

NEGLECTED SUSY; A PERSPECTIVE ON CURRENT SEARCHES



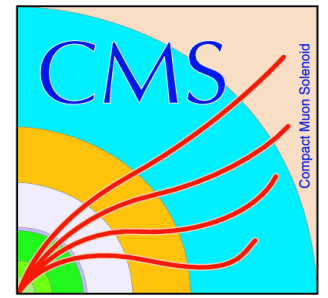
Based on unapproved CMS results, work and several conversations with M. Pierini, G. Rolandi, M. Lisanti, ...

(I am the only one to blame)



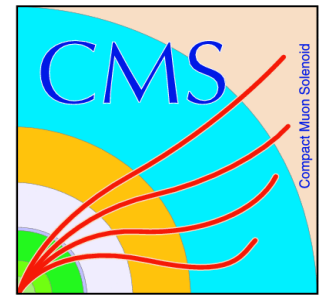
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SUMMARY



- One loophole and one handle
 - Natural SUSY searches
- My view of the future

IS THAT EVEN POSSIBLE?



ATLAS SUSY Searches* - 95% CL Lower Limits (Status: SUSY 2012)

Search Category	Search Description	Lower Limit [TeV]	Notes
Inclusive searches	MSUGRA/CMSSM: 0 lep + j's + E _{T,miss}	1.50 TeV	$\tilde{q} = \tilde{g}$ mass
	MSUGRA/CMSSM: 1 lep + j's + E _{T,miss}	1.24 TeV	$\tilde{q} = \tilde{g}$ mass
	Pheno model: 0 lep + j's + E _{T,miss}	1.18 TeV	\tilde{g} mass ($m(\tilde{q}) < 2$ TeV, light $\tilde{\chi}_0^0$)
	Pheno model: 0 lep + j's + E _{T,miss}	1.38 TeV	\tilde{q} mass ($m(\tilde{q}) < 2$ TeV, light $\tilde{\chi}_0^0$)
	Glينو med. $\tilde{\chi}^{\pm}$ ($\tilde{g} \rightarrow \tilde{q}\tilde{q}^*$): 1 lep + j's + E _{T,miss}	900 GeV	\tilde{g} mass ($m(\tilde{q}) < 200$ GeV, $m(\tilde{\chi}^{\pm}) = \frac{1}{2}(m(\tilde{q}) + m(\tilde{g}))$)
	GMSB: 2 lep (OS) + j's + E _{T,miss}	1.24 TeV	\tilde{g} mass ($\tan\beta < 15$)
	GMSB: 1-2 τ + 0-1 lep + j's + E _{T,miss}	1.20 TeV	\tilde{g} mass ($\tan\beta > 20$)
	GGM: $\gamma\gamma$ + E _{T,miss}	1.07 TeV	\tilde{g} mass ($m(\tilde{q}) > 50$ GeV)
	$\tilde{g} \rightarrow b\tilde{b}\tilde{\chi}_0^0$ (virtual b): 0 lep + 1/2 b-j's + E _{T,miss}	900 GeV	\tilde{g} mass ($m(\tilde{q}) < 300$ GeV)
	$\tilde{g} \rightarrow b\tilde{b}\tilde{\chi}_0^0$ (virtual b): 0 lep + 3 b-j's + E _{T,miss}	1.02 TeV	\tilde{g} mass ($m(\tilde{q}) < 400$ GeV)
3rd gen. squarks gluino mediated	$\tilde{g} \rightarrow b\tilde{b}\tilde{\chi}_0^0$ (real b): 0 lep + 3 b-j's + E _{T,miss}	1.00 TeV	\tilde{g} mass ($m(\tilde{q}) = 60$ GeV)
	$\tilde{g} \rightarrow t\tilde{t}\tilde{\chi}_0^0$ (virtual t): 1 lep + 1/2 b-j's + E _{T,miss}	710 GeV	\tilde{g} mass ($m(\tilde{q}) < 150$ GeV)
	$\tilde{g} \rightarrow t\tilde{t}\tilde{\chi}_0^0$ (virtual t): 2 lep (SS) + j's + E _{T,miss}	850 GeV	\tilde{g} mass ($m(\tilde{q}) < 300$ GeV)
	$\tilde{g} \rightarrow t\tilde{t}\tilde{\chi}_0^0$ (virtual t): 3 lep + j's + E _{T,miss}	760 GeV	\tilde{g} mass ($\text{any } m(\tilde{q}) < m(\tilde{g})$)
	$\tilde{g} \rightarrow t\tilde{t}\tilde{\chi}_0^0$ (virtual t): 0 lep + multi-j's + E _{T,miss}	1.00 TeV	\tilde{g} mass ($m(\tilde{q}) < 300$ GeV)
	$\tilde{g} \rightarrow t\tilde{t}\tilde{\chi}_0^0$ (virtual t): 0 lep + 3 b-j's + E _{T,miss}	940 GeV	\tilde{g} mass ($m(\tilde{q}) < 50$ GeV)
	$\tilde{g} \rightarrow t\tilde{t}\tilde{\chi}_0^0$ (real t): 0 lep + 3 b-j's + E _{T,miss}	820 GeV	\tilde{g} mass ($m(\tilde{q}) = 60$ GeV)
	bb, b _s $\rightarrow b\tilde{b}\tilde{\chi}_0^0$: 0 lep + 2-b-jets + E _{T,miss}	480 GeV	b mass ($m(\tilde{q}) < 150$ GeV)
	bb, b _s $\rightarrow b\tilde{b}\tilde{\chi}_0^0$: 3 lep + j's + E _{T,miss}	380 GeV	\tilde{g} mass ($m(\tilde{q}) = 2m(\tilde{q}_1)$)
	$\tilde{t}\tilde{t}$ (very light), $\tilde{t} \rightarrow b\tilde{b}\tilde{\chi}_0^0$: 2 lep + E _{T,miss}	135 GeV	\tilde{t} mass ($m(\tilde{q}) = 45$ GeV)
3rd gen. squarks direct production	$\tilde{t}\tilde{t}$ (light), $\tilde{t} \rightarrow b\tilde{b}\tilde{\chi}_0^0$: 1/2 lep + b-jet + E _{T,miss}	120-173 GeV	\tilde{t} mass ($m(\tilde{q}) = 45$ GeV)
	$\tilde{t}\tilde{t}$ (heavy), $\tilde{t} \rightarrow b\tilde{b}\tilde{\chi}_0^0$: 0 lep + b-jet + E _{T,miss}	380-485 GeV	\tilde{t} mass ($m(\tilde{q}) = 0$)
	$\tilde{t}\tilde{t}$ (heavy), $\tilde{t} \rightarrow b\tilde{b}\tilde{\chi}_0^0$: 1 lep + b-jet + E _{T,miss}	230-440 GeV	\tilde{t} mass ($m(\tilde{q}) = 0$)
	$\tilde{t}\tilde{t}$ (heavy), $\tilde{t} \rightarrow b\tilde{b}\tilde{\chi}_0^0$: 2 lep + b-jet + E _{T,miss}	298-305 GeV	\tilde{t} mass ($m(\tilde{q}) = 0$)
	$\tilde{t}\tilde{t}$ (GMSB): $Z(\rightarrow ll) + b$ -jet + E _{T,miss}	310 GeV	\tilde{t} mass ($115 < m(\tilde{q}) < 230$ GeV)
	$\tilde{t}\tilde{t}$ (GMSB): $Z(\rightarrow ll) + b$ -jet + E _{T,miss}	93-180 GeV	\tilde{t} mass ($m(\tilde{q}) = 0$)
	$\tilde{t}\tilde{t}$ (GMSB): $Z(\rightarrow ll) + b$ -jet + E _{T,miss}	120-330 GeV	\tilde{t} mass ($m(\tilde{q}) = 0, m(\tilde{\nu}) = \frac{1}{2}(m(\tilde{q}) + m(\tilde{q}_1))$)
	$\tilde{t}\tilde{t}$ (GMSB): $Z(\rightarrow ll) + b$ -jet + E _{T,miss}	60-500 GeV	\tilde{t} mass ($m(\tilde{q}) = m(\tilde{q}_1), m(\tilde{q}_2) = 0, m(\tilde{\nu})$ as above)
	AMSB (direct $\tilde{\chi}^{\pm}$ pair prod.): long-lived $\tilde{\chi}^{\pm}$	210 GeV	$\tilde{\chi}^{\pm}$ mass ($1 < \tau(\tilde{\chi}^{\pm}) < 10$ ns)
	Stable \tilde{g} -R-hadrons: Full detector	985 GeV	\tilde{g} mass
EW direct	Stable \tilde{t} -R-hadrons: Full detector	683 GeV	\tilde{t} mass
	Stable \tilde{b} -R-hadrons: Full detector	910 GeV	\tilde{g} mass ($\tau(\tilde{g}) > 10$ ns)
	Metastable \tilde{g} -R-hadrons: Pixel det. only	310 GeV	\tilde{t} mass ($5 < \tan\beta < 20$)
	GMSB: stable $\tilde{\tau}$	1.32 TeV	$\tilde{\nu}_\tau$ mass ($\beta_{312} = 0.10, \beta_{312} = 0.05$)
	RPV: high-mass $\tilde{e}\mu$	760 GeV	$\tilde{q} = \tilde{g}$ mass ($\epsilon_{1,23} < 15$ mm)
	Bilinear RPV: 1 lep + j's + E _{T,miss}	1.77 TeV	\tilde{g} mass
	BC1 RPV: 4 lep + E _{T,miss}	700 GeV	\tilde{q} mass ($3.0 \times 10^{-6} < \kappa_{211} < 1.5 \times 10^{-5}, 1 \text{ mm} < \epsilon_{1,23} < 1 \text{ m}, \tilde{g}$ decoupled)
	RPV $\tilde{g} \rightarrow q\tilde{q}$: μ + heavy displaced vertex	100-287 GeV	sgluon mass (incl. limit from 1110.2693)
	Hypercolour scalar gluons: 4 jets, $m_{\tilde{g}} = m_{\tilde{q}}$	709 GeV	M^* scale ($m_{\tilde{g}} < 100$ GeV, vector D5, Dirac χ)
	Spin dep. WIMP interaction: monojet + E _{T,miss}	548 GeV	M^* scale ($m_{\tilde{g}} < 100$ GeV, tensor D9, Dirac χ)

10⁻¹

1

10

Mass scale [TeV]

ATLAS Exotics Searches* - 95% CL Lower Limits (Status: LHCC, Sep 2012)

Search Category	Search Description	Lower Limit [TeV]	Notes
Large ED (ADD)	Large ED (ADD): monojet + E _{T,miss}	3.39 TeV	M_D ($\delta=2$)
	Large ED (ADD): monophoton + E _{T,miss}	1.93 TeV	M_D ($\delta=2$)
	Large ED (ADD): diphoton, $m_{\gamma\gamma}$	3.29 TeV	M_S (GRW cut-off, NLO)
	UED: diphoton + E _{T,miss}	1.41 TeV	Compact scale 1/R
	RS1 with $k/M_{Pl} = 0.1$: diphoton, $m_{\gamma\gamma}$	2.06 TeV	Graviton mass
	RS1 with $k/M_{Pl} = 0.1$: dilepton, m_{ll}	2.16 TeV	Graviton mass
	RS1 with $k/M_{Pl} = 0.1$: ZZ resonance, m_{ll}	845 GeV	Graviton mass
	RS1 with $k/M_{Pl} = 0.1$: WW resonance, $m_{\tau,\nu\mu}$	1.23 TeV	Graviton mass
	RS with $BR(g \rightarrow tt) = 0.925$: $tt \rightarrow l^+l^+$, m_{ll}	1.9 TeV	KK gluon mass
	ADD BH ($M_{Th}/M_{Pl} = 3$): SS dimuon, $N_{ch, part.}$	1.25 TeV	M_D ($\delta=6$)
ADD BH ($M_{Th}/M_{Pl} = 3$): leptons + jets, $L_{\mu\tau}$	ADD BH ($M_{Th}/M_{Pl} = 3$): leptons + jets, $L_{\mu\tau}$	1.5 TeV	M_D ($\delta=6$)
	Quantum black hole: dijet, $F_{\mu\nu}$	4.11 TeV	M_D ($\delta=6$)
	qqqq contact interaction: $\tilde{\chi}(m)$	7.8 TeV	Λ
	qqll CI: ee, $\mu\mu$ combined, m_{ll}	10.2 TeV	Λ (constructive int.)
	uutt CI: SS dilepton + jets + E _{T,miss}	1.7 TeV	Λ
	Z' (SSM): $m_{ee\mu\mu}$	2.49 TeV	Z' mass
	Z' (SSM): $m_{\tau\tau}$	1.3 TeV	Z' mass
	W* (SSM): $m_{\tau,e\mu}$	2.55 TeV	W' mass
	W* (SSM): $m_{\tau,\nu\mu}$	350 GeV	W' mass
	W* (SSM): $m_{\tau,bb}$	1.13 TeV	W' mass
W* (SSM): $m_{\tau,e\mu}$	2.42 TeV	W' mass	
Scalar LQ pairs ($\beta=1$): kin. vars. in eejj, evjj	Scalar LQ pairs ($\beta=1$): kin. vars. in eejj, evjj	660 GeV	4 th gen. LQ mass
	Scalar LQ pairs ($\beta=1$): kin. vars. in $\mu\mu jj, \mu\nu jj$	685 GeV	2 nd gen. LQ mass
	4 th generation: $l^+l^+ \rightarrow WbWb$	656 GeV	l' mass
	4 th generation: $b^+b^+ \rightarrow WtWt$	670 GeV	b' (T_{33}) mass
	New quark b': $b^+b^+ \rightarrow Zb^+X, m_{\tau\tau}$	400 GeV	b' mass
	Top partner: $TT \rightarrow tt + A_0$ (dilepton, $m_{\tau\tau}$)	483 GeV	T mass ($m(A_0) < 100$ GeV)
	Vector-like quark: CC, $m_{\nu\mu}$	1.12 TeV	VLQ mass (charge -1/3, coupling $\kappa_{q0} = v/m_{q0}$)
	Vector-like quark: NC, $m_{\nu\mu}$	1.08 TeV	VLQ mass (charge 2/3, coupling $\kappa_{q0} = v/m_{q0}$)
	Excited quarks: γ -jet resonance, m_{jj}	2.46 TeV	q' mass
	Excited quarks: dijet resonance, m_{jj}	3.66 TeV	q' mass
Excited electron: e- γ resonance, $m_{e\gamma}$	Excited electron: e- γ resonance, $m_{e\gamma}$	2.0 TeV	e' mass ($\Lambda = m(e')$)
	Excited muon: μ - γ resonance, $m_{\mu\gamma}$	1.9 TeV	μ' mass ($\Lambda = m(\mu')$)
	Techni-hadrons (LSTC): dilepton, m_{ll}	850 GeV	$\rho_{l'}$ mass ($m(\rho_{l'}) - m(\pi_{l'}) = M_{\nu}$)
	Techni-hadrons (LSTC): WZ resonance (νll), m_{ll}	483 GeV	ρ_{ν} mass ($m(\rho_{\nu}) = m(\pi_{\nu}) + m_{WZ}, m(a_{\nu}) = 1.1m(\rho_{\nu})$)
	Major. neutr. (LRSM, no mixing): 2-lep + jets	1.5 TeV	N mass ($m(W_R) = 2$ TeV)
	W _R (LRSM, no mixing): 2-lep + jets	2.4 TeV	W_R mass ($m(N) < 1.4$ TeV)
	$H_{\tau}^{\pm\pm}$ (DY prod., $BR(H_{\tau}^{\pm\pm} \rightarrow \mu\mu) = 1$): SS dimuon, $m_{\mu\mu}$	355 GeV	$H_{\tau}^{\pm\pm}$ mass
	Color octet scalar: dijet resonance, m_{jj}	1.94 TeV	Scalar resonance mass

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Mass scale [TeV]

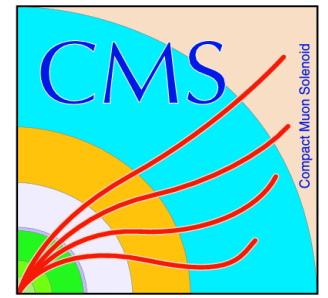
*Only a selection of the available mass limits on new states or phenomena shown.
All limits quoted are observed minus 1 σ theoretical signal cross section uncertainty.

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RELAXING ASSUMPTIONS



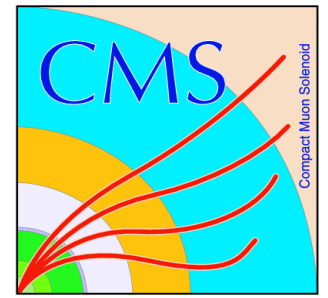
- $SUSY = MET + X$

(with notable exceptions diphotons, SS dileptons and multileptons)



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RELAXING ASSUMPTIONS

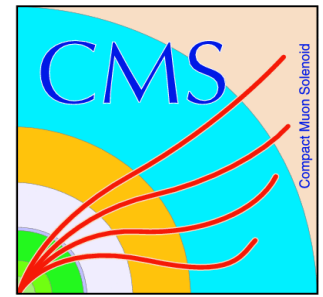


- $SUSY = MET + X$
(with notable exceptions diphotons, SS dileptons and multileptons)
- New physics = high scale = hard objects



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RELAXING ASSUMPTIONS



- $SUSY = \cancel{MET} + X$



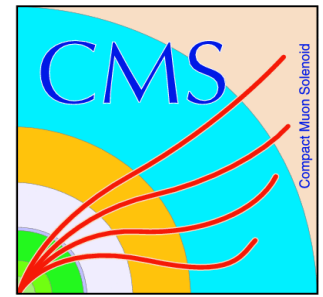
Reminder: MET = p_T of the stable particle

- New physics \sim high scale \sim hard objects or many soft objects



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NATURALNESS

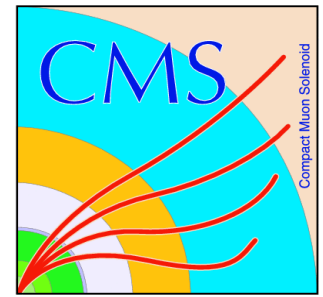


gluino AND stops AND higgsinos



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gluino AND stops AND higgsinos



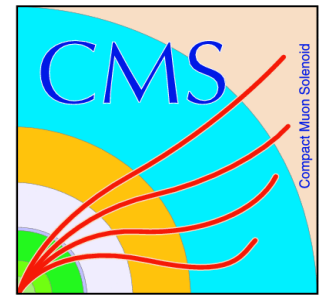
$$M_3 \lesssim 1.3 \text{ TeV} \sin \beta \left(\frac{\log \Lambda / \text{TeV}}{3} \right)^{-1} \left(\frac{m_h}{125 \text{ GeV}} \right) \sqrt{\frac{10\%}{\Delta^{-1}}}$$

$$\frac{\sigma(m_{\tilde{g}}=1.5 \text{ TeV})}{\sigma(m_{\tilde{g}}=1 \text{ TeV})} \sim 10^{-2}$$



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gluino AND stops AND higgsinos

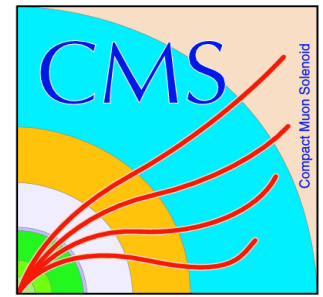
$$t\bar{t}t\bar{t} + \chi^0\chi^0 \longleftrightarrow b\bar{b}b\bar{b} + \chi^0\chi^0$$

$$\dots, t\bar{t}b\bar{b} + X, \dots$$



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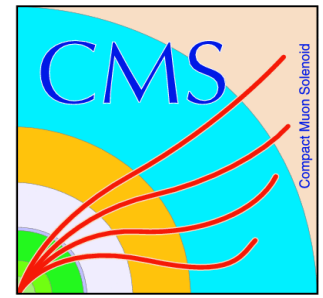


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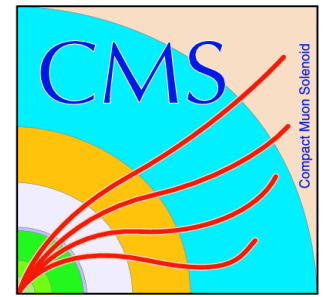
$\bar{t}sb\bar{t}sb, qqqqqq, \dots$

OUT OF THE MET BOX



- SUSY configurations with low MET
 - RPV
 - Cascade decays or moderately squeezed spectrum
 - For very small mass splittings (for instance chargino-neutralino) $p_T(\text{mother}) \sim p_T(\text{daughter})$
 - Partly visible decays of the lightest MSSM neutralino (NMSSM, gravitino LSP)

OUT OF THE MET BOX

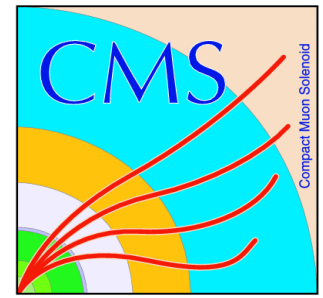


- SUSY configurations with low MET
 - RPV
 - Cascade decays or moderately squeezed spectrum
 - Partly visible decays of the lightest MSSM neutralino (NMSSM, gravitino LSP)
- High multiplicities
 - Jets from RPV, extra W's, Z's, h's, extra steps in the cascades
- Rare objects: leptons (details of the spectrum are important), photons



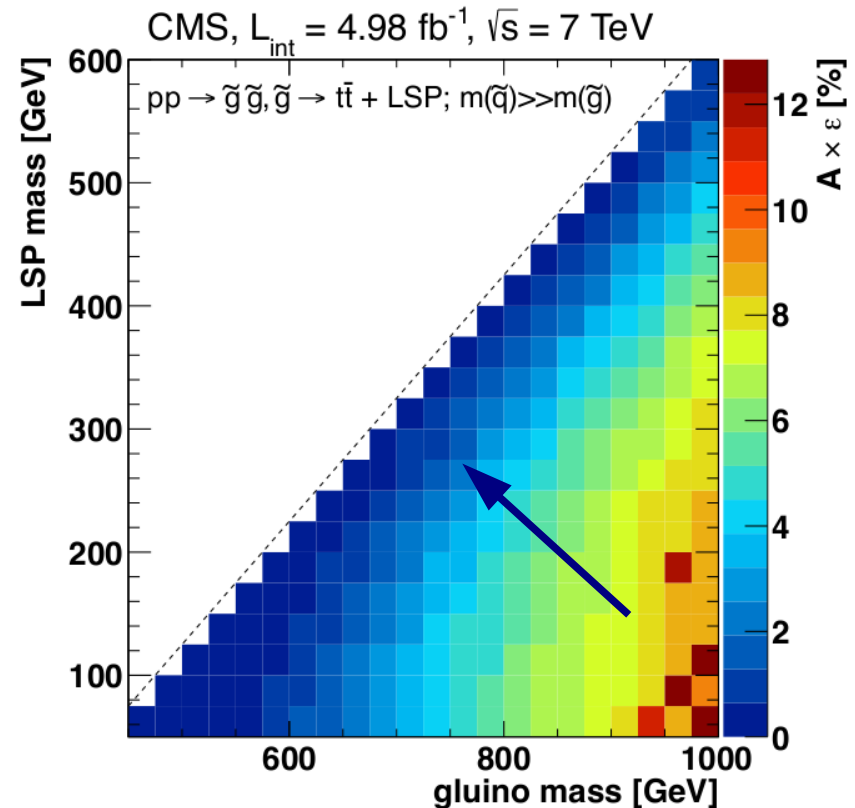
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IT IS SO TYPICAL (HADRONIC)



- We are not always doing our best, even before ISR becomes important

Signal region		H_T [GeV]	E_T^{miss} [GeV]	N_{bjets}
1b-loose	1BL	> 400	> 250	≥ 1
1b-tight	1BT	> 500	> 500	≥ 1
2b-loose	2BL	> 400	> 250	≥ 2
2b-tight	2BT	> 600	> 300	≥ 2
3b	3B	> 400	> 250	≥ 3

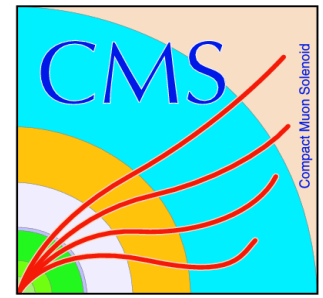


$\sim 1/10$ in efficiency

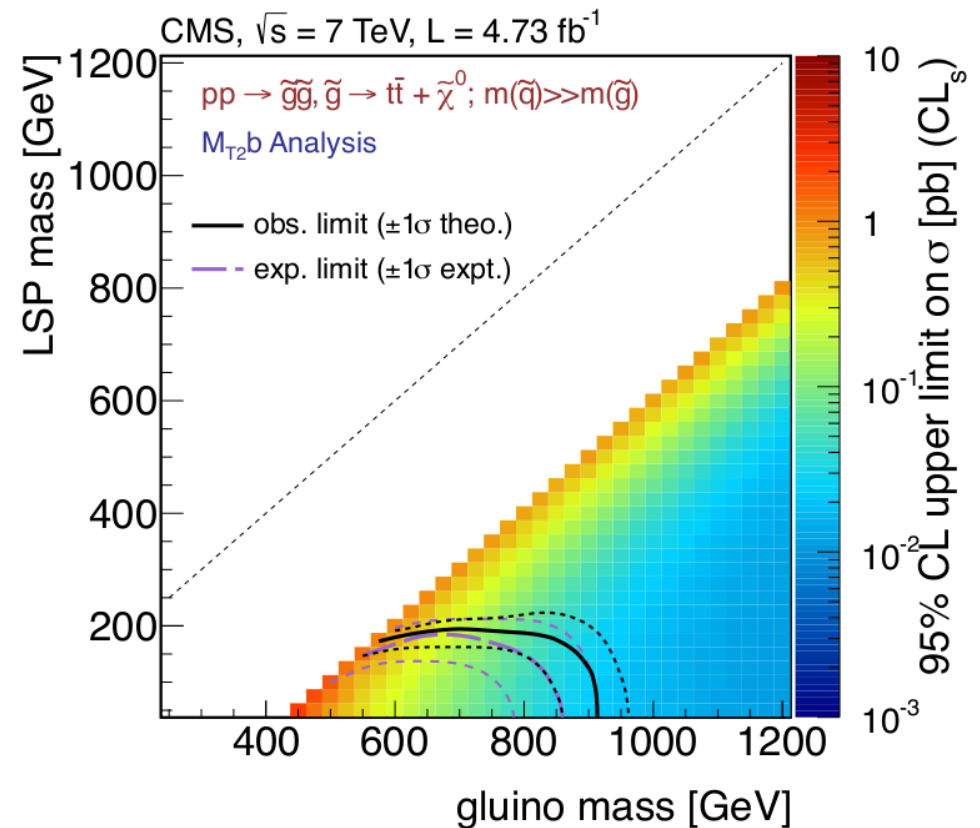
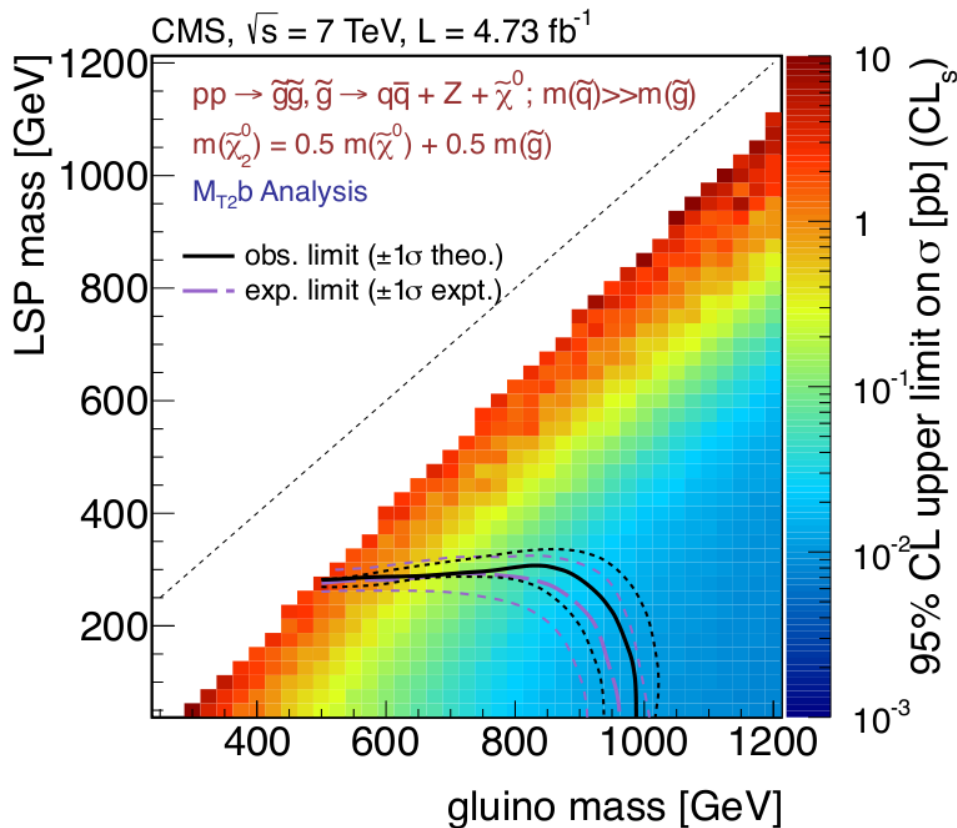


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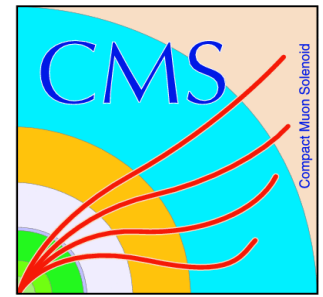
- We are not always doing our best, even before ISR becomes important



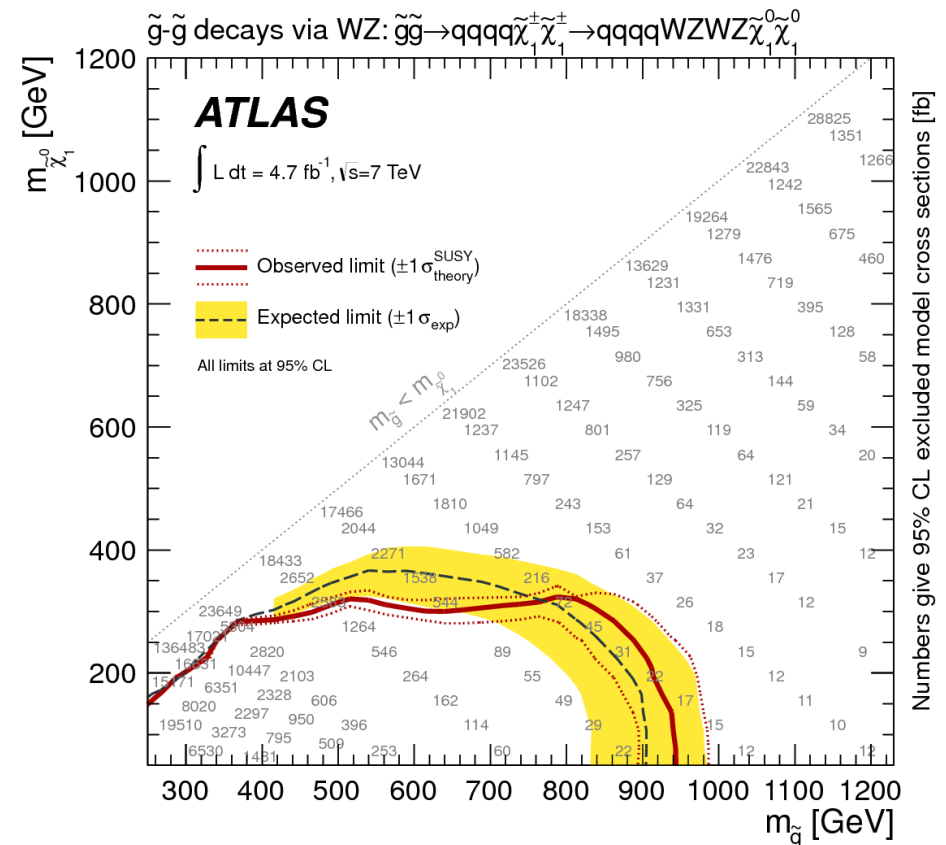
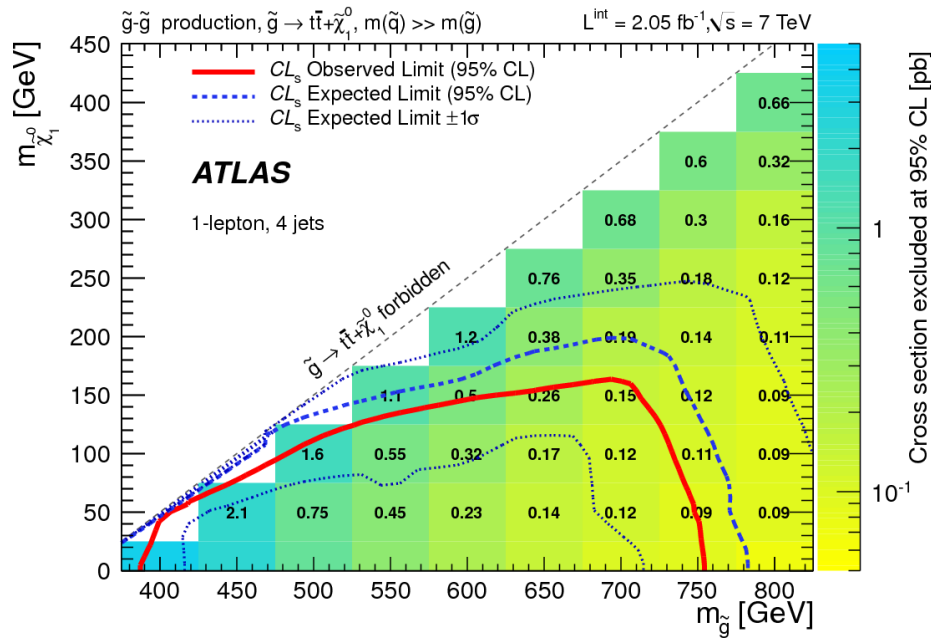


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IT IS SO TYPICAL

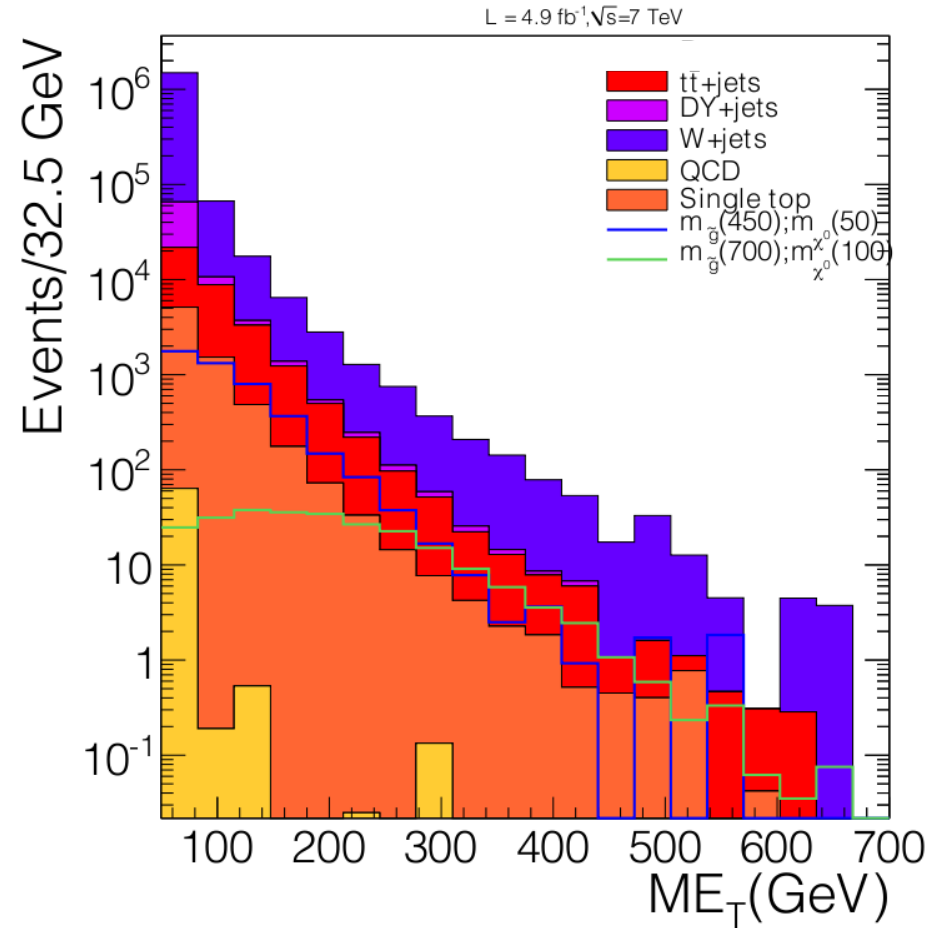
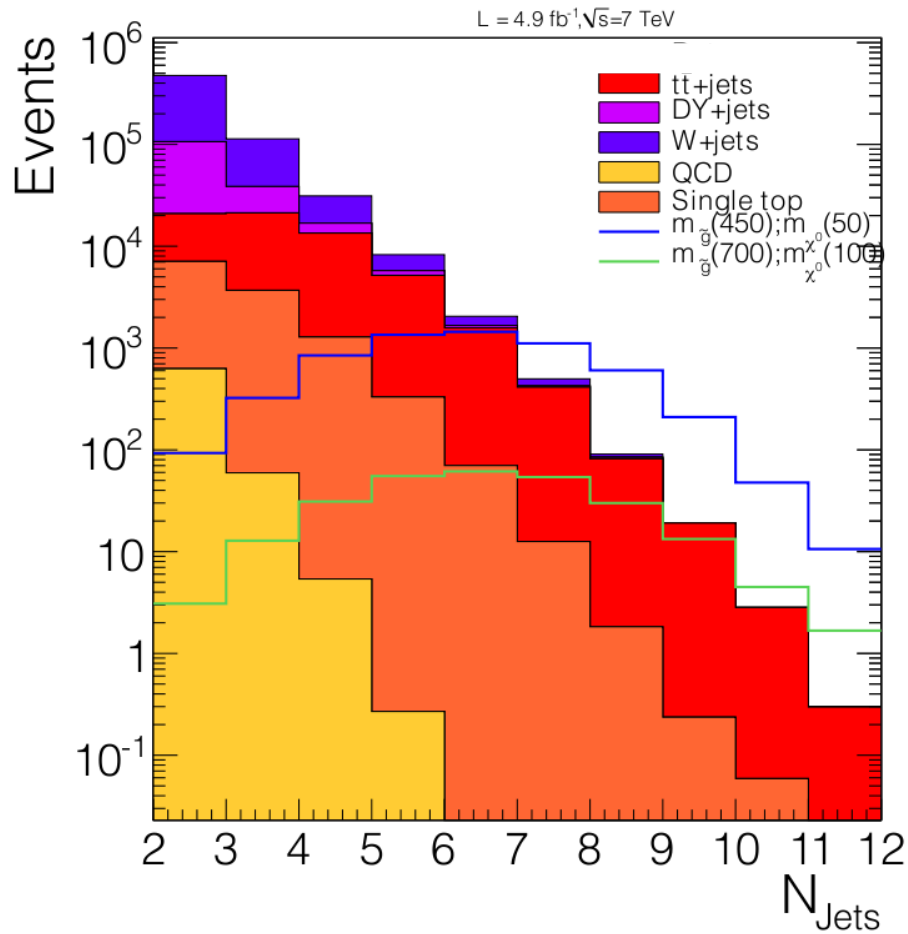
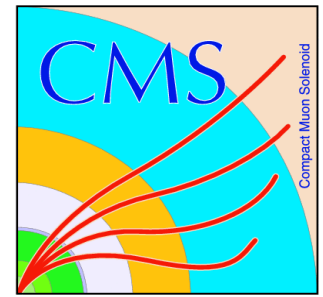


- We are not always doing our best, even before ISR becomes important





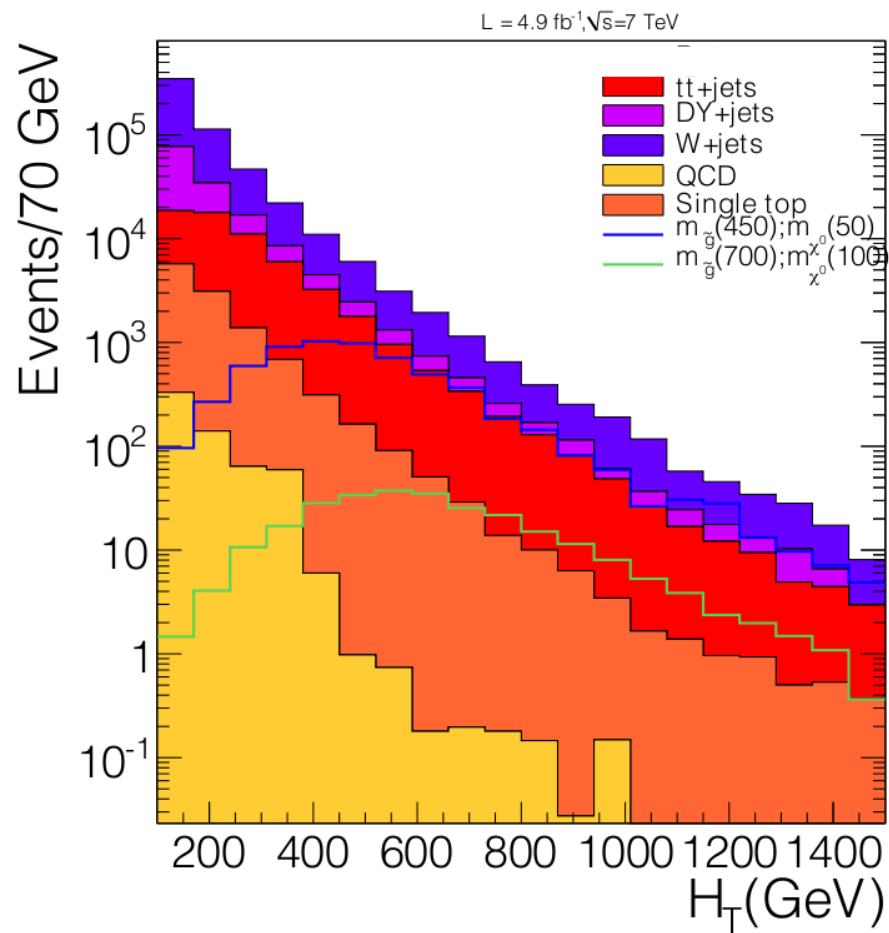
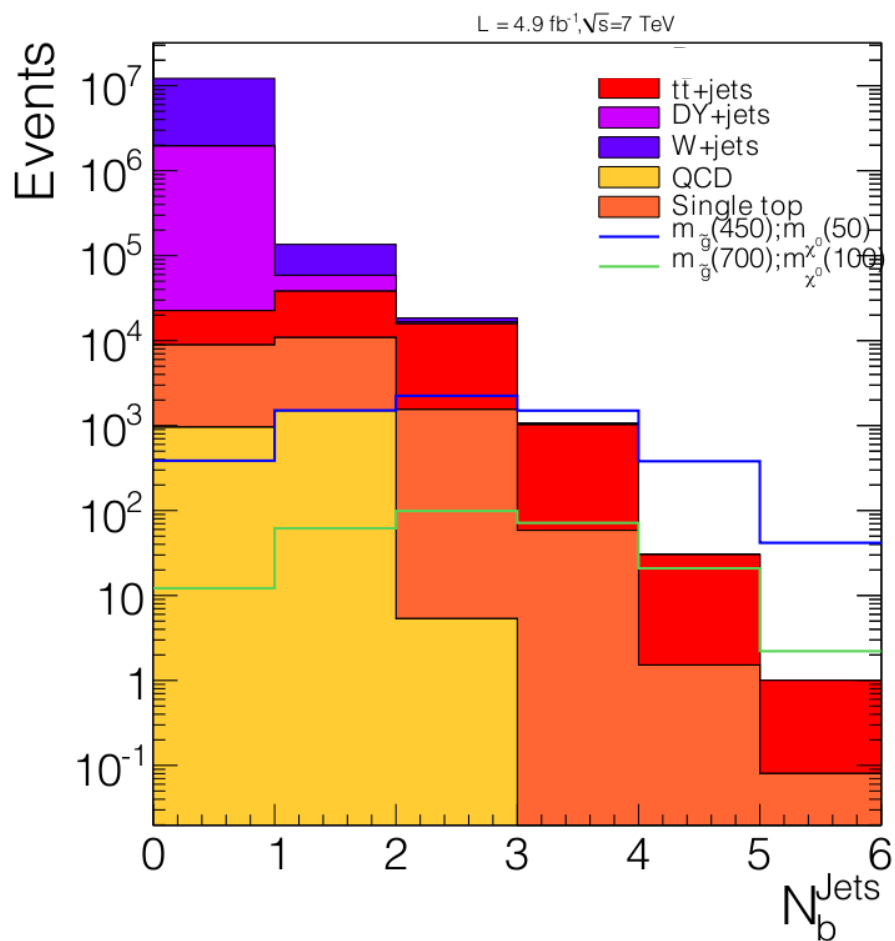
ONE HANDLE





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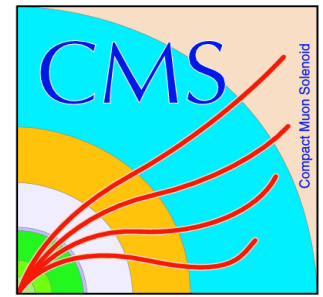
TWO HANDLES





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IN THE MATRIX



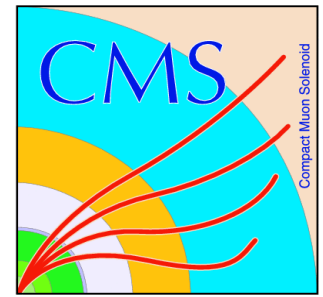
3 leptons					
2 leptons			WHY NOT		
1 lepton			IN PROGRESS		
0 lepton			NEED EXTRA DISCRIMINATION (b-tagging)		
	5 jets	6 jets	7 jets	8 jets	≥ 9 jets

(N_l, N_j, N_b)



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CAN IT WORK?



- Multi-jet background
 - Berends-Giele scaling + phenomenological correction from the Tevatron (essentially a fit to the data)
 - Prerequisite: separate W from Z from tt from QCD
 - Byproduct: first measurement of the scaling for tt
- Multi-b background
 - Assume MC has the p_T and η of the jets (almost) right
 - Correct MC for efficiencies measured on data (p_T -rel template fit)



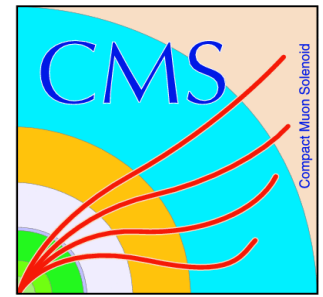
MY VIEW OF THE FUTURE





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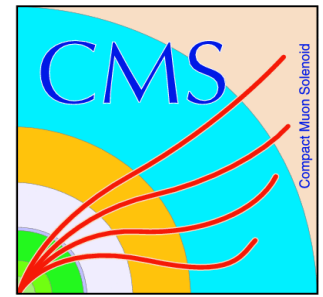


- Theory input
 - Dedicated searches to pursue outside of the grid
 - New dimensions for the grid
 - Simplified understanding of classes of models



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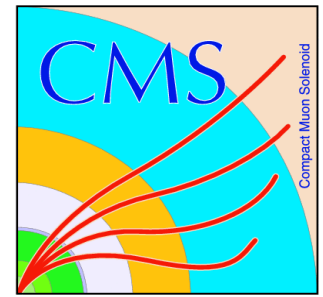


- Theory input
 - Dedicated searches to pursue outside of the grid
 - New dimensions for the grid
 - Simplified understanding of classes of models
- Experimental output
 - New physics discovery

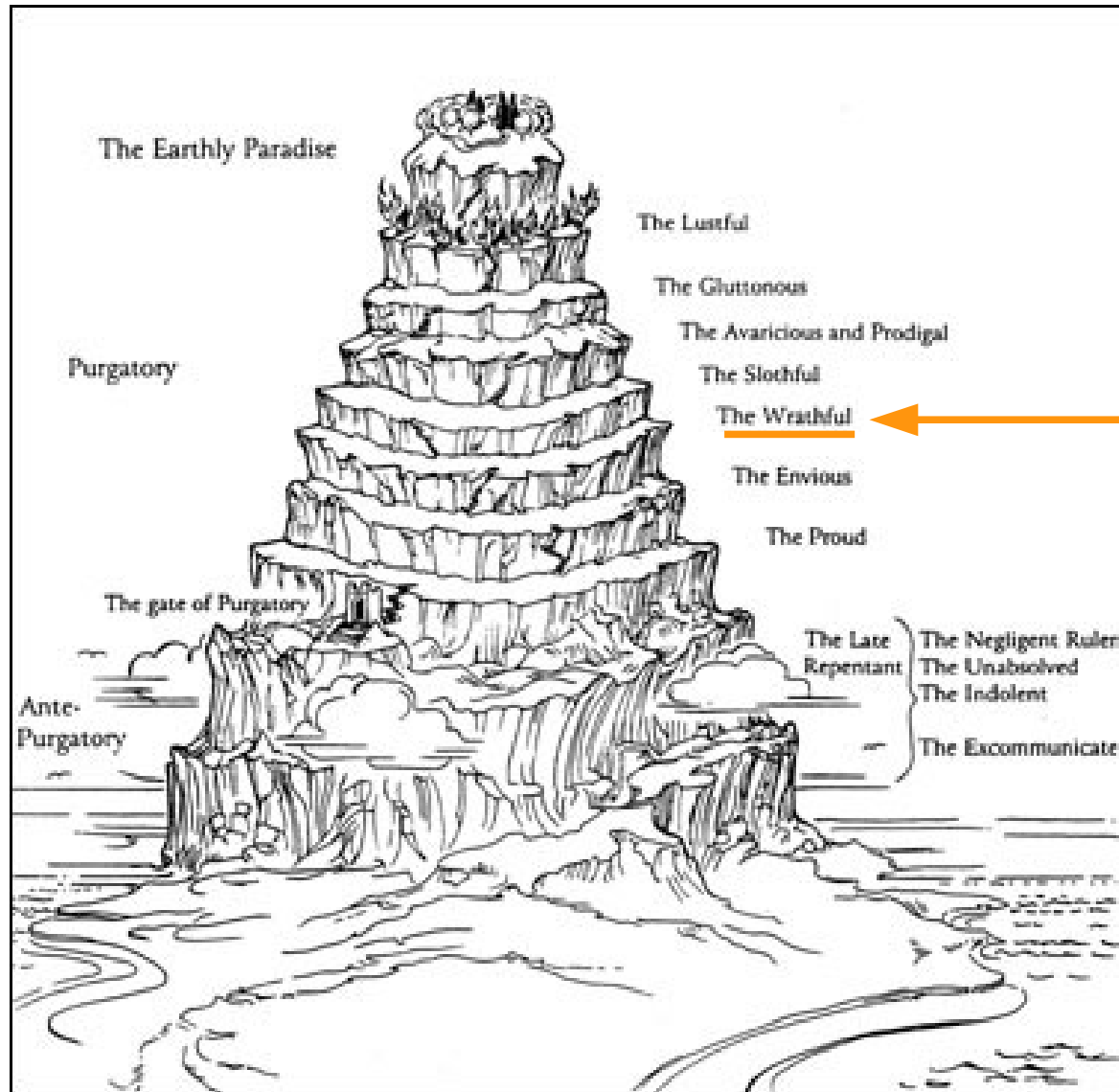


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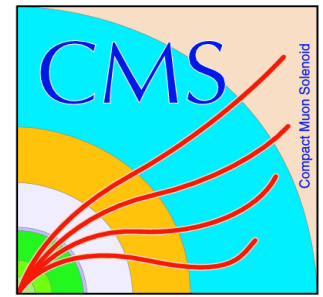
- Theory input
 - Dedicated searches to pursue outside of the grid
 - New dimensions for the grid
 - Simplified understanding of classes of models
- Experimental output
 - N_{bkg} , σ_{bkg} , N_{data} (for each point in the grid) + **public simulation**
 - Likelihood (where doable)





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THE PURGATORY

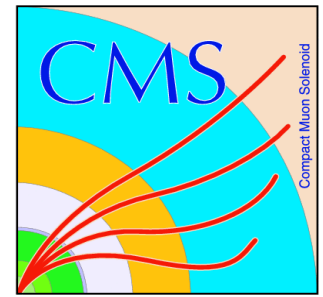


- Theory input
 - Dedicated searches to pursue outside of the grid
 - Ok : stops, long lived, ...
 - New “dimensions” for the grid
 - Ok : α_T , jet substructure, ...
 - Simplified understanding of classes of models
 - Done for vanilla SUSY, but missing RPV, long lived and heavy colored objects travelling inside the detector



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THE PURGATORY



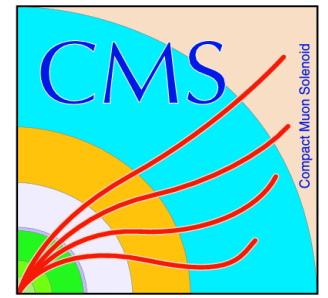
- Experimental output

- N_{bkg} , σ_{bkg} , N_{data} (for each point in the grid) + **public simulation**
 - Strong opposition inside the collaborations
 - Next-to-ideal: fill the grid (not even analyses, just counting experiments) and give detector to generator curves → Razor example
- Likelihood (where doable)
 - “I'd be dead before [LHC experiment] releases a likelihood”. Anonymous



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CONCLUSIONS

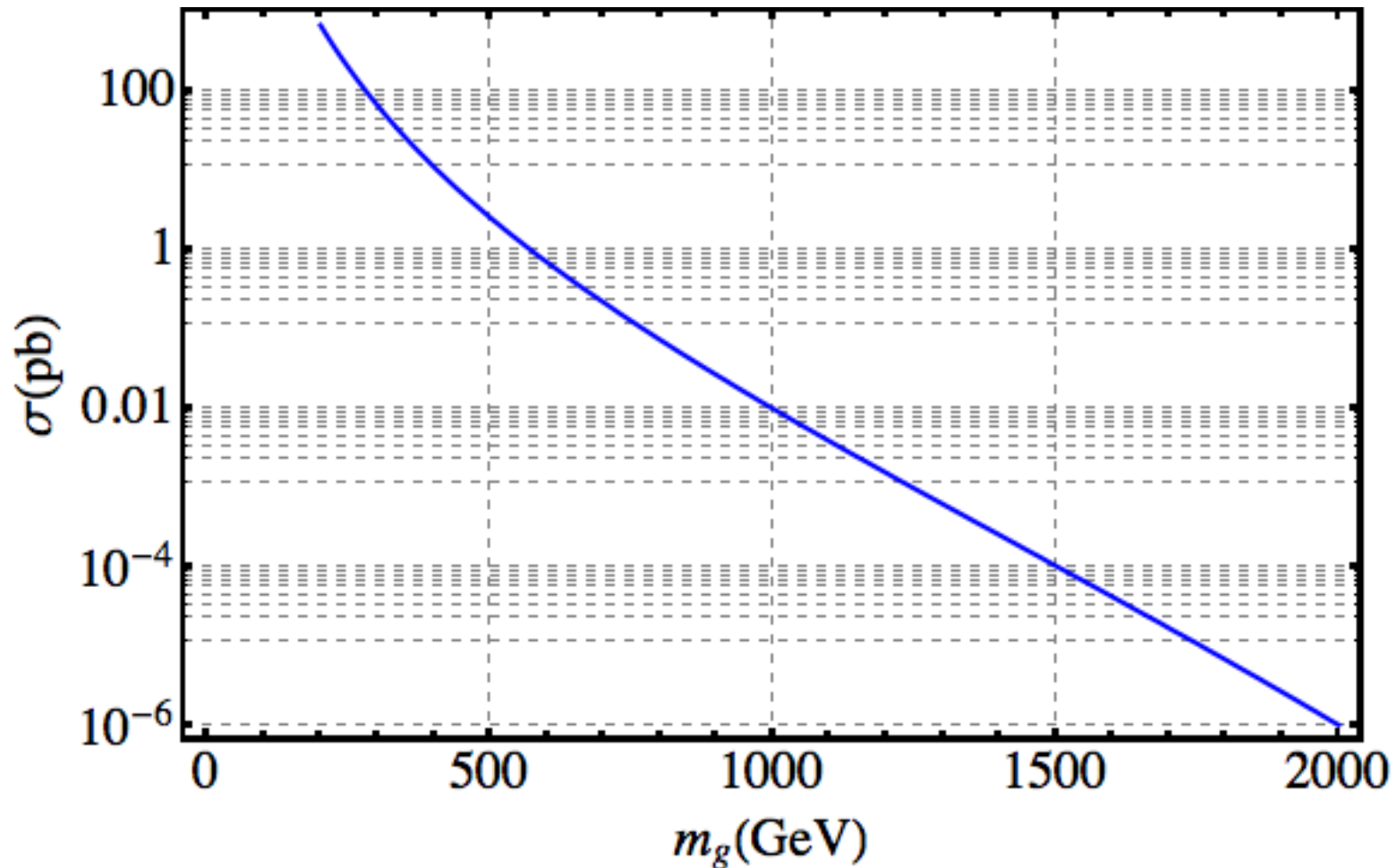
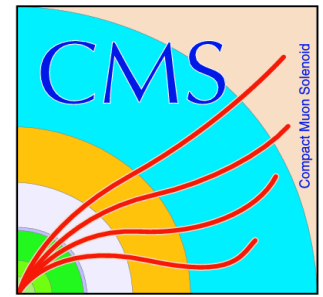


- There is a blind spot in our searches, but no fundamental obstacles (i.e. trigger) in front of us.
- In terms of discovery potential we are doing a great job, also thanks to cross feedback between theorists and experimentalists, but ...
- The future can be a much better place.



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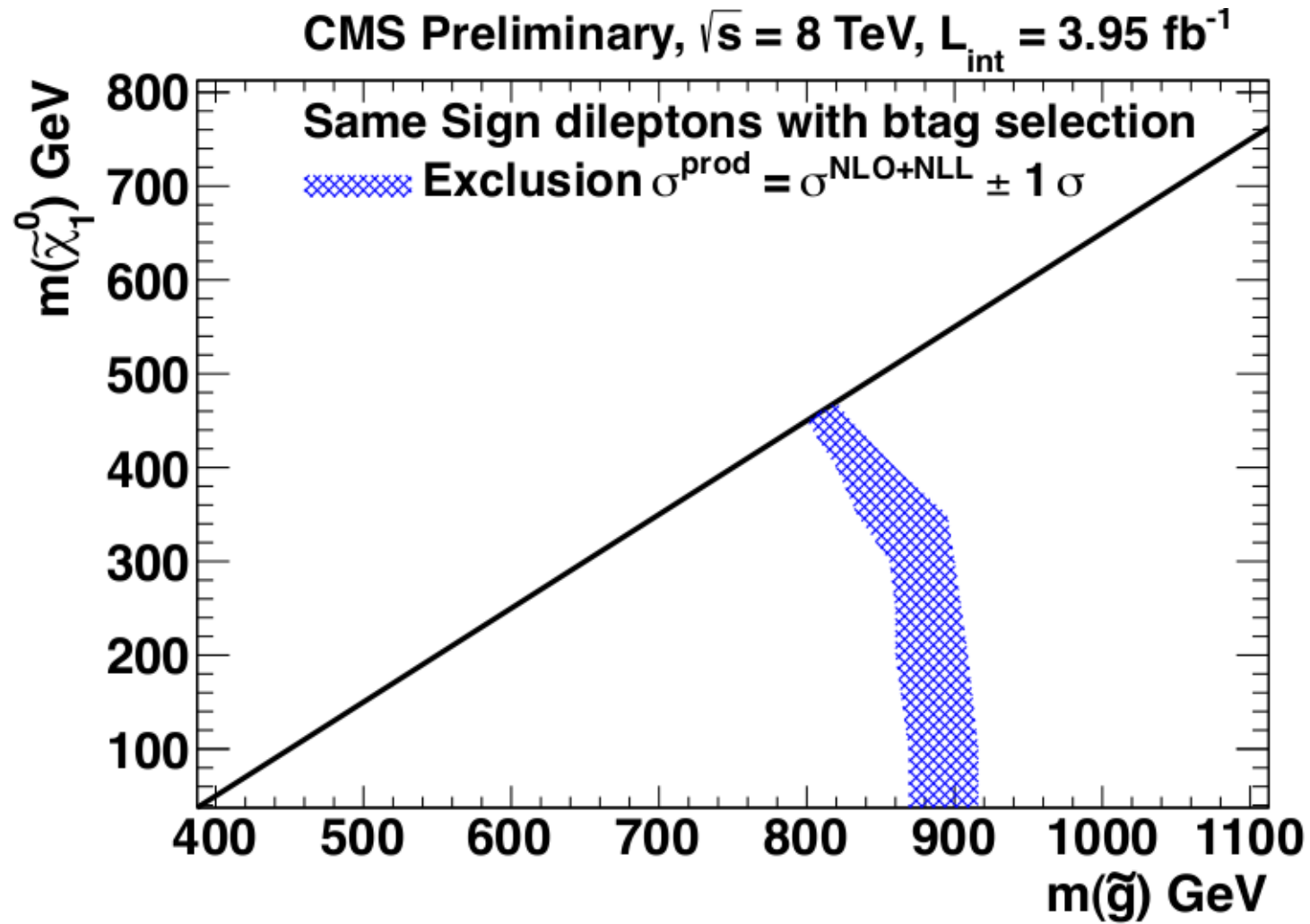
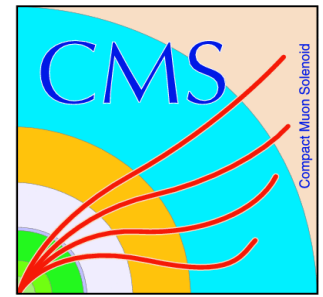
GLUINO 7 TeV





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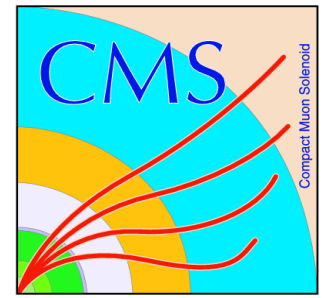
SS DILEPTONS+b





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SRs FOR THE EXAMPLE ANALYSES



CMS MT2

$$750 \leq H_T < 950$$

$$M_{T2} [0, \infty]$$

$$M_{T2} [150, 200]$$

$$M_{T2} [200, 275]$$

$$M_{T2} [275, 375]$$

$$M_{T2} [375, 500]$$

$$M_{T2} [500, \infty]$$

$$H_T \geq 950$$

$$M_{T2} [0, \infty]$$

$$M_{T2} [150, 200]$$

$$M_{T2} [200, 275]$$

$$M_{T2} [275, 375]$$

$$M_{T2} [375, 500]$$

$$M_{T2} [500, \infty]$$

ATLAS 1-2lepton

	3-jet	single-lepton 4-jet	soft-lepton	multi-lepton 2-jet	4-jet
Trigger	Single electron or muon (+jet)		Missing E_T	Single electron or muon (+jet)	
N_{lep}	1	1	1	≥ 2	≥ 2
p_T^ℓ (GeV)	> 25 (20)	> 25 (20)	7 to 25 (6 to 20)	25 (20)	25 (20)
$p_T^{\ell 2}$ (GeV)	< 10	< 10	< 7 (6)	> 10	> 10
N_{jet}	≥ 3	≥ 4	≥ 2	≥ 2	≥ 4
p_T^{jet} (GeV)	$> 100, 25, 25$	$> 80, 80, 80, 80$	$> 130, 25$	$> 200, 200$	$> 50, 50, 50, 50$
$p_T^{add.jet}$ (GeV)	< 80	—	—	< 50	—
E_T^{miss} (GeV)	> 250	> 250	> 250	> 300	> 100
m_T (GeV)	> 100	> 100	> 100	—	—
E_T^{miss}/m_{eff}	> 0.3	> 0.2	> 0.3	—	0.2
m_{eff}^{inc} (GeV)	> 1200	> 800	—	—	> 650

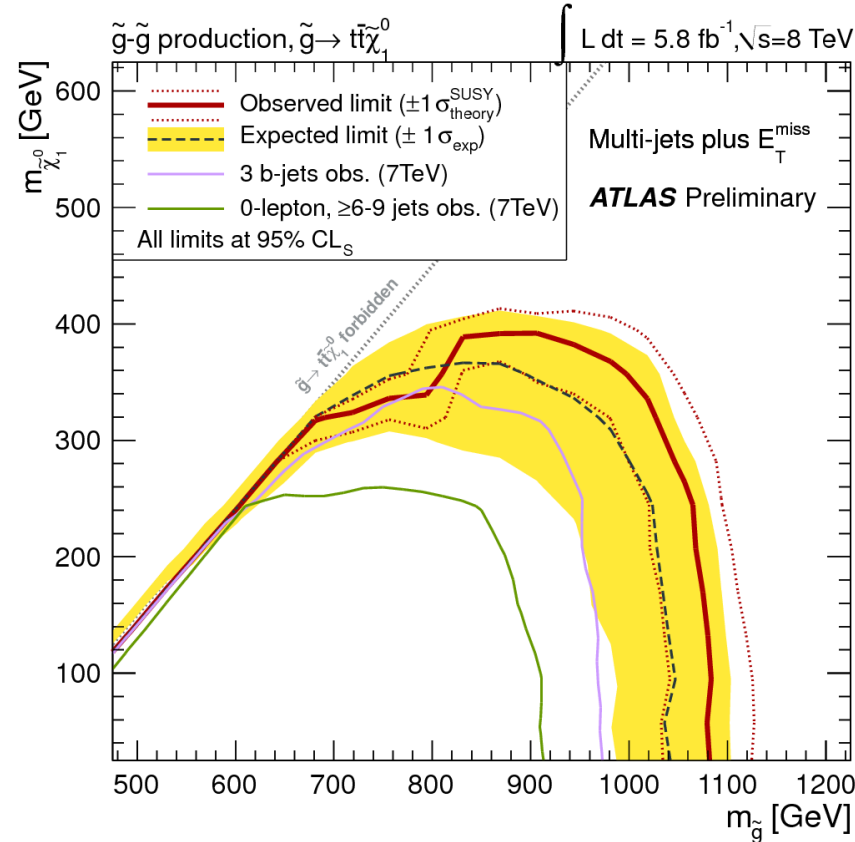
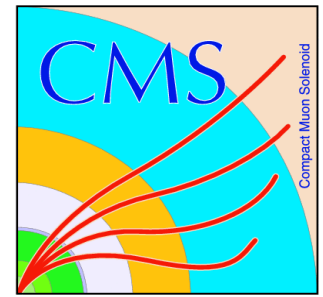
ATLAS 1lepton+4jets

Pre-selection	Signal Region name	Selection
no leptons, at least three jets, $p_T(j1) > 130$ GeV, $p_T(j2, j3) > 50$ GeV, $E_T^{miss} > 130$ GeV, $E_T^{miss}/m_{eff} > 0.25$, $\Delta\phi_{min} > 0.4$	SR0-A1	at least one b -tag, $m_{eff} > 500$ GeV
	SR0-B1	at least one b -tag, $m_{eff} > 700$ GeV
	SR0-C1	at least one b -tag, $m_{eff} > 900$ GeV
	SR0-A2	at least two b -tags, $m_{eff} > 500$ GeV
	SR0-B2	at least two b -tags, $m_{eff} > 700$ GeV
	SR0-C2	at least two b -tags, $m_{eff} > 900$ GeV
one lepton, at least four jets $p_T(j1) > 60$ GeV, $p_T(j2, j3, j4) > 50$ GeV, $E_T^{miss} > 80$ GeV, $m_T > 100$ GeV, at least one b -tag	SR1-D	$m_{eff} > 700$ GeV
	SR1-E	$m_{eff} > 700$ GeV, $E_T^{miss} > 200$ GeV



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ATLAS MULTIJET



Signal region	7j55	8j55	9j55	6j80	7j80	8j80
Number of isolated leptons (e, μ)	= 0					
Jet p_T	> 55 GeV			> 80 GeV		
Jet $ \eta $	< 2.8					
Number of jets	≥ 7	≥ 8	≥ 9	≥ 6	≥ 7	≥ 8
$E_T^{\text{miss}} / \sqrt{H_T}$	> 4 $\text{GeV}^{1/2}$					