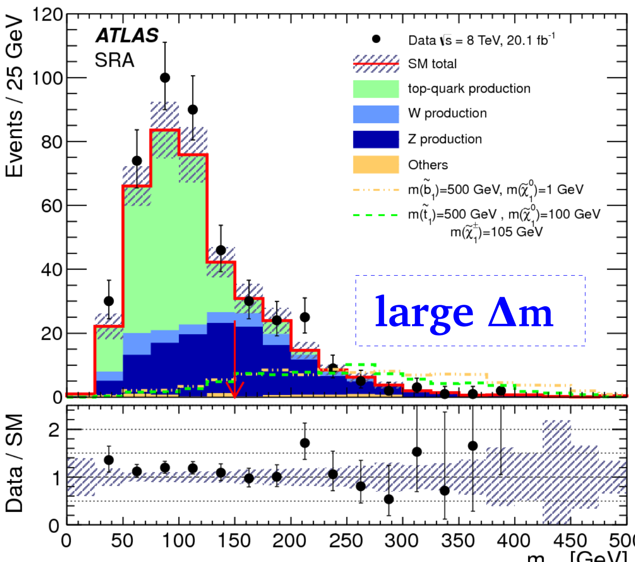


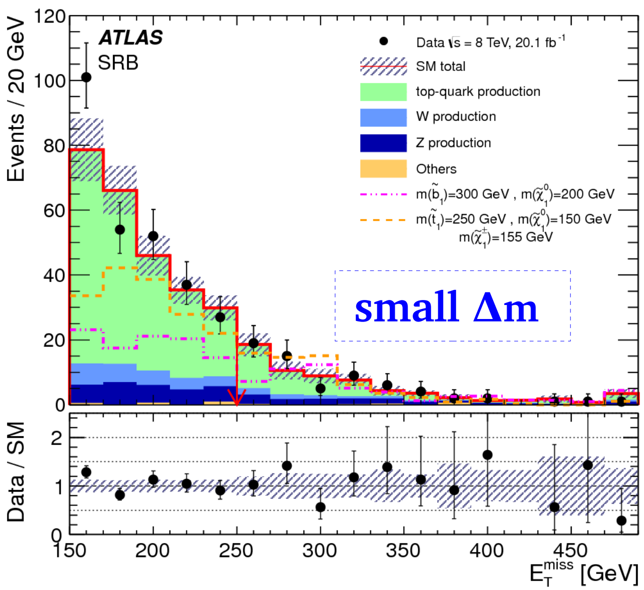
$$\Delta m = m_{\tilde{b}_1} - m_{\tilde{\chi}_1^0}$$

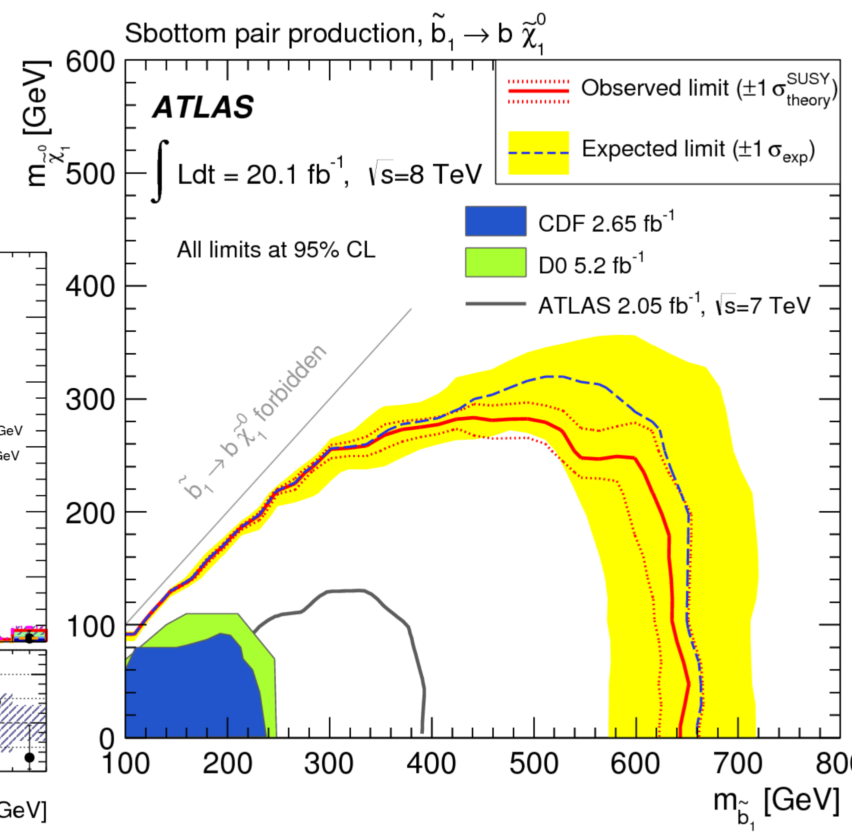
*Special ISR jet selection to target compressed spectra:
1 hard leading jet, only 2nd and 3rd jets *b*-tagged

No excess observed. Exclusion limits at 95% CL:
$m_{\tilde{b}_1}$ < 620 GeV for $m_{\tilde{\chi}_1^0}$ < 100 GeV

$$m_{CT}^2(v_1, v_2) = [E_T(v_1) + E_T(v_2)]^2 - [\mathbf{p}_T(v_1) - \mathbf{p}_T(v_2)]^2$$





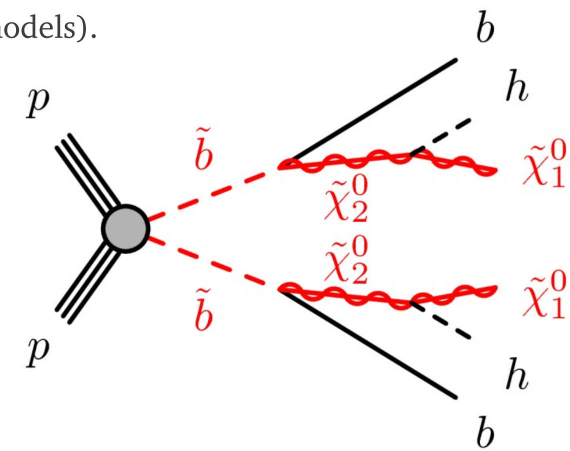


Direct sbottom: $\tilde{b}_1 \to b\tilde{\chi}^0_2 \to bh(bb)\tilde{\chi}^0_1$

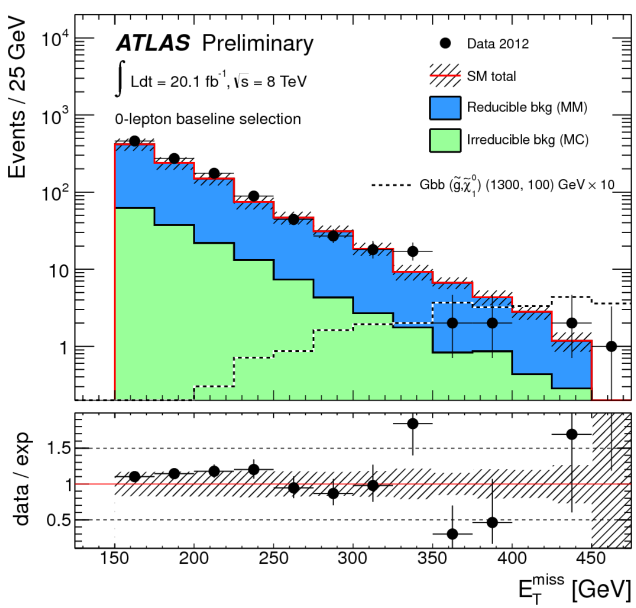
ATLAS-CONF-2013-061

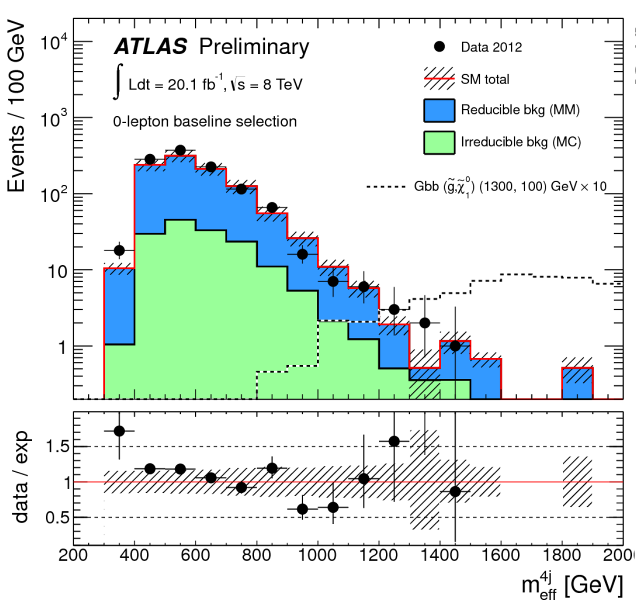
Analysis primarily designed for gluino mediated production of stop and sbottom (best reach for Gtt models).

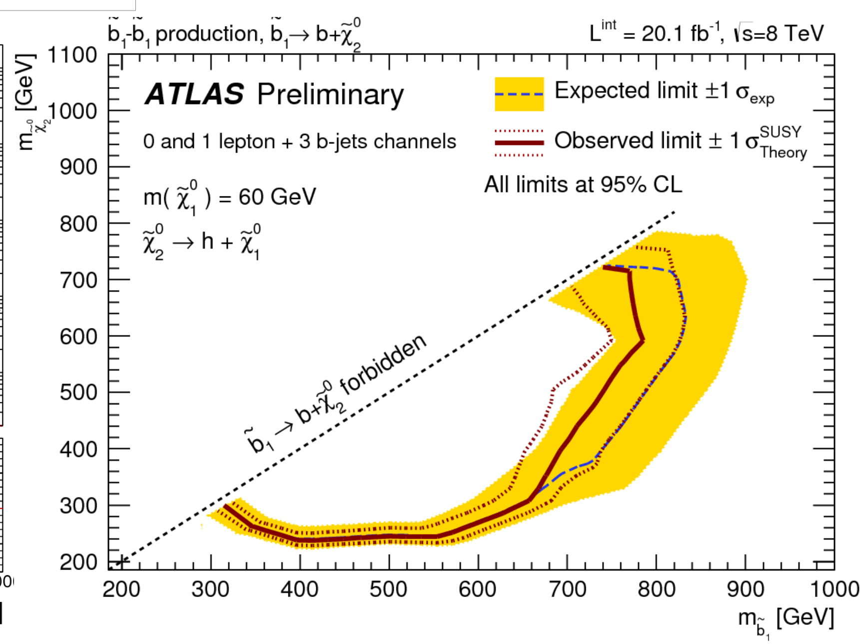
Model	sbottom → $\tilde{\chi}^0_2$ exclusively on/off-shell Z/h (SM-like)
Final states	E_T^{miss} > 150 GeV + 0 lepton + min 3 b-jets (h ⇒ 6 b-jets)
Variables	**To suppress multi-jet background:** $m_{eff}^{4j} = E_T^{miss} + \Sigma\, p_T$ 4 leading jets $\Delta\phi_{min}^{4j}$ = min azimut. sep. any 4 leading jet and E_T^{miss}
Baseline	$\Delta\phi_{min}^{4j} > 0.5$ $E_T^{miss} / m_{eff}^{4j} > 0.2$
SR	3 SR 4-jets + 3 SR 7-jets loose, medium, tight m_{eff} cuts
CR	Irreducible background: *$t\bar{t}$ + b/$b\bar{b}$ and $t\bar{t}$ + Z/h (→ $b\bar{b}$)* Reducible $t\bar{t}$ background (+W) with 1 mistag: from data via Matrix Method (MM); systematic includes insignificant non-closure (MC)



No excess observed.
Exclusion limits at 95% CL
for the Direct-Sbottom model:

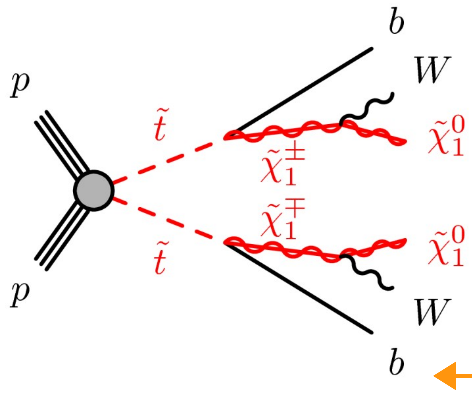






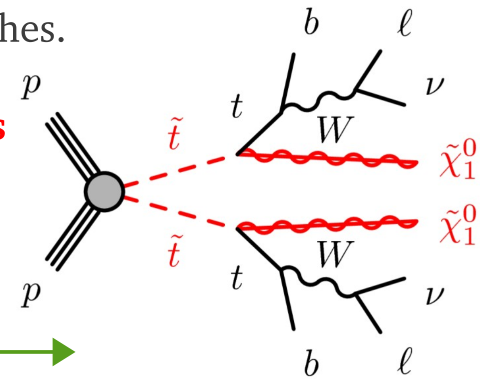
Direct stop in: $\tilde{t}_1 \rightarrow b + \tilde{\chi}_1^{\pm}$ $\tilde{t}_1 \rightarrow t + \tilde{\chi}_1^0$

Stop can decay into variety of final states → dependence of mass hierarchy between lightest Chargino/Neutralino.



Analysis completes the high-BR 0 lepton & 1 lepton searches.
Here 2 leptons + 2 *b*-jets:

- **purer, less efficient selection with m_{T2} between *b*-jets**
- **strongly optimized MVA analysis**

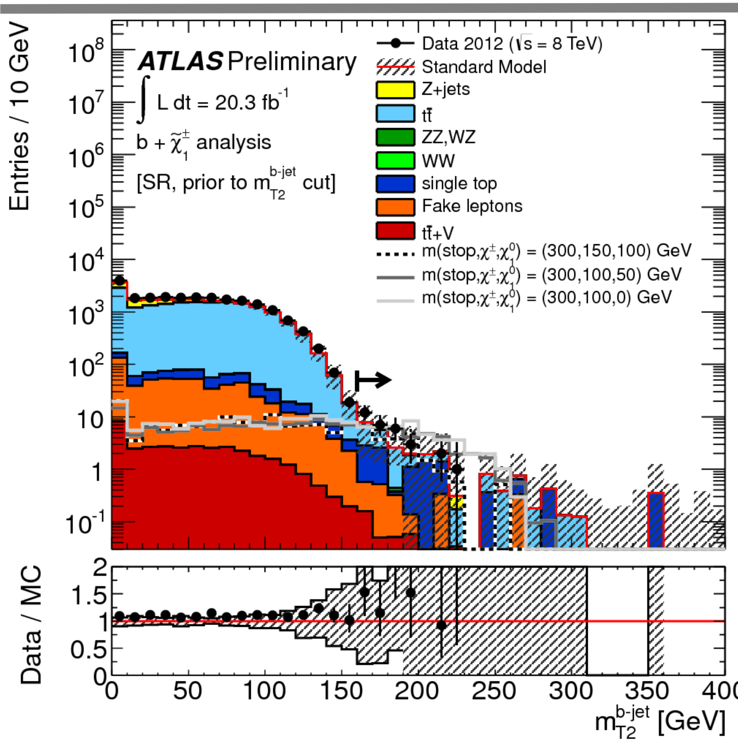


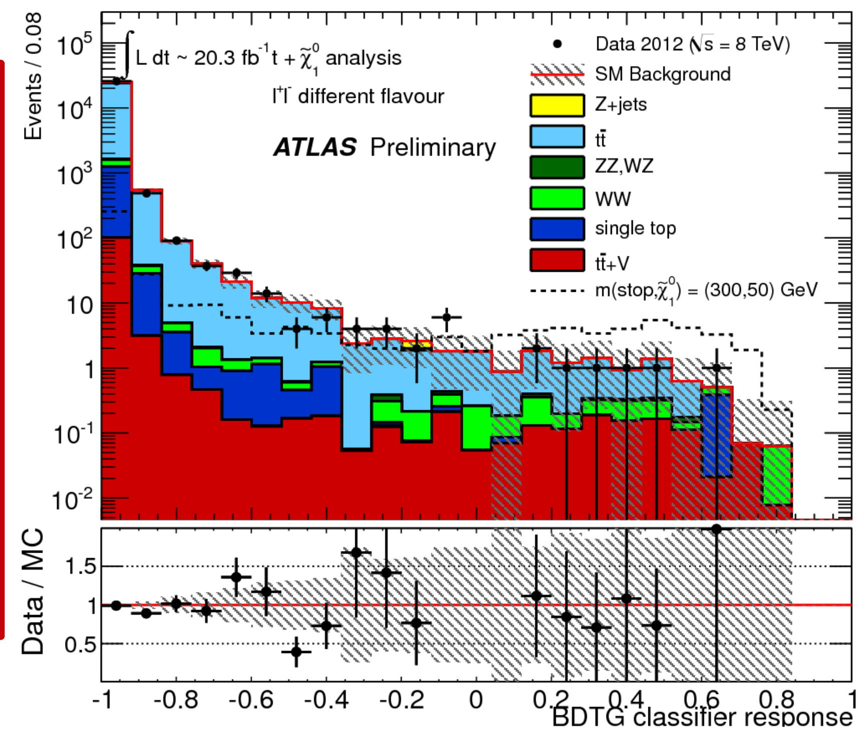
$m(\tilde{t}_1) - m(\tilde{\chi}_1^{\pm}) > m(b)$

$m(\tilde{t}_1) > m(t)$

Model	Stop decays to lightest chargino / neutralino (LSP) with W decaying leptonically	
Final states	E_T^{miss} + 2 opposite sign lepton (e, μ) + 2 *b*-jets	
Variable	$m_{T2}(\mathbf{p}_T^1, \mathbf{p}_T^2, \mathbf{q}_T) = \min_{\mathbf{q}_T^1 + \mathbf{q}_T^2 = \mathbf{q}_T} \left\{ \max[\, m_T(\mathbf{p}_T^1, \mathbf{q}_T^1), m_T(\mathbf{p}_T^2, \mathbf{q}_T^2) \,] \right\}$ p_T for massless particle, min over all q_T decompositions $m_{T2}(l,l,E_T^{miss})$ sharp bound > m_W	
Signal Regions	high cut on $\mathbf{m_{T2}}(b,b,\ l+l+E_T^{miss}) = \mathbf{m_{T2}}^{b\text{-jet}}$ Sensitive to large stop/chargino Δm Small chargino/neutralino Δm	m_{T2} discriminant used in multivariate analysis (MVA) based on a Boosted Decision Tree (BDT) Exploits geometric/kinematic features of stop decays
Main bkgd	Top quark pair & single top (Wt channel)	Top quark pair and diboson productions
Bkgd /CR	**CRT**: SR with 1 b-jet ⇒ top quark pairs **CRZ**: 81 < m_{ll} < 101 GeV ⇒ Z/γ^* + jets **VRT**: $m_{ll} \notin$ [81,101] GeV ⇒ top pair + Wt	**$t\bar{t}$ CRs:** high m_{T2} cut $m_{ll} \notin$ [61,121] GeV ⇒ high $t\bar{t}$ purity, kin. close to SR

Direct stop in: $\tilde{t}_1 \to b + \tilde{\chi}_1^{\pm}$ $\tilde{t}_1 \to t + \tilde{\chi}_1^0$

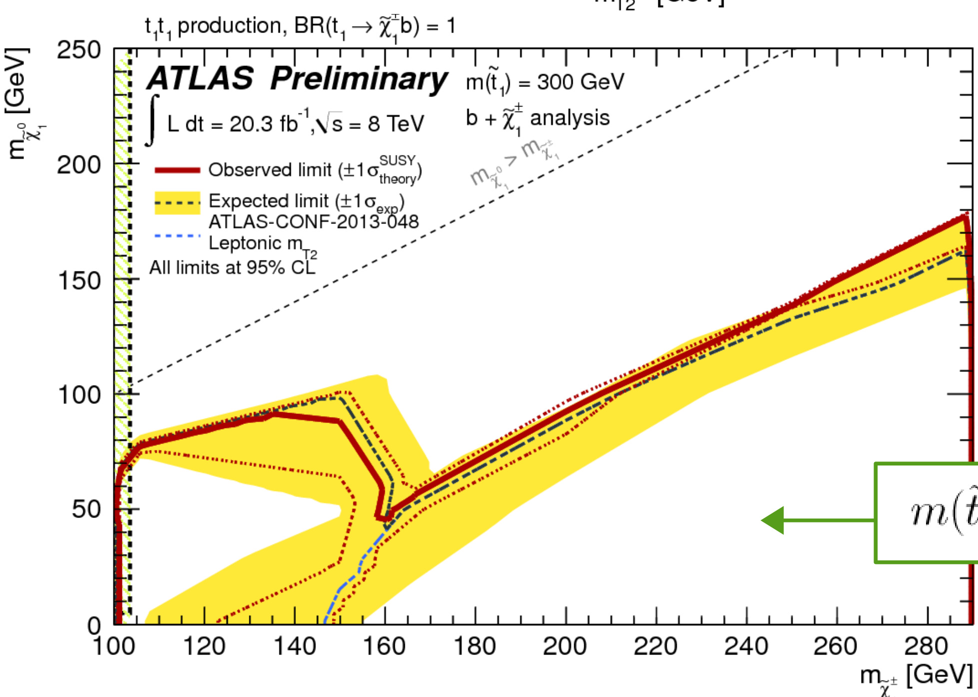




No excess observed.
Exclusion limits at 95% CL:

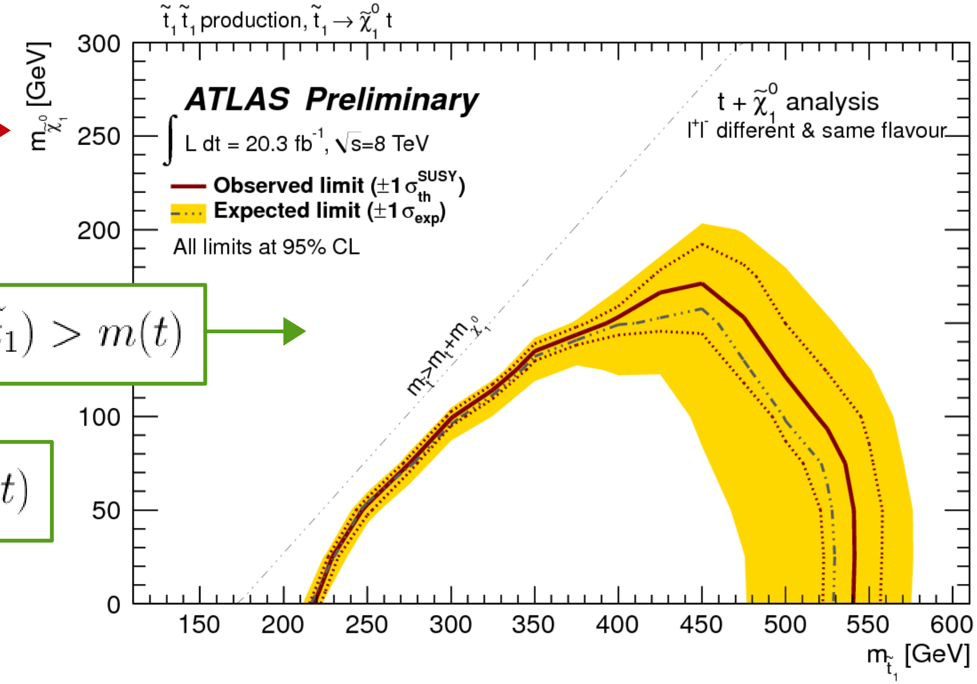
$$220 < m_{\tilde{t}} < 520 \text{ GeV}$$

for massless neutralino



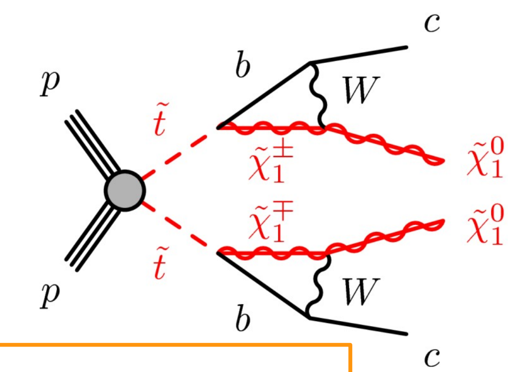
$m(\tilde{t}_1) < m(t)$

$m(\tilde{t}_1) > m(t)$



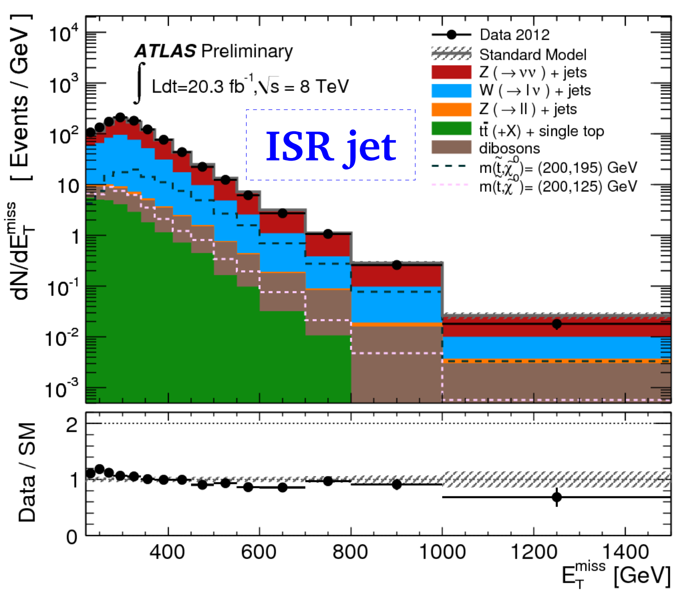
Direct stop in charm + LSP: $\tilde{t} \rightarrow c\tilde{\chi}_1^0$

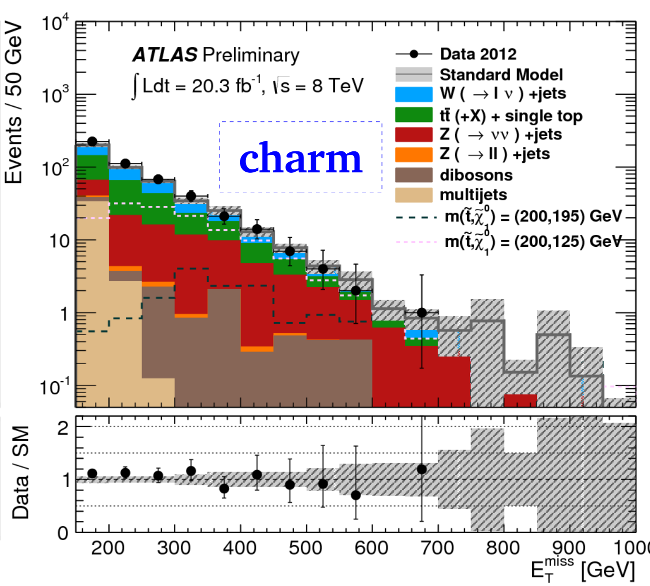
Model	if $\Delta m < m_W + m_b \Rightarrow$ dominant decay mode: $\tilde{t} \rightarrow c\, \tilde{\chi}^0_1$ Using presence of Initial Radiation State (ISR) jet	
Final states SR	**small Δm ⇒ ISR jet**	**medium Δm ⇒ charm-jet**
	0 lepton + $E_T^{miss} > 220$ GeV 1^{st} jet $p_T > 280$ GeV max 3 jets $p_T > 30$ GeV	0 lep + $E_T^{miss} > 410$ GeV 1^{st} jet $p_T > 270$ GeV + min 3 jets 2^{nd} 3^{rd} not $b \Rightarrow t\bar{t}$ reduction 4^{th} *medium* **c-tag → new @ LHC!**
Variable	$\Delta\phi_{min}(\text{jet}, p_T^{miss}) > 0.4 \Rightarrow$ to reduce multijets background	
Main bkgd	$Z(\rightarrow \nu\nu)$ + jets $t\bar{t}$ $W(\rightarrow l, \nu)$ + jets	
Bkgd /CR	**EW**: 1 lepton (e, μ) charm: $81 < m_{\mu\mu} < 101$ GeV ⇒ $t\bar{t}$ rejection **Top**: lower E_T^{miss} and p_T *c*-tag → *b*-tag **Multijets**: data driven *jet-smearing* method	

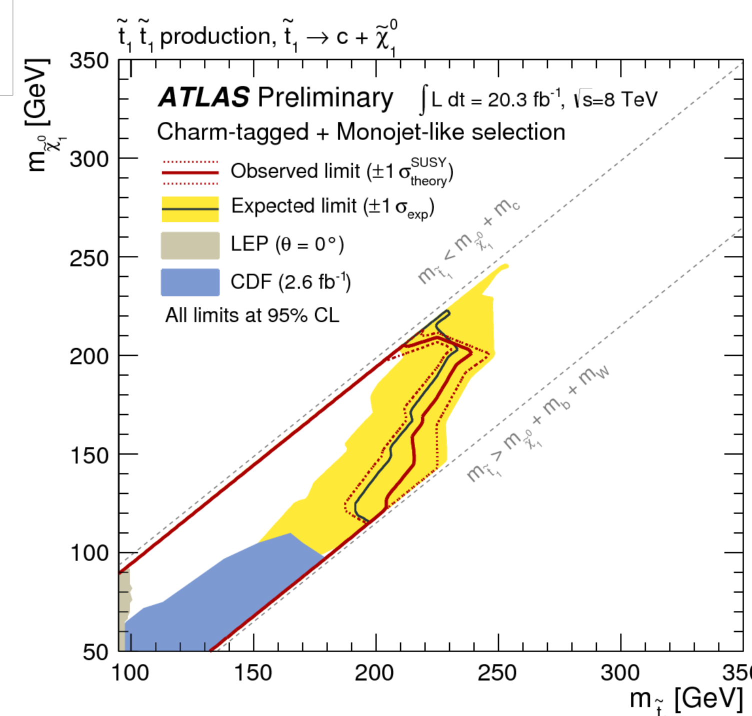


$$\Delta m = m_{\tilde{t}} - m_{\tilde{\chi}_1^0}$$

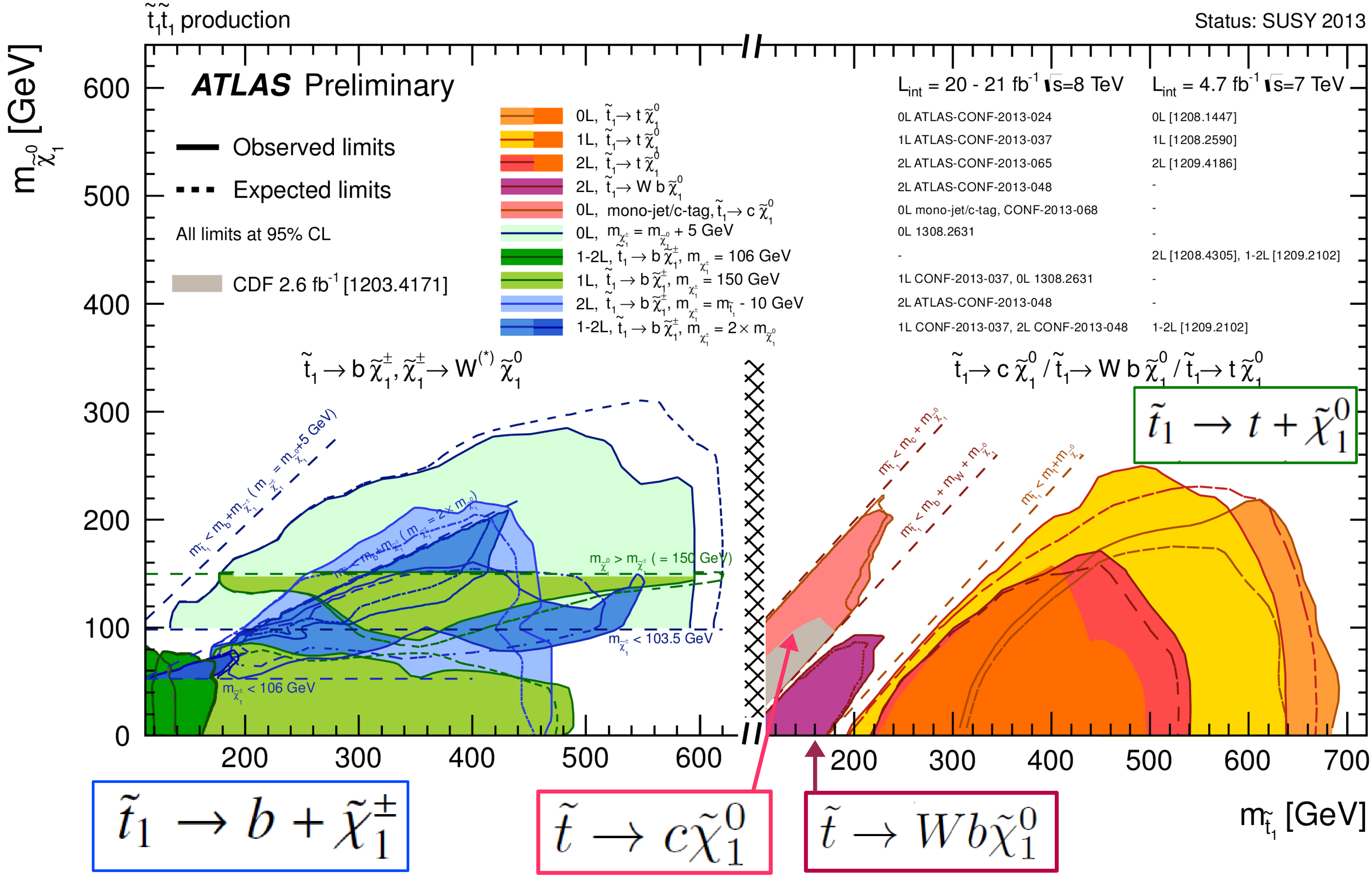
No excess observed.
Exclusion limits at 95% CL:
$m_{\tilde{t}} < 200$ GeV for Δm < 85 GeV



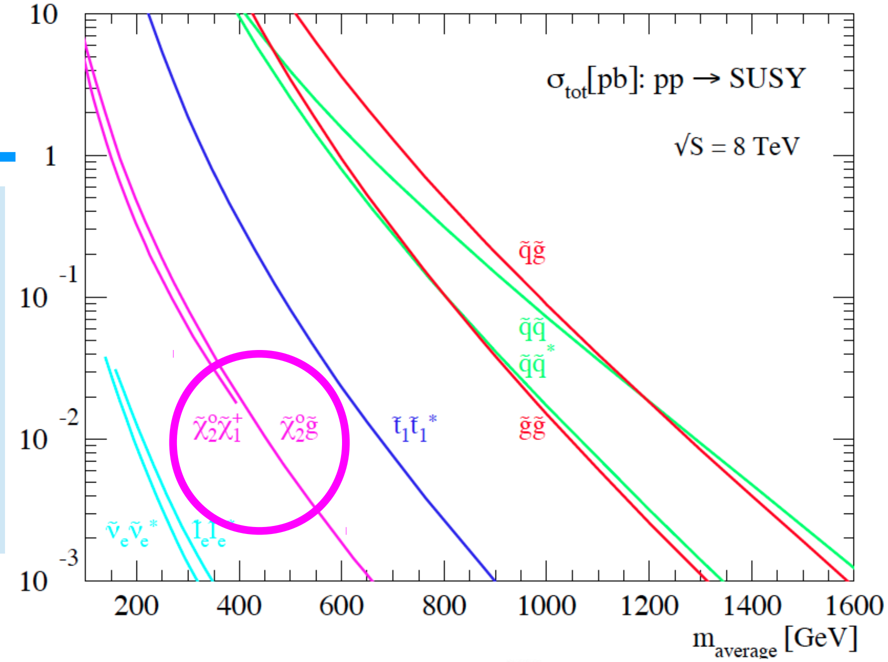




Direct stop production - summary



ElectroWeak production



Motivations

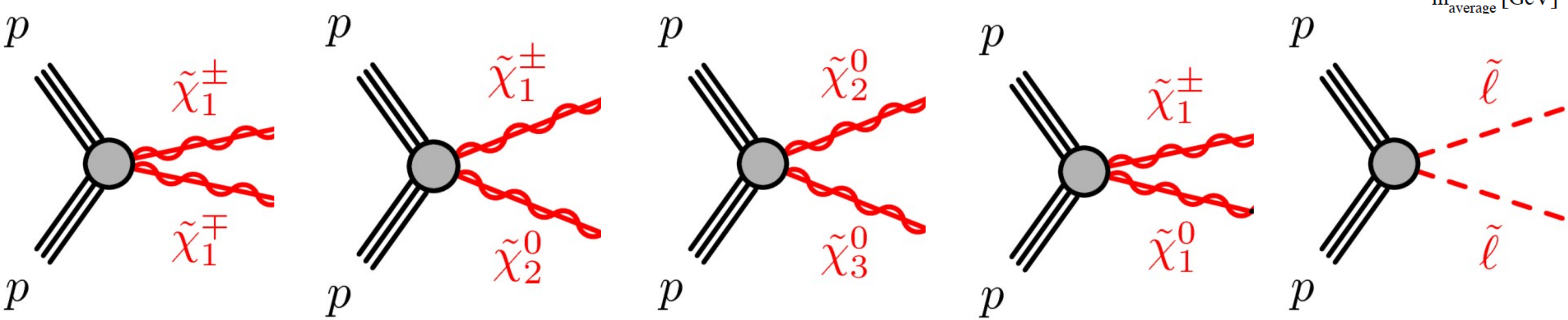
Stringent ATLAS/CMS limits on squark/gluino masses

Naturalness ⇒ light Higgsinos ⇒ growing interest in Weak SUSY

Direct production of charginos/neutralinos may dominate @ LHC

Multilepton signatures: clean final states, neatly reconstructed

Production modes



2 leptons (e, μ):
ATLAS-CONF-2013-049

2 taus
ATLAS-CONF-2013-028

4 leptons (RPV)
ATLAS-CONF-2013-036

Disapp. tracks
ATLAS-CONF-2013-069

3 leptons (e, μ):
ATLAS-CONF-2013-035

2 taus
ATLAS-CONF-2013-028

1 lepton (e, μ) ($h \rightarrow$)bb:
ATLAS-CONF-2013-XXX

4 leptons (e, μ):
ATLAS-CONF-2013-036

4 leptons (GGM)
ATLAS-CONF-2013-036

2 leptons (e, μ):
ATLAS-CONF-2013-049

All analyses: E_T^{miss} in final states.
Full 8 TeV dataset at ~21 fb $^{-1}$

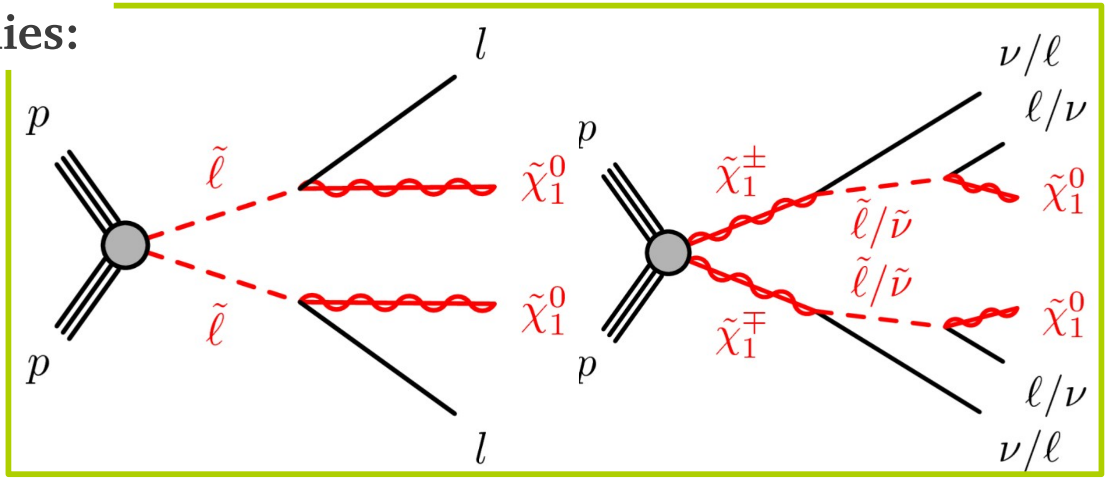
Two lepton (e, μ) analysis

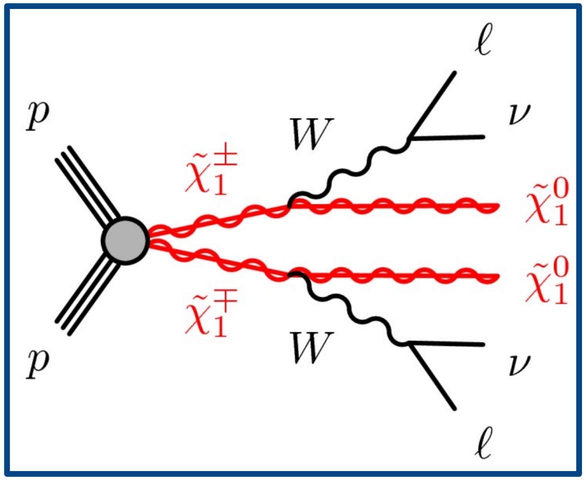
ATLAS-CONF-2013-049

2 mass hierarchies:

Light sleptons
⇒ cascade via sleptons

Heavy sleptons
⇒ cascade via W (→ l, ν)



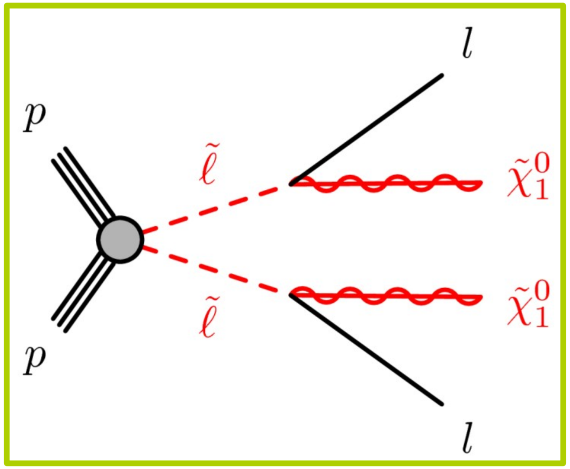


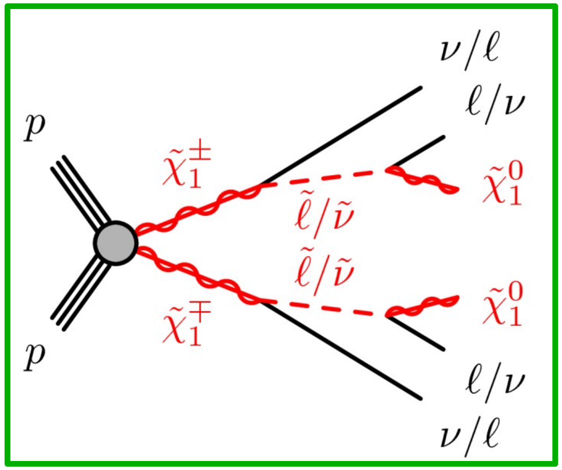
Model	Large squark/gluino masses ⇒ direct chargino/neutralino/slepton production (mass: few 100 GeV)	
Final states	$E_T^{miss,rel}$ > 70 GeV + 2 opposite-sign leptons (e, μ)	W channel: only different-flavour $e^{\pm}$, $\mu^{\mp}$
Variable	$m_{T2} = \min_{\mathbf{q}_T}\left[\max\left(m_T(\mathbf{p}_T^{\ell 1}, \mathbf{q}_T), m_T(\mathbf{p}_T^{\ell 2}, \mathbf{p}_T^{miss} - \mathbf{q}_T)\right)\right]$ $m_T(\mathbf{p}_T, \mathbf{q}_T) = \sqrt{2(p_T q_T - \mathbf{p}_T \cdot \mathbf{q}_T)}$. q_T min the 2 m_T . Presence of end-point at m_W for $t\bar{t}$ and WW events.	
Signal Regions	2 SR: sensitive to sleptons production m_{T2} > 90 GeV , m_{T2} > 110 GeV	3 SR: W(→ l, ν): m_{ll}, $p_{T,ll}$, m_{T2} cuts for light / heavier charginos
Main bkgd	WW production (decaying leptonically) + top production	
Bkgd /CR	**WW CR**: Z veto, different flavor leptons (no Z/γ^* + jets) ***$t\bar{t}$/top* CR**: Z veto, no m_{T2} cut **ZV CR:** Z and same flavor leptons	**WW CRs: $E_T^{miss,rel}$** cut inverted ***$t\bar{t}$/top* CR**: at least 1 *b*-jet

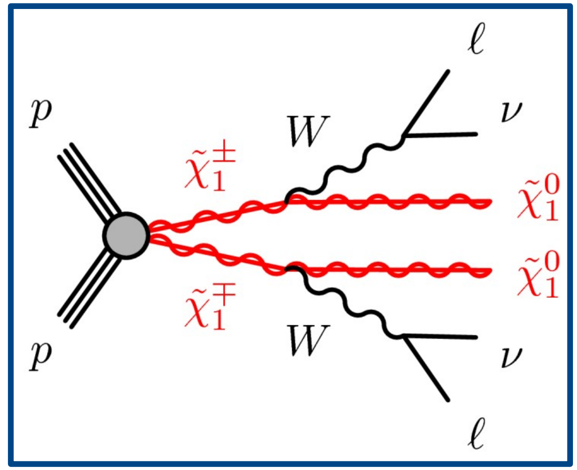
Two lepton (e, μ) analysis - Results

ATLAS-CONF-2013-049

No significant excess.
95% CL **limits** on slepton and chargino masses.







Slepton to neutralino

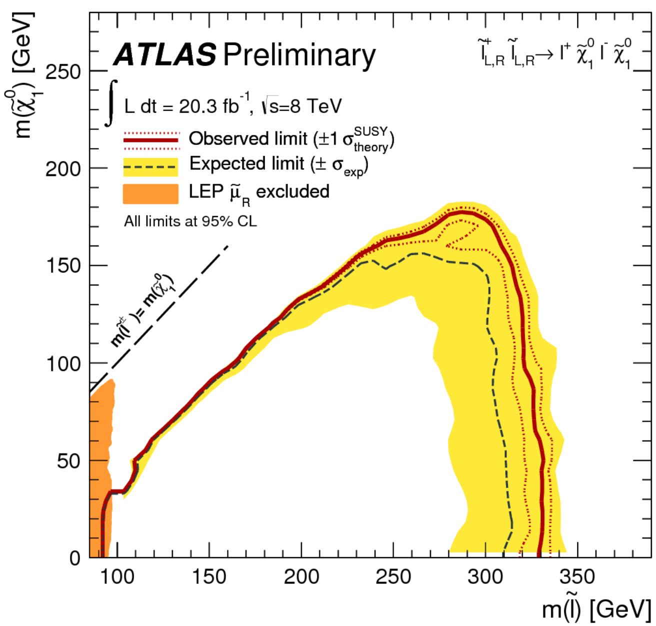
90 GeV < $m_{\tilde{\ell}}$ < 320 GeV
for $m_{\tilde{\chi}_1^0} = 0$

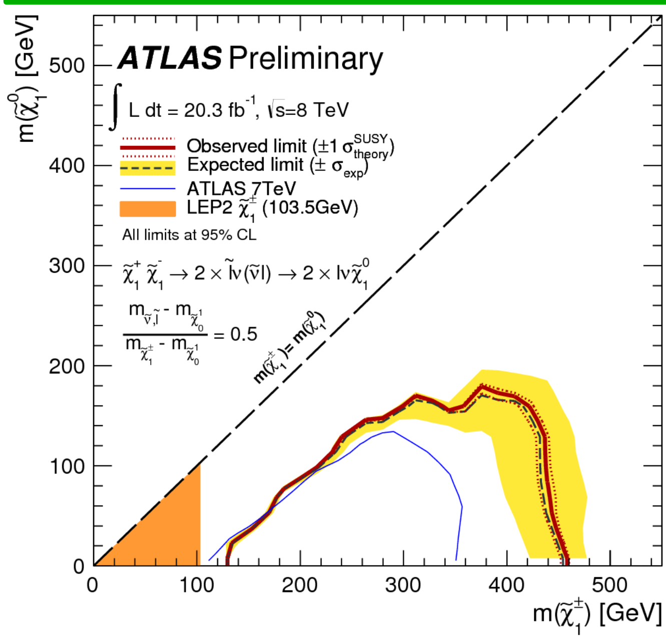
Charginos to LSP

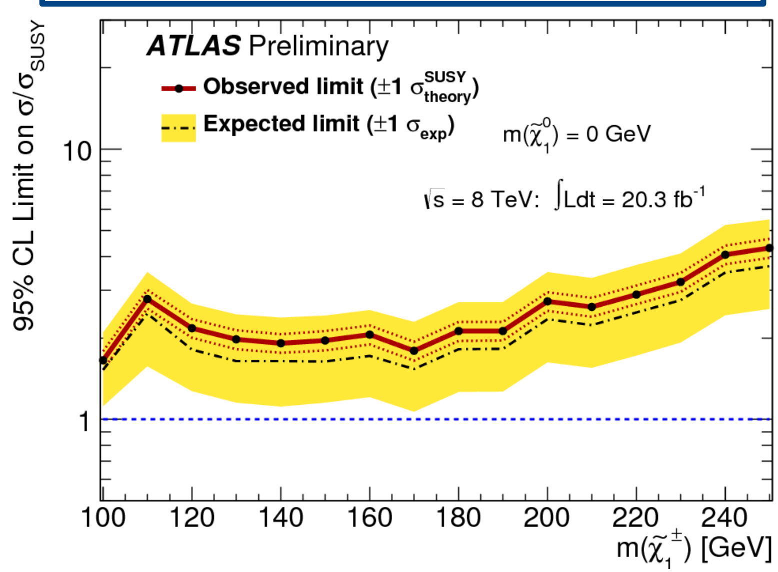
130 GeV < $m_{\tilde{\chi}_1^{\pm}}$ < 450 GeV
for $m_{\tilde{\chi}_1^0}$ = 20 GeV

Charginos to W + LSP

Excluded σ above model cross-section by factor of **1.9 – 2.8** for 100 GeV < $m_{\tilde{\chi}_1^{\pm}}$ < 190 GeV and to **4.7** for > 250 GeV



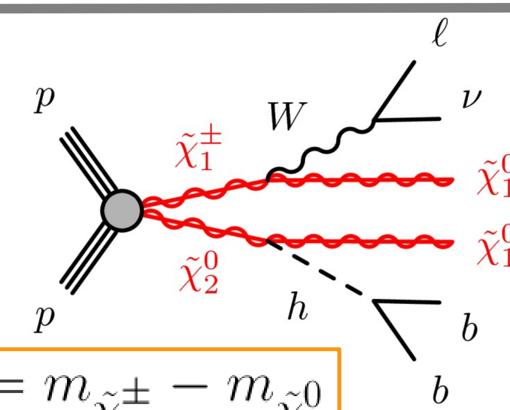




One lepton, 2 b-jets analysis NEW!

ATLAS-CONF-2013-093

Model	Production chargino/neutralino pair Exploiting presence of a Higgs boson → **1st time @ LHC**
Final states	E_T^{miss} > 130 GeV + 1 lepton (e, μ) + exactly 2 leading b-jets
Variables	**Key variable: m_{bb}** . For background suppression: m_{CT} and m_T $m_{CT}^2 = \left(E_T^{b_1} + E_T^{b_2}\right)^2 - \left\|\mathbf{p}_T^{b_1} - \mathbf{p}_T^{b_2}\right\|^2$ $m_T = \sqrt{2 p_T^{lep} E_T^{miss} - 2 \mathbf{p}_T^{lep} \cdot \mathbf{p}_T^{miss}}$ **Kinematic end-point** high m_{CT} ⇒ rejects $t\bar{t}$ high m_T ⇒ rejects W
SR	2 SR: SRA sensitive at low Δm , SRB high Δm
Main bkgd CR	***$t\bar{t}$* and W , 2 CR**. CR1 = (SRA+SRB) w/ 1 b-jet CR2: orthogonal to CR1, low m_T cut

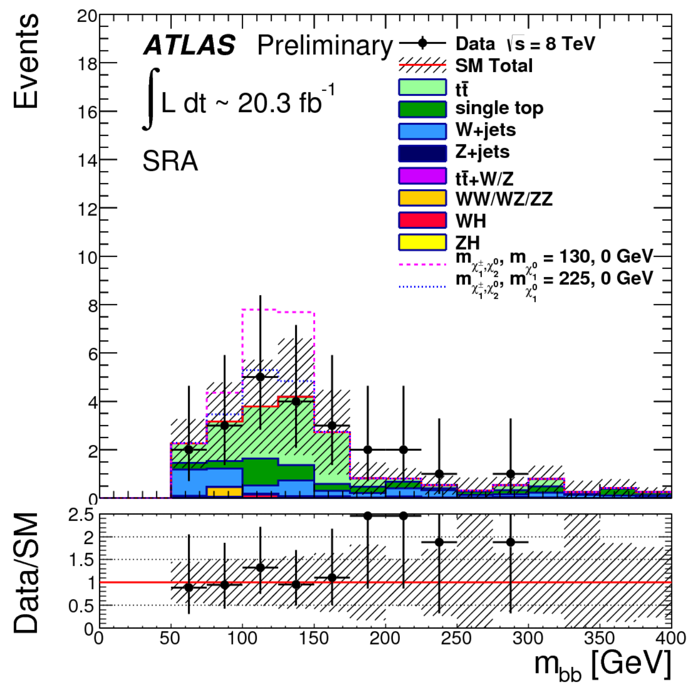


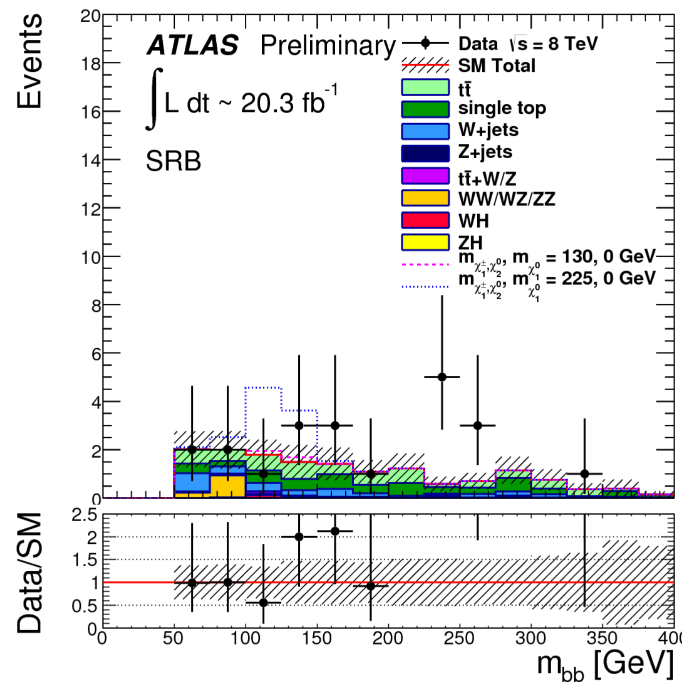
$$\Delta m = m_{\tilde{\chi}_1^\pm} - m_{\tilde{\chi}_1^0}$$

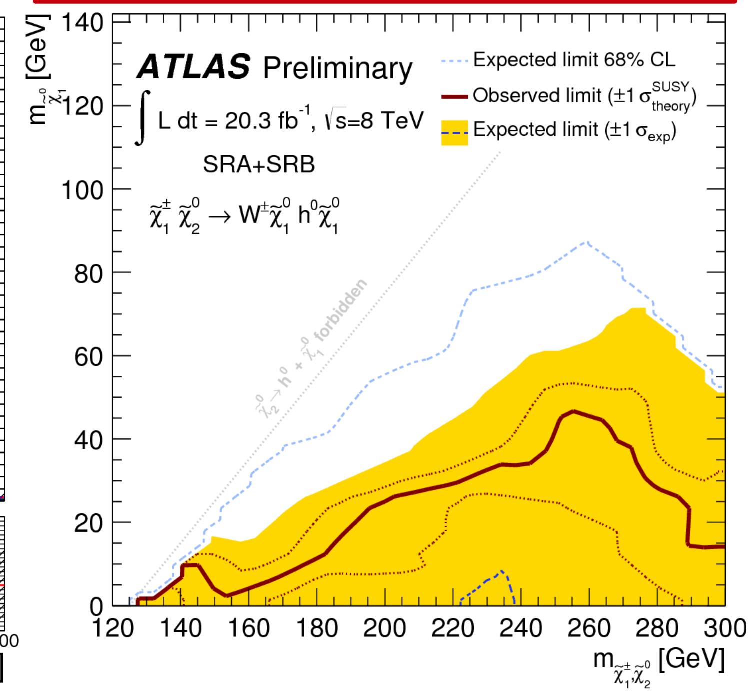
No excess observed. Limits 95% CL

For $m_{\tilde{\chi}_1^0} = 0$ expected exclusion range: [225 – 235 GeV]

Observed: $125 < m_{\tilde{\chi}_1^\pm, \tilde{\chi}_2^0} < 141$ GeV and $166 < m_{\tilde{\chi}_1^\pm, \tilde{\chi}_2^0} < 187$ GeV





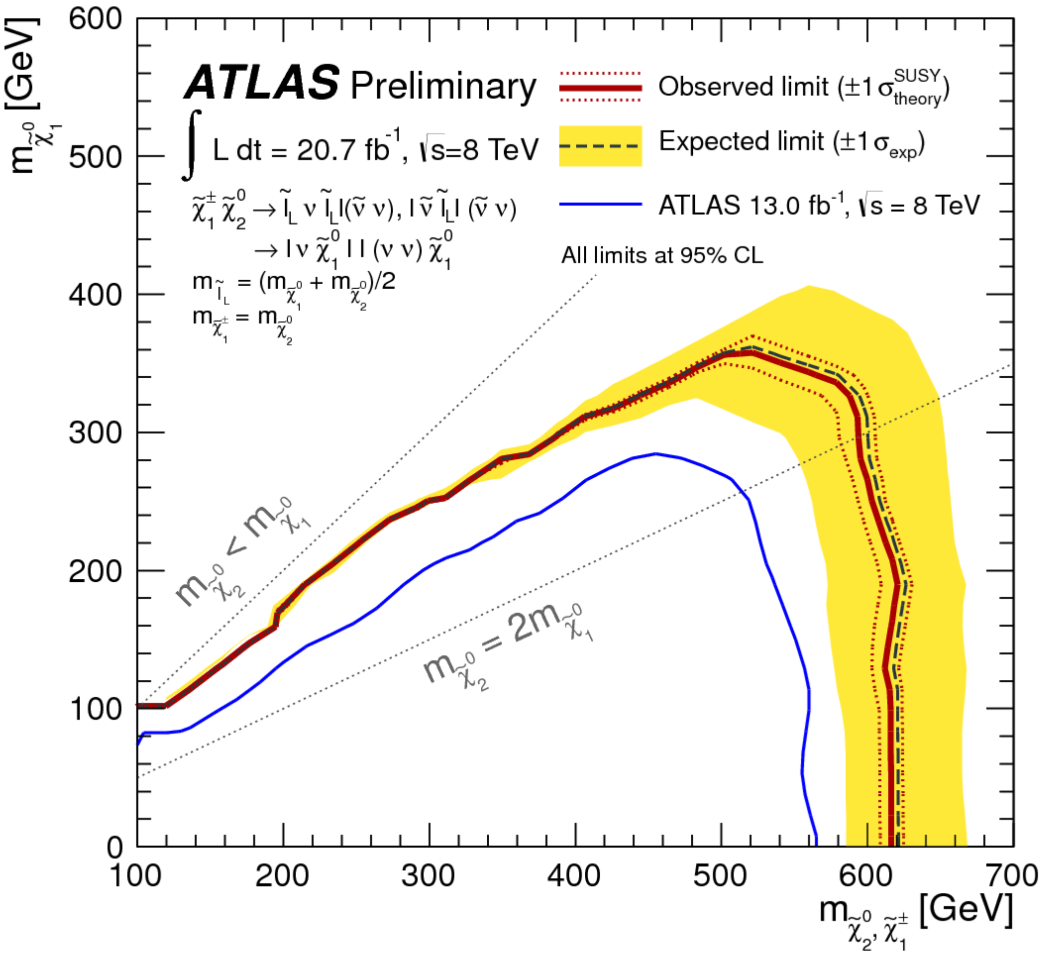


Three lepton (e, μ) analysis - Results

Observed and expected 95% CL limit contours for chargino and neutralino production

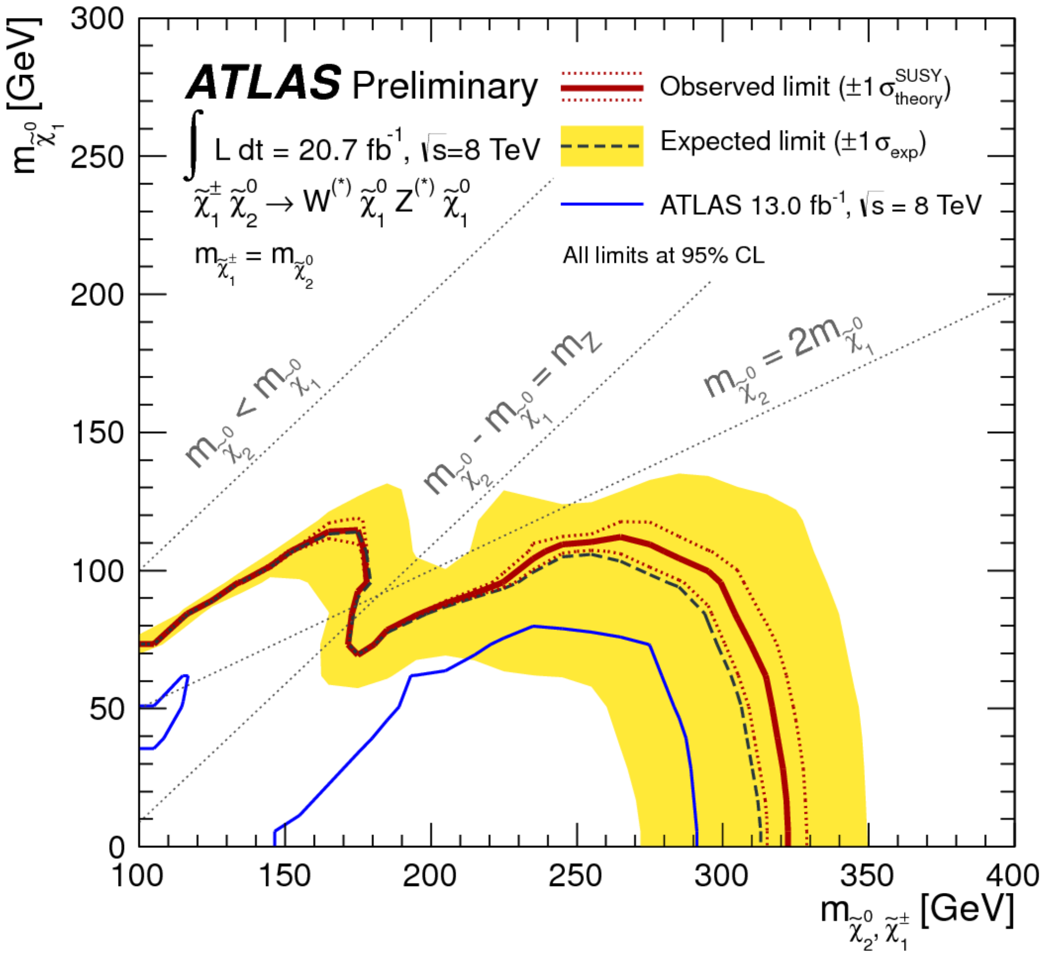
Decay via sleptons

100% BR ⇒ very strong exclusion

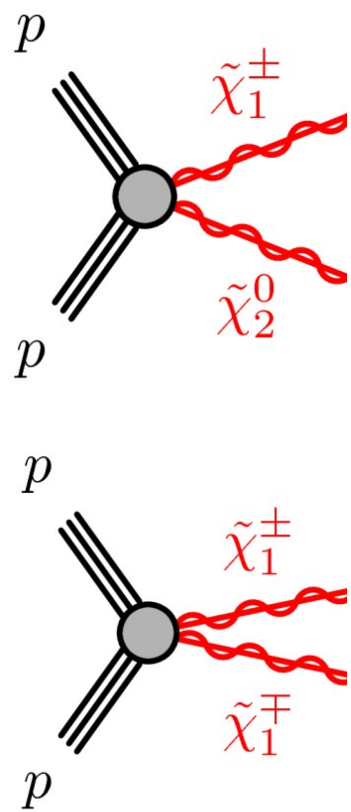


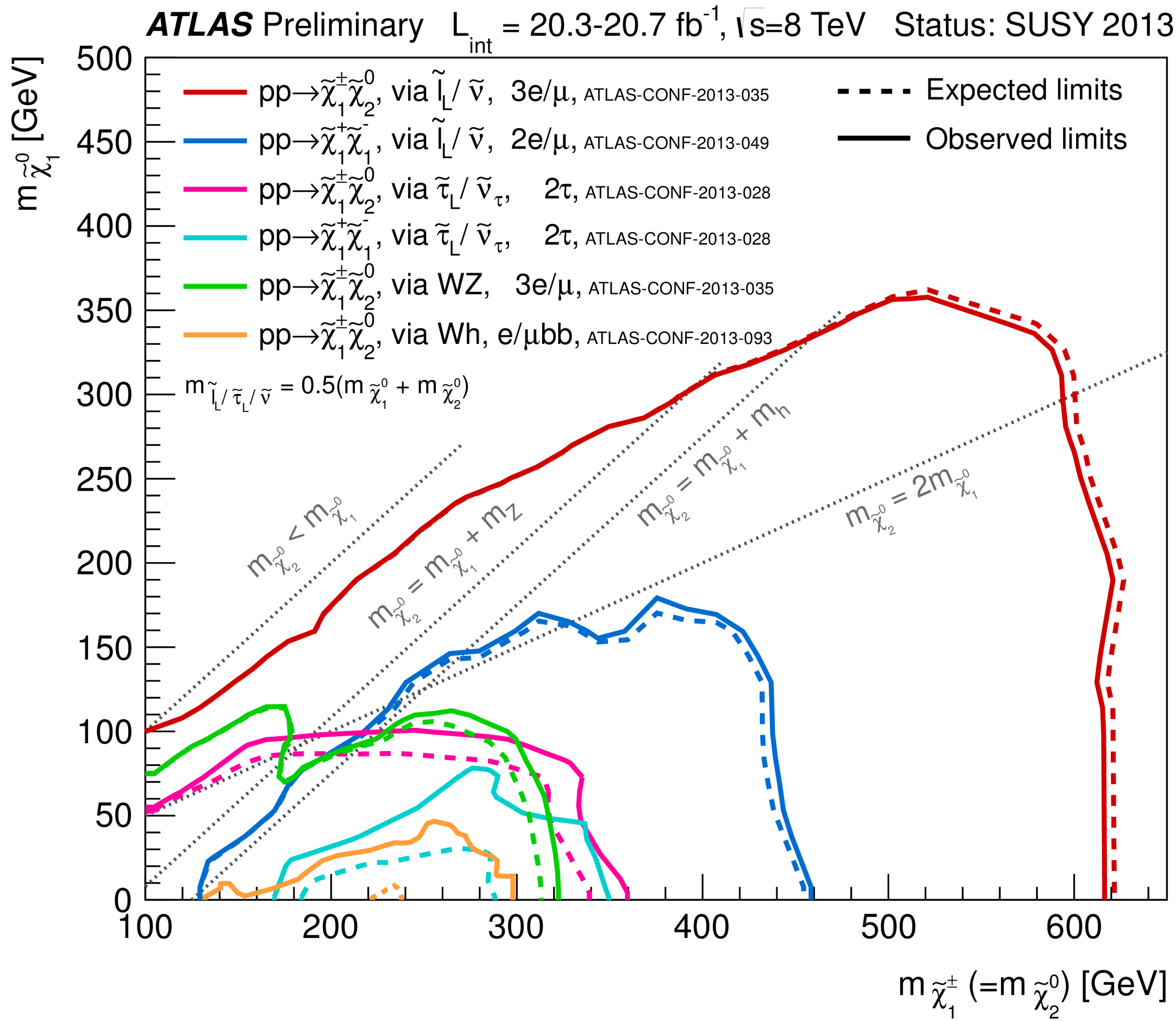
Decay via gauge bosons

Exclusion limited by W and Z BR



SUSY Electroweak production - summary



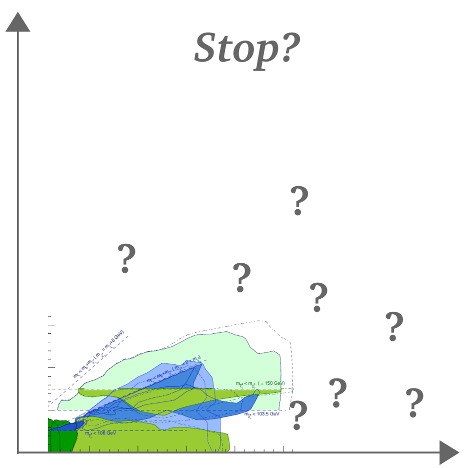


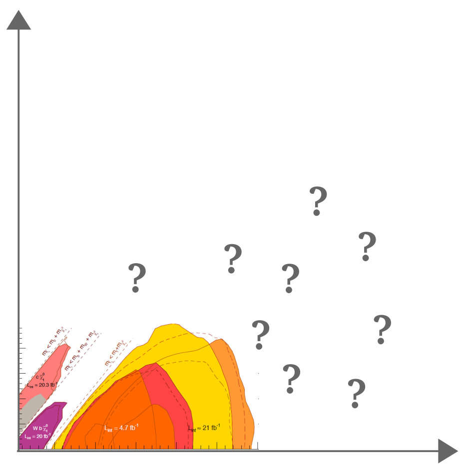
Conclusions

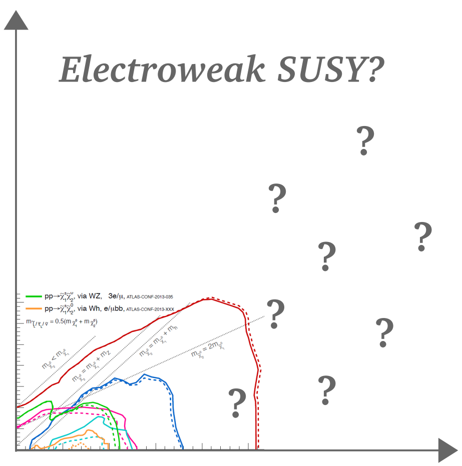
Wide range of final states and models ⇨ Stringent limits on superpartner masses

2015: next energy running at the LHC ⇨ SUSY can hide in 13 TeV data!

To be continued...







SUSY 3rd generation squark and Electroweak production

Conclusions

	Model	e, μ, τ, γ	Jets	E_T^{miss}	$\int \mathcal{L} dt [fb^{-1}]$		Mass limit		Reference
3rd gen. squarks direct production	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1 \to b\tilde{\chi}_1^0$	0	2 b	Yes	20.1	$\tilde{b}_1$	100-620 GeV	$m(\tilde{\chi}_1^0)$<90 GeV	1308.2631
	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1 \to t\tilde{\chi}_1^\pm$	2 e, μ (SS)	0-3 b	Yes	20.7	$\tilde{b}_1$	275-430 GeV	$m(\tilde{\chi}_1^\pm)$=2 $m(\tilde{\chi}_1^0)$	ATLAS-CONF-2013-007
	$\tilde{t}_1\tilde{t}_1$(light), $\tilde{t}_1 \to b\tilde{\chi}_1^\pm$	1-2 e, μ	1-2 b	Yes	4.7	$\tilde{t}_1$	110-167 GeV	$m(\tilde{\chi}_1^0)$=55 GeV	1208.4305, 1209.2102
	$\tilde{t}_1\tilde{t}_1$(light), $\tilde{t}_1 \to Wb\tilde{\chi}_1^0$	2 e, μ	0-2 jets	Yes	20.3	$\tilde{t}_1$	130-220 GeV	$m(\tilde{\chi}_1^0)$ =$m(\tilde{t}_1)$-$m(W)$-50 GeV, $m(\tilde{t}_1)$<<$m(\tilde{\chi}_1^\pm)$	ATLAS-CONF-2013-048
	$\tilde{t}_1\tilde{t}_1$(medium), $\tilde{t}_1 \to t\tilde{\chi}_1^0$	2 e, μ	2 jets	Yes	20.3	$\tilde{t}_1$	225-525 GeV	$m(\tilde{\chi}_1^0)$=0 GeV	ATLAS-CONF-2013-065
	$\tilde{t}_1\tilde{t}_1$(medium), $\tilde{t}_1 \to b\tilde{\chi}_1^\pm$	0	2 b	Yes	20.1	$\tilde{t}_1$	150-580 GeV	$m(\tilde{\chi}_1^0)$<200 GeV, $m(\tilde{\chi}_1^\pm)$-$m(\tilde{\chi}_1^0)$=5 GeV	1308.2631
	$\tilde{t}_1\tilde{t}_1$(heavy), $\tilde{t}_1 \to t\tilde{\chi}_1^0$	1 e, μ	1 b	Yes	20.7	$\tilde{t}_1$	200-610 GeV	$m(\tilde{\chi}_1^0)$=0 GeV	ATLAS-CONF-2013-037
	$\tilde{t}_1\tilde{t}_1$(heavy), $\tilde{t}_1 \to t\tilde{\chi}_1^0$	0	2 b	Yes	20.5	$\tilde{t}_1$	320-660 GeV	$m(\tilde{\chi}_1^0)$=0 GeV	ATLAS-CONF-2013-024
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \to c\tilde{\chi}_1^0$	0	mono-jet/c-tag	Yes	20.3	$\tilde{t}_1$	90-200 GeV	$m(\tilde{t}_1)$-$m(\tilde{\chi}_1^0)$<85 GeV	ATLAS-CONF-2013-068
	$\tilde{t}_1\tilde{t}_1$(natural GMSB)	2 e, μ (Z)	1 b	Yes	20.7	$\tilde{t}_1$	500 GeV	$m(\tilde{\chi}_1^0)$>150 GeV	ATLAS-CONF-2013-025
	$\tilde{t}_2\tilde{t}_2, \tilde{t}_2 \to \tilde{t}_1 + Z$	3 e, μ (Z)	1 b	Yes	20.7	$\tilde{t}_2$	271-520 GeV	$m(\tilde{t}_1)$=$m(\tilde{\chi}_1^0)$+180 GeV	ATLAS-CONF-2013-025
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	$\tilde{\ell}$	85-315 GeV	$m(\tilde{\chi}_1^0)$=0 GeV	ATLAS-CONF-2013-049
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+ \to \tilde{\ell}\nu(\ell\tilde{\nu})$	2 e, μ	0	Yes	20.3	$\tilde{\chi}_1^\pm$	125-450 GeV	$m(\tilde{\chi}_1^0)$=0 GeV, $m(\tilde{\ell}, \tilde{\nu})$=0.5($m(\tilde{\chi}_1^\pm)$+$m(\tilde{\chi}_1^0)$)	ATLAS-CONF-2013-049
	$\tilde{\chi}_1^+\tilde{\chi}_1^-, \tilde{\chi}_1^+ \to \tilde{\tau}\nu(\tau\tilde{\nu})$	2 τ	-	Yes	20.7	$\tilde{\chi}_1^\pm$	180-330 GeV	$m(\tilde{\chi}_1^0)$=0 GeV, $m(\tilde{\tau}, \tilde{\nu})$=0.5($m(\tilde{\chi}_1^\pm)$+$m(\tilde{\chi}_1^0)$)	ATLAS-CONF-2013-028
	$\tilde{\chi}_1^\pm\tilde{\chi}_2^0 \to \tilde{\ell}_L\nu\tilde{\ell}_L\ell(\tilde{\nu}\nu), \ell\tilde{\nu}\tilde{\ell}_L\ell(\tilde{\nu}\nu)$	3 e, μ	0	Yes	20.7	$\tilde{\chi}_1^\pm, \tilde{\chi}_2^0$	600 GeV	$m(\tilde{\chi}_1^\pm)$=$m(\tilde{\chi}_2^0)$, $m(\tilde{\chi}_1^0)$=0, $m(\tilde{\ell}, \tilde{\nu})$=0.5($m(\tilde{\chi}_1^\pm)$+$m(\tilde{\chi}_1^0)$)	ATLAS-CONF-2013-035
	$\tilde{\chi}_1^\pm\tilde{\chi}_2^0 \to W\tilde{\chi}_1^0 Z\tilde{\chi}_1^0$	3 e, μ	0	Yes	20.7	$\tilde{\chi}_1^\pm, \tilde{\chi}_2^0$	315 GeV	$m(\tilde{\chi}_1^\pm)$=$m(\tilde{\chi}_2^0)$, $m(\tilde{\chi}_1^0)$=0, sleptons decoupled	ATLAS-CONF-2013-035
	$\tilde{\chi}_1^\pm\tilde{\chi}_2^0 \to W\tilde{\chi}_1^0 h\tilde{\chi}_1^0$	1 e, μ	2 b	Yes	20.3	$\tilde{\chi}_1^\pm, \tilde{\chi}_2^0$	285 GeV	$m(\tilde{\chi}_1^\pm)$=$m(\tilde{\chi}_2^0)$, $m(\tilde{\chi}_1^0)$=0, sleptons decoupled	ATLAS-CONF-2013-093

All ATLAS SUSY results here:

https://twiki.cern.ch/twiki/bin/view/AtlasPublic/SupersymmetryPublicResults

Backup slides

Direct sbottom production $\tilde{b}_1 \rightarrow b\tilde{\chi}_1^0$

1308.2631

Signal regions

Description	Signal Regions	
	SRA	SRB
Event cleaning	Common to all SR	
Lepton veto	No e/μ after overlap removal with $p_T > 7(6)$ GeV for $e(\mu)$	
E_T^{miss}	> 150 GeV	> 250 GeV
Leading jet $p_T(j_1)$	> 130 GeV	> 150 GeV
Second jet $p_T(j_2)$	> 50 GeV,	> 30 GeV
Third jet $p_T(j_3)$	veto if > 50 GeV	> 30 GeV
$\Delta\phi(\boldsymbol{p}_T^{miss}, j_1)$	-	> 2.5
b-tagging	leading 2 jets ($p_T > 50$ GeV, $\lvert\eta\rvert < 2.5$)	2nd- and 3rd-leading jets ($p_T > 30$ GeV, $\lvert\eta\rvert < 2.5$)
	$n_{b\text{-jets}} = 2$	
$\Delta\phi_{min}$	> 0.4	> 0.4
$E_T^{miss}/m_{eff}(k)$	$E_T^{miss}/m_{eff}(2) > 0.25$	$E_T^{miss}/m_{eff}(3) > 0.25$
m_{CT}	$> 150, 200, 250, 300, 350$ GeV	-
$H_{T,3}$	-	< 50 GeV
m_{bb}	> 200 GeV	-

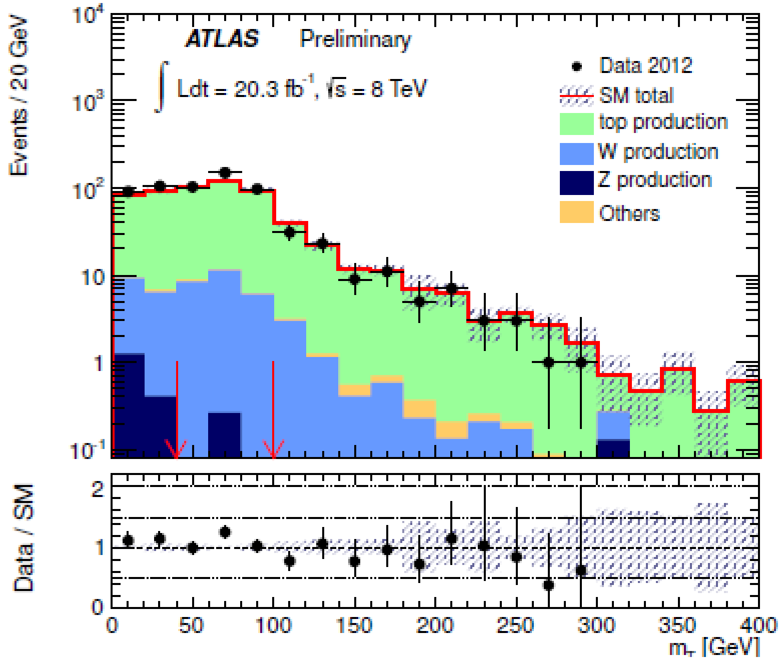
Control regions

CRA_1L	CRA_SF	CRA_DF
One e or μ	$e^{\pm}e^{\mp}$ or $\mu^{\pm}\mu^{\mp}$	$e^{\pm}\mu^{\mp}$
Veto additional lepton candidates ($p_T(e)$ >7 GeV $p_T(\mu)$ >6 GeV)		
Only two reconstructed jets with $p_T > 50$ GeV		
$p_T(j_1) > 130$ GeV $p_T(j_2) > 50$ GeV $E_T^{miss} > 100$ GeV	$p_T(j_1) > 50$ GeV $p_T(j_2) > 50$ GeV E_T^{miss}(lepton-corrected) > 100 GeV	$p_T(j_1) > 130$ GeV $p_T(j_2) > 50$ GeV $E_T^{miss} > 100$ GeV
Two reconstructed b-jets ($p_T > 50$)		
40 GeV $< m_T <$ 100 GeV	75 GeV $< m_{\ell\ell} <$ 105 GeV	$m_{\ell\ell} > 50$ GeV
$m_{CT} > 150$ GeV	lepton $p_T > 90$ GeV	$m_{CT} > 75$ GeV
–	$m_{bb} > 200$ GeV	–

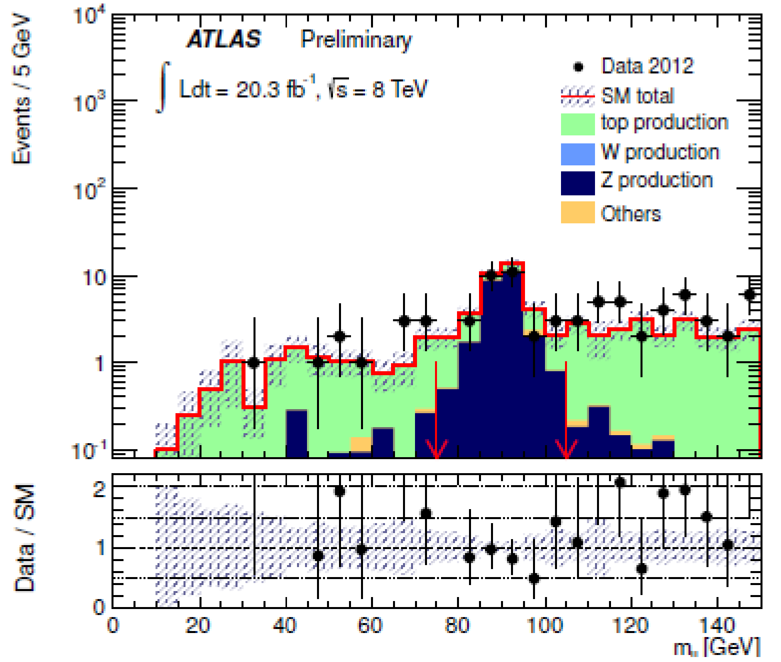
CRB_1L	CRB_SF
One e or μ	$e^{\pm}e^{\mp}$ or $\mu^{\pm}\mu^{\mp}$
Veto additional lepton candidates ($p_T(e)$ >7 GeV $p_T(\mu)$ >6 GeV)	
Only three reconstructed jets with $p_T > 30$ GeV	
$p_T(j_1) > 130$ GeV $E_T^{miss} > 120$ GeV	$p_T(j_1) > 50$ GeV E_T^{miss}(lepton-corrected) > 100 GeV
j_1 anti b-tagged; j_2 and j_3 b-tagged	
40 GeV $< m_T <$ 100 GeV	75 GeV $< m_{\ell\ell} <$ 105 GeV
–	Lepton $p_T > 90$ GeV
$H_{T,3} < 50$ GeV	

Direct sbottom production $\tilde{b}_1 \to b\tilde{\chi}_1^0$

1308.2631



Channel	CRA_1L	CRA_SF	CRA_DF
Observed events	136	68	76
Fitted background events			
Total SM	136 ± 12	68 ± 8	76 ± 9
Top production	92 ± 17	10.2 ± 1.4	75 ± 9
Z production	0.42 ± 0.12	57 ± 8	$0.07^{+0.11}_{-0.07}$
W production	40 ± 20	< 0.1	0.07 ± 0.03
Others	3.8 ± 2.0	0.44 ± 0.19	0.39 ± 0.14
MC expected events			
Top production	100	11.0	82
Z production	0.46	63	0.08
W production	48	< 0.1	0.08
Others	3.8	0.44	0.39



Channel	CRB_1L	CRB_SF
Observed events	350	29
Fitted background events		
Total SM	350 ± 19	29 ± 5
Top production	323 ± 24	11.2 ± 1.4
Z production	0.25 ± 0.12	17 ± 6
W production	26 ± 16	< 0.1
Others	1.1 ± 0.5	0.72 ± 0.27
MC expected events		
Top production	293	10.2
Z production	0.38	25
W production	25	< 0.1
Others	1.1	0.72

Direct sbottom production $\tilde{b}_1 \to b\tilde{\chi}_1^0$

1308.2631

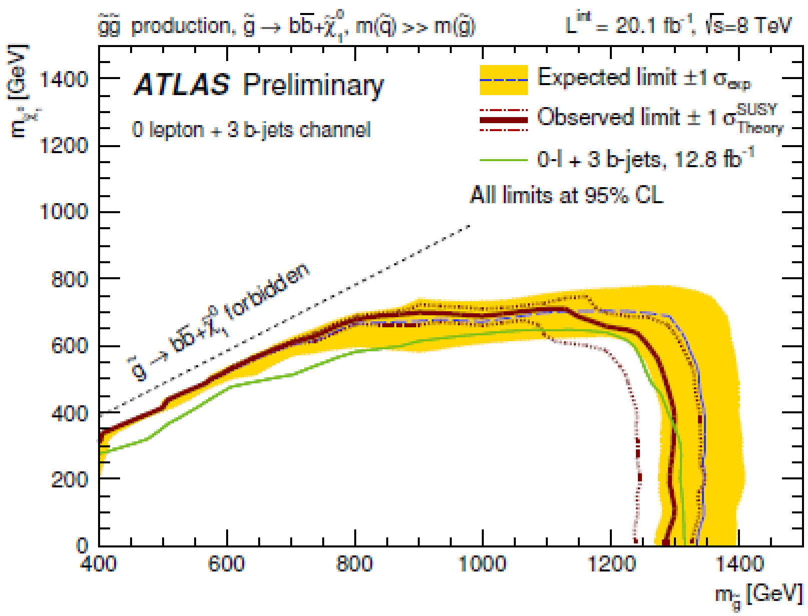
Results

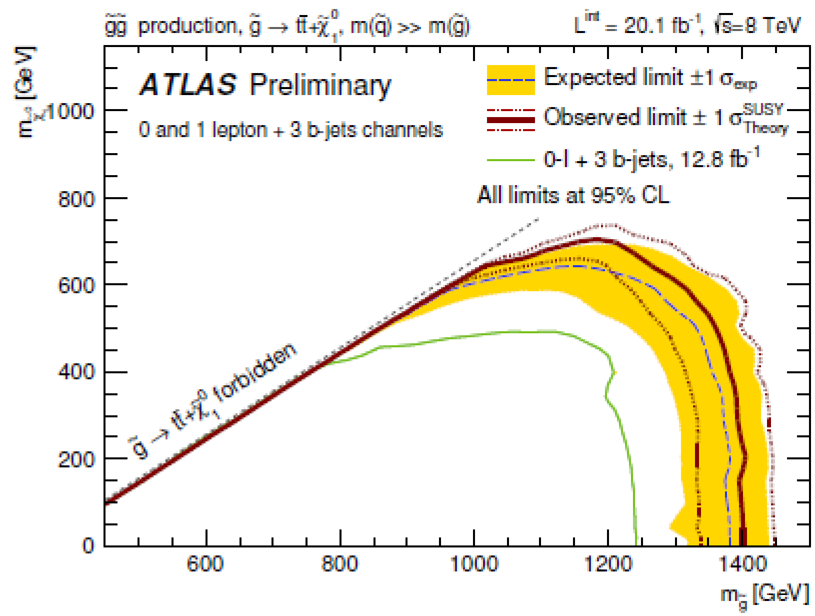
Channel	SRA, m_{CT} selection					SRB
	150 GeV	200 GeV	250 GeV	300 GeV	350 GeV	
Observed	103	48	14	7	3	58
Total SM	92 ± 12	38 ± 6	15.3 ± 2.7	5.8 ± 1.2	2.6 ± 0.6	50 ± 9
Top production	11.3 ± 1.8	2.5 ± 1.4	0.45 ± 0.25	< 0.01	< 0.01	34 ± 7
Z production	64 ± 10	28 ± 5	11.1 ± 2.1	4.7 ± 0.9	2.0 ± 0.4	8 ± 3
W production	12 ± 6	4.6 ± 2.5	2.0 ± 1.1	1.0 ± 0.5	0.48 ± 0.27	5 ± 4
Others	4.3 ± 1.5	3.3 ± 1.3	1.8 ± 0.6	0.12 ± 0.11	$0.10^{+0.12}_{-0.10}$	1.5 ± 0.7
Multijet production	0.21 ± 0.21	0.06 ± 0.06	0.02 ± 0.02	< 0.01	< 0.01	0.2 ± 0.2

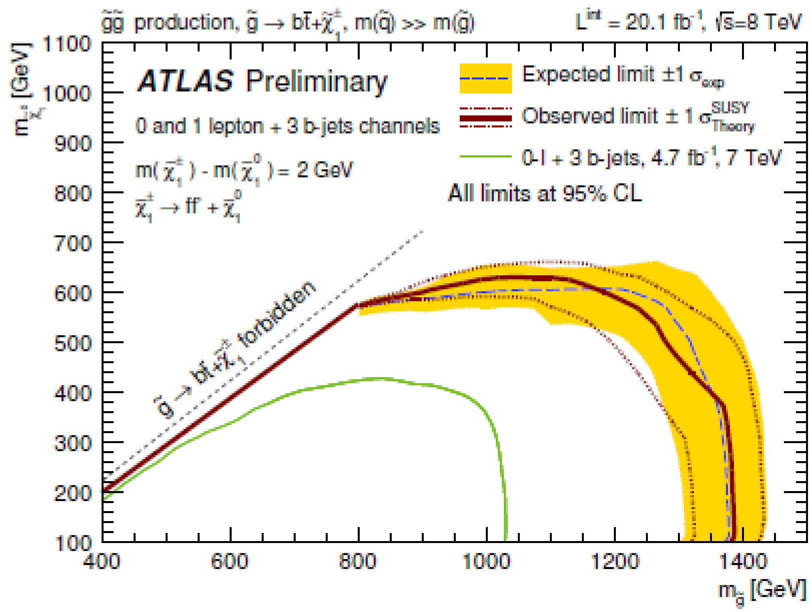
Signal Regions	Bkg. estimate	Obs. data	95% CL upper limit			
			on BSM event yield		on σ_{vis} (fb)	
			expected	observed	expected	observed
SRA ($m_{CT} > 150$ GeV)	92 ± 12	103	31^{+12}_{-8}	39.2	$1.5^{+0.6}_{-0.4}$	1.95
SRA ($m_{CT} > 200$ GeV)	38 ± 6	48	18^{+7}_{-5}	25.9	$0.89^{+0.35}_{-0.25}$	1.29
SRA ($m_{CT} > 250$ GeV)	15.3 ± 2.7	14	$10.0^{+4.6}_{-2.9}$	9.2	$0.50^{+0.23}_{-0.14}$	0.46
SRA ($m_{CT} > 300$ GeV)	5.8 ± 1.2	7	$6.5^{+3.3}_{-2.1}$	7.6	$0.32^{+0.16}_{-0.1}$	0.38
SRA ($m_{CT} > 350$ GeV)	2.6 ± 0.6	3	$4.7^{+2.6}_{-1.6}$	5.2	$0.23^{+0.13}_{-0.08}$	0.26
SRB	50 ± 9	58	24^{+9}_{-7}	30.0	$1.21^{+0.45}_{-0.35}$	1.49

Direct sbottom production $\tilde{b}_1 \to b\tilde{\chi}_1^0$ 1308.2631

Gluino-mediated summary plots Gbb, Gtt, Gtb:







Direct sbottom: $\tilde{b}_1 \to b\tilde{\chi}_2^0 \to bh(bb)\tilde{\chi}_1^0$

ATLAS-CONF-2013-061

Signal regions

baseline selection: baseline lepton veto, $p_T^{j_1} > 90$ GeV, $E_T^{miss} > 150$ GeV, ≥ 4 jets with $p_T > 30$ GeV, $\Delta\phi_{min}^{4j} > 0.5$, $E_T^{miss}/m_{eff}^{4j} > 0.2$, ≥ 3 b-jets with $p_T > 30$ GeV

0-ℓ region	N jets	p_T jets [GeV]	E_T^{miss} [GeV]	m_{eff} [GeV]	$E_T^{miss}/\sqrt{H_T^{4j}}$ [GeV$^{\frac{1}{2}}$]
VR-0l-4j-A	≥ 4	> 30	> 150	-	< 16
VR-0l-4j-B	≥ 4	> 50	> 150	$m_{eff}^{4j} < 1000$	-
VR-0l-7j-A	≥ 7	> 30	> 150	$m_{eff}^{incl} < 1000$	-
VR-0l-7j-B	≥ 7	> 30	$150 < E_T^{miss} < 350$	$m_{eff}^{incl} < 1500$	-
SR-0l-4j-A	≥ 4	> 30	> 200	$m_{eff}^{4j} > 1000$	> 16
SR-0l-4j-B	≥ 4	> 50	> 350	$m_{eff}^{4j} > 1100$	-
SR-0l-4j-C	≥ 4	> 50	> 250	$m_{eff}^{4j} > 1300$	-
SR-0l-7j-A	≥ 7	> 30	> 200	$m_{eff}^{incl} > 1000$	-
SR-0l-7j-B	≥ 7	> 30	> 350	$m_{eff}^{incl} > 1000$	-
SR-0l-7j-C	≥ 7	> 30	> 250	$m_{eff}^{incl} > 1500$	-

Validation regions

region	reducible bkg	irreducible bkg	total bkg (MC)	data
VR-0l-4j-A	840 ± 120	150 ± 120	990 ± 170 (1020)	1101
VR-0l-4j-B	300 ± 50	60 ± 50	360 ± 70 (360)	360
VR-0l-7j-A	97 ± 16	36 ± 32	130 ± 40 (140)	140
VR-0l-7j-B	115 ± 22	40 ± 40	160 ± 40 (170)	165

Direct sbottom: $\tilde{b}_1 \rightarrow b\tilde{\chi}_2^0 \rightarrow bh(bb)\tilde{\chi}_1^0$

ATLAS-CONF-2013-061

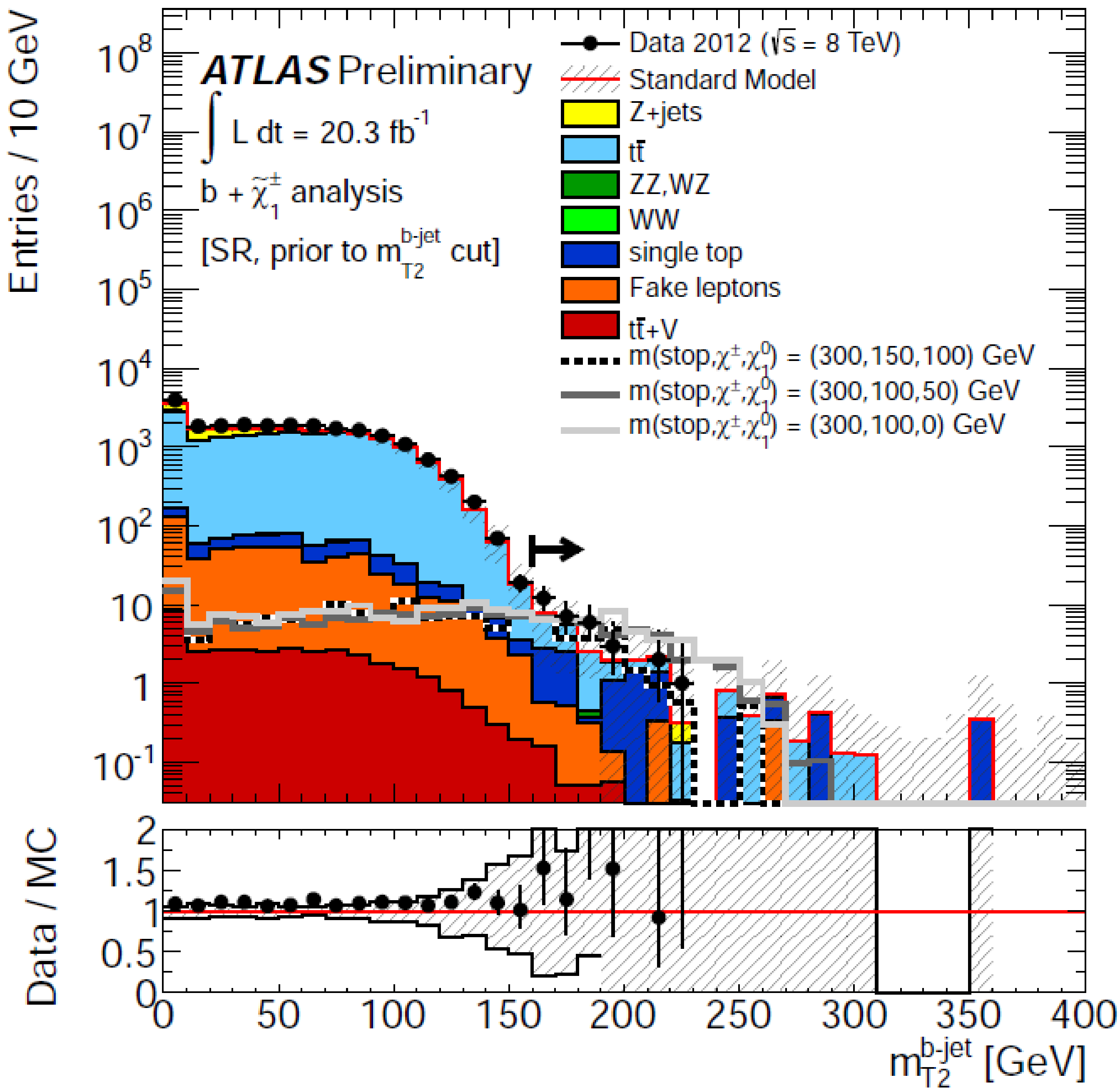
Results

region	reducible bkg	irreducible bkg	total bkg (MC)	data
SR-0l-4j-A	2.2 ± 1.1	0.8 ± 0.7	3.0 ± 1.3 (5.1)	2
SR-0l-4j-B	0.8 ± 0.9	0.5 ± 0.5	1.3 ± 1.0 (3.9)	3
SR-0l-4j-C	1.2 ± 0.8	0.6 ± 0.6	1.8 ± 1.0 (2.5)	2
SR-0l-7j-A	15.5 ± 3.4	7.0 ± 6.0	22.5 ± 6.9 (28.8)	22
SR-0l-7j-B	2.3 ± 2.3	1.3 ± 1.1	3.6 ± 2.5 (6.2)	3
SR-0l-7j-C	$0 \pm 0.5^{+0.5}_{-0}$	0.8 ± 0.7	$0.8 \pm {}^{+0.9}_{-0.8}$ (3.1)	1

SR	95% CL UL on N_{BSM}		95% CL UL on $\sigma \times A \times \varepsilon$ [fb]	
	Observed	Expected	Observed	Expected
SR-0l-4j-A	4.6 (4.3)	$5.0^{+2.0}_{-1.3}$ (5.0)	0.23	0.25
SR-0l-4j-B	6.7 (6.2)	$5.0^{+1.5}_{-0.8}$ (4.5)	0.33	0.25
SR-0l-4j-C	4.8 (4.6)	$4.4^{+1.7}_{-1.0}$ (4.4)	0.24	0.22
SR-0l-7j-A	15.3 (14.4)	$14.6^{+6.1}_{-3.4}$ (14.6)	0.76	0.73
SR-0l-7j-B	6.1 (5.7)	$6.0^{+2.3}_{-1.0}$(6.0)	0.30	0.30
SR-0l-7j-C	3.9 (3.6)	$3.6^{+1.2}_{-0.5}$ (3.5)	0.19	0.18

Direct stop in: $\tilde{t}_1 \to b + \tilde{\chi}_1^{\pm}$ $\tilde{t}_1 \to t + \tilde{\chi}_1^0$

ATLAS-CONF-2013-065



Direct stop in: $\tilde{t}_1 \rightarrow b + \tilde{\chi}_1^{\pm}$ $\tilde{t}_1 \rightarrow t + \tilde{\chi}_1^0$ ATLAS-CONF-2013-065

Results

channel	SR
Observed events	31
Total (constrained to CRT, CRZ) expected background events	26 ± 6
Fitted $t\bar{t}$ events	14 ± 4
Fitted $Z\gamma^* \rightarrow ee, \mu\mu$+jets events	$0.23^{+0.30}_{-0.23}$
Expected $Z\gamma^* \rightarrow \tau\tau$+jets events	0.80 ± 0.21
Expected Wt events	9 ± 4
Expected WW events	$0.01^{+0.34}_{-0.01}$
Expected $t\bar{t} + V$ events	0.46 ± 0.16
Expected WZ, ZZ events	$0.08^{+0.09}_{-0.08}$
Expected events with fake leptons	1.8 ± 0.9
Fit input, expectation $t\bar{t}$	12 ± 5
Fit input, expectation $Z\gamma^* \rightarrow ee, \mu\mu$+jets	0.15 ± 0.15

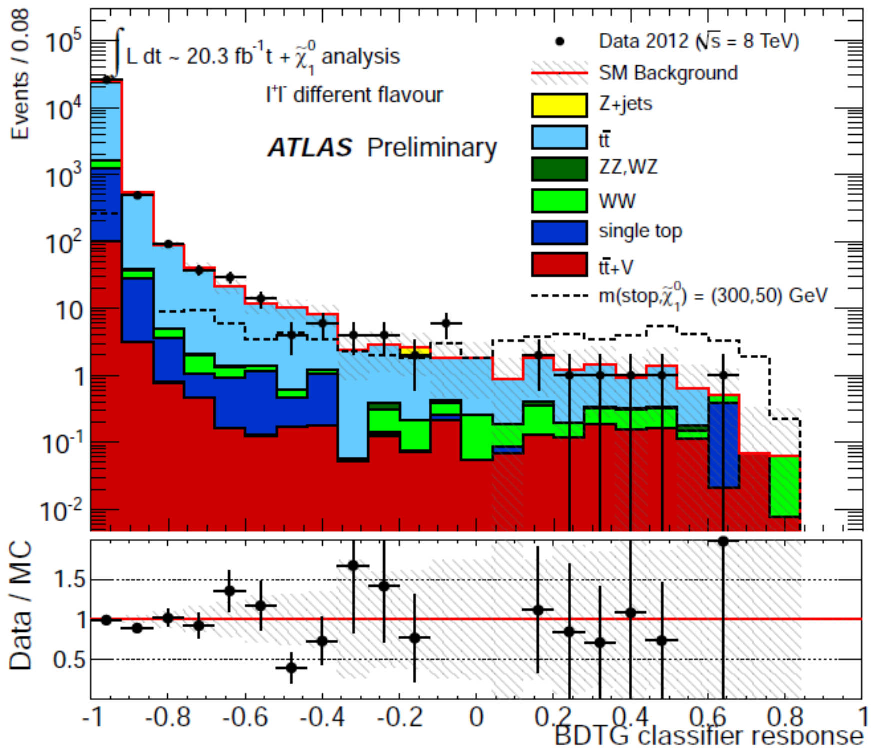
Signal channel	$\langle\epsilon\sigma\rangle^{95}_{\rm obs}$[fb]	$S^{95}_{\rm obs}$ [events]	$S^{95}_{\rm exp}$ [events]	CL_B	$p(s=0)$
SR	0.96	19.5	16^{+6}_{-5}	0.76	0.27

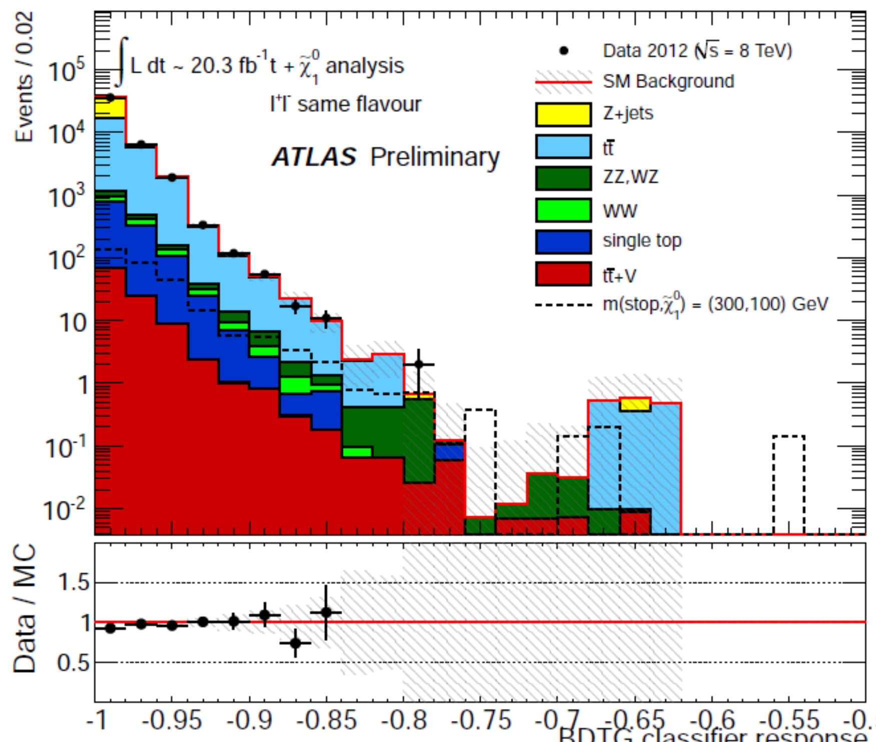
Direct stop in: $\tilde{t}_1 \rightarrow b + \tilde{\chi}_1^{\pm}$ $\tilde{t}_1 \rightarrow t + \tilde{\chi}_1^0$

ATLAS-CONF-2013-065

Results

channel	SR_1^{DF}	SR_2^{DF}	SR_3^{DF}	SR_4^{DF}	SR_5^{DF}	SR_6^{DF}	SR_7^{DF}
Observed events	9	3	12	5	3	2	1
Total (constrained) bkg events	4.7 ± 2.0	2.5 ± 1.9	11 ± 5	6.3 ± 2.5	1.0 ± 0.8	$0.33^{+1.1}_{-0.33}$	1.6 ± 1.4
Fitted $t\bar{t}$ events	3.9 ± 1.9	2.2 ± 1.9	8 ± 4	4.1 ± 2.3	$0.2^{+1.0}_{-0.2}$	$0.0^{+1.0}_{-0.0}$	$0.1^{+0.6}_{-0.1}$
Expected $t\bar{t} + V$ events	0.49 ± 0.21	0.13 ± 0.06	1.0 ± 0.4	0.85 ± 0.35	0.41 ± 0.15	0.18 ± 0.07	0.24 ± 0.10
Expected Wt events	$0.00^{+0.09}_{-0.00}$	0.0	0.6 ± 0.6	0.4 ± 0.4	0.0	0.0	0.0
Expected WW events	$0.28^{+0.6}_{-0.28}$	$0.06^{+0.08}_{-0.06}$	$0.7^{+1.2}_{-0.7}$	$0.8^{+0.9}_{-0.8}$	$0.32^{+0.5}_{-0.32}$	$0.10^{+0.26}_{-0.10}$	0.49 ± 0.19
Expected $ZW + ZZ$ events	0.06 ± 0.06	$0.05^{+0.06}_{-0.05}$	0.09 ± 0.09	$0.09^{+0.11}_{-0.09}$	$0.05^{+0.06}_{-0.05}$	$0.05^{+0.06}_{-0.05}$	$0.02^{+0.03}_{-0.02}$
Expected Z events	0.0	0.0	0.0	0.0	0.0	0.0	$0.7^{+1.5}_{-0.7}$
Expected events with fake leptons	$0.00^{+0.28}_{-0.00}$	$0.03^{+0.10}_{-0.03}$	$0.00^{+0.30}_{-0.00}$	$0.00^{+0.27}_{-0.00}$	$0.00^{+0.25}_{-0.00}$	$0.00^{+0.25}_{-0.00}$	$0.00^{+0.31}_{-0.00}$
Fit input, expectation $t\bar{t}$	4.0 ± 2.2	2.3 ± 1.9	9 ± 5	4.2 ± 2.6	$0.2^{+0.6}_{-0.2}$	$0.0^{+1.1}_{-0.0}$	$0.1^{+0.6}_{-0.1}$





Direct stop in charm + LSP: $\tilde{t} \rightarrow c\tilde{\chi}_1^0$

ATLAS-CONF-2013-068

Monojet-like control regions	$W(\rightarrow e\nu)$+jets	$W(\rightarrow \mu\nu)$+jets	Z/γ^* $(\rightarrow \mu^+\mu^-)$+jets
Observed events (20.3 fb^{-1})	8707	13703	1916
SM prediction (post-fit)	8710 ± 95	13700 ± 122	1920 ± 44
Fitted $W(\rightarrow e\nu)$	6230 ± 144	0.3 ± 0.2	–
Fitted $W(\rightarrow \mu\nu)$	40 ± 17	11420 ± 310	2.4 ± 1.4
Fitted $W(\rightarrow \tau\nu)$	1470 ± 54	950 ± 192	0.6 ± 0.4
Fitted $Z(\rightarrow \nu\bar{\nu})$	16 ± 16	3.4 ± 2.2	–
Fitted Z/γ^* $(\rightarrow e^+e^-)$	0.01 ± 0.04	–	–
Fitted Z/γ^* $(\rightarrow \mu^+\mu^-)$	2.4 ± 1.4	270 ± 14	1830 ± 51
Fitted $Z/\gamma^*(\rightarrow \tau^+\tau^-)$	114 ± 8	40 ± 27	2.7 ± 1.6
Expected top	620 ± 77	770 ± 94	34 ± 4
Expected dibosons	210 ± 107	250 ± 126	50 ± 23
Expected multijets	–	–	–
SM prediction (pre-fit)	9786	15688	2137
Fit input $W(\rightarrow e\nu)$	7084	0.3	–
Fit input $W(\rightarrow \mu\nu)$	46	13232	2.8
Fit input $W(\rightarrow \tau\nu)$	1675	1080	0.7
Fit input $Z(\rightarrow \nu\bar{\nu})$	18	3.9	–
Fit input Z/γ^* $(\rightarrow e^+e^-)$	0.01	–	–
Fit input Z/γ^* $(\rightarrow \mu^+\mu^-)$	2.7	306	2051
Fit input $Z/\gamma^*(\rightarrow \tau^+\tau^-)$	129	41	3.0
Fit input top	616	770	34
Fit input dibosons	214	253	46
Fit input multijets	–	–	–

Direct stop in charm + LSP: $\tilde{t} \rightarrow c\tilde{\chi}_1^0$

ATLAS-CONF-2013-068

Charm-tagged control regions	$W(\rightarrow \mu\nu)$+jets	$W(\rightarrow e\nu)$+jets	$t\bar{t}$	$Z/\gamma^*(\rightarrow \mu^+\mu^-)$+jets
Observed events (20.3 fb^{-1})	1060	485	685	28
SM prediction (post-fit)	1060 ± 32	485 ± 22	685 ± 26	28 ± 5
Fitted $W(\rightarrow e\nu)$	–	120 ± 54	4.0 ± 2.2	–
Fitted $W(\rightarrow \mu\nu)$	270 ± 110	0.1 ± 0.1	5.0 ± 2.5	0.09 ± 0.07
Fitted $W(\rightarrow \tau\nu)$	27 ± 13	17 ± 7	15 ± 9	–
Fitted $Z(\rightarrow \nu\bar{\nu})$	0.03 ± 0.01	1.3 ± 0.4	21 ± 7	–
Fitted $Z/\gamma^*(\rightarrow e^+e^-)$	–	–	–	–
Fitted $Z/\gamma^*(\rightarrow \mu^+\mu^-)$	9.0 ± 2.5	–	–	22 ± 5
Fitted $Z/\gamma^*(\rightarrow \tau^+\tau^-)$	8.0 ± 3.4	1.8 ± 0.8	0.5 ± 0.3	–
Fitted $t\bar{t}$	660 ± 110	310 ± 52	560 ± 35	4.3 ± 0.8
Fitted $t\bar{t}$+V	6.1 ± 1.1	2.9 ± 0.5	5.0 ± 0.3	0.4 ± 0.1
Fitted single top	56 ± 9	28 ± 5	48 ± 3	–
Expected dibosons	24 ± 4	8.2 ± 1.4	1.4 ± 0.4	1.4 ± 0.2
Expected multijets	–	–	28 ± 15	–
SM prediction (pre-fit)	1023	487	658	24
Fit input $W(\rightarrow e\nu)$	–	132	4.4	–
Fit input $W(\rightarrow \mu\nu)$	262	0.1	4.7	0.09
Fit input $W(\rightarrow \tau\nu)$	30	19	17	–
Fit input $Z(\rightarrow \nu\bar{\nu})$	0.02	1.0	17	–
Fit input $Z/\gamma^*(\rightarrow e^+e^-)$	–	–	–	–
Fit input $Z/\gamma^*(\rightarrow \mu^+\mu^-)$	7.3	–	–	18
Fit input $Z/\gamma^*(\rightarrow \tau^+\tau^-)$	8.5	2.0	0.5	–
Fit input $t\bar{t}$	631	295	534	4.1
Fit input $t\bar{t}$+V	5.9	2.8	4.8	0.4
Fit input single top	54	27	46	–
Fit input dibosons	24	8.2	1.4	1.4
Fit input multijets	–	–	28	–

Direct stop in charm + LSP: $\tilde{t} \to c\tilde{\chi}_1^0$

ATLAS-CONF-2013-068

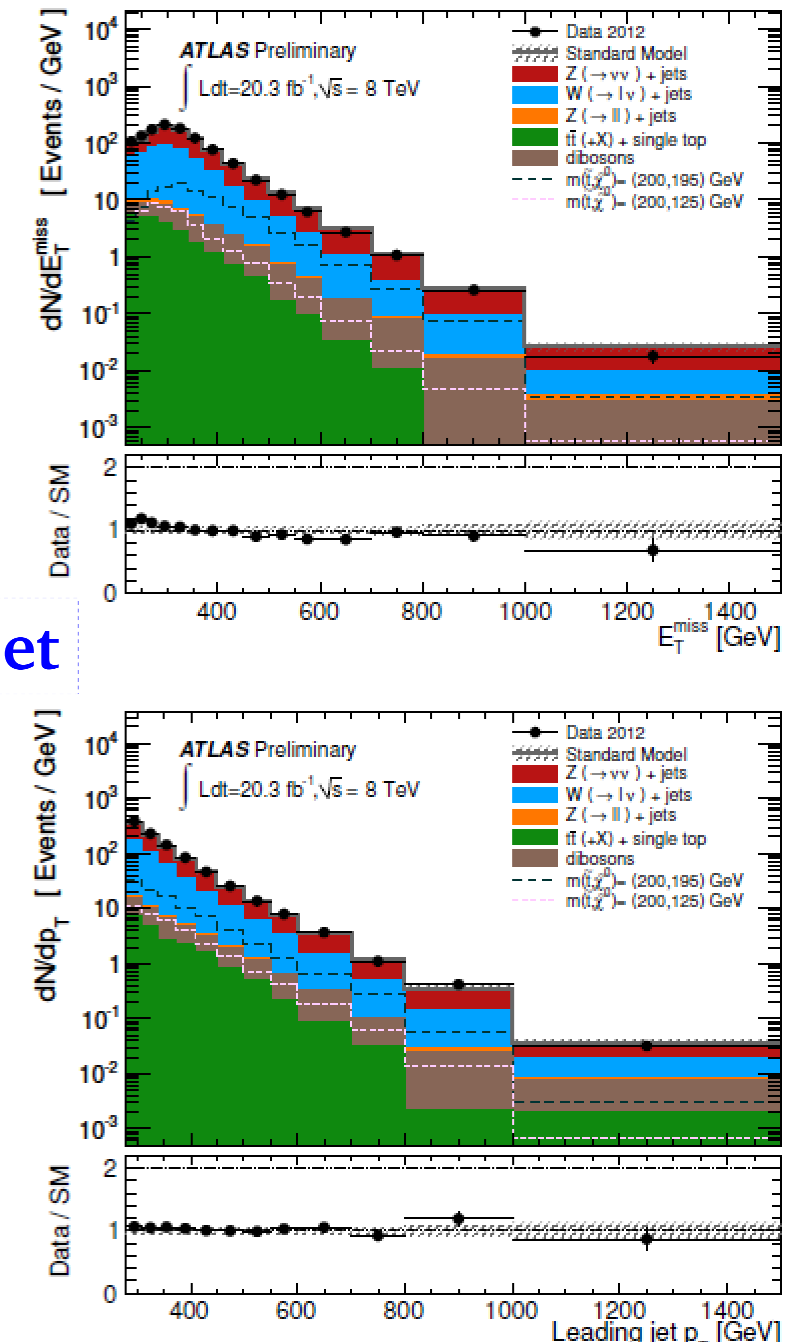
Signal Region	M1	C1
Observed events (20.3 fb^{-1})	30793	25
SM prediction	29800 ± 900	29 ± 7
$W(\to e\nu)$	2700 ± 420	0.5 ± 0.3
$W(\to \mu\nu)$	2900 ± 330	0.8 ± 0.4
$W(\to \tau\nu)$	6600 ± 300	7 ± 4
$Z(\to \nu\bar{\nu})$	15600 ± 900	10 ± 5
$Z/\gamma^* (\to e^+ e^-)$	–	–
$Z/\gamma^* (\to \mu^+ \mu^-)$	50 ± 28	0.01 ± 0.01
$Z/\gamma^* (\to \tau^+ \tau^-)$	80 ± 24	0.09 ± 0.04
top	700 ± 86	7 ± 3
dibosons	900 ± 420	2 ± 2
multijets	340 ± 340	–

Signal channel	$\langle\epsilon\sigma\rangle^{95}_{\text{obs}}$ [fb]	S^{95}_{obs}	S^{95}_{exp}	CL_B
M1	136	2770	2060^{+780}_{-570}	0.82
C1	0.7	13	14^{+5}_{-4}	0.45

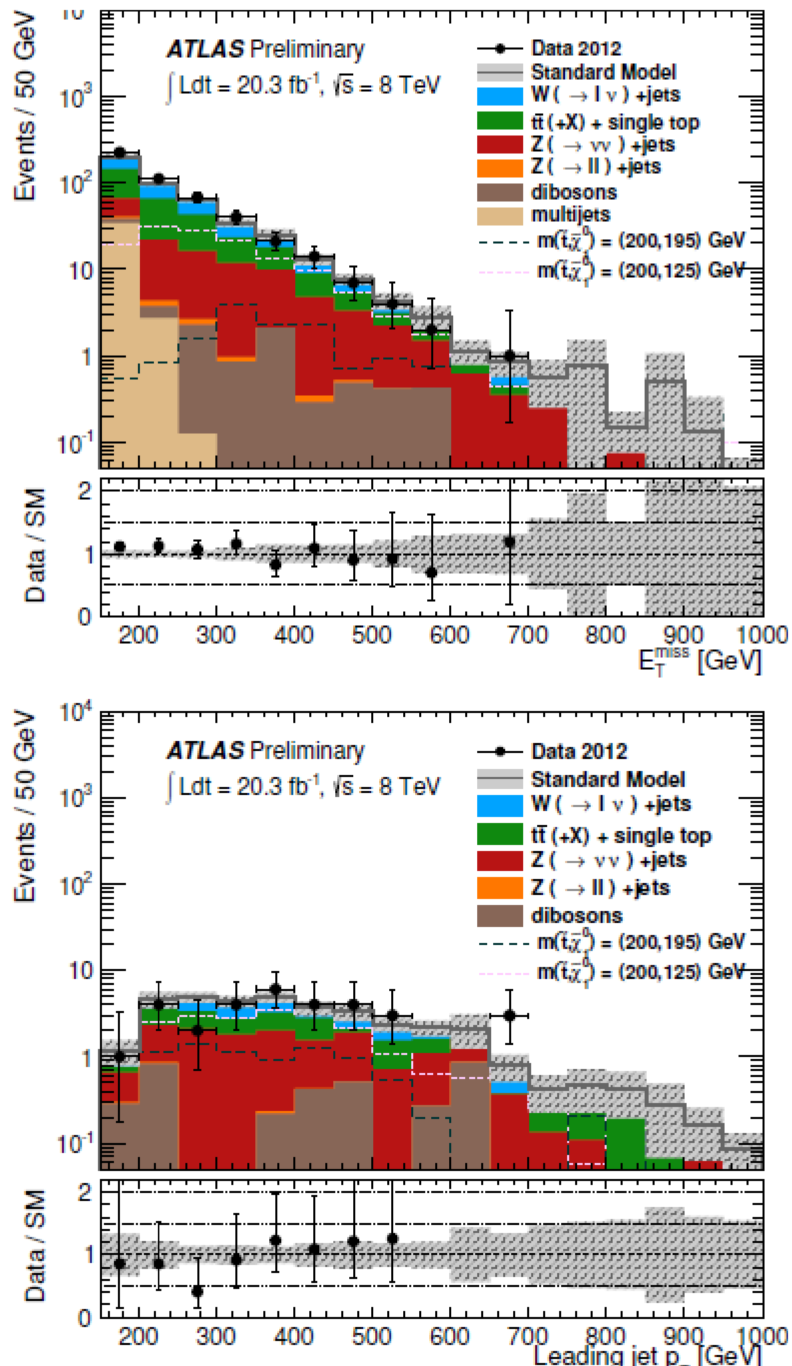
Direct stop in charm + LSP: $\tilde{t} \to c\tilde{\chi}_1^0$

ATLAS-CONF-2013-068

monojet



charm

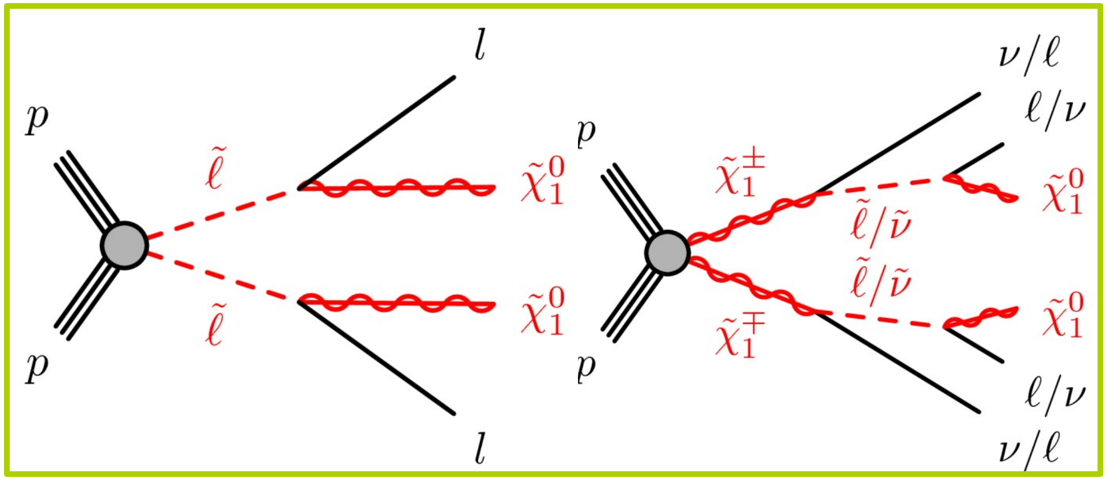


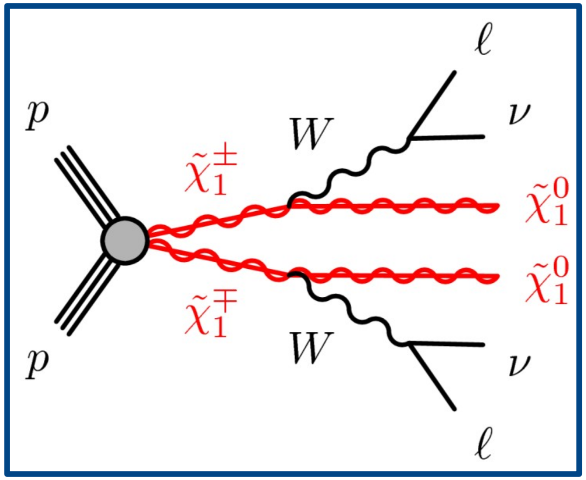
vid -

Two lepton analysis

ATLAS-CONF-2013-049

Signal regions



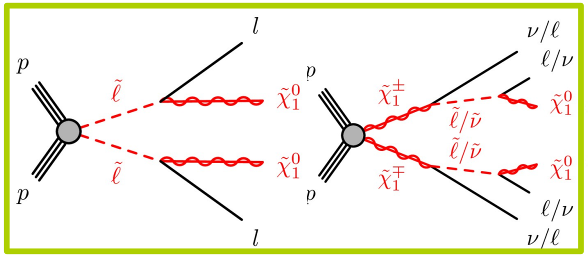


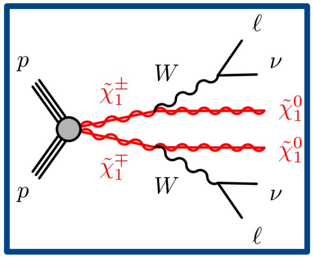
	SR-$m_{\mathrm{T2},90}$	SR-$m_{\mathrm{T2},110}$	SR-WWa	SR-WWb	SR-WWc
lepton flavour	e^+e^-, $\mu^+\mu^-$, $e^{\pm}\mu^{\mp}$		$e^{\pm}\mu^{\mp}$		
$p_{\mathrm{T}}^{\ell 1}$	—		> 35 GeV		
$p_{\mathrm{T}}^{\ell 2}$	—		> 20 GeV		
$m_{\ell\ell}$	Z veto		< 80 GeV	< 130 GeV	—
$p_{\mathrm{T},\ell\ell}$	—		> 70 GeV	< 170 GeV	< 190 GeV
$\Delta\phi_{\ell\ell}$	—		< 1.8 rad		
$E_{\mathrm{T}}^{\mathrm{miss,rel}}$	> 40 GeV		> 70 GeV	—	
m_{T2}	> 90 GeV	> 110 GeV	—	> 90 GeV	> 100 GeV

Two lepton analysis

ATLAS-CONF-2013-049

Control regions





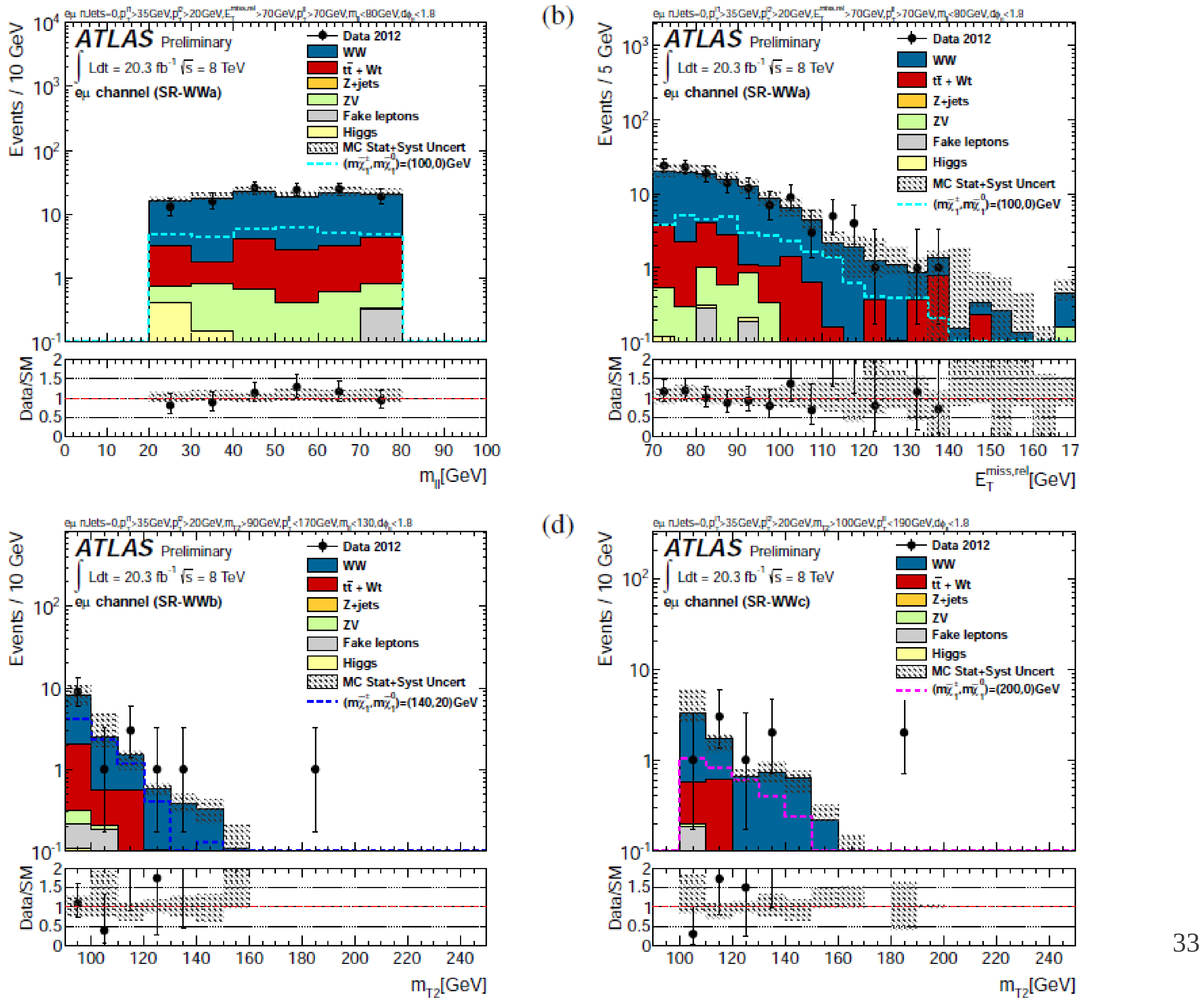
SR	SR-$m_{T2,90}$	SR-$m_{T2,110}$	SR-WWa	SR-WWb	SR-WWc
WW CR					
lepton flavour	$e^\pm\mu^\mp$		$e^\pm\mu^\mp$		
$m_{\ell\ell}$	Z veto		—		
$\Delta\phi_{\ell\ell}$	—		< 1.8 rad		
$E_T^{miss,rel}$	> 40 GeV		< 70 GeV	—	
m_{T2}	50–90 GeV		—	< 90 GeV	
Top CR					
b-tagged jets	≥ 1		≥ 1		
signal jets	≥ 2		≥ 1		
lepton flavour	e^+e^-, $\mu^+\mu^-$, $e^\pm\mu^\mp$		$e^\pm\mu^\mp$		
$m_{\ell\ell}$	Z veto		< 80 GeV	< 130 GeV	
$p_{T,\ell\ell}$	—		> 70 GeV	< 170 GeV	< 190 GeV
$\Delta\phi_{\ell\ell}$	—		< 1.8 rad		
$E_T^{miss,rel}$	> 40 GeV		> 70 GeV	—	
m_{T2}	—		—	> 90 GeV	> 100 GeV
ZV CR					
lepton flavour	e^+e^-, $\mu^+\mu^-$		not defined		
$m_{\ell\ell}$	Z select				
$E_T^{miss,rel}$	> 40 GeV				
m_{T2}	> 90 GeV	> 110 GeV			

Two lepton analysis

ATLAS-CONF-2013-049

Results:

Chargino to W scenario

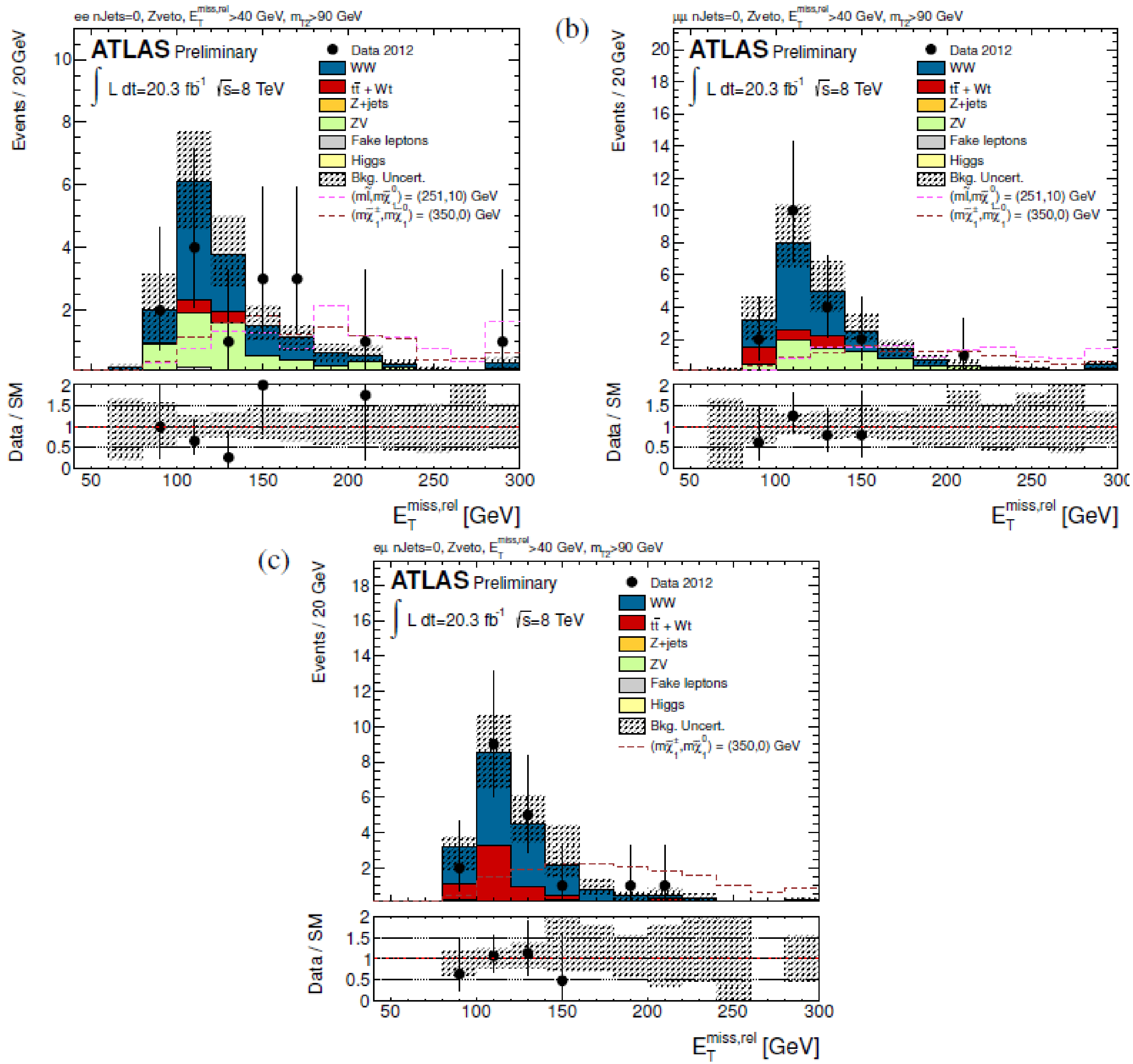


Two lepton analysis

ATLAS-CONF-2013-049

Results:

Chargino to Slepton scenario



Two lepton analysis

ATLAS-CONF-2013-049

Results:

Direct lepton Scenario

SR-$m_{T2,90}$	e^+e^-	$e^\pm\mu^\mp$	$\mu^+\mu^-$	all
Observed	15	19	19	53
Background total	16.6 ± 2.3	20.7 ± 3.2	22.4 ± 3.3	59.7 ± 7.3
WW	9.3 ± 1.6	14.1 ± 2.2	12.6 ± 2.0	36.1 ± 5.1
ZV ($V = W$ or Z)	6.3 ± 1.5	0.8 ± 0.3	7.3 ± 1.7	14.4 ± 3.2
Top	$0.9^{+1.1}_{-0.9}$	5.6 ± 2.1	2.5 ± 1.8	8.9 ± 3.9
Higgs	0.11 ± 0.04	0.19 ± 0.05	0.08 ± 0.04	0.38 ± 0.08
Fake	$0.00^{+0.18}_{-0.00}$	$0.00^{+0.14}_{-0.00}$	$0.00^{+0.15}_{-0.00}$	$0.00^{+0.28}_{-0.00}$
Signal expectation				
$(m_{\tilde{\ell}}, m_{\tilde{\chi}_1^0}) = (191, 90)$ GeV	21.6	0	21.6	43.2
$(m_{\tilde{\ell}}, m_{\tilde{\chi}_1^0}) = (251, 10)$ GeV	12.2	0	12.5	24.7
$(m_{\tilde{\chi}_1^\pm}, m_{\tilde{\chi}_1^0}) = (350, 0)$ GeV	11.7	16.6	10.5	38.8
$(m_{\tilde{\chi}_1^\pm}, m_{\tilde{\chi}_1^0}) = (425, 75)$ GeV	4.3	6.7	4.4	15.4
Observed $\sigma^{95}_{\rm vis}$ (fb)	0.44	0.51	0.47	0.81
Expected $\sigma^{95}_{\rm vis}$ (fb)	$0.50^{+0.22}_{-0.15}$	$0.57^{+0.25}_{-0.17}$	$0.58^{+0.25}_{-0.17}$	$1.00^{+0.41}_{-0.28}$

Chargino to slepton scenario

SR-$m_{T2,110}$	e^+e^-	$e^\pm\mu^\mp$	$\mu^+\mu^-$	all
Observed	4	5	4	13
Background total	6.1 ± 2.2	4.4 ± 2.0	6.3 ± 2.4	16.9 ± 6.0
WW	2.7 ± 1.5	3.6 ± 2.0	2.9 ± 1.6	9.1 ± 4.9
ZV ($V = W$ or Z)	2.7 ± 1.4	0.2 ± 0.1	3.4 ± 1.8	6.3 ± 3.3
Top	0.7 ± 0.7	0.6 ± 0.4	0.0 ± 0.0	1.3 ± 1.0
Higgs	0.05 ± 0.03	0.12 ± 0.04	0.05 ± 0.02	0.22 ± 0.05
Fake	$0.00^{+0.09}_{-0.00}$	$0.00^{+0.13}_{-0.00}$	$0.00^{+0.12}_{-0.00}$	$0.00^{+0.28}_{-0.00}$
Signal expectation				
$(m_{\tilde{\ell}}, m_{\tilde{\chi}_1^0}) = (191, 90)$ GeV	12.3	0	12.0	24.3
$(m_{\tilde{\ell}}, m_{\tilde{\chi}_1^0}) = (251, 10)$ GeV	10.5	0	11.2	21.7
$(m_{\tilde{\chi}_1^\pm}, m_{\tilde{\chi}_1^0}) = (350, 0)$ GeV	9.5	14.0	8.7	32.2
$(m_{\tilde{\chi}_1^\pm}, m_{\tilde{\chi}_1^0}) = (425, 75)$ GeV	3.7	1.1	3.8	8.5
Observed $\sigma^{95}_{\rm vis}$ (fb)	0.27	0.35	0.28	0.54
Expected $\sigma^{95}_{\rm vis}$ (fb)	$0.33^{+0.16}_{-0.10}$	$0.33^{+0.16}_{-0.09}$	$0.33^{+0.16}_{-0.10}$	$0.62^{+0.23}_{-0.16}$

Two lepton analysis

ATLAS-CONF-2013-049

Results:

Chargino to W scenario

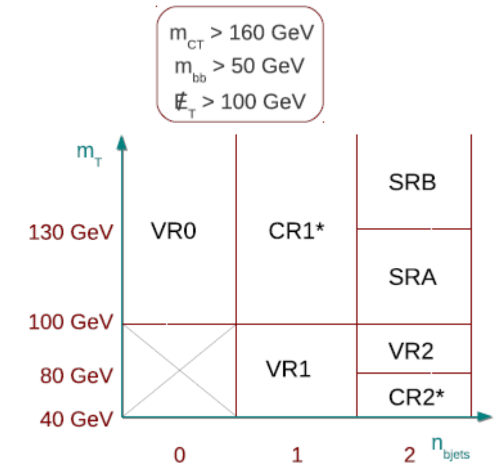
	SR-WWa	SR-WWb	SR-WWc
Observed	123	16	9
Background total	117.9 ± 14.6	13.6 ± 2.3	7.4 ± 1.5
Top	15.2 ± 6.6	2.7 ± 1.1	1.0 ± 0.7
WW	98.6 ± 14.6	10.2 ± 2.1	5.9 ± 1.3
ZV ($V = W$ or Z)	3.4 ± 0.8	$0.26^{+0.31}_{-0.26}$	0.29 ± 0.14
Higgs	0.76 ± 0.14	0.21 ± 0.06	0.10 ± 0.04
fake	$0.02^{+0.33}_{-0.02}$	$0.26^{+0.30}_{-0.26}$	$0.12^{+0.17}_{-0.12}$
Signal expectation			
$(m_{\tilde{\chi}_1^\pm}, m_{\tilde{\chi}_1^0}) = (100, 0)$ GeV	31	N/A	N/A
$(m_{\tilde{\chi}_1^\pm}, m_{\tilde{\chi}_1^0}) = (140, 20)$ GeV	N/A	8.2	N/A
$(m_{\tilde{\chi}_1^\pm}, m_{\tilde{\chi}_1^0}) = (200, 0)$ GeV	N/A	N/A	3.3
$(m_{\tilde{\chi}_1^\pm}, m_{\tilde{\chi}_1^0}) = (110, 113)$ GeV	18	4.3	N/A
Observed σ^{95}_{vis} (fb)	1.94	0.58	0.43
Expected σ^{95}_{vis} (fb)	$1.77^{+0.66}_{-0.49}$	$0.51^{+0.21}_{-0.15}$	$0.37^{+0.18}_{-0.11}$

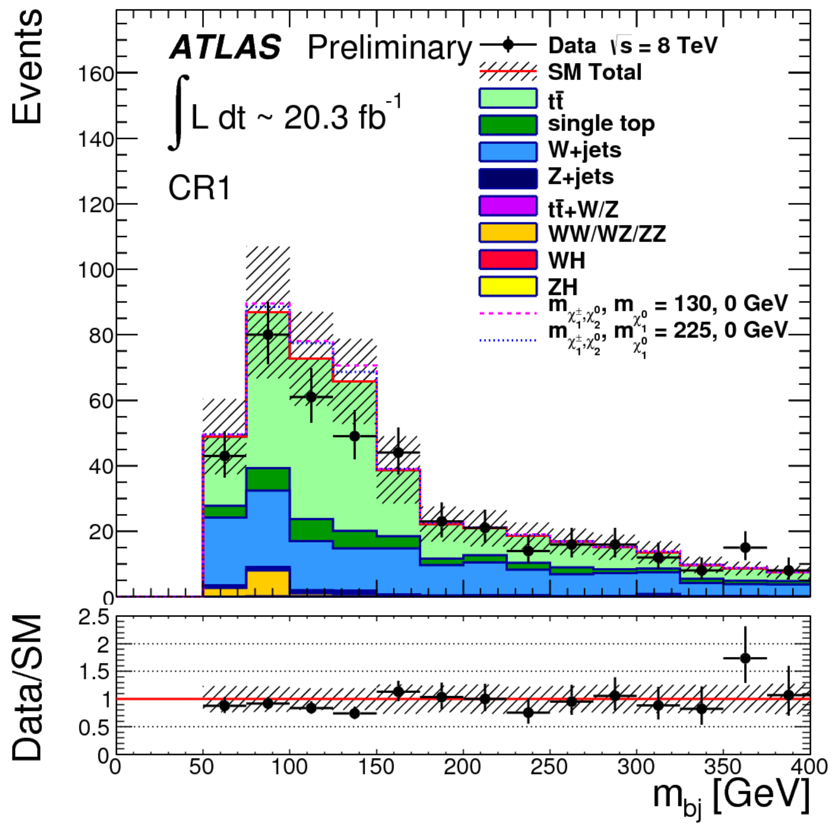
One lepton, 2 *b*-jets analysis **NEW!**

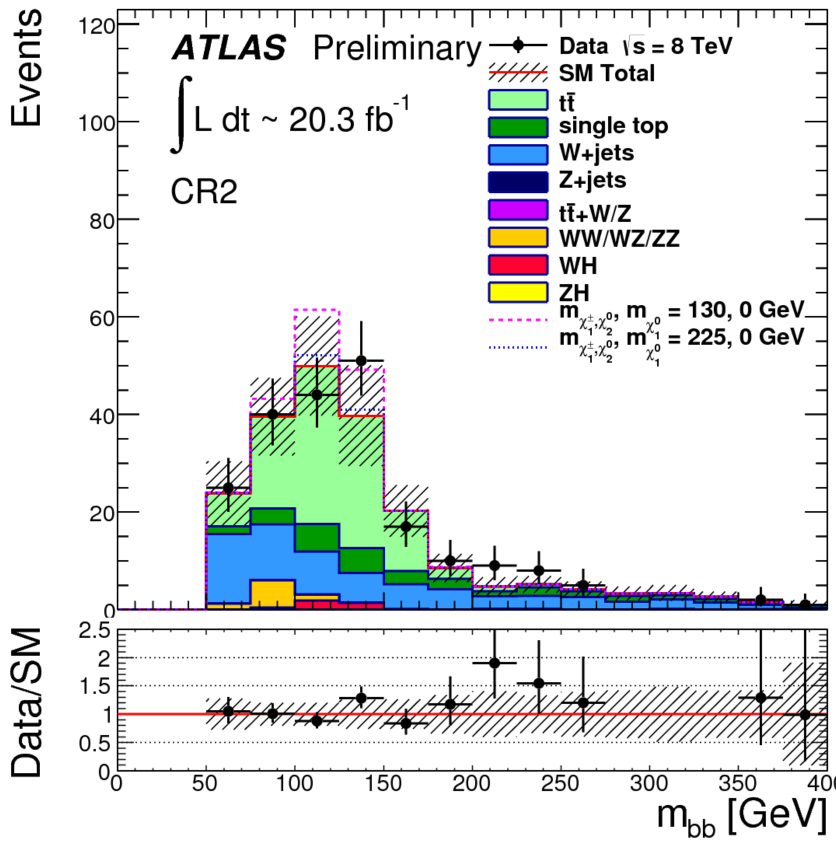
ATLAS-CONF-2013-093

Signal, control and validation regions

	SRA	SRB	CR1	CR2	VR0	VR1	VR2
Number of b-tagged jets	2	2	1	2	0	1	2
m_T (GeV)	100–130	> 130	> 100	40–80	> 100	40-100	80–100







One lepton, 2 *b*-jets analysis NEW!

Results

$105 < m_{bb} < 125$ GeV

	SRAh	SRBh
Observed	4	2
Background estimate		
$t\bar{t}$	2.8 ± 1.7	1.0 ± 0.5
W + jets	0.7 ± 0.4	0.3 ± 0.2
Single top	$1.5^{+1.6}_{-1.3}$	$0.5^{+0.5}_{-0.5}$
Other	0.2 ± 0.1	0.3 ± 0.1
Total	5.2 ± 2.4	2.0 ± 0.8
Signal prediction		
$(130, 0)$ GeV	6.5	0.2
$(225, 0)$ GeV	1.9	4.1
Observed $\sigma^{95}_{\mathrm{vis}}$ (Asymptotic)	0.29 fb	0.22 fb
Expected S^{95}_{exp} (Asymptotic)	$6.7^{+3.1}_{-1.9}$	$4.6^{+2.5}_{-1.5}$
Observed $\sigma^{95}_{\mathrm{vis}}$ (Pseudo-experiments)	0.31 fb	0.22 fb
Expected S^{95}_{exp} (Pseudo-experiments)	$6.8^{+2.7}_{-1.4}$	$4.4^{+1.8}_{-0.8}$