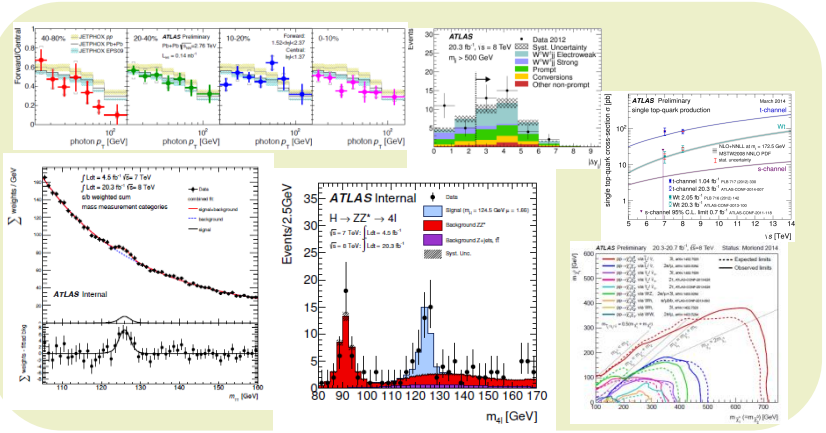
ATLAS Status Report

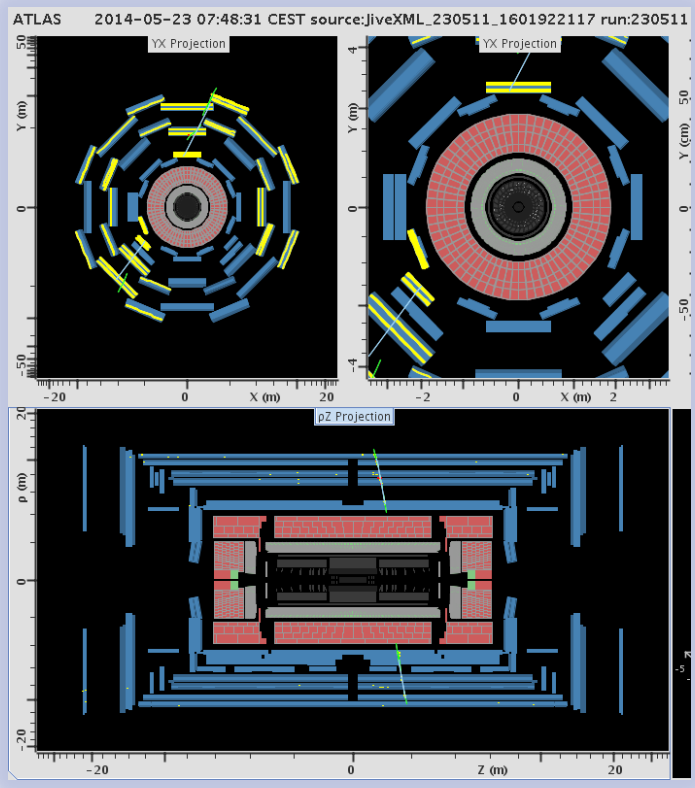
118th OPEN LHCC Session, 4th of June 2014

Monica D'Onofrio (University of Liverpool)

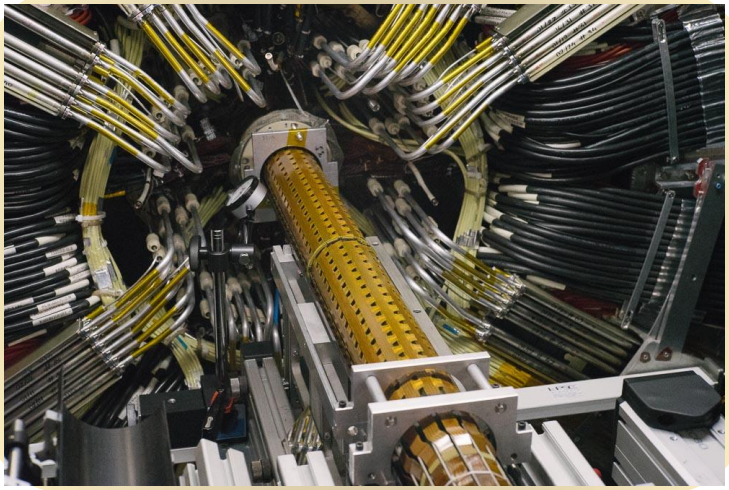
On behalf of the ATLAS Collaboration



Physics Highlights: many new results!



Milestone Week 3: cosmics in ATLAS!



IBL Insertion and ID cooling tests

Recent Physics Highlights

Papers since last LHCC meetings

- Finalizing Run 1 data analysis (7 and 8 TeV)

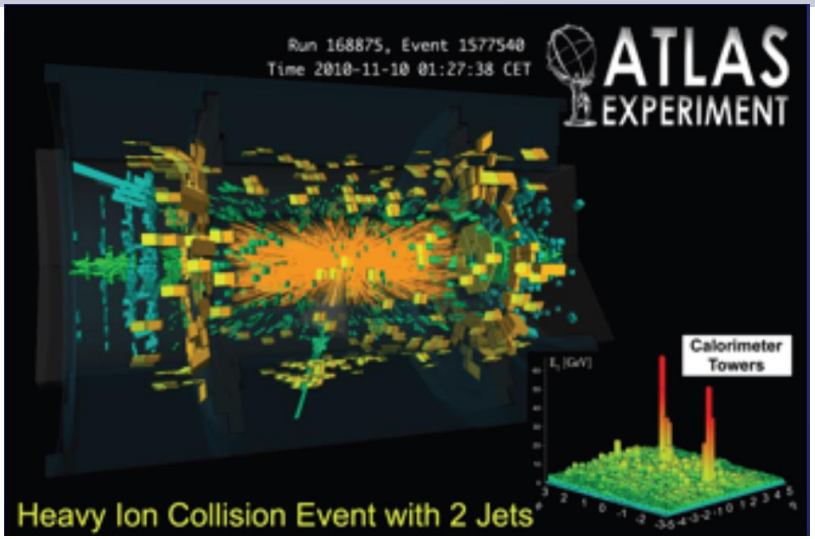
Since the last LHCC meeting:
- **25 new papers**
- **27 CONF notes**

	Measurement of the underlying event in jet events from 7 TeV proton-proton collisions with the ATLAS detector	EPJC
	Jet energy measurement and its systematic uncertainty in proton-proton collisions at $\sqrt{s}$ = 7 TeV with the ATLAS detector	EPJC
★	Search for squarks and gluinos with the ATLAS detector in final states with jets and missing transverse momentum using 20.3 fb−1 of $\sqrt{s}$=8 TeV proton-proton collision data	JHEP
	Light-quark and gluon jet discrimination in pp collisions at $\sqrt{s}$ =7 TeV with the ATLAS detector	PRD
★	Evidence of electroweak production of WWjj in pp collisions at sqrs{s}=8 TeV with the ATLAS detector	PRL
★	Search for supersymmetry in events with four or more leptons in $\sqrt{s}$ = 8 TeV pp collisions with the ATLAS detector	PRD
★	Search for microscopic black holes and string balls in final states with leptons and jets with the ATLAS detector at $\sqrt{s}$ = 8 TeV	JHEP
★	Search for High-Mass Dilepton Resonances in pp Collisions at $\sqrt{s}$ = 8 TeV with the ATLAS Detector	PRD
	Measurement of the centrality and pseudorapidity dependence of the integrated elliptic flow in lead-lead collisions at $\sqrt{s_{NN}}$ = 2.76 TeV with the ATLAS detector	EPJC
	The monitoring and data quality assessment of the ATLAS liquid argon calorimeter	JINST
	Operation and Performance of the ATLAS Semiconductor Tracker	JINST
★	Measurement of chi_c1 and chi_c2 production with $\sqrt{s}$ = 7 TeV pp collisions at ATLAS	JHEP
★	Observation of Boosted Z-→bb Production in Proton-Proton Collisions at $\sqrt{s}$ = 8 TeV and Measurement of the Production Cross-Section	PLB
	Muon Reconstruction Efficiency and Momentum Resolution of the ATLAS Experiment in Proton-Proton Collisions at $\sqrt{s}$ = 7 TeV in 2010	EPJC
★	Search for supersymmetry at $\sqrt{s}$ = 8 TeV in final states with jets and two same-sign leptons or three leptons with the ATLAS detector	JHEP
	Electron reconstruction and identification efficiency measurements with the ATLAS detector using the 2011 LHC proton-proton collision data	EPJC
	Measurement of the low mass Drell-Yan differential cross section at $\sqrt{s}$ = 7 TeV using the ATLAS detector	JHEP
	Measurement of the parity violating asymmetry parameter α_b and the helicity amplitudes for the decay ΛB → J/ψ Λ0 with the ATLAS detector	PRD
★	Search for dark Matter in events with single Z and missing transverse Energy using pp collisions at $\sqrt{s}$ = 8 TeV with the ATLAS detector	PRD
★	Search for top quark decays t→ qH with H→γγ using the ATLAS detector	JHEP
★	Searches for direct production of charginos, neutralinos and sleptons in final states with two leptons and missing transverse momentum in pp collisions at $\sqrt{s}$ = 8TeV with the ATLAS detector	JHEP
★	Measurement of the 4l Cross Section at the Z Resonance and Determination of the Branching Fraction of Z→4l in pp Collisions at $\sqrt{s}$ = 7 and 8 TeV with ATLAS	PRL
★	Search for direct stop pair production in events with a Z boson, b-jets and missing transverse energy with the ATLAS detector using 21 fb^{-1} from proton-proton collision at $\sqrt{s}$ =8 TeV	EPJC
★	Search for direct top squark pair production in final states with two leptons in $\sqrt{s}$ = 8 TeV pp collisions with the ATLAS detector	JHEP
	Measurement of event-plane correlations in $\sqrt{s_{NN}}$ = 2.76 TeV lead-lead collisions with the ATLAS detector	PRC

★ Paper shown in this talk
★ Paper in back-up

Heavy Ions

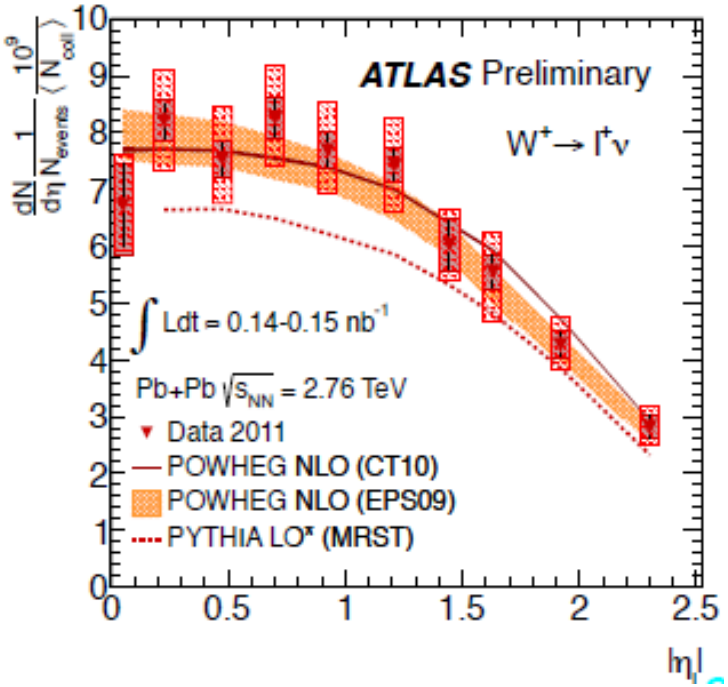
- 10 new results released since last LHCC meeting!
  - Cover a variety of topics aiming to study quark gluon plasma using soft and hard probes (in p-Pb and Pb-Pb)
  - Presented at QuarkMatter 2014 Conference



May 2014

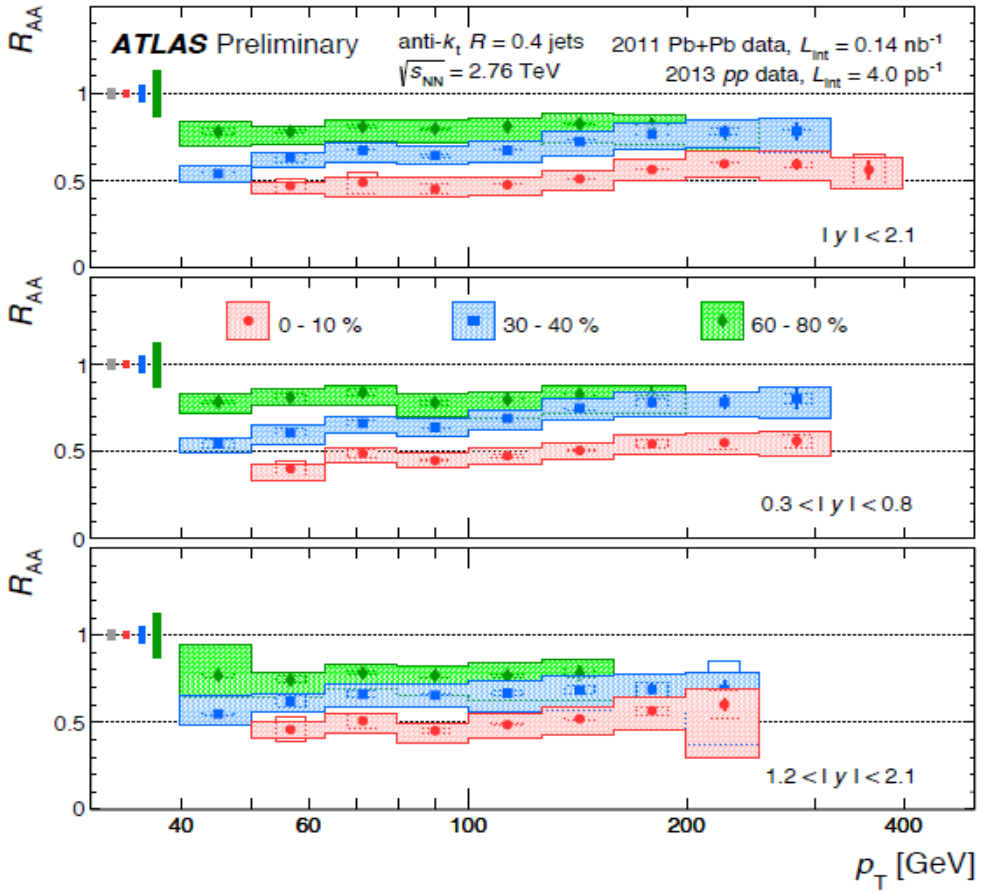
Charged hadron production in *p*+Pb collisions at $\sqrt{s_{NN}}$=~5.02~TeV measured at high transverse momentum	ATLAS-CONF-2014-029
Measurement of the production of neighbouring jets in lead-lead collisions at $\sqrt{s_{NN}}$= 2.76 TeV	ATLAS-CONF-2014-028
Collective flow with higher-order cumulants in lead-lead collisions at $\sqrt{s_{NN}}$=2.76 TeV	ATLAS-CONF-2014-027
Centrality, rapidity and pT dependence of isolated prompt photon production in Pb-Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV	ATLAS-CONF-2014-026
Measurements of the nuclear modification factor for jets in Pb+Pb collisions at sqrt{NN}=2.76 TeV	ATLAS-CONF-2014-025
Centrality and rapidity dependence of inclusive jet production in $\sqrt{s_{NN}}$=~5.02~TeV proton–lead collisions	ATLAS-CONF-2014-024
Measurement of W boson production and lepton charge asymmetry in Pb+Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV	ATLAS-CONF-2014-023
Elucidating the event-shape fluctuations via flow correlations and jet tomography studies in 2.76 TeV Pb+Pb collisions	ATLAS-CONF-2014-022
Measurement of the long-range pseudorapidity correlations and associated Fourier harmonics in $\sqrt{s_{NN}}$=5.02 TeV proton-lead collisions	ATLAS-CONF-2014-021
Measurement of the Z-boson production in pPb collisions at $\sqrt{s_{NN}}$=5.02TeV	ATLAS-CONF-2014-020

HI highlights: Hard Probes and jets



EWK Boson measurements → additional way to study partonic energy loss in HI collisions *(standard candles)*.

- *E.g.: W (→e,μ)*



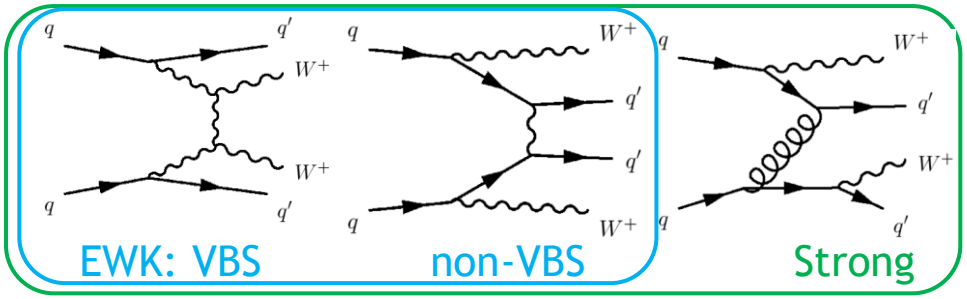
Jet production in p-p and Pb-Pb:

- Measure absolute jet suppression: **R_{AA}** *(=nuclear modification factor)* vs rapidity and in ranges of centrality
  - 0-10% Centr: **R_{AA}= 0.47 (0.56) for p_T = 55 (355) GeV** consistent with central-to-peripheral ratio

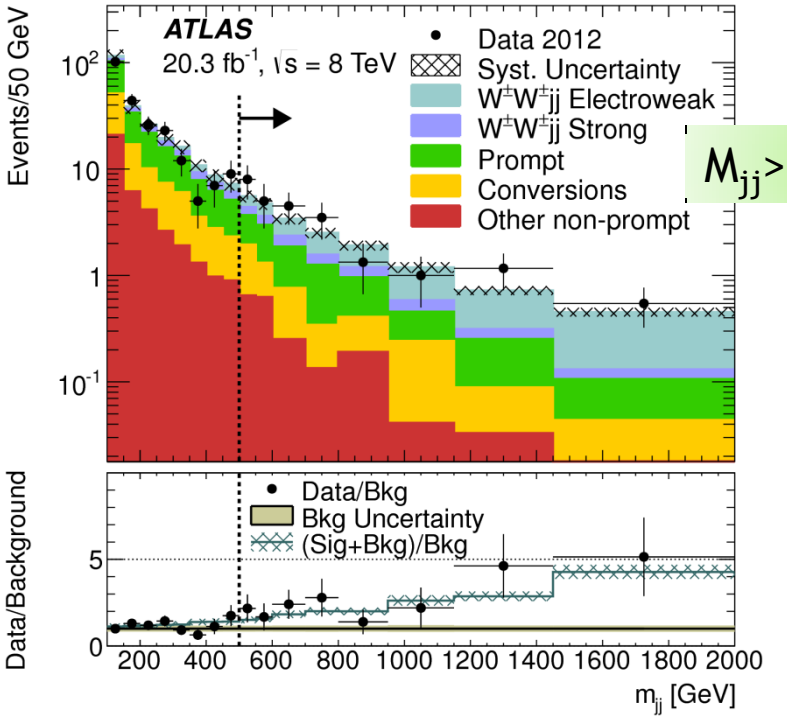
Evidence for Electroweak Production of $W^{\pm}W^{\pm}jj$

arXiv:1405.6241

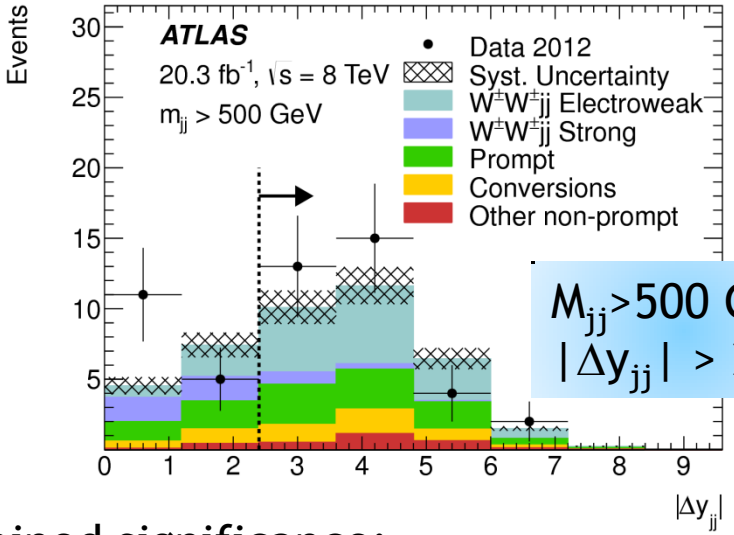
- Key process to probe the nature of EWK symmetry breaking
- Use 8 TeV full dataset in $e^{\pm}e^{\pm}$, $e^{\pm}\mu^{\pm}$, and $\mu^{\pm}\mu^{\pm}$ final state (+2jets)



'Inclusive' and 'VBS' fiducial regions



M_{jj}>500 GeV



M_{jj}>500 GeV
$|\Delta y_{jj}| > 2.4$

Combined significance:
4.5 (3.6) σ in the inclusive (VBS) region

Fiducial cross section in VBS region:

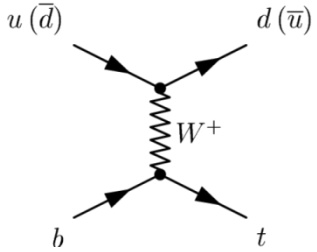
$$\sigma^{\text{fid}} = 1.3 \pm 0.4(\text{stat}) \pm 0.2(\text{syst}) \text{ fb}$$

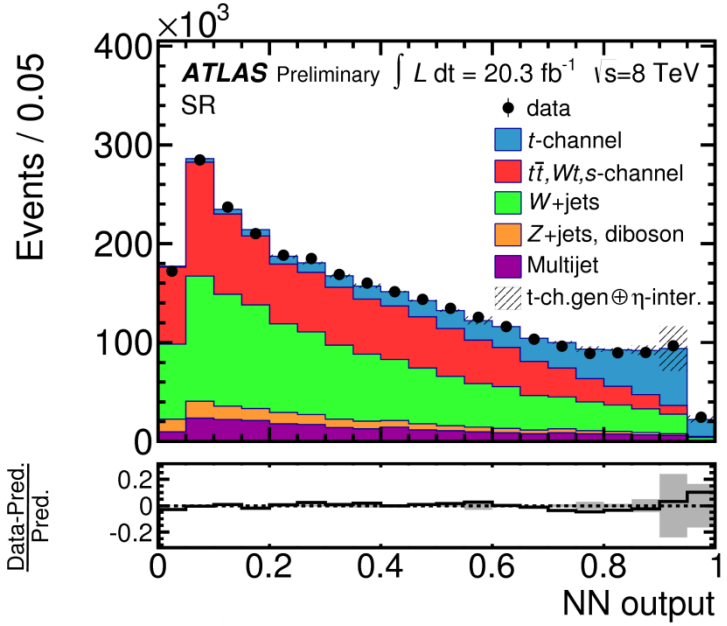
SM: 0.95 ± 0.06 fb

Set also limits on anomalous quartic gauge boson couplings (a4, a5)

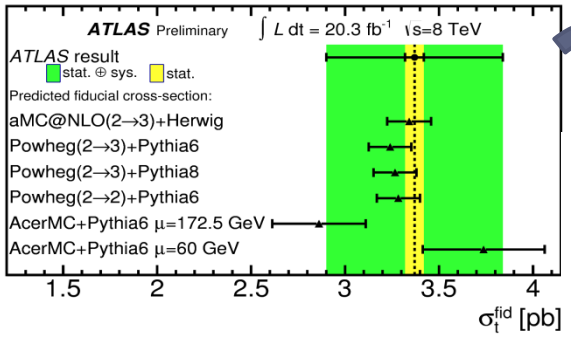
Top production

- **Single top t-channel** inclusive and fiducial cross section

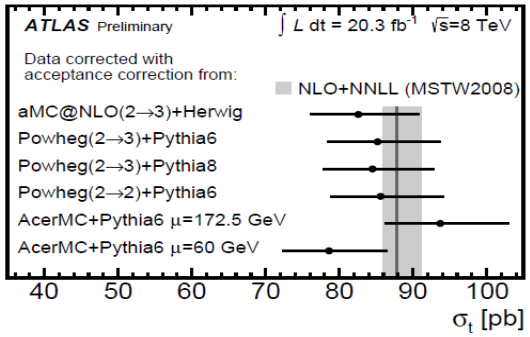




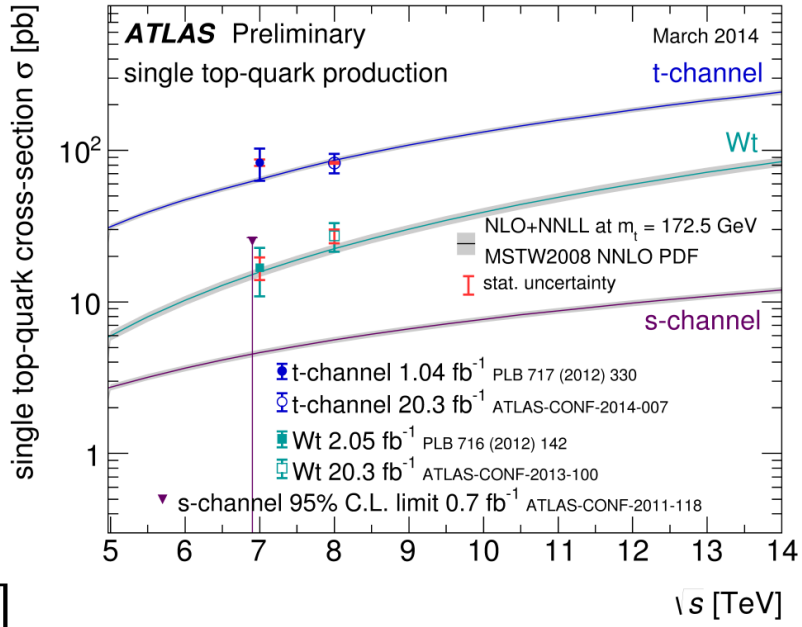
ATLAS-CONF-2014-007



Translate fiducial σ to total σ



Summary of single top production



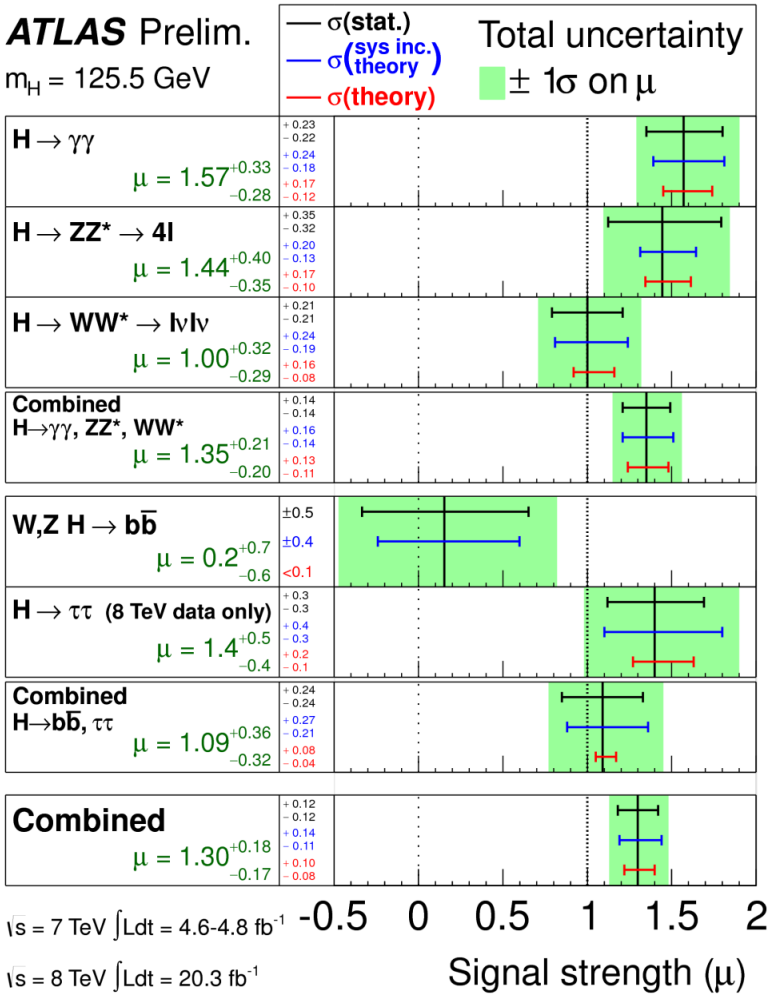
Also: arXiv:1403.6293

Search for FCNC top → Hq, H→ γγ
BR < 0.79% and limits on tqH (q=u,c) coupling

Higgs highlights

- Shortly after last LHCC meeting: update on **higgs couplings**
  - Inclusion of fermion results (H to ττ and VH, H → bb)

ATLAS-CONF-2014-009



Fermionic: $\mu^{bb,\tau\tau} = 1.09 \pm 0.24\,(\text{stat})\,^{+0.27}_{-0.21}\,(\text{sys})$

Total: $\mu = 1.30 \pm 0.12\,(\text{stat})\,^{+0.14}_{-0.11}\,(\text{sys})$.

Coupling fits assuming only SM

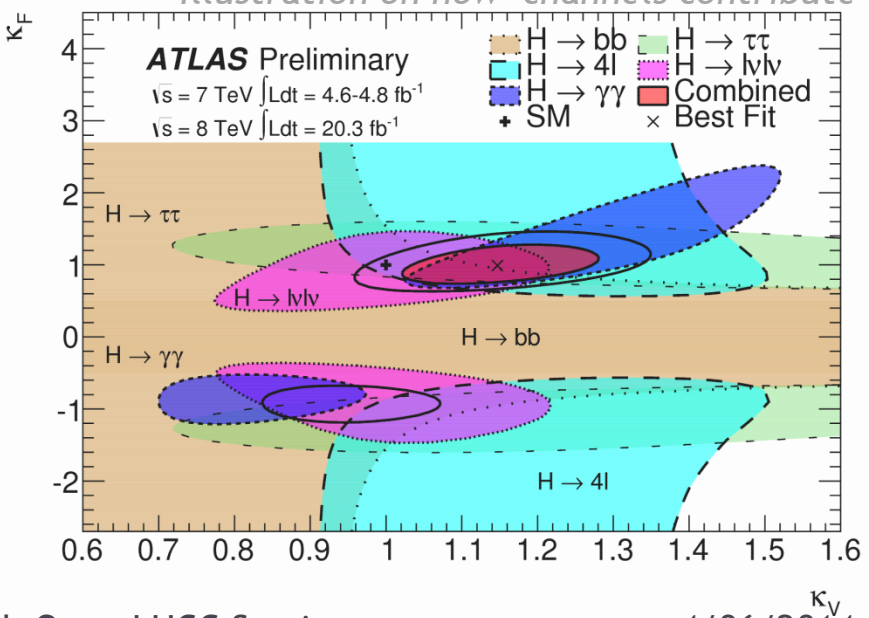
$\kappa_V = \kappa_W = \kappa_Z$

$\kappa_F = \kappa_t = \kappa_b = \kappa_\tau = \kappa_g$

$\kappa_V = 1.15 \pm 0.08$

$\kappa_F = 0.99^{+0.17}_{-0.15}$.

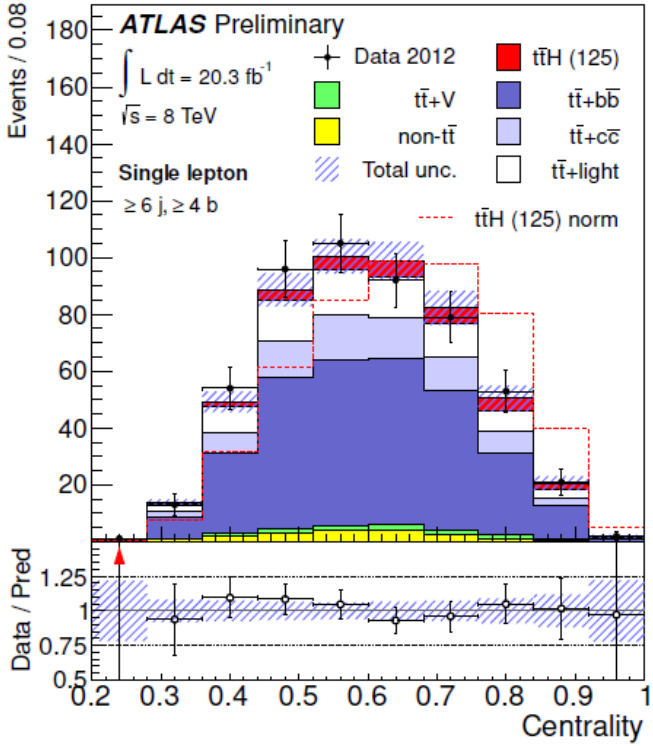
Illustration on how channels contribute



ttbar+Higgs

ATLAS-CONF-2014-011

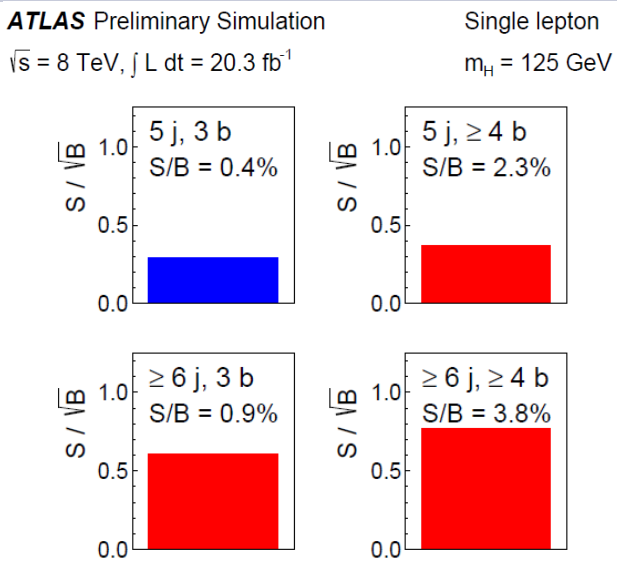
- Direct access to top-Higgs Yukawa coupling
- Consider H→bb: single and dilepton channels, categorized in N jets, N b-jets.
- Use Neural Network based on several discriminating variables



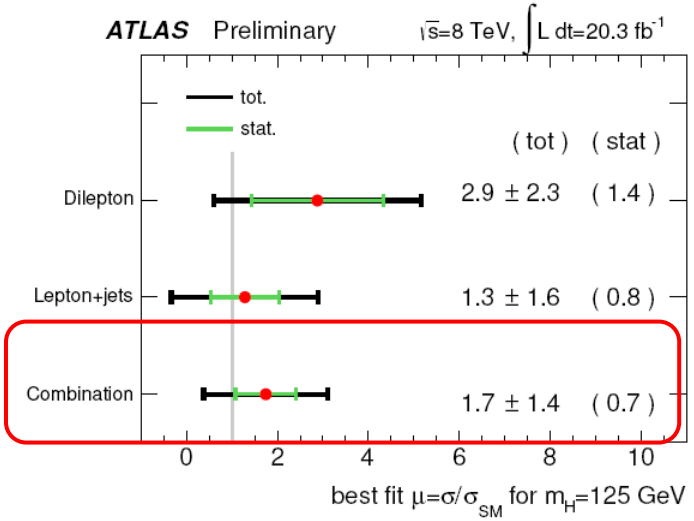
Centrality=Sum pT / Sum E (all jets and lepton)

E.g.: single lepton 6j, 4b

Constrain background in suitable Control Regions → help reducing systematic uncertainties



Signal strength assuming m_H=125 GeV



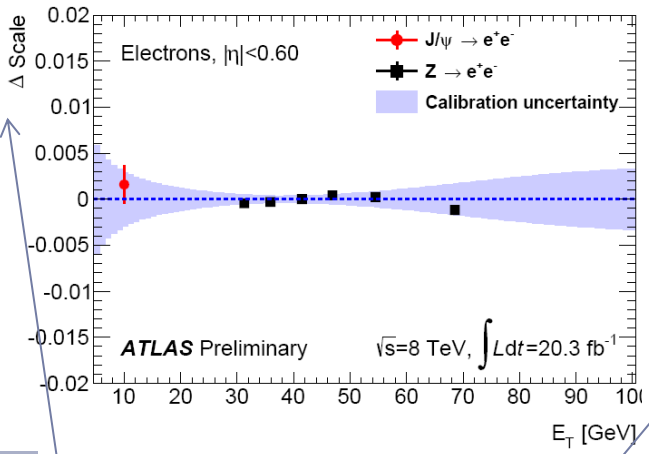
Improved measurement of Higgs boson mass

Last Mass measurement (July 2013)

Measurement limited by systematic uncertainties on e/γ energy scale

Channel	Mass value
$H \to \gamma\gamma$	126.8 ± 0.2 (stat) ± 0.7 (sys) GeV
$H \to 4l$	$124.3\ ^{+0.6}_{-0.5}$ (stat) $^{+0.5}_{-0.3}$ (sys) GeV
Combined	125.5 ± 0.2 (stat) $^{+0.5}_{-0.6}$ (sys) GeV

- Since then: **improvements in energy-scale calibrations for *e* , γ and μ**

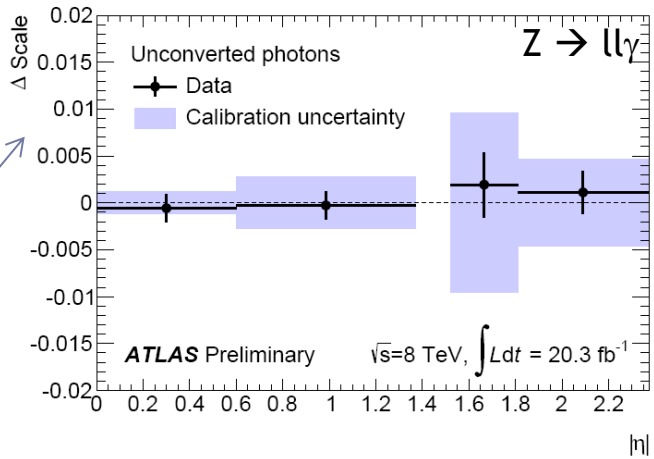


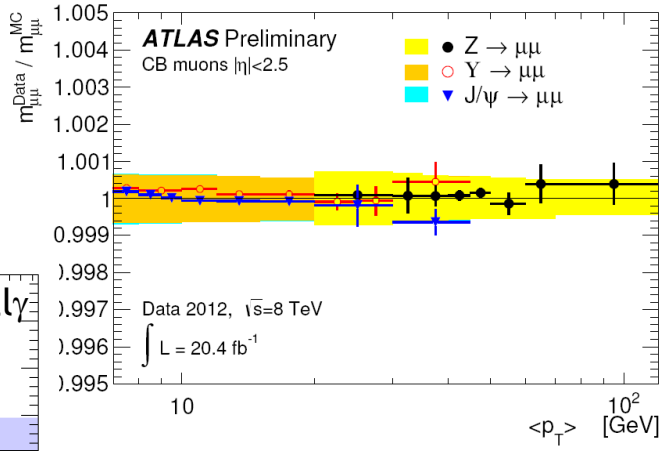
Comparison of measured and nominal scale

Ele/photon in 2012 data

6.6M Z to *ee* used to derive in-situ energy scales for *e* and γ

0.3M J/ψ to *ee* and 0.2M Z to llγ for cross checks





Muon in 2012 data:

9M Z to μμ, 6M J/ψ used to set the muon p scale and resolution.

5M Υ to μμ used to verify results and systematics

Total uncertainty on *e* energy scale: 0.03%-0.3% for E^e_T ~ 40 GeV

Total uncertainty on γ energy scale: 0.2%-0.6% for E^γ_T~ 60 GeV

Total uncertainty on μ: from 0.04% for η ~ 0 to 0.2% for |η| > 2.0

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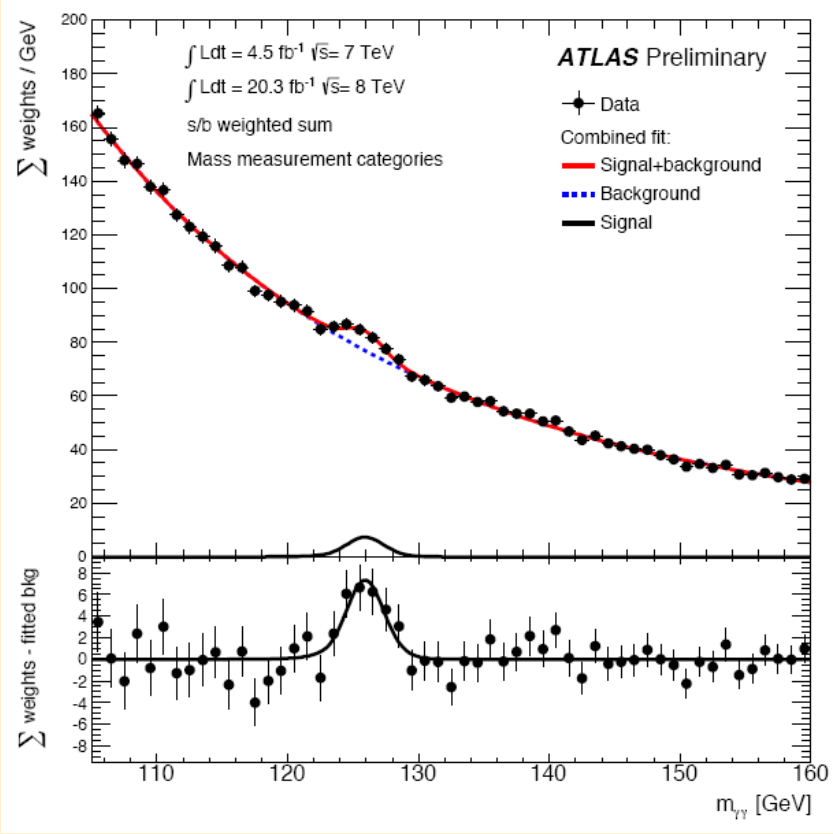
Mass measurement in H→ γγ

- Unbinned likelihood fit with mH as parameter of interest
- **10 mutually orthogonal categories** (converted/ unconverted γ, η of γ) with different S/B, optimized to minimize the expected uncertainty on the mass measurement
- Reduction by 10% of expected signal resolution
- Reduce systematics on $m_{\gamma\gamma}$ from **0.7 GeV** (Summer 2013) to **0.24 GeV** (now!)



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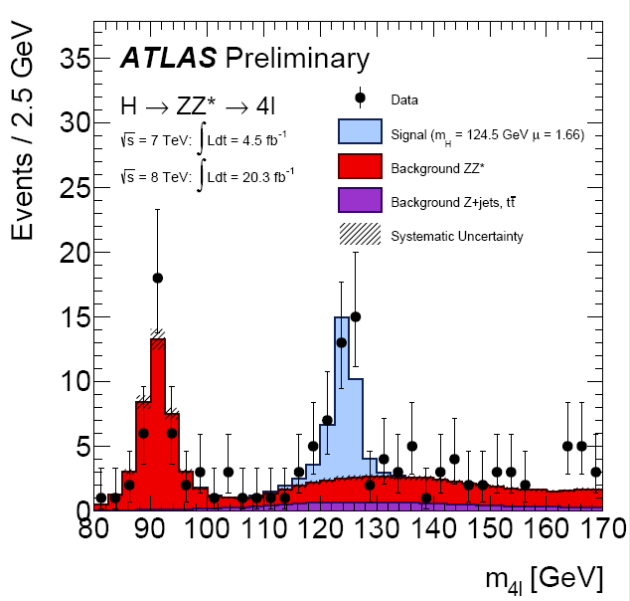
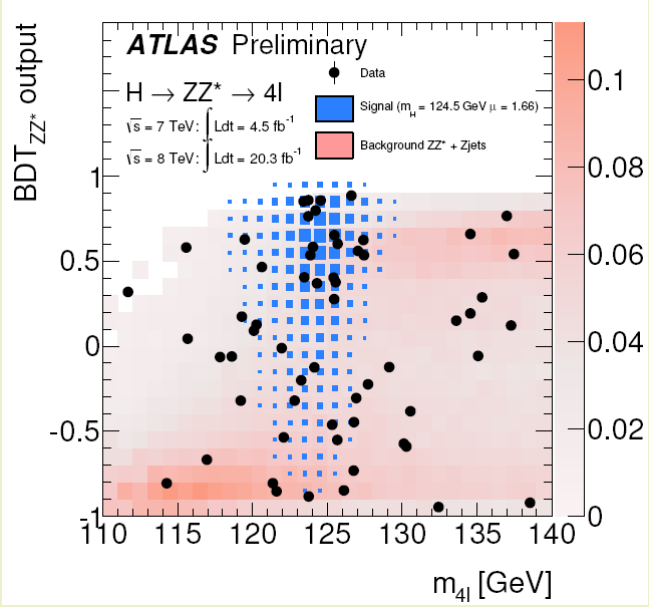
Mass measurement in H→4l

Factor of 2 to 10 reduction of uncertainties related to energy calibration

Improvements in analysis techniques

- Use new multivariate discriminant
- 2D fit (m4l,BDT) with 4 categories (4μ,4e,2μ2e,2e2μ)





Increase S/B

Reduction of the statistical uncertainties

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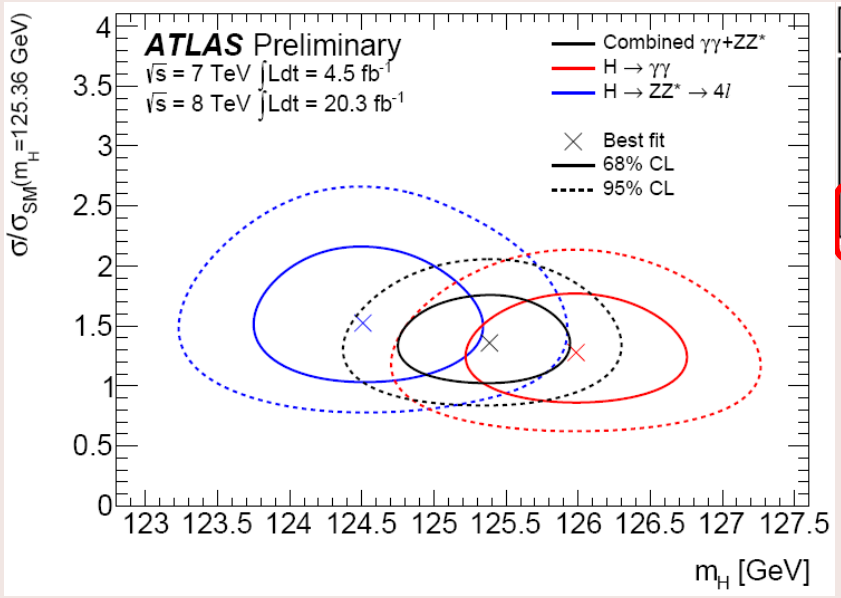
Combination

$$\Lambda(m_H) = \frac{L(m_H\,,\,\hat{\hat{\mu}}_{\gamma\gamma}(m_H)\,,\,\hat{\hat{\mu}}_{4\ell}(m_H)\,,\,\hat{\hat{\boldsymbol{\theta}}}(m_H))}{L(\hat{m}_H, \hat{\mu}_{\gamma\gamma}, \hat{\mu}_{4\ell}, \hat{\boldsymbol{\theta}})}$$

Use profile likelihood ratio defined in terms of m_H and treating $\mu_{\gamma\gamma}$ and μ_{4l} as independent nuisance parameters



Channel	Mass measurement (GeV)
$H \to \gamma\gamma$	$125.98 \pm 0.42\,(\text{stat}) \pm 0.28\,(\text{sys}) = 125.98 \pm 0.50$
$H \to ZZ^* \to 4\ell$	$124.51 \pm 0.52\,(\text{stat}) \pm 0.04\,(\text{sys}) = 124.51 \pm 0.52$
Combined	$125.36 \pm 0.37\,(\text{stat}) \pm 0.18\,(\text{sys}) = 125.36 \pm 0.41$

Considerable reduction of systematic uncertainties on individual measurements

$$\Delta m_H = 1.47 \pm 0.67\,(\text{stat}) \pm 0.28\,(\text{sys})\ \text{GeV} = 1.47 \pm 0.72\ \text{GeV}$$

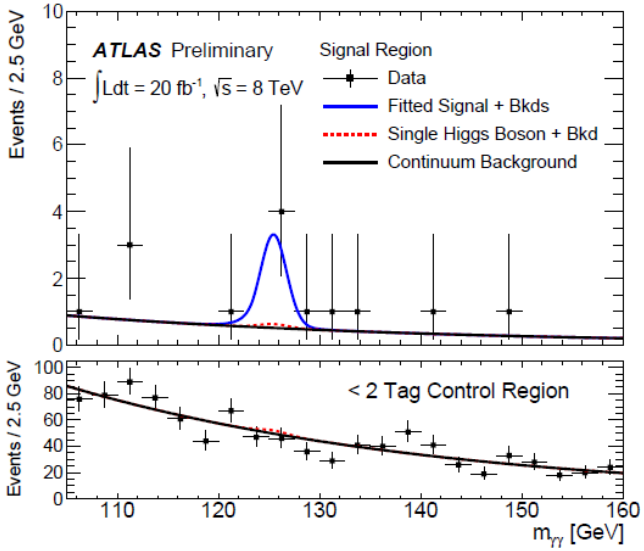
Compatibility: **2.0σ** (was 2.5σ) corresponding to a probability of 4.8%

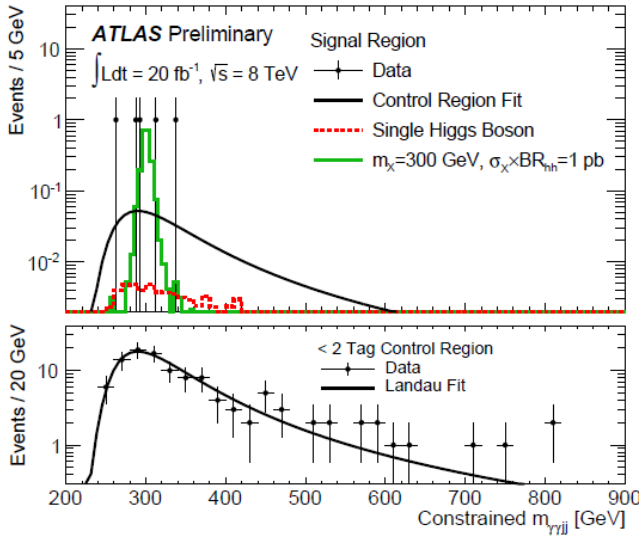
Shown at LHCP this week for first time; paper to be submitted shortly

Beyond SM Higgs searches

Shown at LHCP this week for first time; paper to be submitted shortly

- Search for resonant (X→hh) and non-resonant Higgs pair production **in γγbb**
  - X could be heavy Higgs in 2HD Models
  - Non resonant: **SM hh production** NLO xsect = 9.22 fb (includes interference between trilinear Higgs couplings and box diagrams)

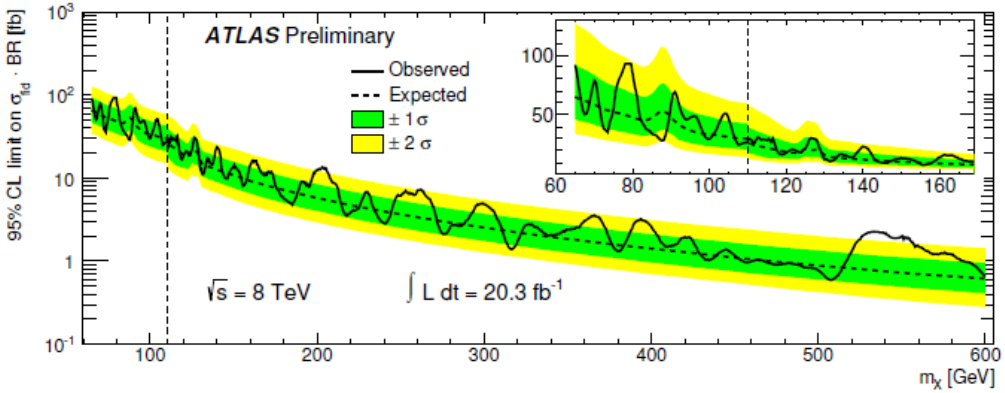




95% CL upper limit on σxBR of non-resonant production:
Obs: 2.2pb
(Exp: $1.0^{+0.6}_{-0.3}$pb)

Limit for narrow resonance:
0.8 – 3.5 pb as function of its mass

- Search in low/high **γγ mass**
  - Explore region between 65 and 600 GeV
  - SM Higgs production treated as background
  - Model-independent limit at the 95% CL on the production cross-section x BR(→ **γγ**) in a fiducial volume



SUSY searches: strong production

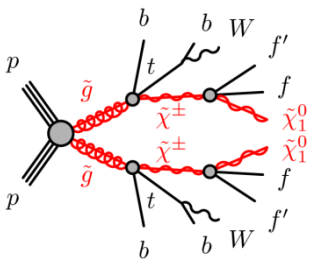
Several new results on searches for SUSY strong production: gluinos, squarks including top squarks

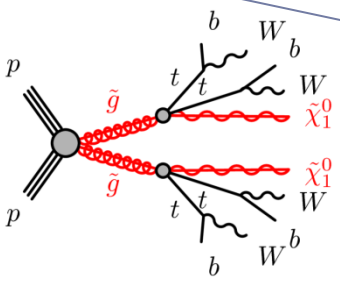
arXiv:1404.2500

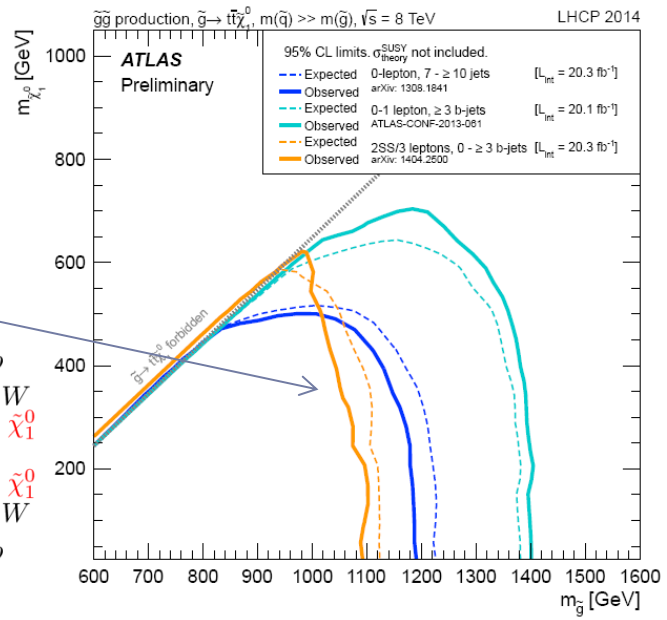
2 same sign leptons (e/mu) + (b-) jets (/ 3-leptons + (b-)jets).

Background estimate mostly data-driven

Several interpretations
→ gluino pair production

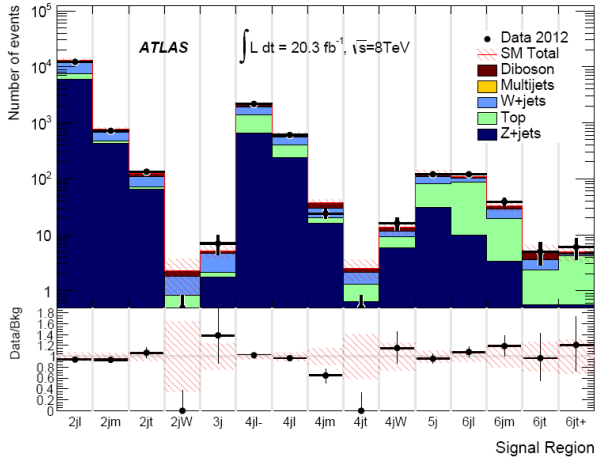




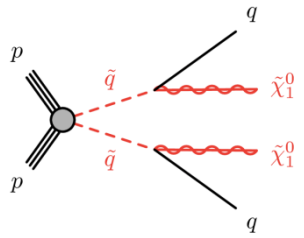


0 leptons, 2-6 jets +Missing E_T → several SR targeting many strong production scenarios.

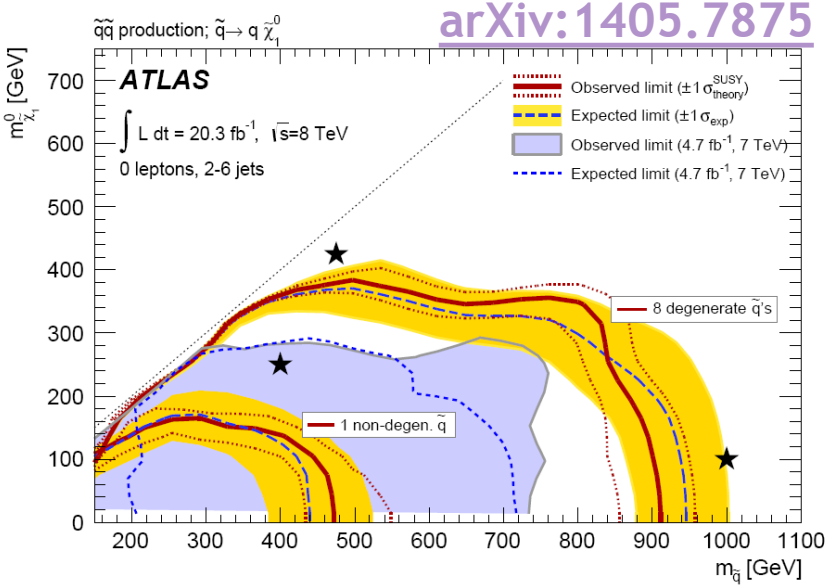
arXiv:1405.7875



Example: squark pair production



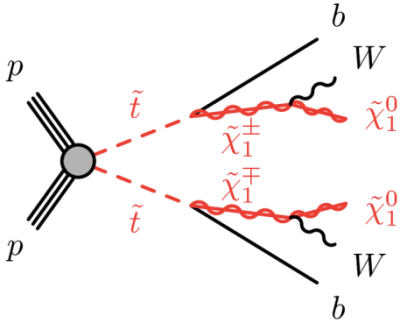
Background estimate from control regions.

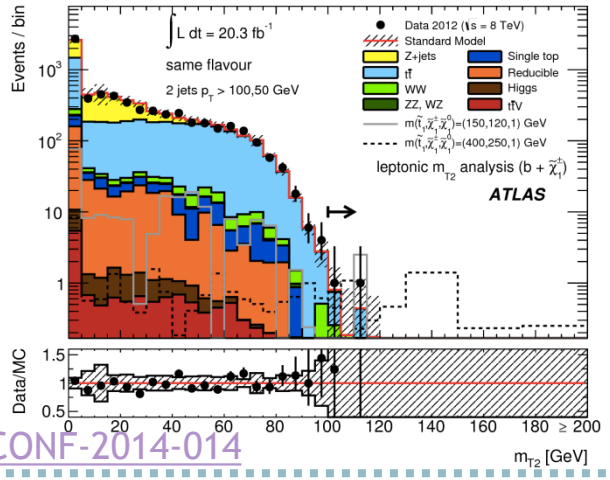


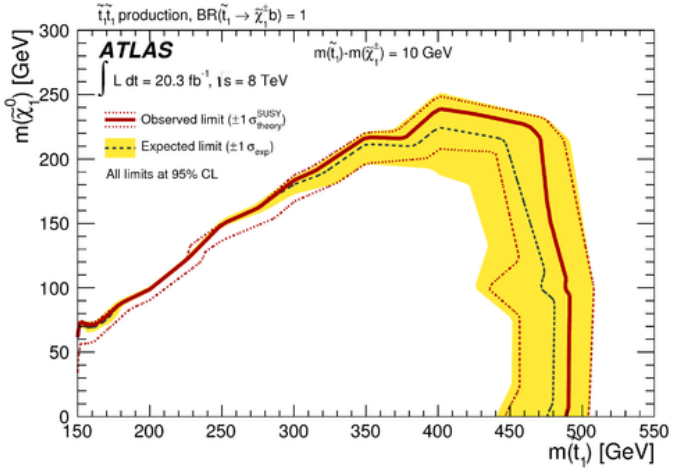
SUSY searches: top squarks

2-lepton (e/μ) + b-jet: targets different mass hierarchies.
Uses M_{T2} variable to suppress the background

arXiv:1403.4853

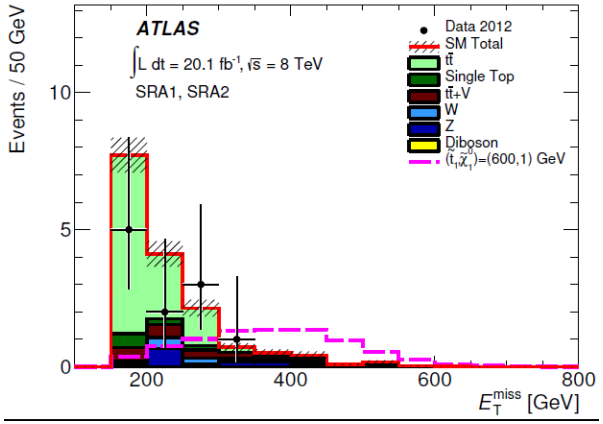


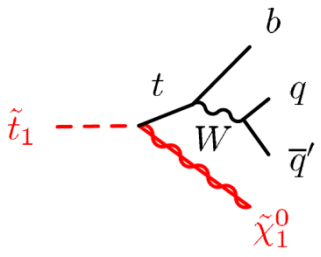


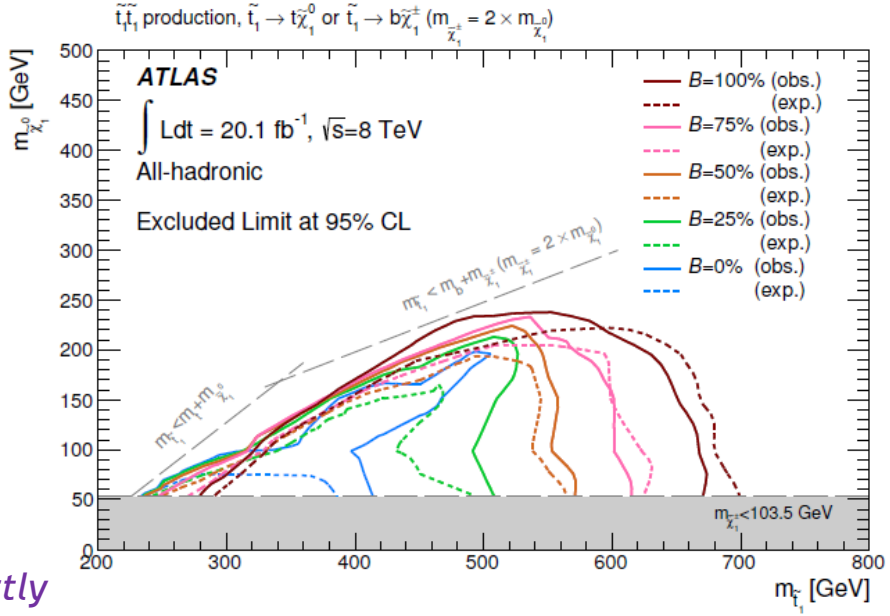


OR decay via stau ATLAS-CONF-2014-014

0 leptons + 4/5/6 jets + Missing E_T :
sensitive to various scenarios







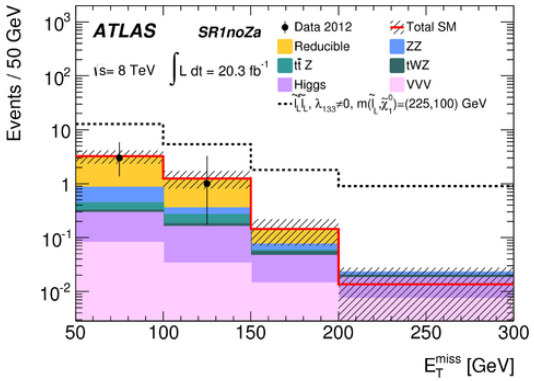
***Shown TODAY for first time**; paper to be submitted shortly*

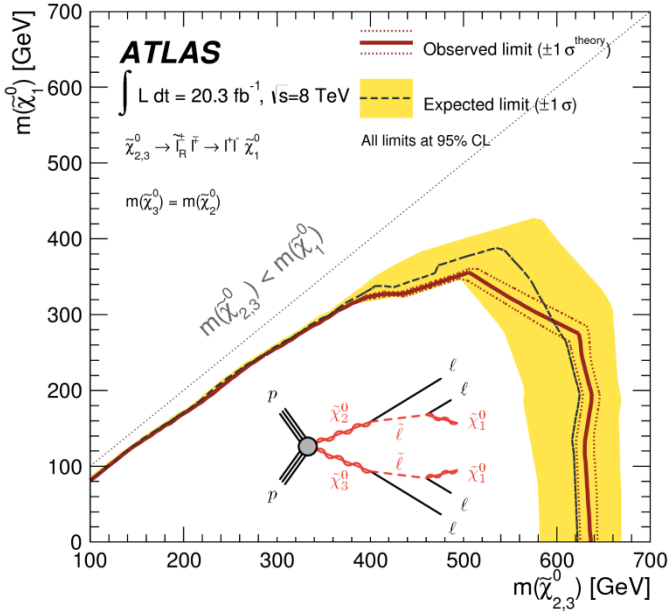
SUSY Searches: Electroweak production

1405.5086

4-lepton (e,μ,τ) – many interpretations (R-parity violating and EWK scenarios).

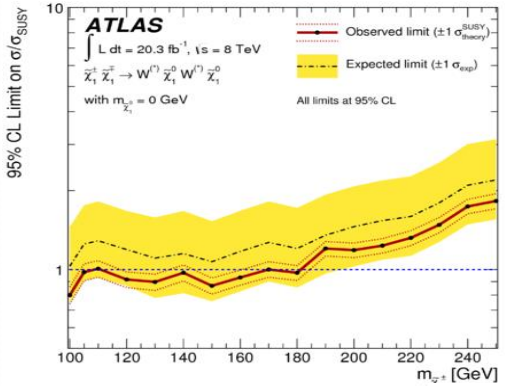
Example of SR with 1τ

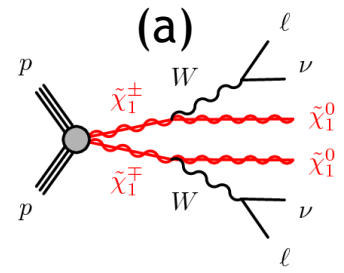


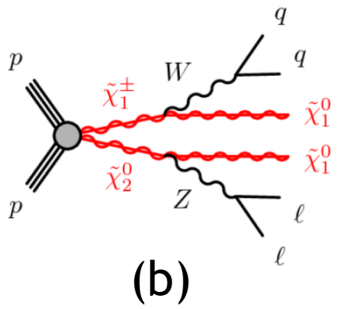


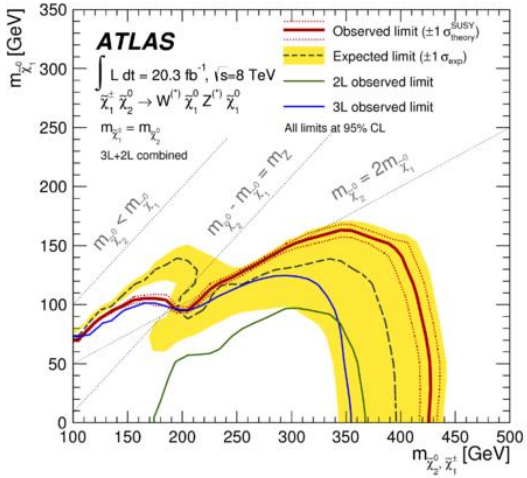
1403.4853

2-lepton (e,μ) – many interpretations.
(a) Exclusion of chargino pair production decaying via W's (b)combined chargino-neutralino exclusion in WZ final states





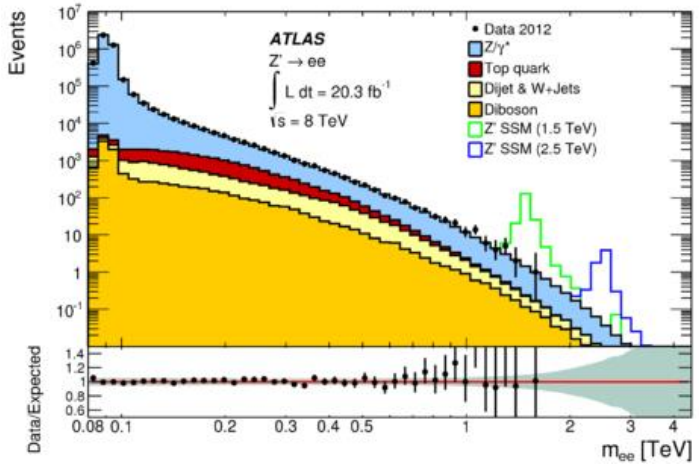


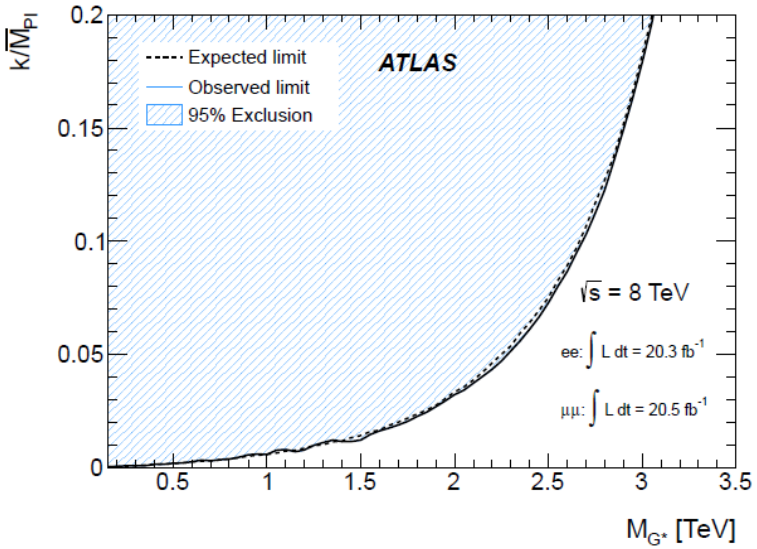


Searches in dilepton final states

- Resonant dilepton production
  - ee, μμ

arXiv:1405.4123

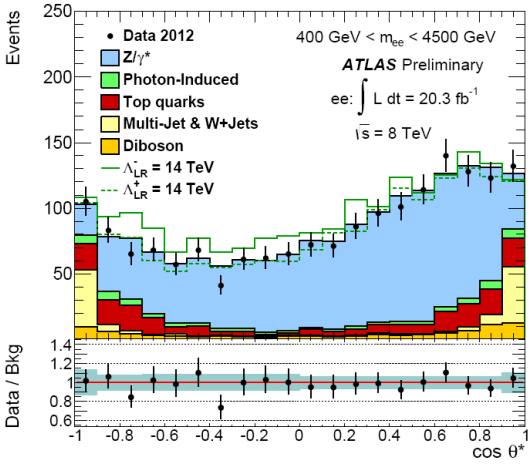


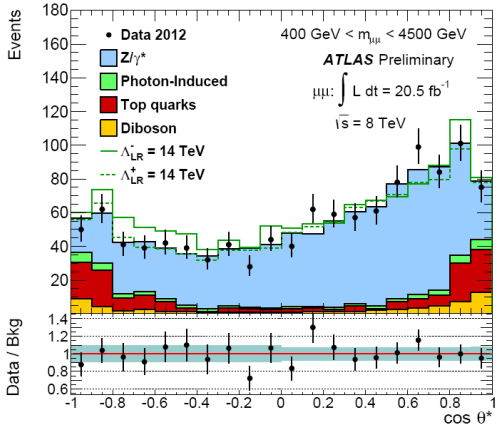


- Non resonant dilepton production

ATLAS-CONF-2014-030

Use also the *ll* decay angle, cosθ*





Lower limits on:

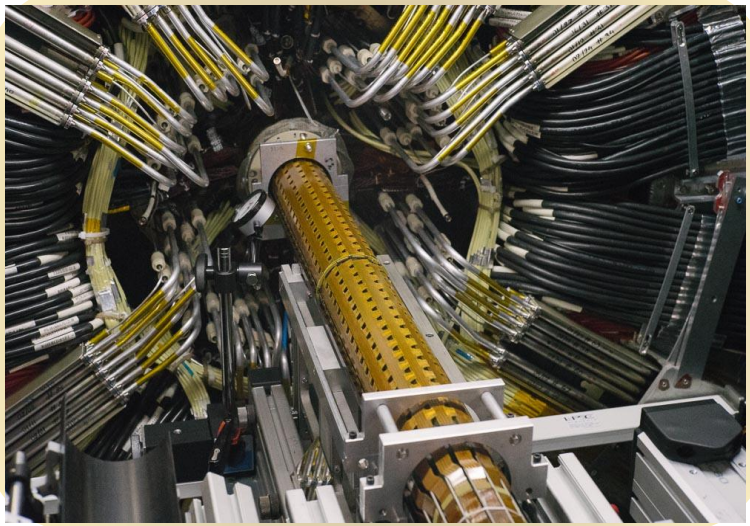
Scale for Contact Interaction: Λ>26.3 TeV

Large Extra Dimension: Ms>6.1 TeV for n=3 ADD

Towards Run 2

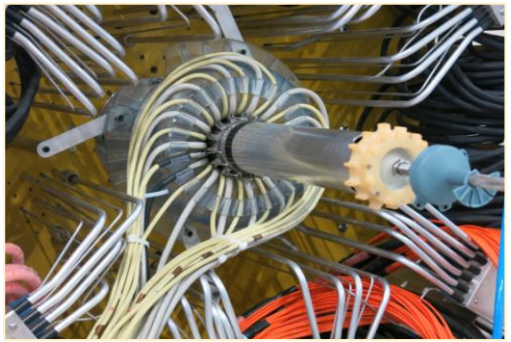
IBL insertion and Pixel status

- IBL (new inner pixel layer being added during LS1) completely inserted on Wednesday May 7!
  - Smooth operations, followed by installation of N_2 lines and flushing in IBL sealed volume



In addition:

- Pixel detector reconnected and cooling restarted
  - All 82 Pixel loops operated successfully



On-going:

- IBL service connections
- Further extensive cooling trials in **July** for IBL, Pixel and SCT systems

M-weeks

Milestone weeks:

- get all sub detectors up and running for Run-2
- 6 milestone weeks foreseen until October 2014

- Since last LHCC meeting: two more M-weeks completed

M3 (just two weeks ago):

- Huge progress on all systems!
- Could run with combined system at 100+ kHz level-1 rate using random triggers
- Overnight Cosmic Trigger Run TRT Fast OR + RPC + MDT (HV nominal) and CSC (~side A HV nominal)

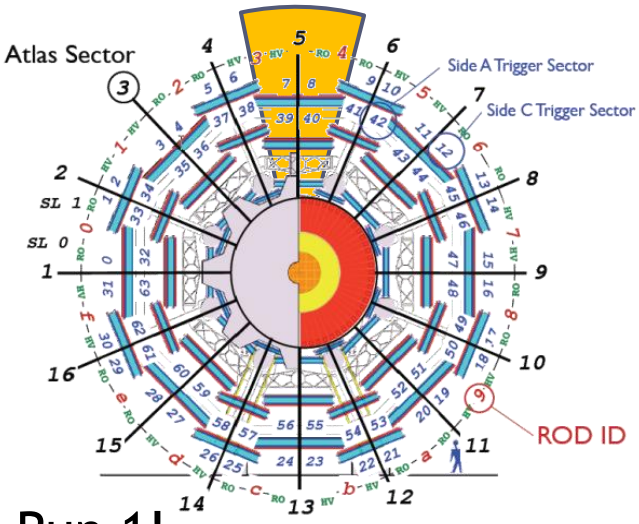
	M1	M2	M3	M4	M5	M6
	Feb 17–Feb 23	Mar 31-Apr 4	May19-May 23	Jul 7-Jul 11	Sep 8-Sep 12	Oct 13-Oct 17
PIX				X^1, X^2		
IBL				X^1	X^2	
SCT				X		
TRT		X				
LAR				X		
TIL				X		
MBTS				X		
L1Calo	X^1			X^2	X^3	X^4
CSC	X^1				X^2	X^2
MDT	X					
RPC		X^1	X^1			
TGC	X^1					
BCM		X				
ALFA					X	
LUCID						X
Lumi					X	

Cosmic run Nov 24-Dec 5

A busy ATLAS Control Room

M3 Participating Components and Runs

- **Include BCM, TRT, CSC, MDT , TGC and RPC (new in M3!):**
  - Tested with 100+ kHz level-1 rate
  - Sector 5 A RPC providing trigger



- **Also include HLT (New in M3!):**
  - For the first time in ATLAS partition since Run 1!

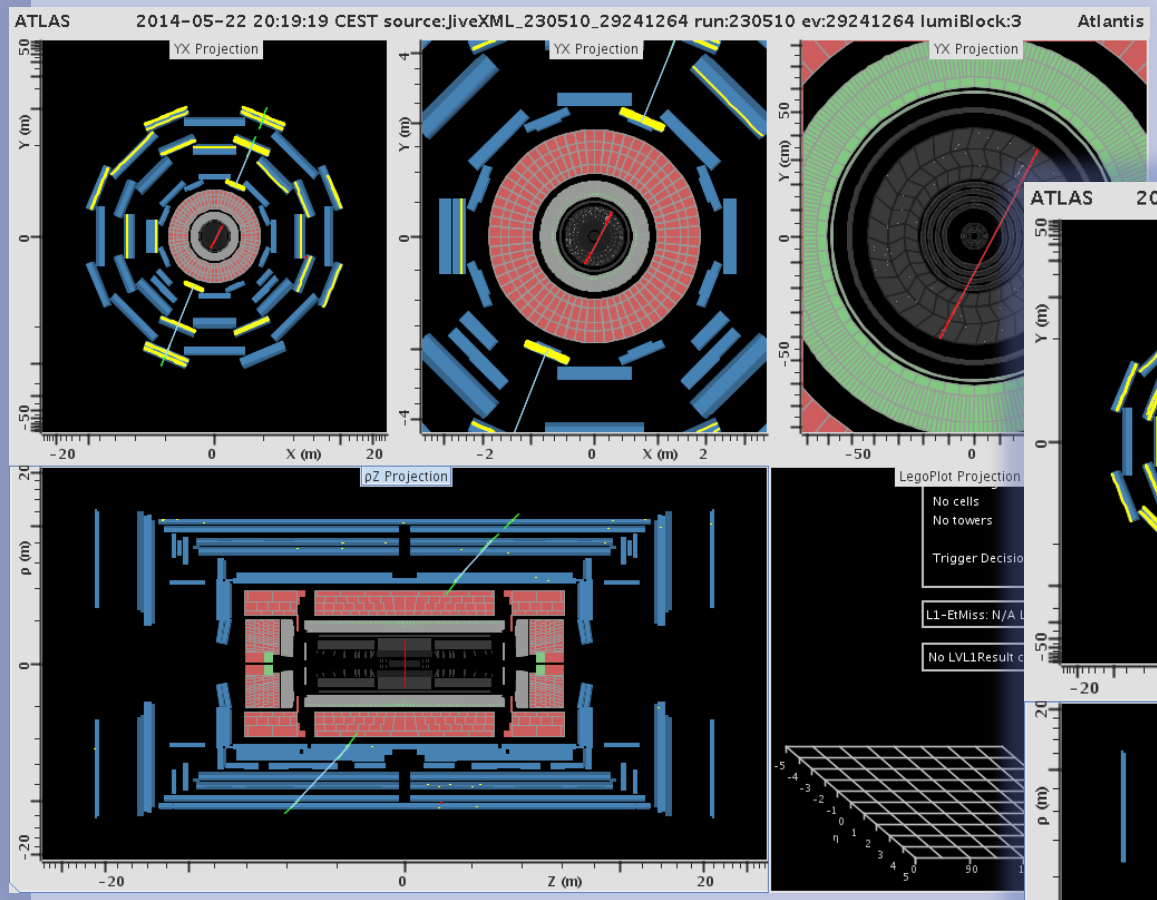
M3 Menu:
LVL1: latest Run 1 Physics menu
HLT: basic L1 streamers (e.g. L1_TRT)

Basic algorithms expected in M4

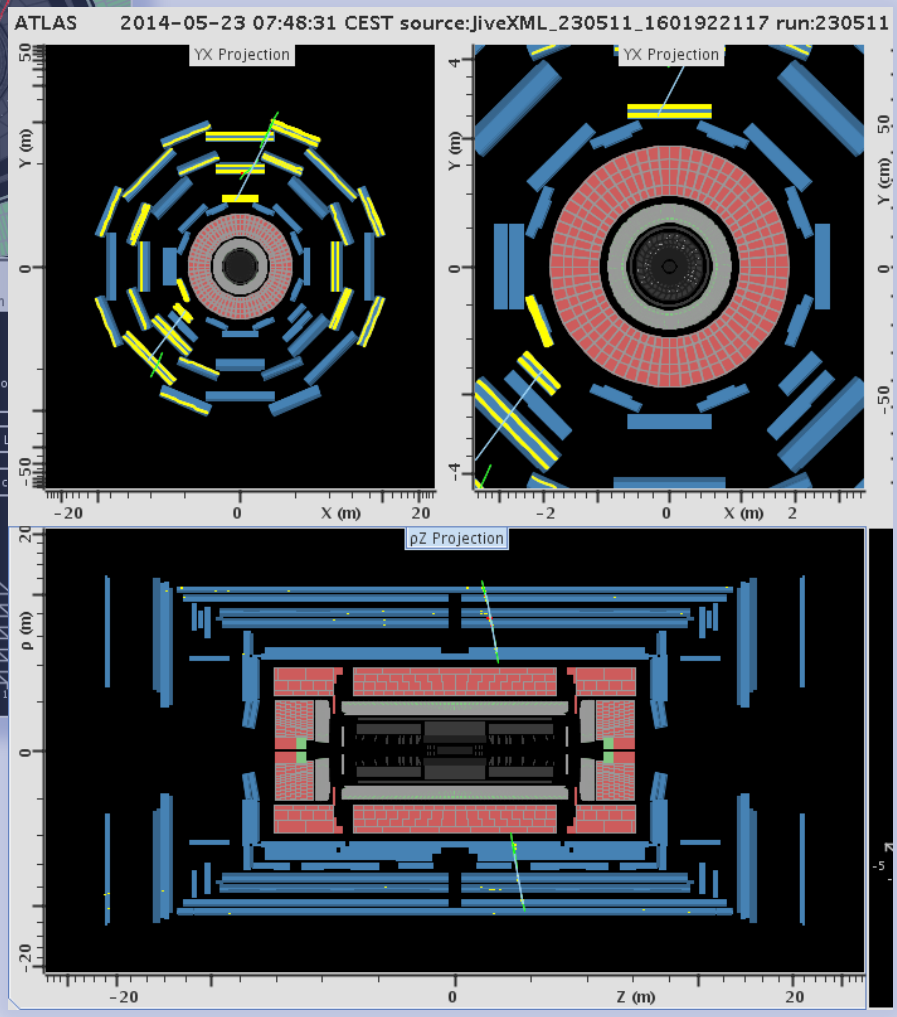
Cosmic Run with all the above systems participating

- Event Display and Monitoring working at Point1.
- Tier0 processing of the data streamlined
- Data Quality Web-displays produced automatically for incoming data

Cosmics through ATLAS again!



←TRT Fast-OR



RPC Trigger Event →

Further preparation for Run 2

Detector consolidation and repair work ongoing, e.g.

- **LAr** low voltage power supplies being re-installed on the detector after capacitor replacements done at the company (Wiener)
- **Tile**: replacement of LVPS and check of HV boards (235/256 drawers done)
- **RPC** leak chasing: more than half done
- **MDT/RPC**: new BME chambers installed

New functionalities in run-2:

- 1 crate of new L1Calo input processor MCMs installed & under test
- L1Topo trigger on schedule through production readiness review
- new CSC ROD commissioning to start in June, to go to 100 kHz L1 rate

Software and Analysis preparation:

- new Geant version (4.9.6) for simulation fully validated
- new reconstruction software based on "xAOD" in final validation stage (format readable by both ROOT and Athena)
- tuning of clustering for IBL layer ongoing
- major improvements to grid-related software on track (ProdSys2, Rucio)
- tutorials on new analysis model have started (and are fully booked!)

Major testing of new SW components and analysis model during the summer ("DC14")

See more detail in March LHCC talk (A. Salzburger)

Conclusions

- Many new results released in the last few months based on heavy ions and proton-proton collisions!
  - Emphasis on finalising Run-1 papers.
- Re-analysis of 2011 and 2012 data using improved energy scale calibration for e , γ and μ led to a new precision measurement of the Higgs mass
  - Improves systematic uncertainties on individual channel measurements:
    - H→$\gamma\gamma$: from 700 MeV to 280 MeV; H →4l: from +500/-300 MeV to 40 MeV
  - Detailed groundwork opens door to further precision measurements
- Preparations for Run-2 continue to progress well
  - IBL successfully inserted into ATLAS
  - Pixel reconnected and testing in progress, much other work across many detectors well advanced
  - Cosmic rays recorded again during the last M-week (M3), with high-level trigger and several detectors included
- Upgrade work on Phase-1 and Phase-2 ongoing, as reported yesterday by P. Allport in the upgrade session

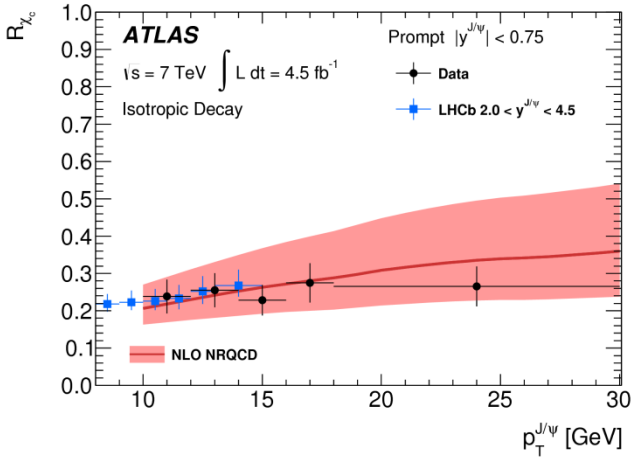
Back-up

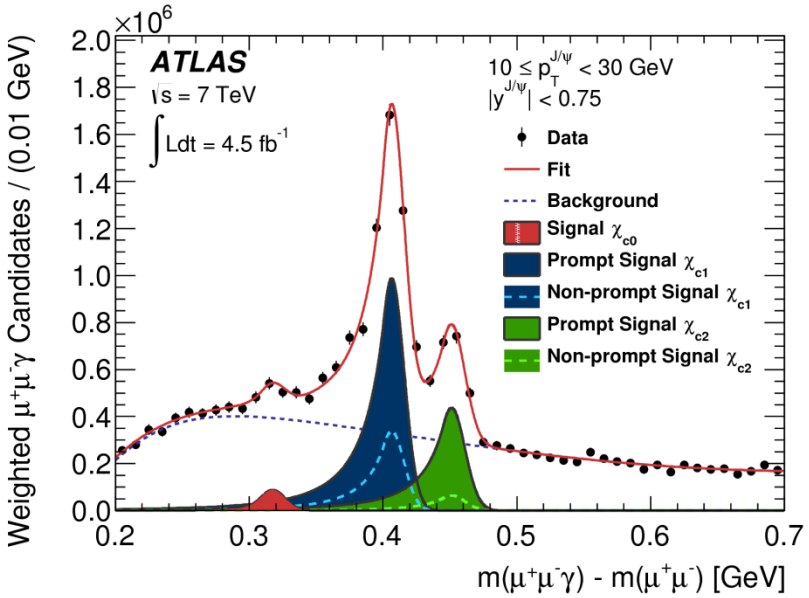
B-Physics highlights: charmonium

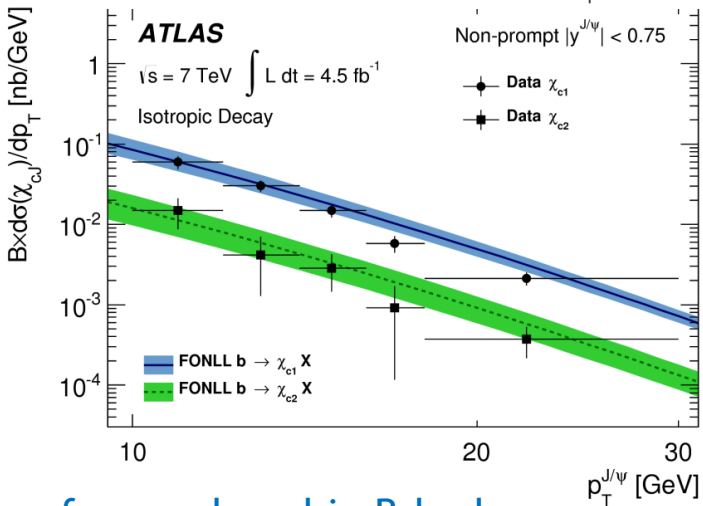
New B-physics results since March LHCC:

Measurement of x_{c1} and x_{c2} production ($\sqrt{s}$ = 7TeV)	arXiv:1404.7035
Measurement of the parity violating asymmetry parameter α_b and the helicity amplitudes for the decay $\Lambda_b^0 \rightarrow J/\psi\, \Lambda^0$ ($\sqrt{s}$ = 7TeV)	arXiv:1404.1071

- Study of heavy quarkonium production → unique insight into dynamics of strong interaction.
  - prompt and non-prompt production cross-sections for the χ_{c1} and χ_{c2} charmonium states where χ_c are reconstructed through the radiative decay $\chi_c \rightarrow J/\psi(\rightarrow\mu\mu)+\gamma$



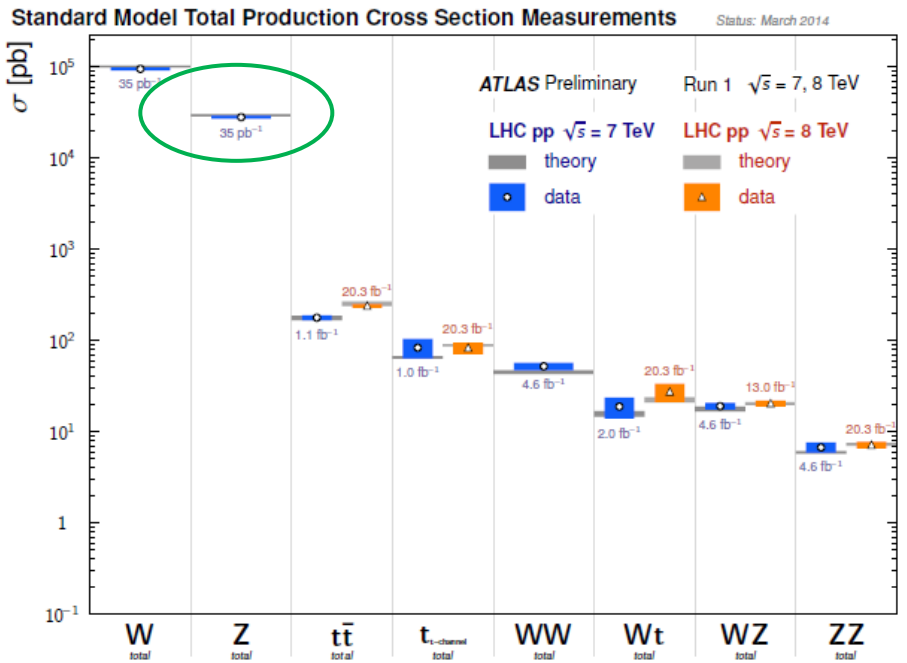




Fraction of χ_c produced in B-hadrons measured
$BR(B^{\pm} \rightarrow \chi_c K^{\pm}) = 4.9 \pm 0.9(stat) \pm 0.6(syst) \times 10^{-4}$

Other SM highlights

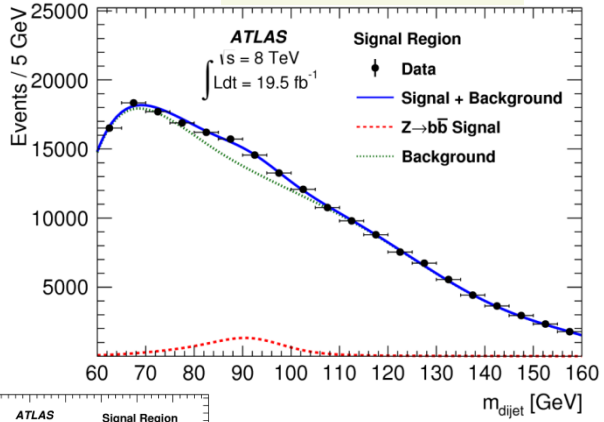
- More and more precision measurements but also study challenging or rare final states with 7 and 8 TeV data:
  - *e.g.* **Z boson**

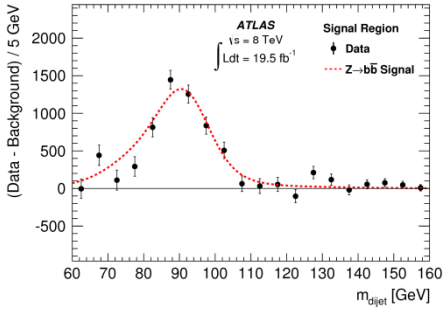


arXiv:1404.7042

$Z \rightarrow b\bar{b}$

b-jet pairs mass



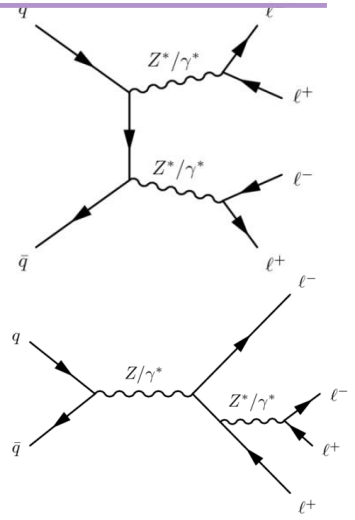


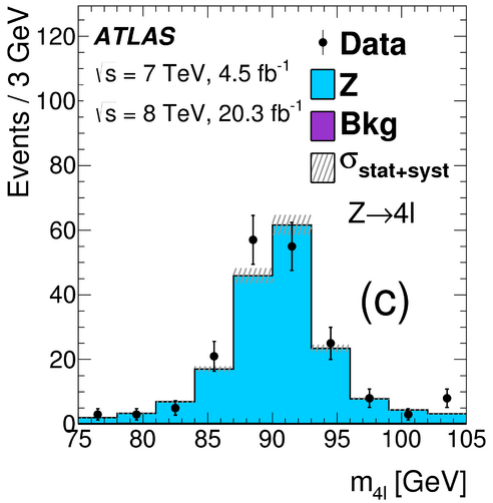
Fiducial σ in good agreement with NLO predictions

σ(fid) = 2.02 ± 0.33 pb

arXiv:1403.5657

$Z \rightarrow 4l(e,\mu)$





BR(Z→4l):(3.20±0.25(stat)±0.13(syst))×10^{-6}

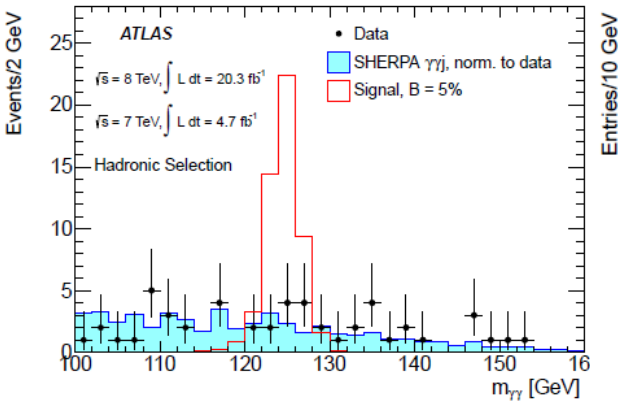
Consistent with SM predictions

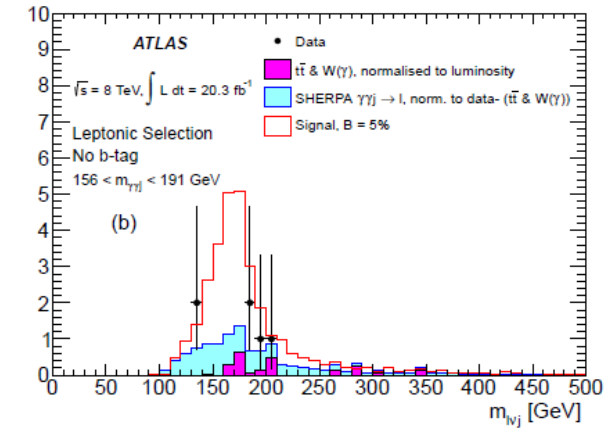
t → qH, H→γγ

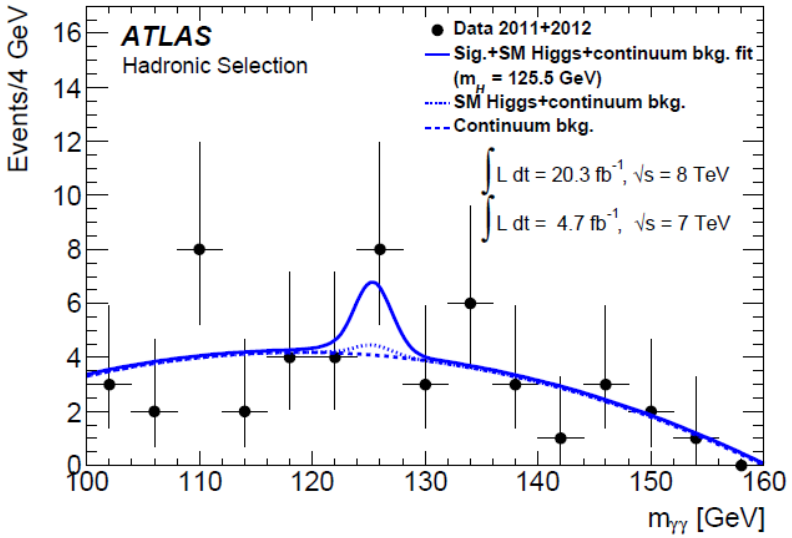
arXiv:1403.6293

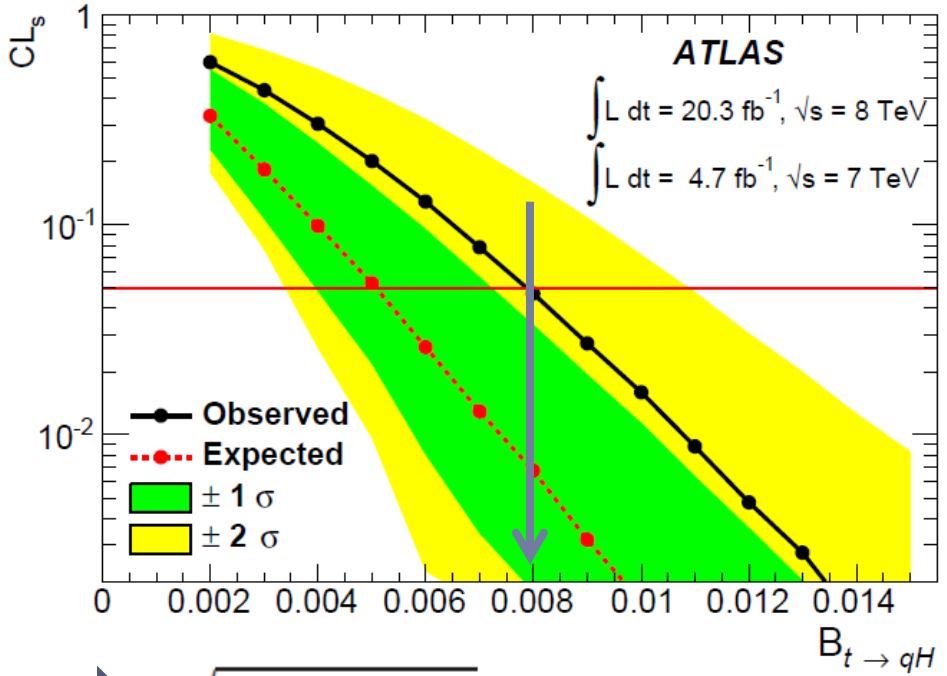
Search for top pair production assuming:

- one top in Wb (with W→jj or →lν)
- one top in Hq, H→ γγ







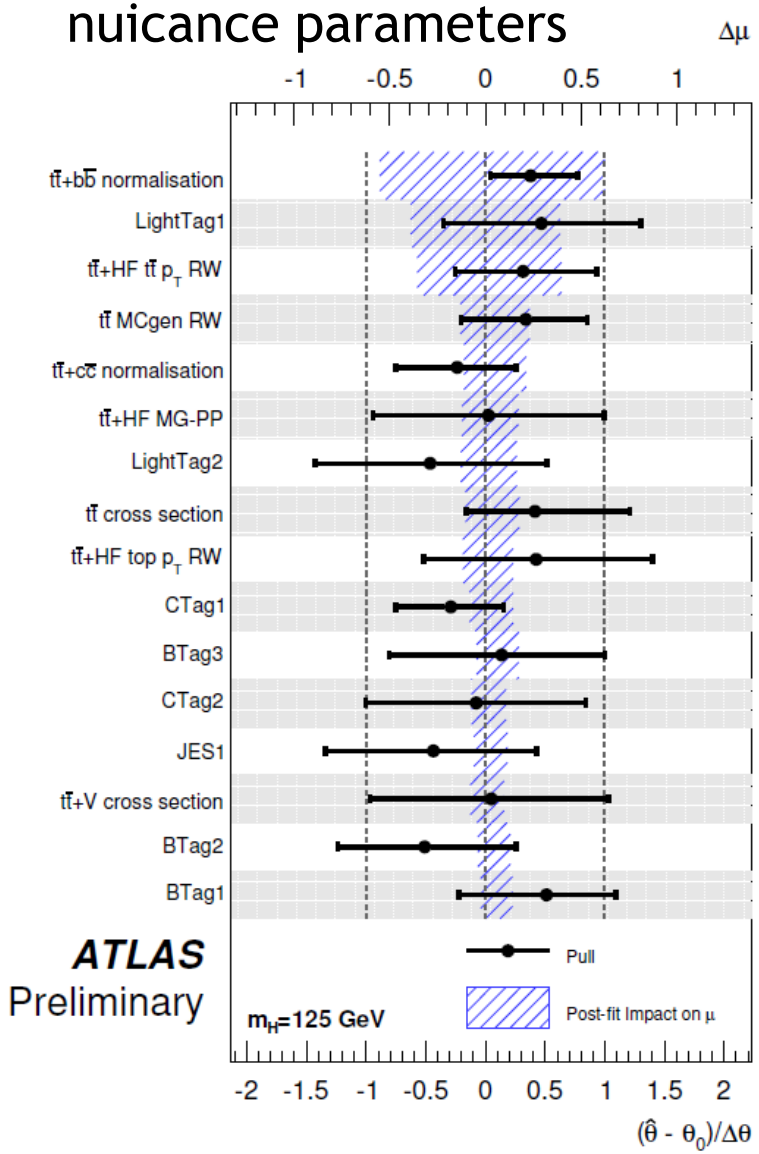


Limits on tqH coupling assuming equal sensitivity to q=u and q=c

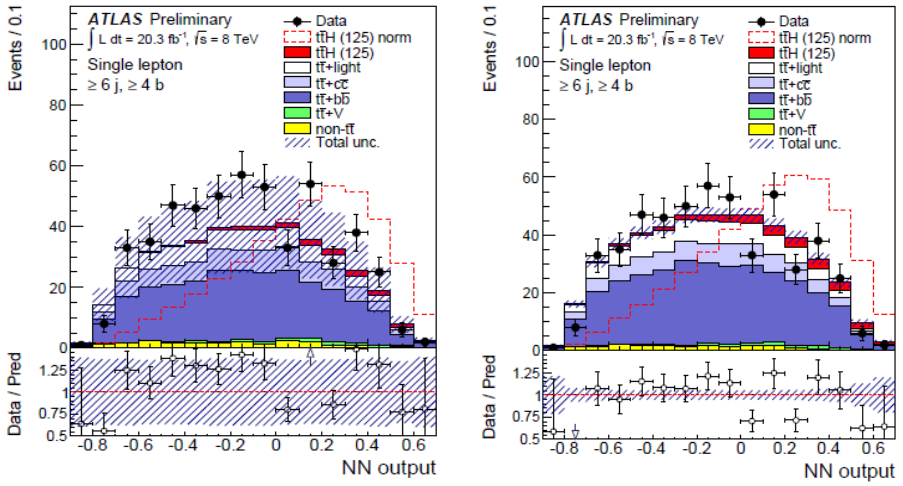
$$\sqrt{\lambda_{tcH}^2 + \lambda_{tuH}^2} < 0.17$$

ttbar+Higgs (II)

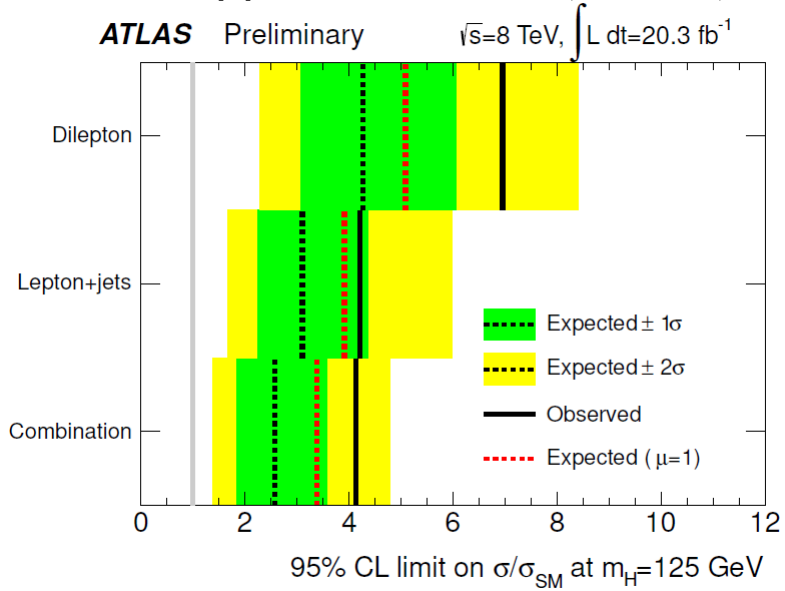
- Fitted values of most relevant nuicance parameters



Before/After fit



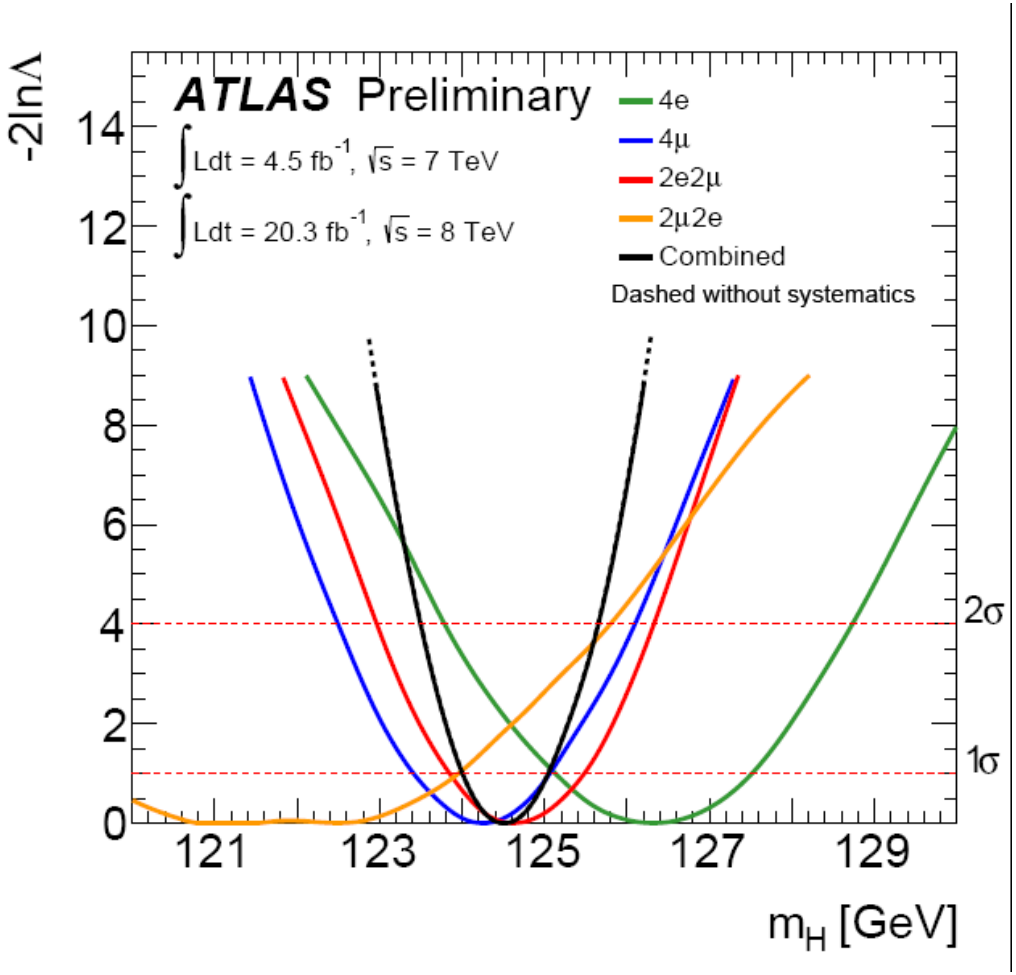
95% CL upper limits on σ(ttbarH)

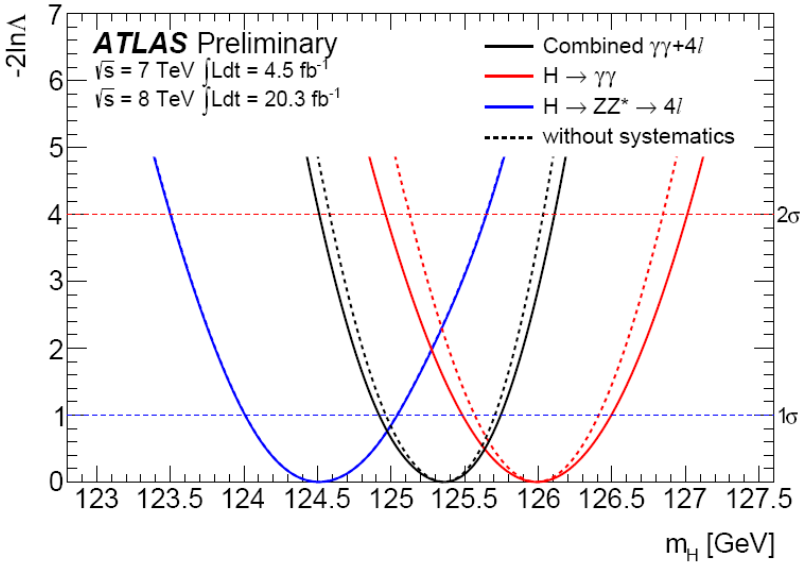


Details on Higgs boson mass measurement

Systematic	Uncertainty on m_H (MeV)
LAr syst on material before presampler (barrel)	70
LAr syst on material after presampler (barrel)	20
LAr electronics non-linearity (layer 2)	60
LAr electronics non-linearity (layer 1)	30
LAr layer calibration (barrel)	50
Lateral shower shape (conv)	50
Lateral shower shape (unconv)	40
Presampler energy scale (barrel)	20
ID material model ($\|\eta\| < 1.1$)	50
$H \to \gamma\gamma$ background model (unconv rest low p_{Tt})	40
$Z \to ee$ calibration	50
Primary vertex effect on mass scale	20
Muon momentum scale	10
Remaining systematic uncertainties	70
Total	180

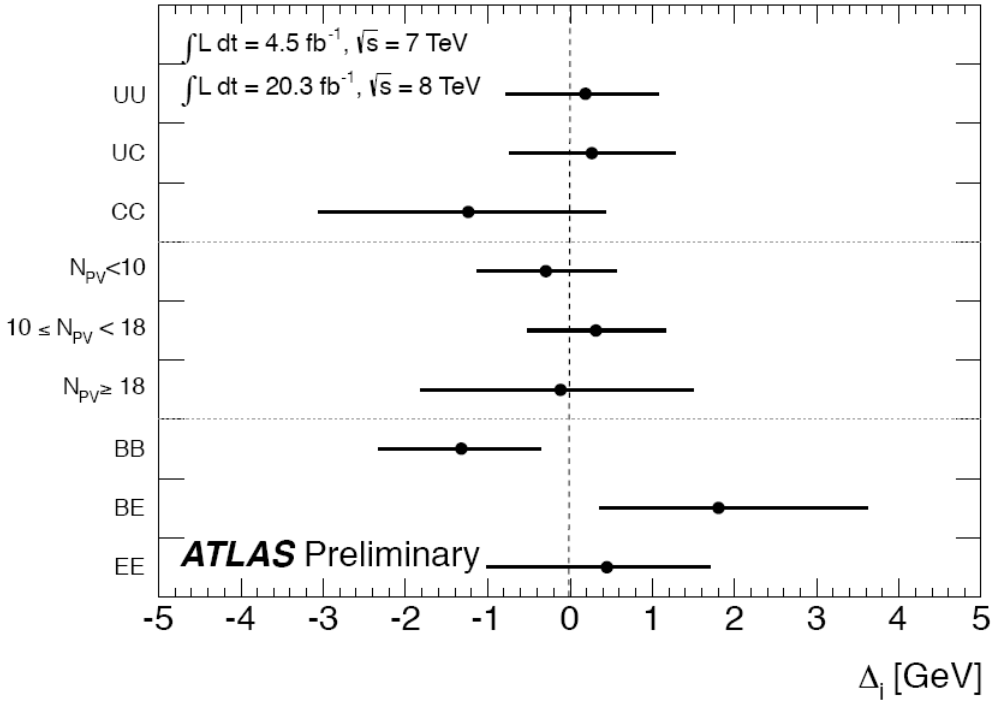
Details on Higgs mass measurement





Details on Higgs boson mass measurement

- Difference, Δi, between the mass measured in a given γγ sub-sample and the combined γγ mass, using three different alternative categorizations to define the sub-samples. The top three points show a categorization based on the photon conversion status: UU is the sub-sample with both photons unconverted, UC the sub-sample with one converted and one unconverted photon, CC the sub-sample with two converted photons. The middle three points show a categorization based on the number of reconstructed primary vertices (NP V) in the event. The bottom three points show a categorization based on the photon impact points on the calorimeter: BB is the sub-sample with both photons detected in the barrel calorimeter, BE the sub-sample with one photon in the barrel calorimeter and one photon in the end-cap calorimeter and EE the sub-sample with both photons in the end-cap calorimeter.

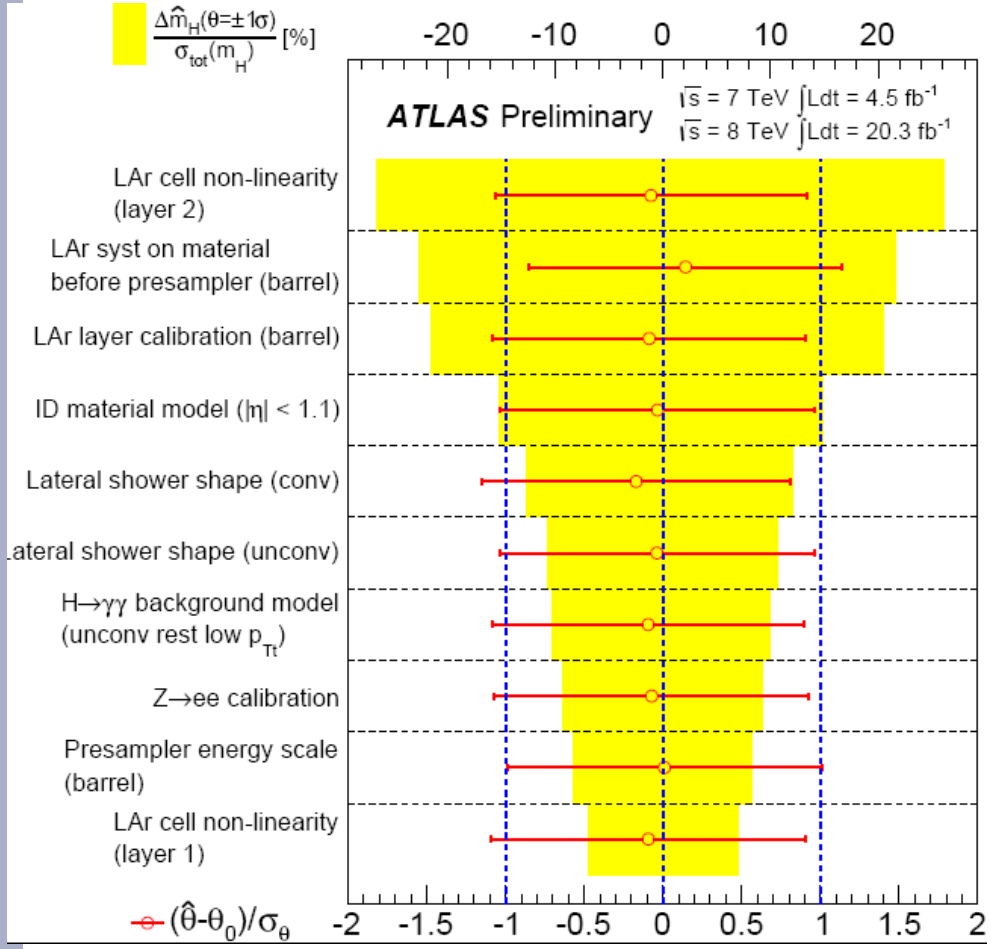


H→γγ

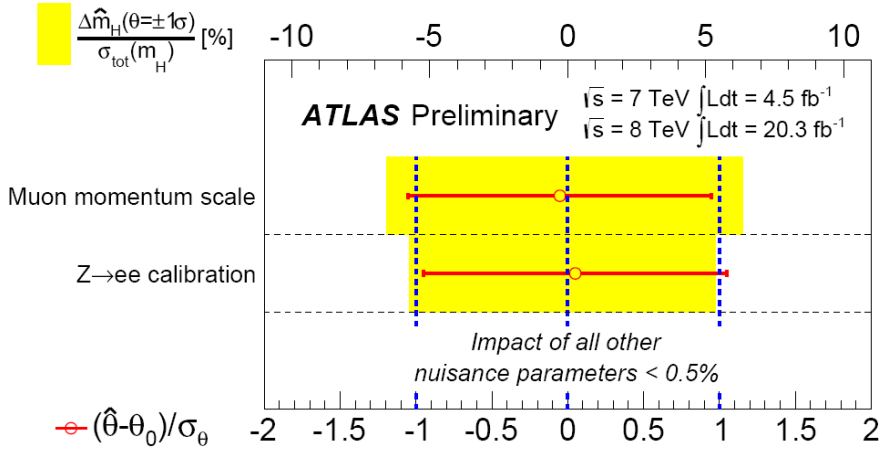
Details on Higgs boson mass measurement

- Pulls and impact on mH(hat) for the principal constrained nuisance parameters in the H → γγ and H→4l channels. The fitted value and ±1σ uncertainties are shown for each parameter by the points and error bars (lower scale). The relative change in mH(hat) as a result of varying each parameter by its fitted uncertainty (upper scale) is shown in yellow. Parameters are selected and ordered according to their impact on mH(hat).

H→γγ



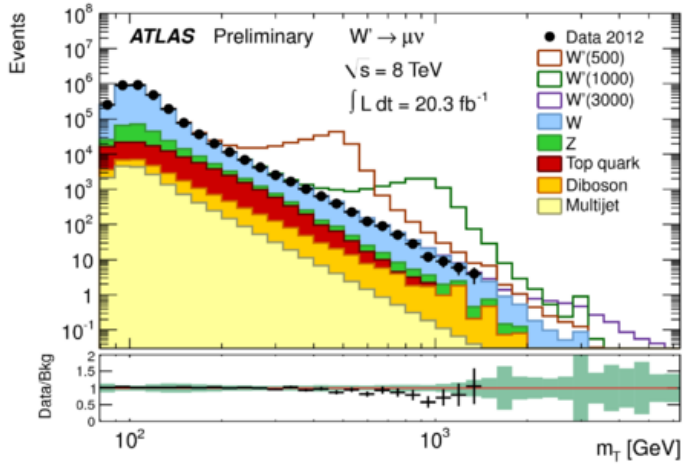
H→4l

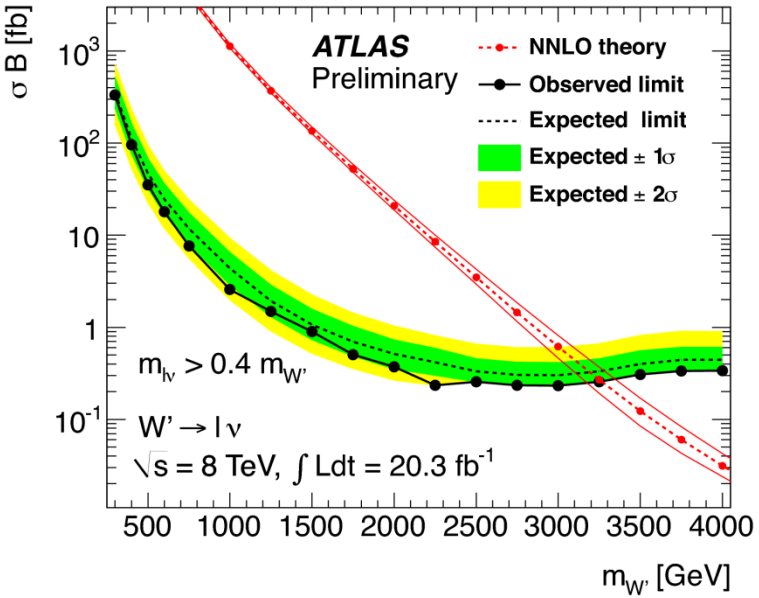


W' searches

ATLAS-CONF-2014-017

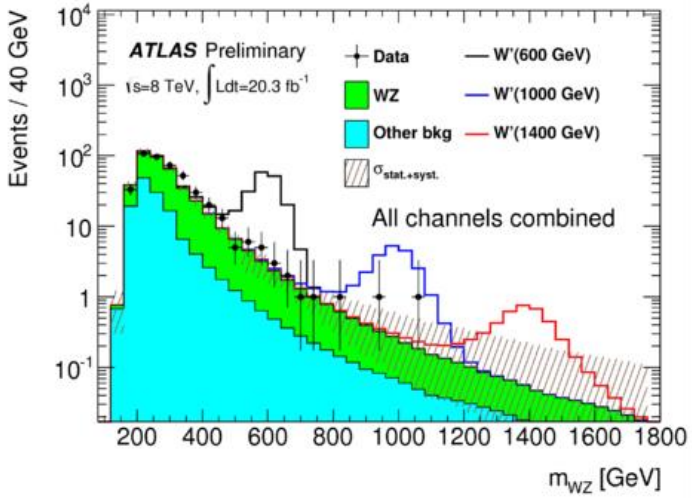
- W'→lν

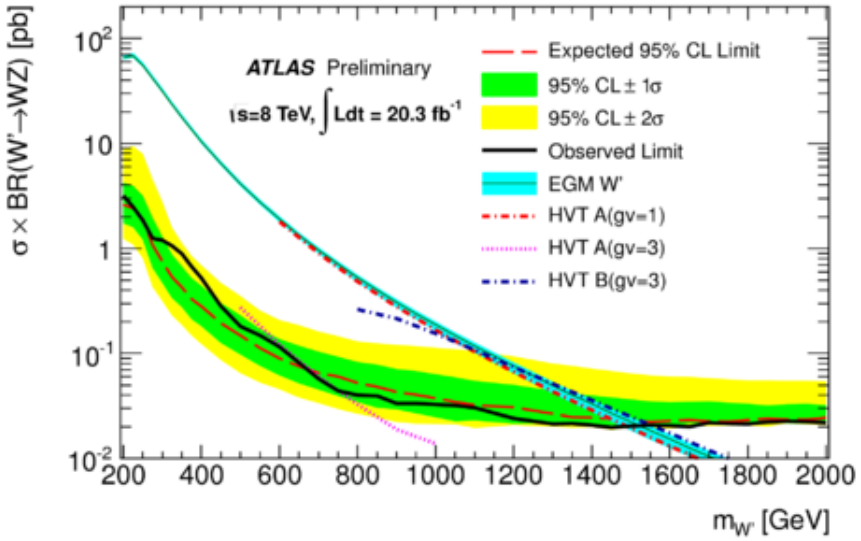




ATLAS-CONF-2014-015

- W'→WZ (3 leptons)

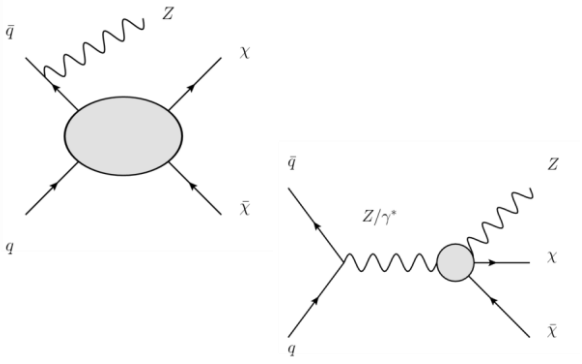


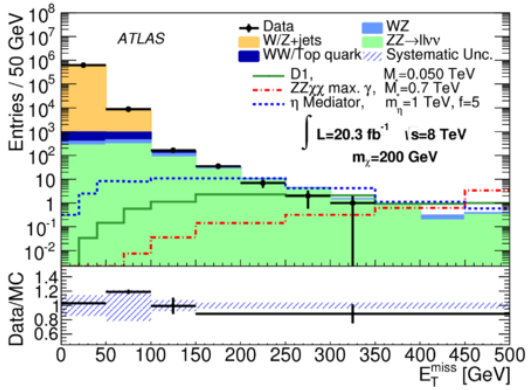


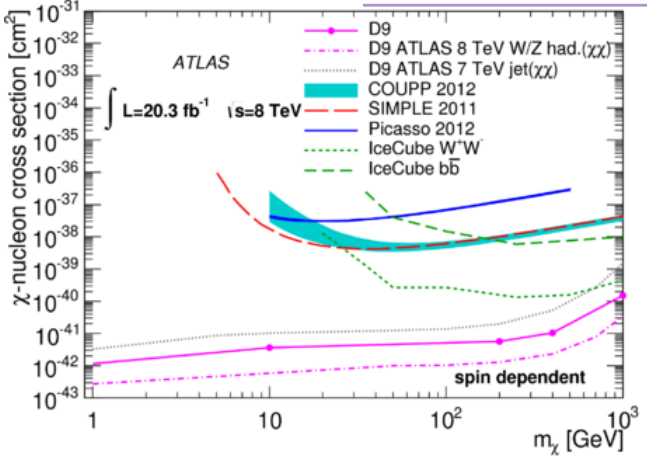
Other exotic searches highlights

- **Mono-Z production: window to Dark Matter**

arXiv:1404.0051



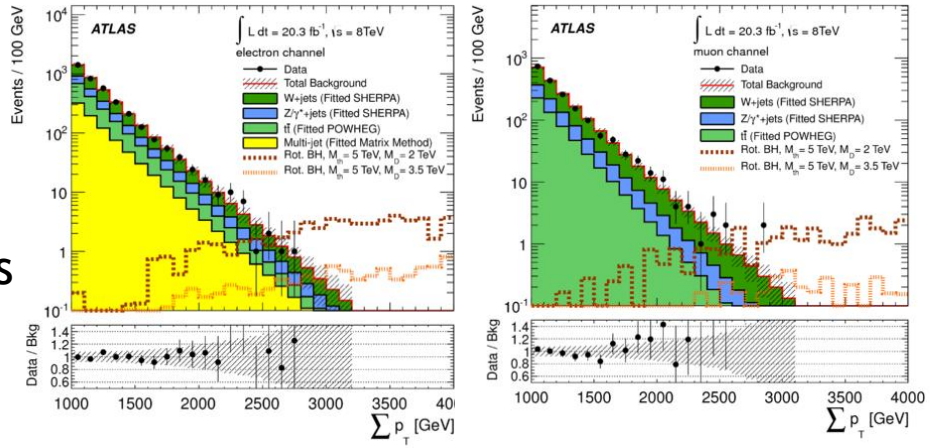


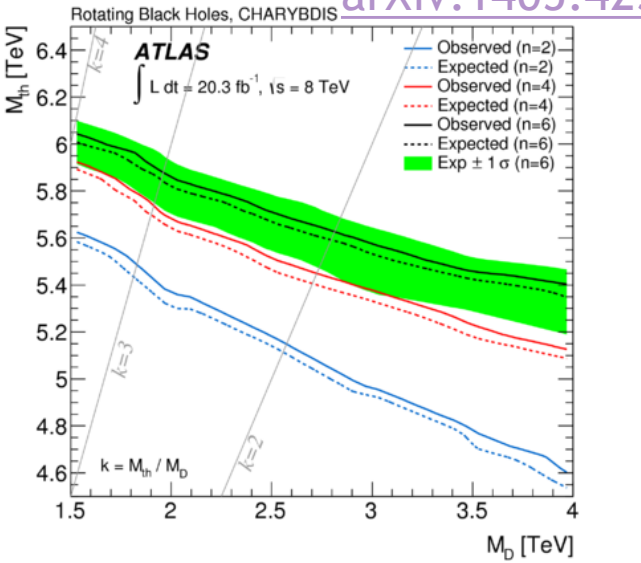


- **Microscopic Black-holes: gravity**

arXiv:1405.4254

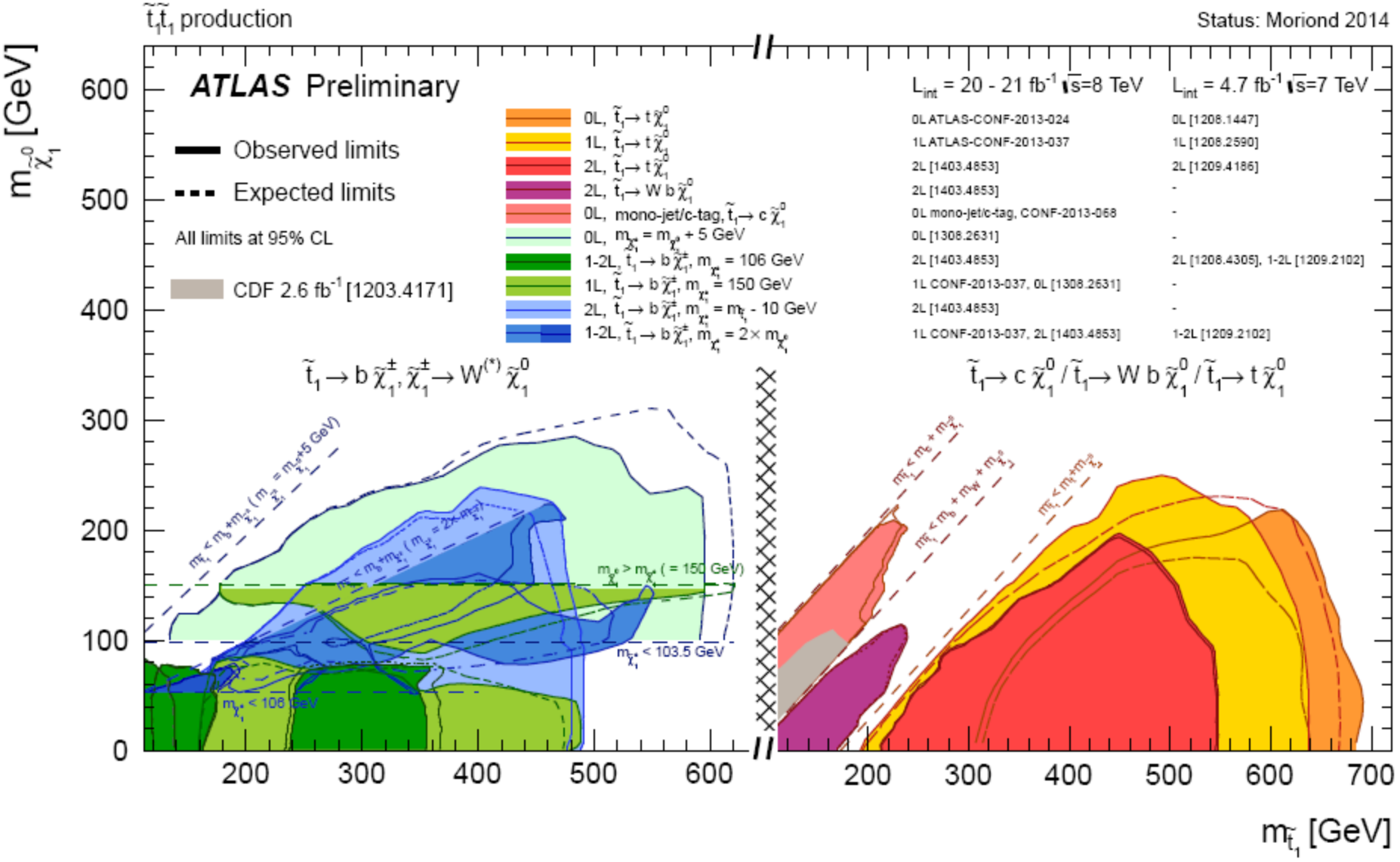
In high pT leptons and jets final state events





For 6 extra dimensions, mass thresholds of **4.8-6.2 TeV** excluded at 95%CL, depending on the fundamental gravity scale and model assumptions.

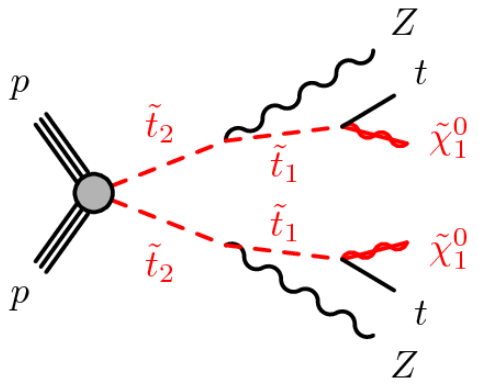
SUSY searches: top squarks

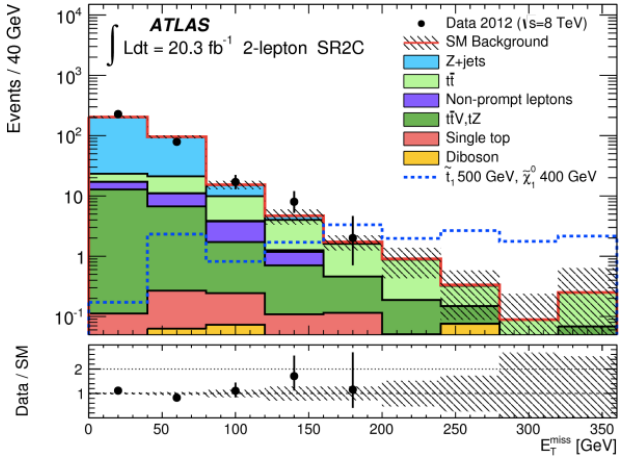


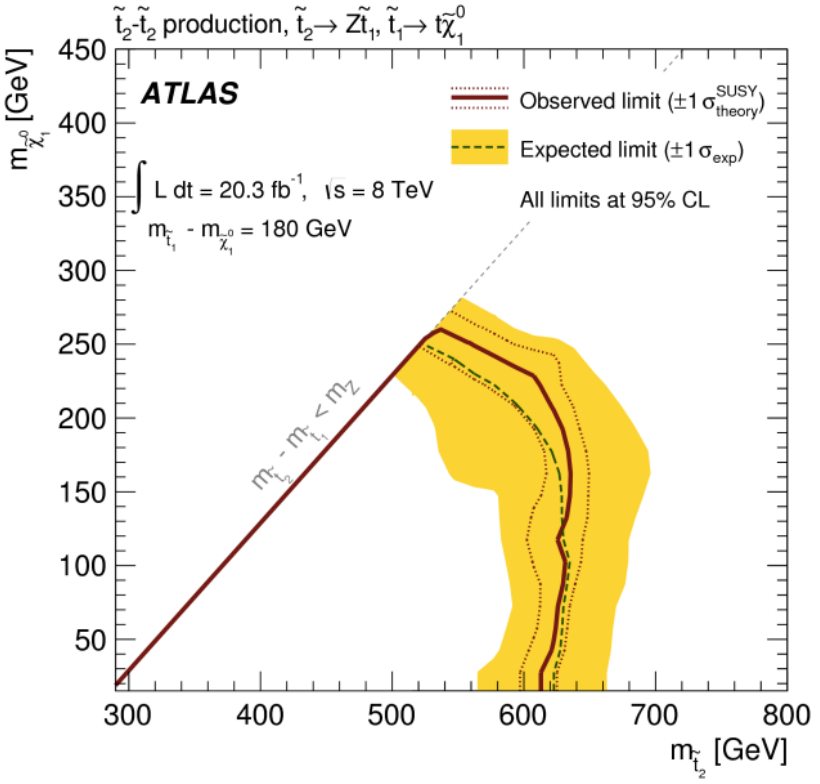
SUSY searches: top squarks

arXiv:1403.5222

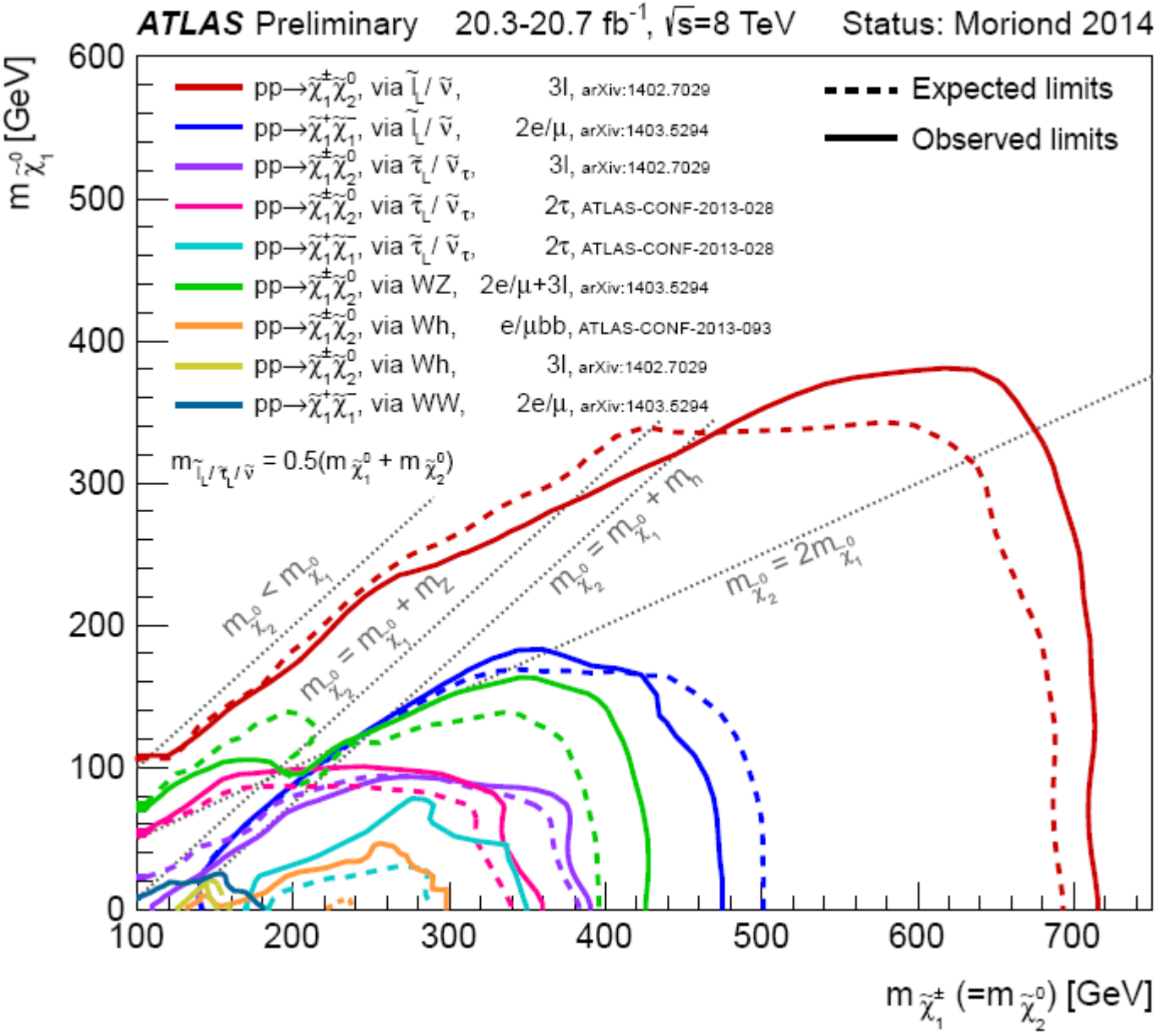
$Z(l^+l^-)$ + b-jets + Missing E_T : targets heavier stop (stop2), as window for difficult regions (stop mass close to top mass).







SUSY Searches: Weak production summary



M-weeks

	M1	M2	M3	M4	M5	M6	
	Feb 17– Feb 23	Mar 31- Apr 4	May19- May 23	Jul 7- Jul 11	Sep 8- Sep 12	Oct 13- Oct 17	Cosmic Run Nov 24th - Dec 5th
PIX				X[1], X[2]			[1] TDAQ integration, using events simulated at ROD [2] test with frontend, detector cold
IBL				X1	X[2]		[1] TDAQ integration, using events simulated at ROD [2] test with frontend, detector cold
SCT				X			detector cold
TRT		X					All information in P1 Twiki: https://atlasop.cern.ch/twiki/bin/view/Main/Run2Preparation
LAR				X			
TIL				X			• M4: • Calorimeters, PIX, SCT, IBL
MBTS				X			
L1Calo	X[1]			X[2]	X[3]	X[4]	[1] Readout only. [2] Full legacy triggering with TIL + LAR [3] CMX triggering both CP/JEP systems, L1Topo Readout Commissioned. [4] L1Topo Commissioned fully in trigger system. Possibly TGC trigger
CSC	X[1]				X[2]	X[2]	[1] Old RODs, side A only [2] New ROD Commissioning
MDT	X						
RPC		X[1]	X[1]				[1] TDAQ integration. HV for ~ 1 sector
TGC	X[1]						[1] no operating gas until detector closed
BCM		X					• M3: TRT and RPC Cosmic Trigger • LAr moved to M4 (PS refurbishment) • Validation of M2 sub-systems • HLT chain
ALFA					X		
LUCID						X	
Lumi					X		

Towards Run 2: DC14

- Technical and Physics improvements in offline areas being tested during a data-challenge in 2014 (DC14).
- **The goal is to get ready for Run-2 analyses** and engage a large fraction of the collaboration in the preparation:
- 500 M of MC events with the run-1 conditions have been simulated.
- Software has been migrated to the new ROOT-readable Event Data Model (xAOD) and the reconstruction is now about two times faster than run-1 release, thanks to the migration from CLHEP to Eigen libraries, (auto-)vectorization and careful rewriting and optionization of the code.
- Next steps are:
  - Reconstruction of the MC with new software and run-1 conditions and reprocessing of 25% of the 2012 data.
  - Test of the new analysis model by the Combined Performance groups and selected physics analyses.
  - Production of MC at 13 TeV and run-2 conditions