

ATLAS Status Report status and recent results

**127th LHCC Meeting, CERN
Open Session**

21 September 2016

**Rob McPherson
University of Victoria / IPP + CERN
On behalf of the ATLAS Collaboration**

Outline of Talk

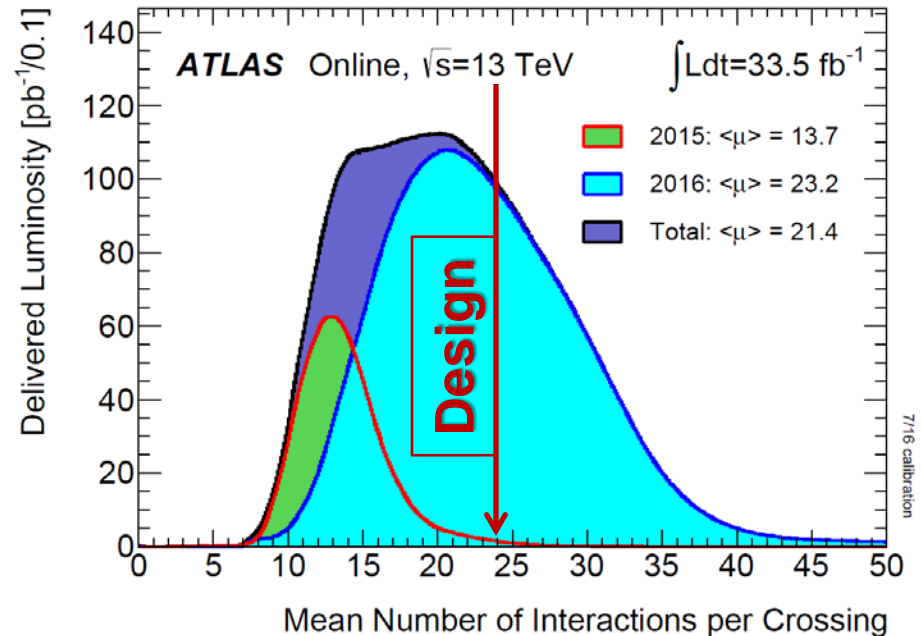
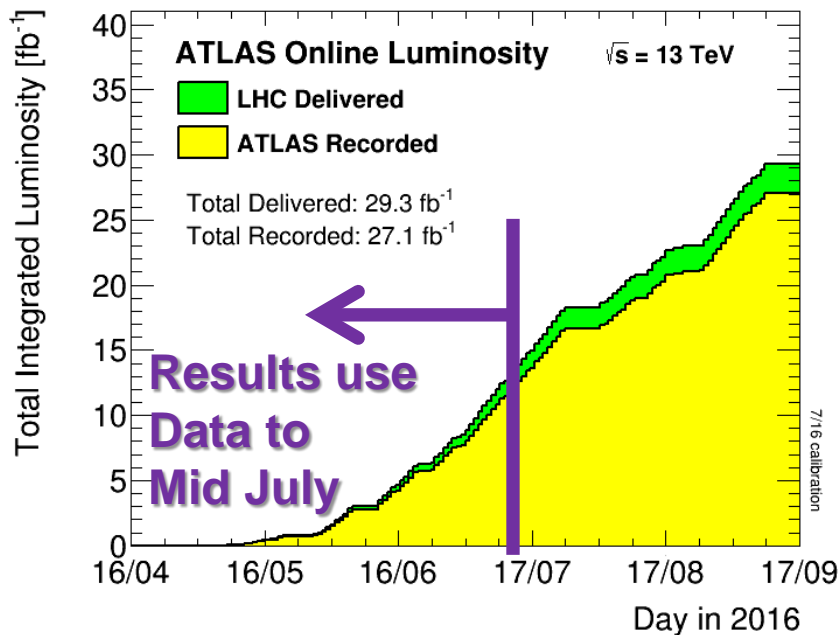
- **ATLAS data-taking**
- **ATLAS detector status and issues**
- **Computing challenges for Run-2**
- **Selected physics analysis highlights**
- **ATLAS Open Data**
- **Summary**

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$\sqrt{s}=13$ TeV ATLAS Data Sample

- Excellent 2016 LHC Performance – welcome the challenge!
- ICHEP16 data set: reporting results with up to 15 fb^{-1}
 - 2015+2016 together, including more recent results
- Luminosity uncertainty
 - 2015: $\pm 2.1\%$
 - 2016: $\pm 3.7\%$ (preliminary)
- Overall data-taking (rec./del.) efficiency = 92.3%
 - > 95% for recent runs



Detector and Offline Data Quality

Subdetector	Number of Channels	Approximate Operational Fraction	
Pixels	92 M	98.0%	
SCT Silicon Strips	6.3 M	98.6%	
TRT Transition Radiation Tracker	350 k	97.2%	
LAr EM Calorimeter	170 k	100%	
Tile calorimeter	5200	99.0%	
Hadronic endcap LAr calorimeter	5600	99.5%	
Forward LAr calorimeter	3500	99.7%	
LVL1 Calo trigger	7160	99.9%	
LVL1 Muon RPC trigger	383 k	99.8%	
LVL1 Muon TGC trigger	320 k	99.9%	
MDT Muon Drift Tubes	357 k	99.7%	
CSC Cathode Strip Chambers	31 k	97.7%	
RPC Barrel Muon Chambers	383 k	96.6%	
TGC Endcap Muon Chambers	320 k	99.6%	
ALFA	10 k	99.9 %	
AFP	NEW in 2016	188 k	98.8 %

Detector operational channel levels:

- **At or better than Run-1 levels**
- **Very small changes during 2016**

Data Quality efficiency using data up to TS2:

- **Overall: 91.9%**
- **Incl. Toroid Off: 94.4%**

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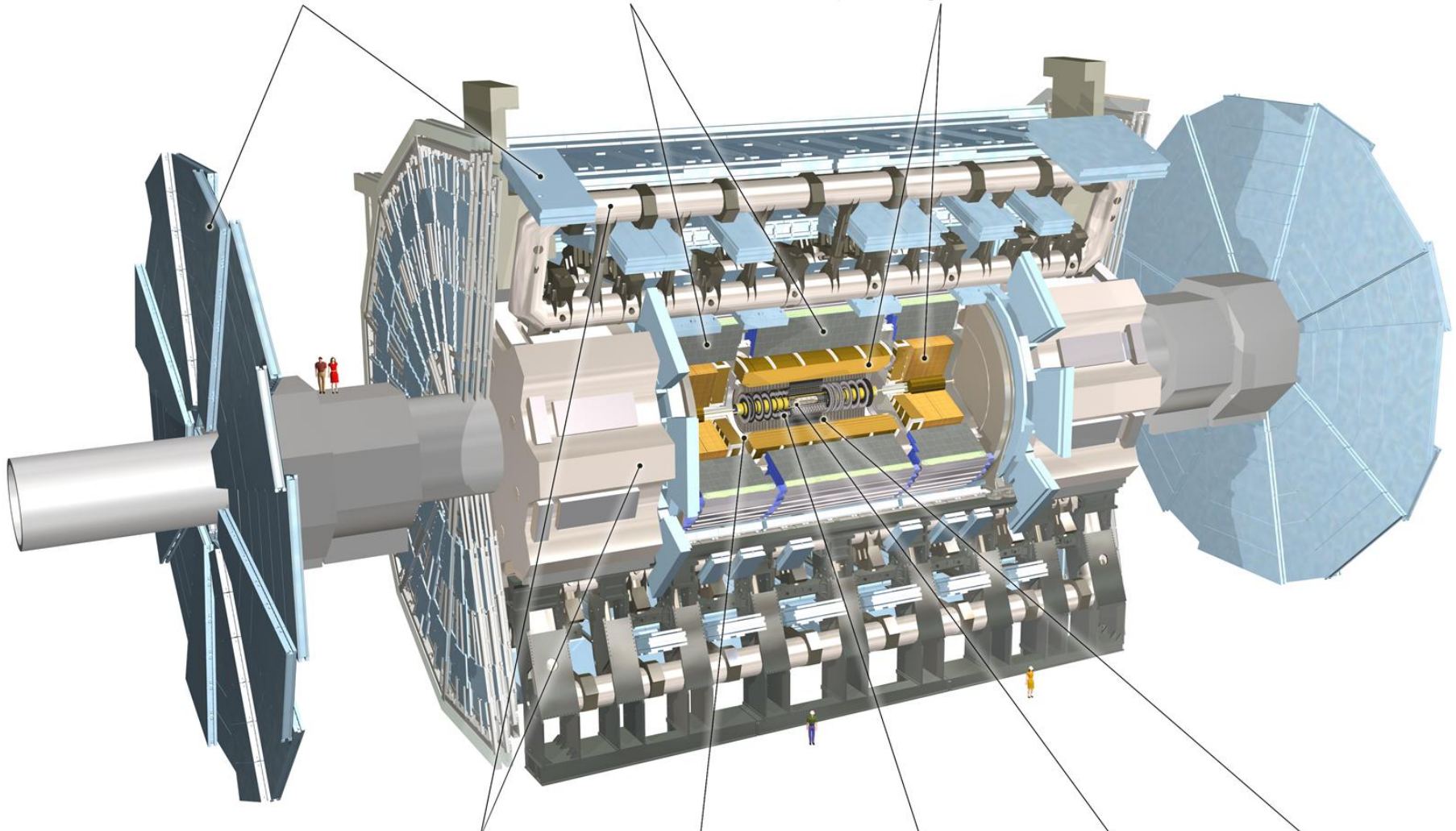
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ATLAS Detector

Muon Detectors

Tile Calorimeter

Liquid Argon Calorimeter



Toroid Magnets

Solenoid Magnet

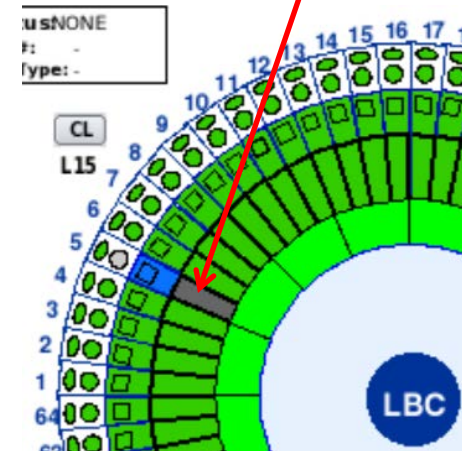
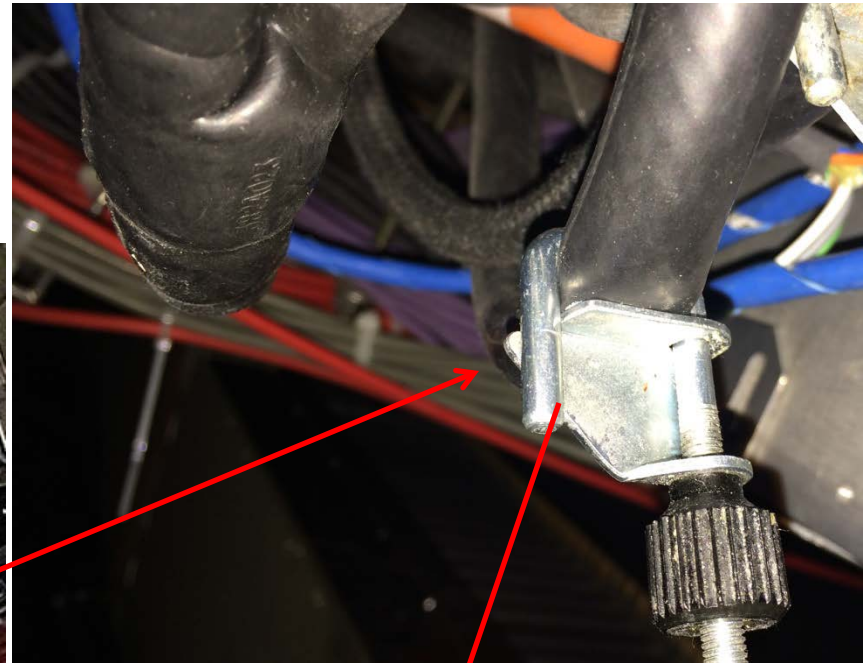
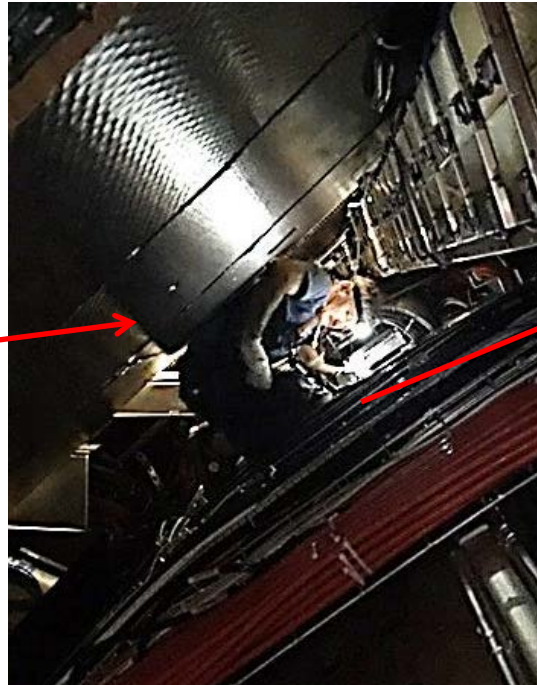
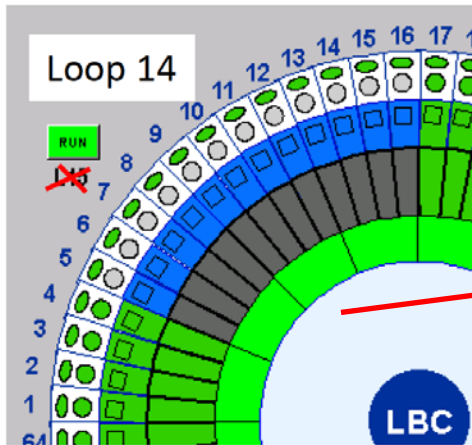
SCT Tracker

Pixel Detector

TRT Tracker

Calorimeter Cooling

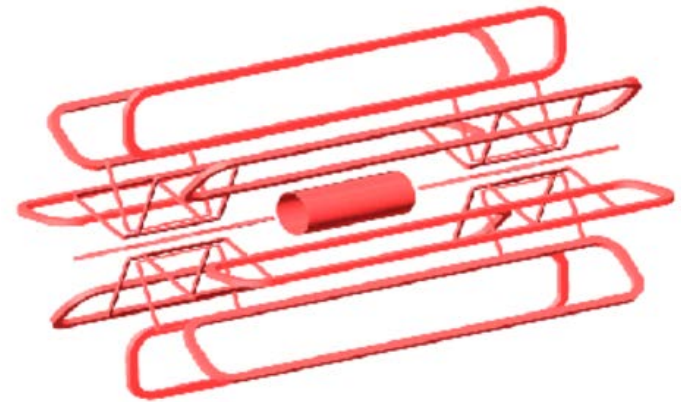
- 20 August 2016: Tile Calorimeter front-end electronics cooling issue (air leak into water loop)
 - 12 Tile modules turned off due to high temperatures



- Three accesses during MD2 in difficult environment
 - Isolate to one module
 - Small performance impact

ATLAS Magnets

- **Very rare toroid fast dump from full field in physics on 17 August 2016**
 - **Schneider PLC CPU crash**
 - **One week recovery from fast dump**
 - **During recovery, solenoid also turned off (LHe levels)**
 - **$\approx 275 \text{ pb}^{-1}$ lost due to solenoid off**
- **Data loss minimized with flexibility of LHC to shift MD2 plans**
- **Investigating with Be-ICS the PLC issue for a longer term, more robust, solution**
 - **Different PLC, add redundancy, ...**



ATLAS Magnets

- **Very rare fast dump from full field in physics**

ATLAS would like to thank everyone from the

- **Sch** LHC teams and LHC program coordinators who
- **One** shifted around the MD (**including on a**
- **Duri** **weekend in mid August!**) to minimize the
- off** (physics data taken with the ATLAS magnets off

- ≈

- **Data loss to shift**

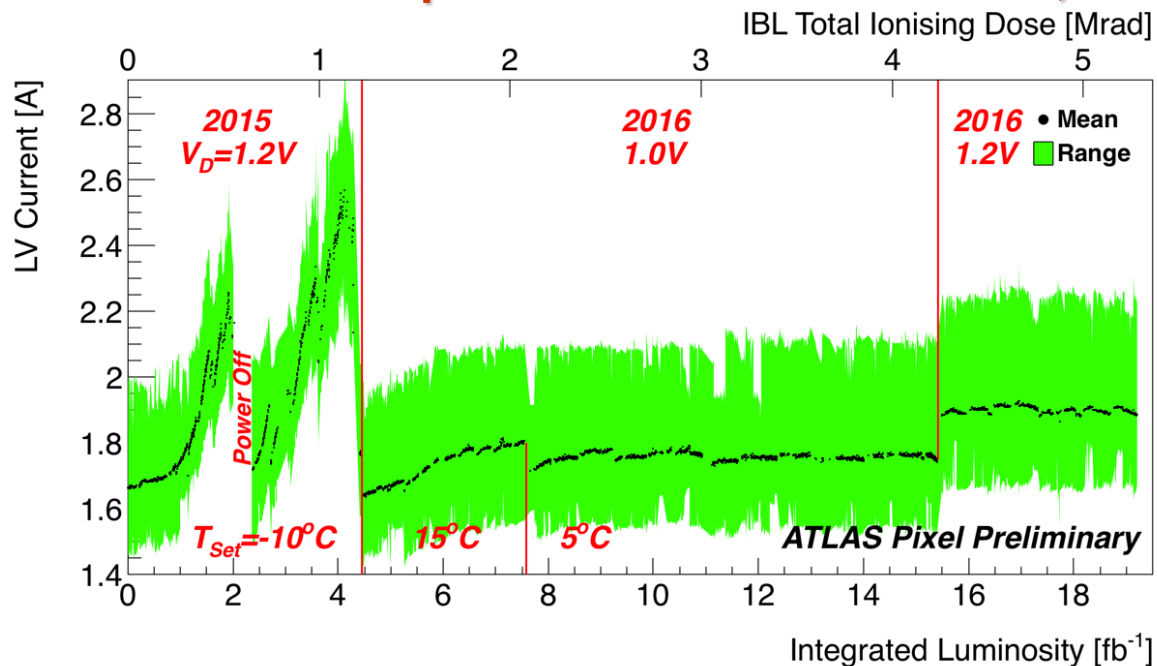
ATLAS very much appreciates this, and hope that it will be a long time (if ever) before we need to make such an exceptional request again!

- **Investigating with 2016 the PLC issues for a longer term, more robust, solution**

- **Different PLC, add redundancy, ...**

IBL – FE susceptibility @ low TID

- **IBL (innermost pixels @ R=33mm)**
 - LV current drift related to TID → major concern with increasing \mathcal{L}_{PEAK}
 - Setup task force & performed irradiation tests
 - ⇒ **IBL to room temperature at start of 2016 run, reducing in steps**

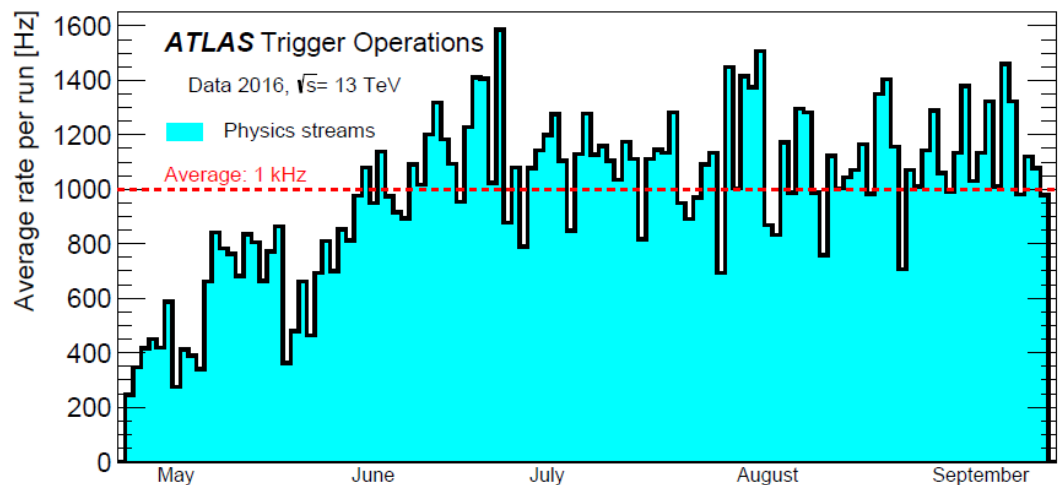


- Phenomenon can be parametrized by formula relating defect creation in NMOS STI (shallow trench isolation) to temperature and dose rate
 - Consider this issue behind us **BUT** are monitoring carefully

Trigger Menus and Rates

- **Complex trigger menu**

- **Physics and monitoring**
- **Typically ≈ 2000 items**
- **Stable primaries**
- **Level 1: ≈ 85 kHz**
- **To Tier-0: ≈ 1 kHz**

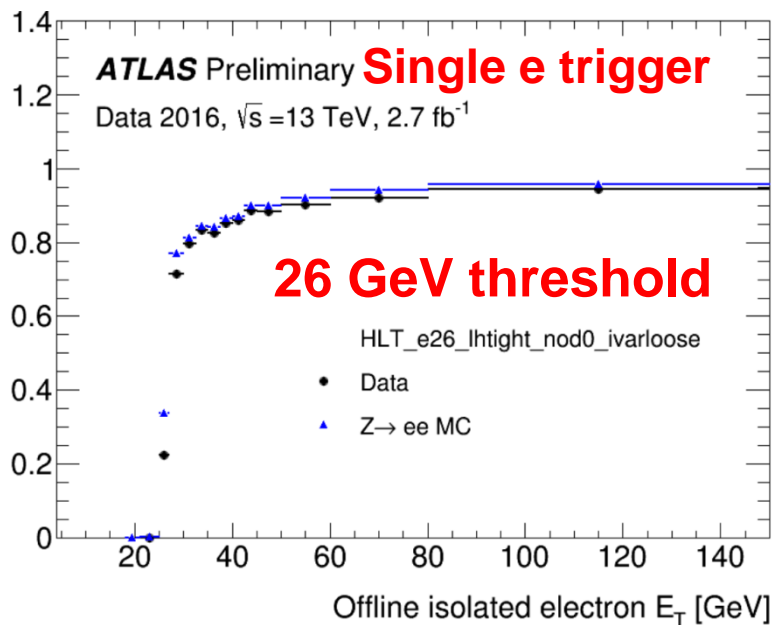


ATLAS runs

- **Main Primary Triggers**

Trigger	Trigger thresholds at HLT [GeV]
single leptons	Isolated μ , $p_T > 26$
	Isolated e, $E_T > 26$
$E_{T, \text{miss}}$	> 110 in MHT
single jet	$p_T > 380$
single photon	$E_T > 140$
di-muon for B-phys	$p_T(\mu_1, \mu_2) > 6, 6$ + topological/mass cuts
di-tau	$p_T(\tau_1, \tau_2) > 35, 25$ + jet requirement at L1
di-photon	$p_T(\gamma_1, \gamma_2) > 35, 25$

Trigger Efficiency

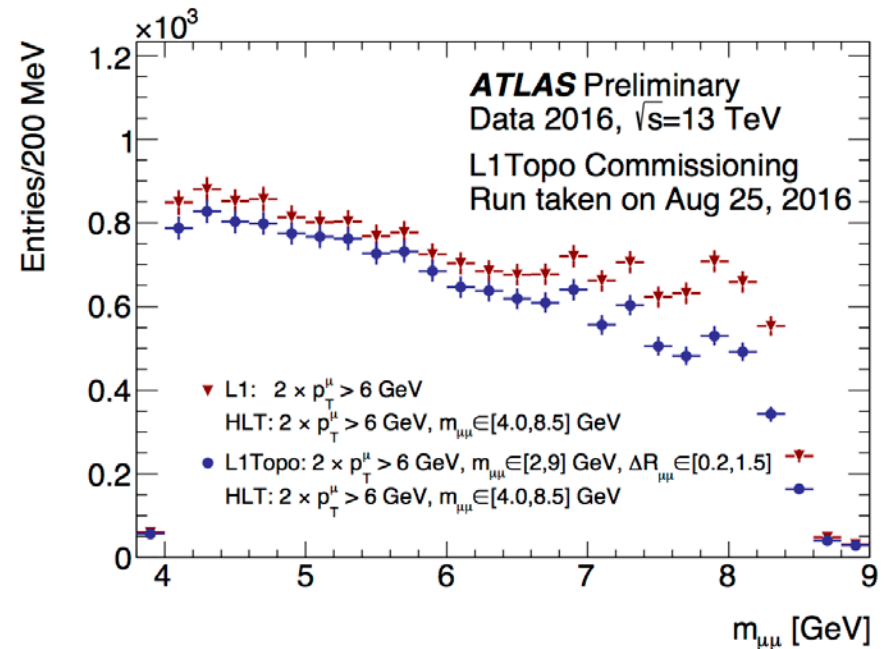
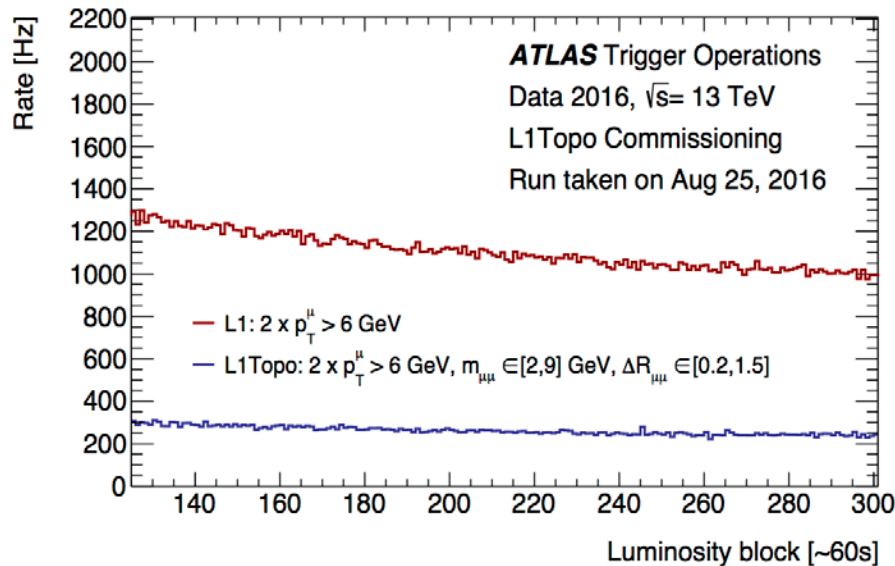


Level 1 Topological Trigger – L1Topo

- L1Topo**

- Commissioned in 2016
- Recently enabled for physics
- Low- p_T dimuon / ditau signatures

– Example from fill in August with $\mathcal{L}_{\text{PEAK}}=2.9 \times 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$, pileup=31.9

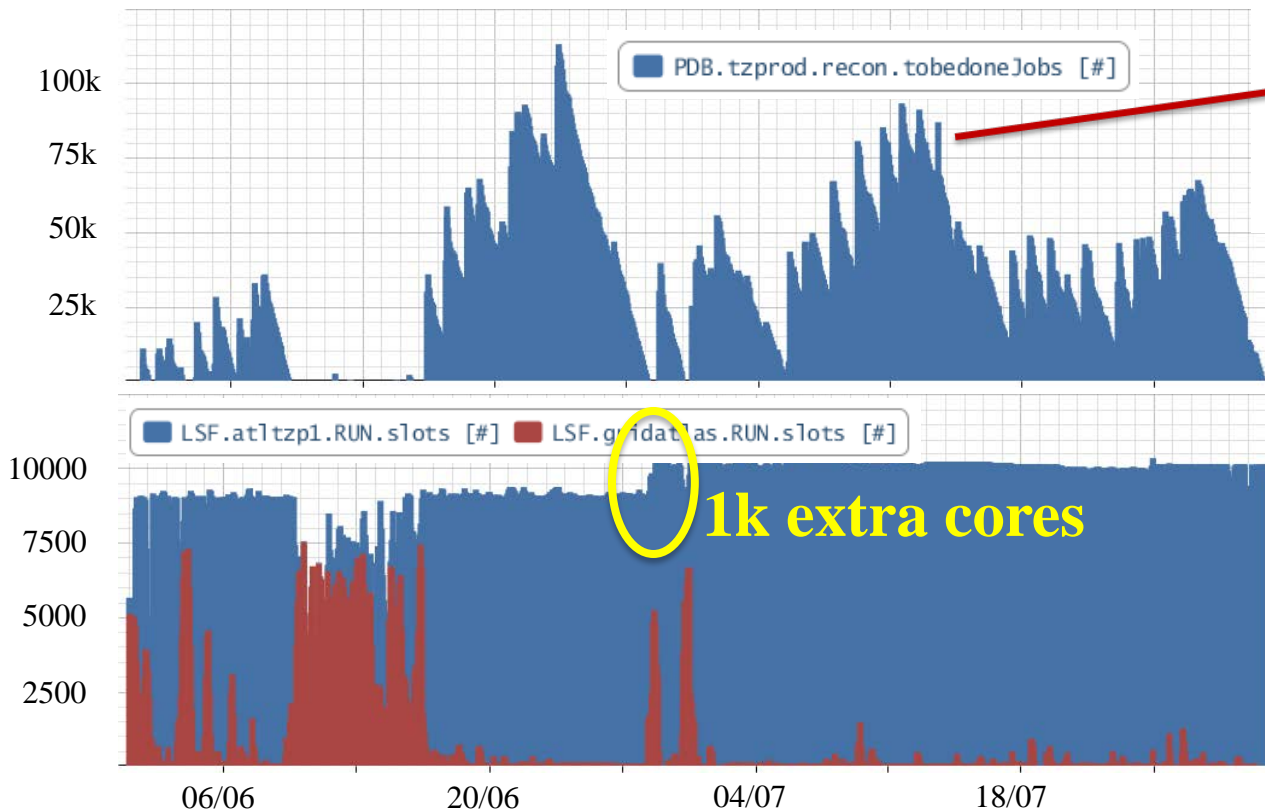


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CERN Tier-0 in 2016

- Major improvements in 2016
 - Tuning dedicated hardware for ATLAS use case
 - Lightweight metadata, I/O improvements
 - “RAWtoALL” workflow
- Still had to “spill-over” 3 (large) runs to grid



Tier-0 Processing Backlog and Spillover



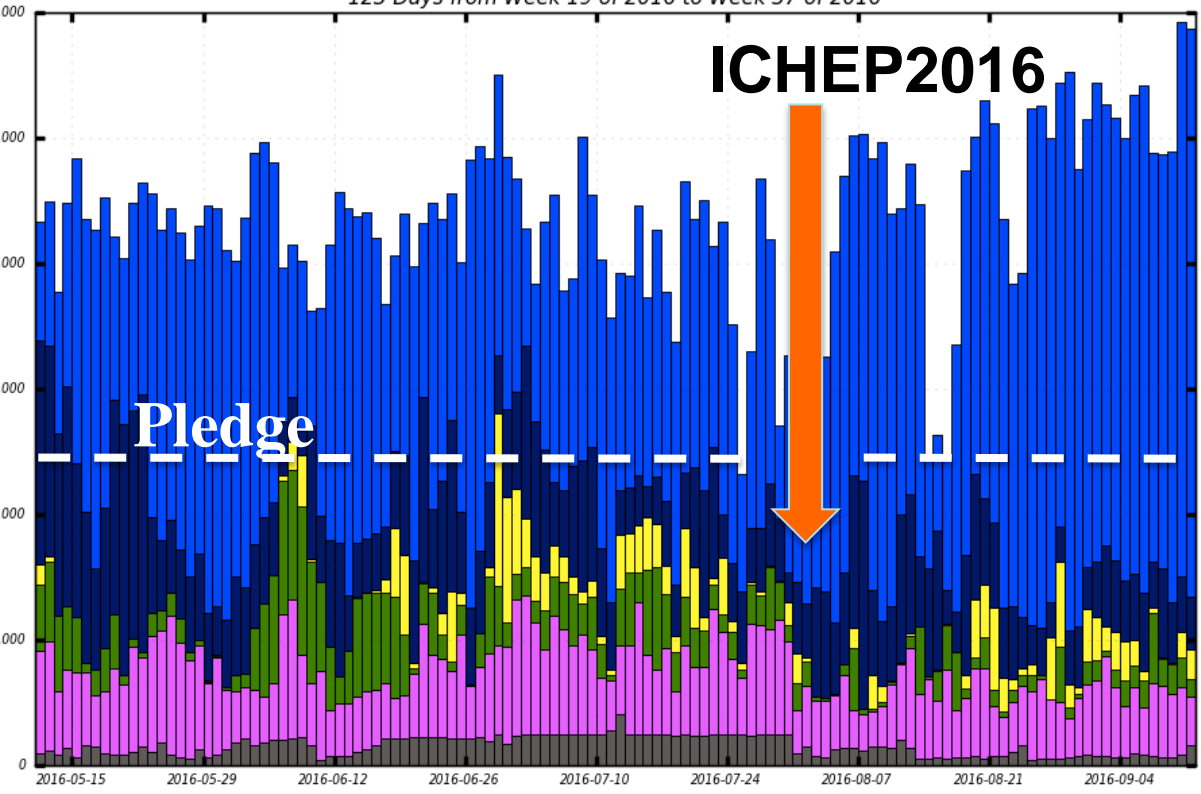
Processing at Tier-0
Grid jobs backfill rare available slots

Processing: data and MC

- Fully leverage all pledged resources
- And leverage opportunistic resources

dashboard

Slots of Running Jobs
123 Days from Week 19 of 2016 to Week 37 of 2016



- MC simulation and event generation
- MC reconstruction
- Partial data reprocessing
- Analysis derivation Production
- User Analysis

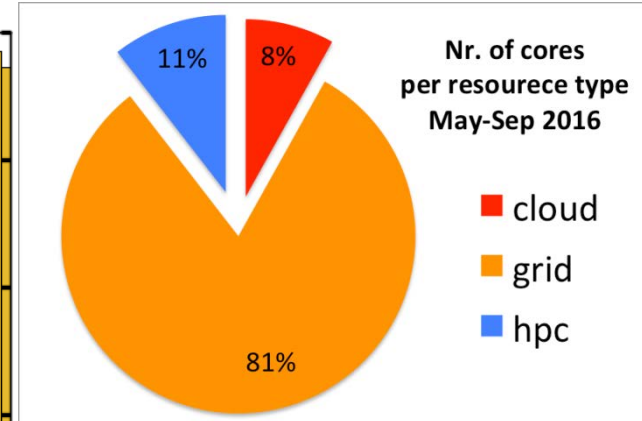
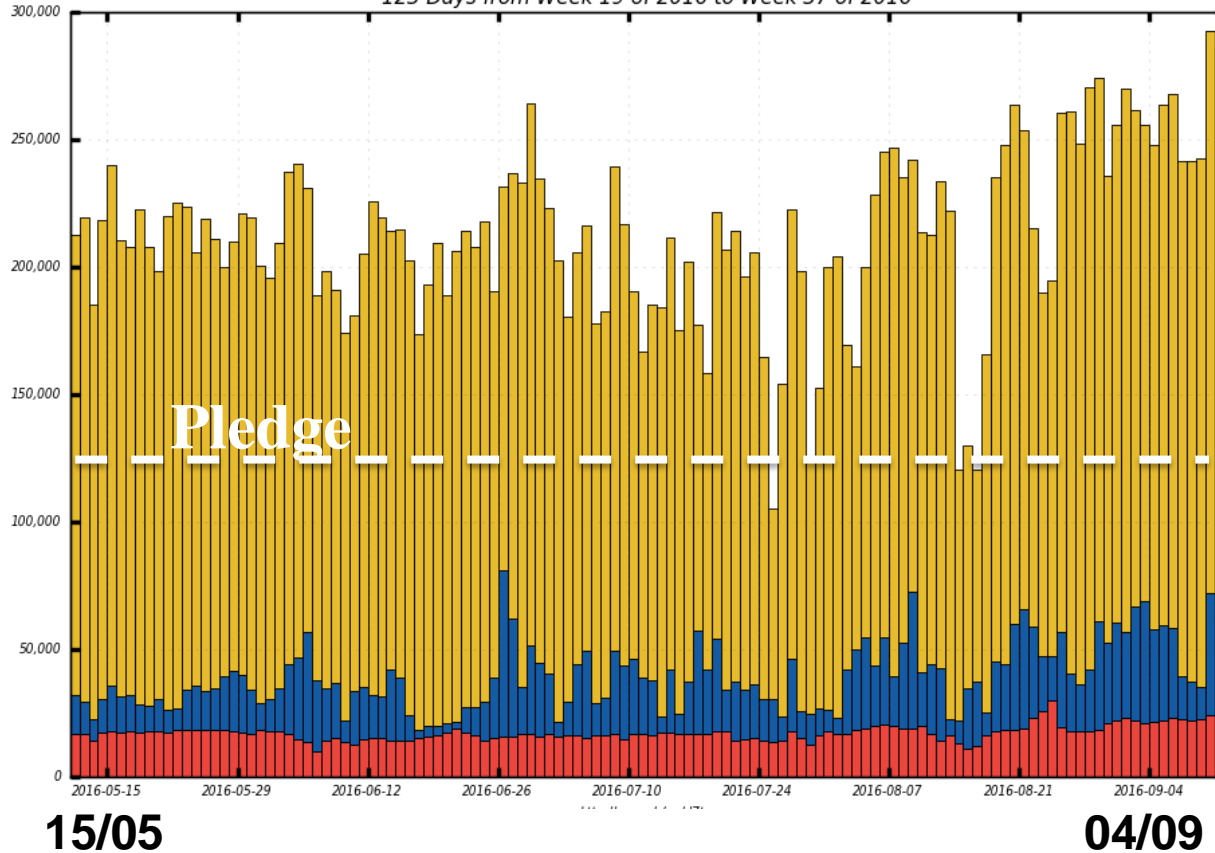
15/05

04/09

Heterogeneous Resources

dashboard

Slots of Running Jobs
123 Days from Week 19 of 2016 to Week 37 of 2016



20% of data processing happens today on non grid resources

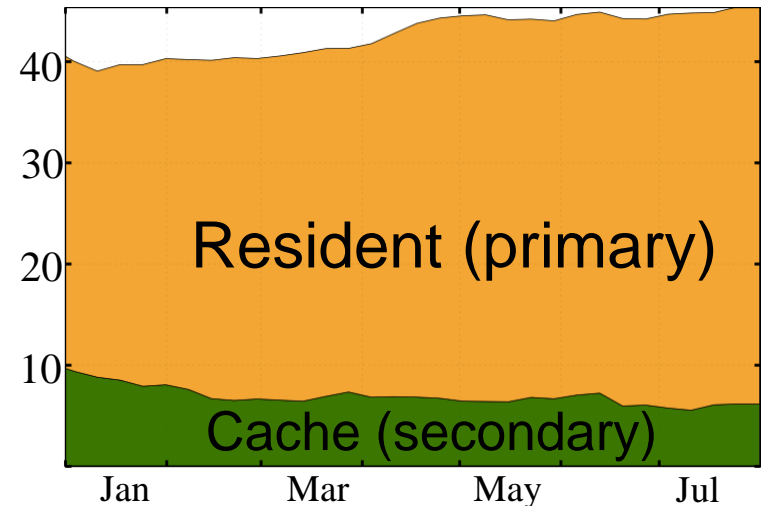
Integration of non Grid resources in ATLAS is a big investment with a big return

Automation is the key

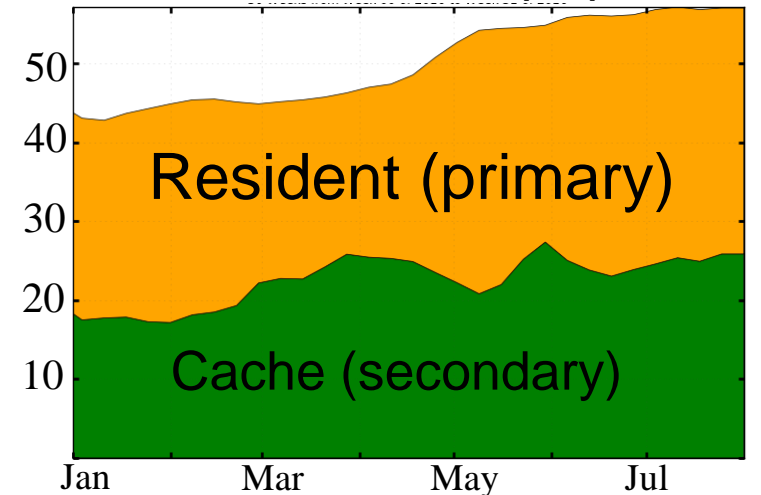
Remarks on 2016 Computing (and beyond)

- **Tier-1 and Tier-2 fully used**
 - CPU fully used
 - + significant opportunistic resources
 - Available disks are full
 - Aggressively using our “lifetime” deletion model to keep some space
 - Ability to cache secondary datasets increasingly limited
- **Resources for 2017 requirements still needed**
 - Must reconstruct 2015+2016 data and generate MC samples in EYETS
- **Require additional resources for 2017 and 2018 to exploit excellent LHC performance**
 - LHC efficiency: **increase by 50%** from previous projections (2016 experience)
 - ATLAS computing resources: **increase $\mathcal{O}(20\%)$** to complete physics programme
 - More details in Ian Bird’s talk in this session

Disk Use at T1s (PB)



Disk use at T2s (PB)



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ICHEP2016 and Beyond



ATLAS EXPERIMENT - Public Results

ATLAS 13 TeV Results for 2016 Summer Conferences

- Physics Analysis and Performance
- Object Performance and Trigger

This page provides a compact summary of the public results on 13 TeV proton-proton collision data prepared by ATLAS for the 2016 summer conferences (ICHEP onwards). For questions please contact

This page also provides links to [ATLAS Physics Briefings](#) for specific results. These are intended to provide a general introduction to ATLAS physics results for a non-specialist audience.

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Physics Analysis and Performance

Topic	Document type	Short title (link to ATLAS Physics Briefing)	Reference and Link	Release conference
SUSY physics	Conference note	Searches for SUSY with two same-sign or three leptons and jets (briefing)	ATLAS-CONF-2016-037	ICHEP
SUSY physics	Conference note	Searches for SUSY top squarks with Z bosons (briefing)	ATLAS-CONF-2016-038	ICHEP
SUSY physics	Conference note	Searches for SUSY top squarks in events with tau leptons (briefing)	ATLAS-CONF-2016-048	ICHEP
SUSY physics	Conference note	Searches for SUSY top squarks in events with one lepton (briefing)	ATLAS-CONF-2016-050	ICHEP
SUSY physics	Conference note	Searches for SUSY in events with multiple b-jets (briefing)	ATLAS-CONF-2016-052	ICHEP
SUSY physics	Conference note	Searches for SUSY in events with one lepton (briefing)	ATLAS-CONF-2016-054	ICHEP
SUSY physics	Conference note	Searches for RPV SUSY signatures with multi-jet events (briefing)	ATLAS-CONF-2016-057	ICHEP
SUSY physics	Conference note	Searches for SUSY in events with photons and ETmiss (briefing)	ATLAS-CONF-2016-066	ICHEP
SUSY physics	Conference note	Searches for SUSY in events with four or more leptons (briefing)	ATLAS-CONF-2016-075	ICHEP
SUSY physics	Conference note	Searches for SUSY top squarks in events with two leptons (briefing)	ATLAS-CONF-2016-076	ICHEP
SUSY physics	Conference note	Searches for SUSY top squarks in events with no leptons (briefing)	ATLAS-CONF-2016-077	ICHEP
SUSY physics	Conference note	Searches for SUSY in events with jets and ETmiss (briefing)	ATLAS-CONF-2016-078	ICHEP
SUSY physics	Conference note	Searches for electroweak SUSY particles in events with two tau leptons	ATLAS-CONF-2016-063	SEARCH NEW
SUSY physics	Conference note	Searches for R-Parity violating SUSY particles in events with one lepton and jets	ATLAS-CONF-2016-064	SEARCH NEW
SUSY physics	Conference note	Searches for SUSY particles in events with large jet multiplicity	ATLAS-CONF-2016-065	SEARCH NEW
SUSY physics	Conference note	Searches for electroweak SUSY particles in events with two or three leptons	ATLAS-CONF-2016-066	SEARCH NEW
Top quark physics	Conference note	Differential cross-sections for top pair production with l+jets	ATLAS-CONF-2016-040	ICHEP
Top quark physics	Conference note	Top quark mass in the fully hadronic channel (8 TeV)	ATLAS-CONF-2016-064	ICHEP
Top quark physics	Conference note	Single top production in the Wt channel with 2015 data	ATLAS-CONF-2016-065	ICHEP
Higgs physics	Conference note	Searches for Higgs decays to muon pairs	ATLAS-CONF-2016-041	ICHEP
Higgs physics	Conference note	Searches for new physics in the Z-photon channel	ATLAS-CONF-2016-044	ICHEP
Higgs physics	Conference note	Searches for new physics in the ZZ-tlinn channel	ATLAS-CONF-2016-056	ICHEP
Higgs physics	Conference note	Searches for tH production with multi-lepton events (briefing)	ATLAS-CONF-2016-058	ICHEP
Higgs physics	Conference note	Searches for VBF Higgs production with a photon (briefing)	ATLAS-CONF-2016-063	ICHEP
Higgs physics	Conference note	Measurements of Higgs couplings in the diphoton channel	ATLAS-CONF-2016-067	ICHEP
Higgs physics	Conference note	Combination of searches for tH production (briefing)	ATLAS-CONF-2016-058	ICHEP
Higgs physics	Conference note	Searches for Higgs pair production in the WW-2-photon channel	ATLAS-CONF-2016-071	ICHEP
Higgs physics	Conference note	Searches for new physics in the high mass WW channel	ATLAS-CONF-2016-074	ICHEP
Higgs physics	Conference note	Measurements of Higgs couplings in the 4-lepton channel	ATLAS-CONF-2016-079	ICHEP
Higgs physics	Conference note	Searches for tH production with Higgs decays to bb (briefing)	ATLAS-CONF-2016-080	ICHEP
Higgs physics	Conference note	Combination of Higgs measurements in the 4-lepton and diphoton channels	ATLAS-CONF-2016-081	ICHEP
Higgs physics	Conference note	Searches for heavy Higgs bosons decaying to tautau	ATLAS-CONF-2016-085	ICHEP
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Higgs and Exotic physics	Conference note	Searches for high mass diphoton resonances (briefing)	ATLAS-CONF-2016-059	ICHEP
Exotic physics	Conference note	Searches for non-prompt lepton jets	ATLAS-CONF-2016-042	ICHEP
Exotic physics	Conference note	Searches for new high mass dilepton resonances	ATLAS-CONF-2016-045	ICHEP
Exotic physics	Conference note	Searches for Higgs pair production in the 4 b-jet channel (briefing)	ATLAS-CONF-2016-049	ICHEP
Exotic physics	Conference note	Searches for new physics with same-sign dilepton events	ATLAS-CONF-2016-051	ICHEP
Exotic physics	Conference note	Searches for new physics with VBF production of WW resonances	ATLAS-CONF-2016-053	ICHEP
Exotic physics	Conference note	Searches for new physics decaying to dibosons in fully hadronic channels (briefing)	ATLAS-CONF-2016-055	ICHEP
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Exotic physics	Conference note	Searches for new physics with high mass dijet events	ATLAS-CONF-2016-099	ICHEP
Exotic physics	Conference note	Searches for new physics with high mass dijet + ISR events	ATLAS-CONF-2016-070	ICHEP
Exotic physics	Conference note	Searches for single vector-like quarks decaying to Wb in the 1-lepton channel	ATLAS-CONF-2016-072	ICHEP
Exotic physics	Conference note	Searches for heavy Higgs bosons decaying to top quarks at 8 TeV	ATLAS-CONF-2016-073	ICHEP
Exotic physics	Conference note	Searches for new physics decaying to dibosons in the l-l+qq and nu-nu+qq channels (briefing)	ATLAS-CONF-2016-082	ICHEP
Exotic physics	Conference note	Searches for new physics decaying to VH in the fully hadronic channel (briefing)	ATLAS-CONF-2016-083	ICHEP
Exotic physics	Conference note	Searches for high mass resonances decaying to pairs of dijets	ATLAS-CONF-2016-084	ICHEP
Exotic physics	Conference note	Searches for dark matter production in events with b-jets and ETmiss	ATLAS-CONF-2016-088	ICHEP
Standard Model physics	Conference note	Differential measurements of WZ production at 13 TeV (briefing)	ATLAS-CONF-2016-043	ICHEP
Standard Model physics	Conference note	Z-jets production at 13 TeV	ATLAS-CONF-2016-046	ICHEP
Standard Model physics	Conference note	WW production at 13 TeV (briefing)	ATLAS-CONF-2016-090	ICHEP
Standard Model physics	Conference note	Inclusive jet cross-section at 13 TeV	ATLAS-CONF-2016-092	QC&D @LHC NEW
B-Physics and Light States	Conference note	Prompt di-J/psi production and double parton scattering (8 TeV)	ATLAS-CONF-2016-047	ICHEP

- ATLAS produced 70 new sets of results for ICHEP 2016

- Establish detector & trigger performance

- Re-observe SM processes

- 44 “searches” notes:

- 13—15 fb⁻¹ √s = 13 TeV data (2015+2016)

- No significant excesses observed

- Previous modest excesses not enhanced

- New results since ICHEP

- 9 searches: 13 TeV (2015+2016)

- 1 measurement: 13 TeV (2015)

- 2 measurement: 8 TeV (2012)

- + new heavy ion results for “Hard Probes”

- Will show a few 13 TeV results (mostly 2016)

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<https://twiki.cern.ch/twiki/bin/view/AtlasPublic/Summer2016-13TeV>

- Previous modest excesses not enhanced

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Exotic physics	Conference note	Searches for new physics decaying to dibosons in the l-nu+qq channel (briefing.pdf)	ATLAS-CONF-2016-052.pdf	ICHEP
Exotic physics	Conference note	Searches for new physics with high mass dijet events	ATLAS-CONF-2016-059.pdf	ICHEP
Exotic physics	Conference note	Searches for new physics with high mass dijet + ISR events	ATLAS-CONF-2016-070.pdf	ICHEP
Exotic physics	Conference note	Searches for single vector-like quarks decaying to Wb in the 1-lepton channel	ATLAS-CONF-2016-072.pdf	ICHEP
Exotic physics	Conference note	Searches for heavy Higgs bosons decaying to top quarks at 8 TeV	ATLAS-CONF-2016-073.pdf	ICHEP
Exotic physics	Conference note	Searches for new physics decaying to dibosons in the l+l+qq and nu+nu+qq channels (briefing.pdf)	ATLAS-CONF-2016-082.pdf	ICHEP
Exotic physics	Conference note	Searches for new physics decaying to VH in the fully hadronic channel (briefing.pdf)	ATLAS-CONF-2016-083.pdf	ICHEP
Exotic physics	Conference note	Searches for new high mass resonances decaying to pairs of dijets	ATLAS-CONF-2016-084.pdf	ICHEP
Exotic physics	Conference note	Searches for dark matter production in events with b-jets and ETmiss	ATLAS-CONF-2016-086.pdf	ICHEP
Standard Model physics	Conference note	Differential measurements of WZ production at 13 TeV (briefing.pdf)	ATLAS-CONF-2016-043.pdf	ICHEP
Standard Model physics	Conference note	Z-jets production at 13 TeV	ATLAS-CONF-2016-046.pdf	ICHEP
Standard Model physics	Conference note	WW production at 13 TeV (briefing.pdf)	ATLAS-CONF-2016-050.pdf	ICHEP
Standard Model physics	Conference note	Inclusive jet cross-section at 13 TeV	ATLAS-CONF-2016-062.pdf	QC&D @LHC NEW
B-Physics and Light States	Conference note	Prompt di-J/psi production and double parton scattering (8 TeV)	ATLAS-CONF-2016-047.pdf	ICHEP

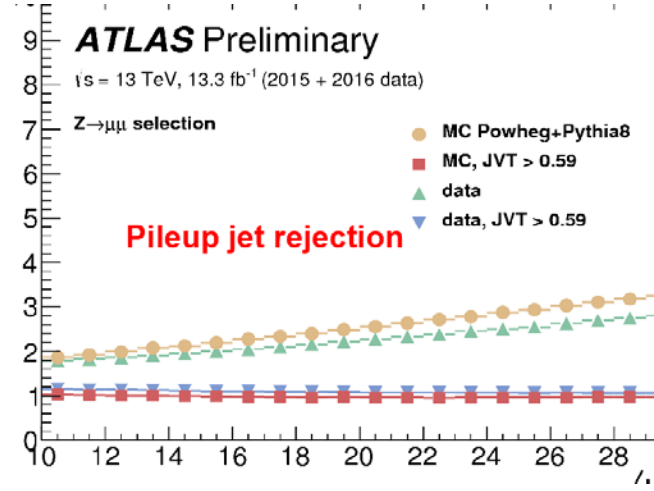
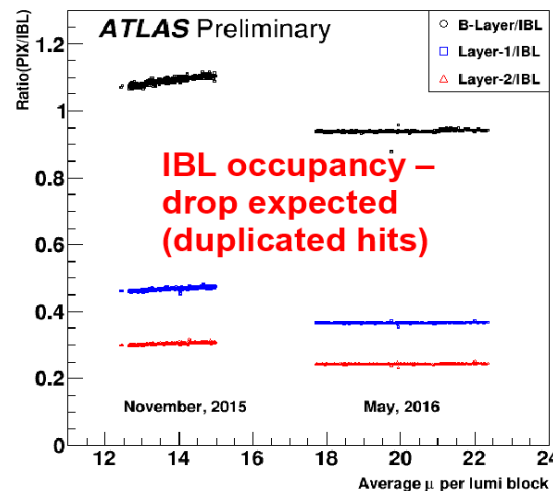
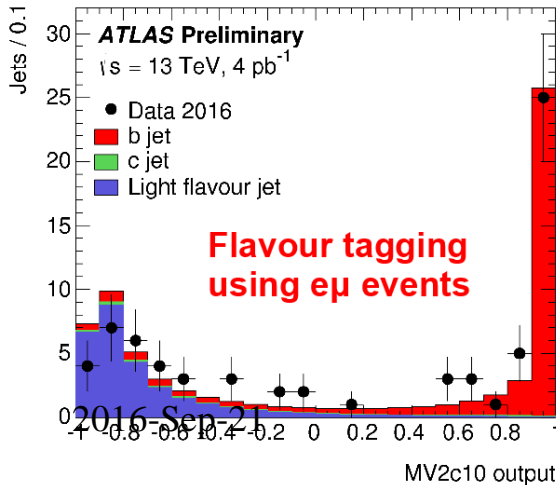
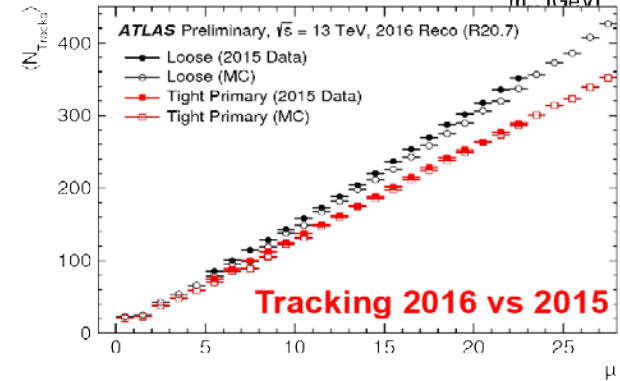
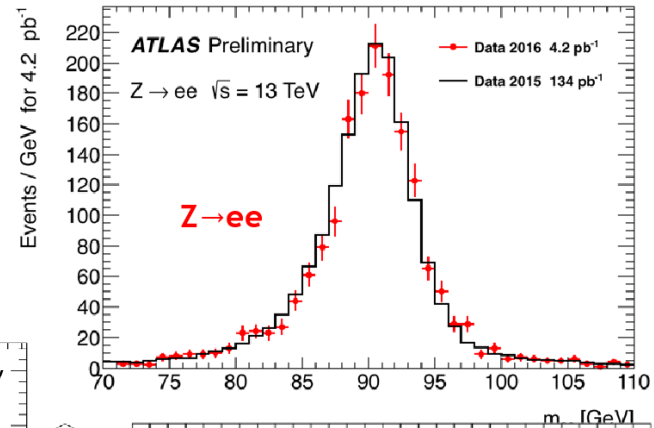
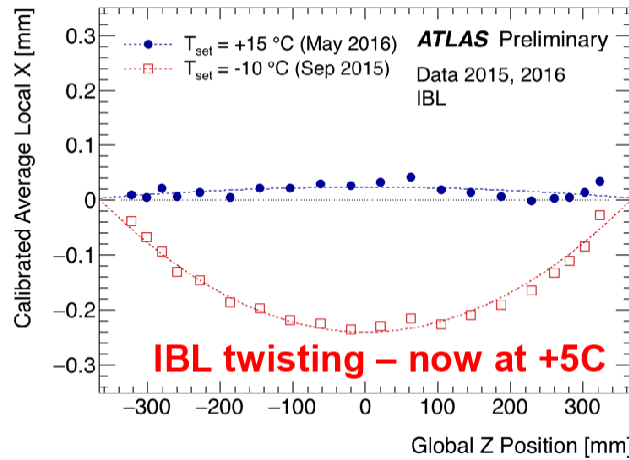
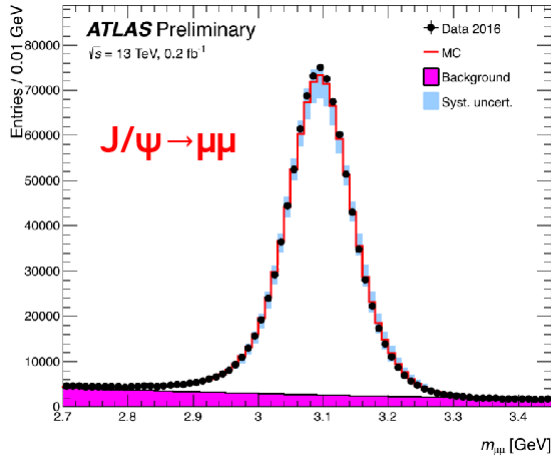
New results since ICHEP

- 9 searches: 13 TeV (2015+2016)
- 1 measurement: 13 TeV (2015)
- 2 measurement: 8 TeV (2012)
- + new heavy ion results for “Hard Probes”

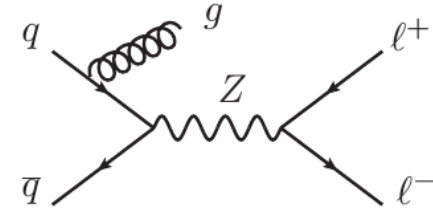
Will show a few 13 TeV results (mostly 2016)

Detector & Physics Performance Critical

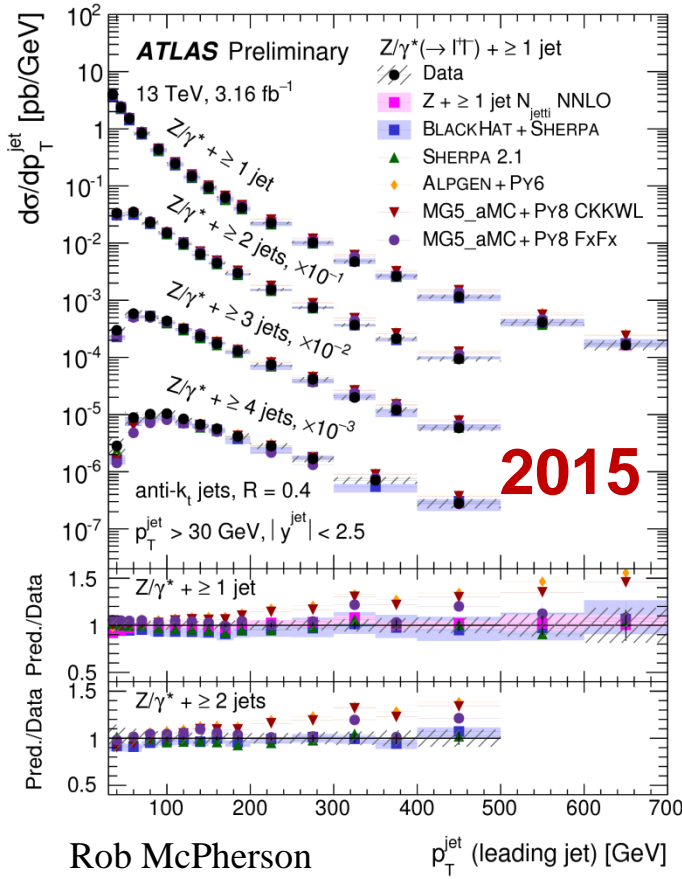
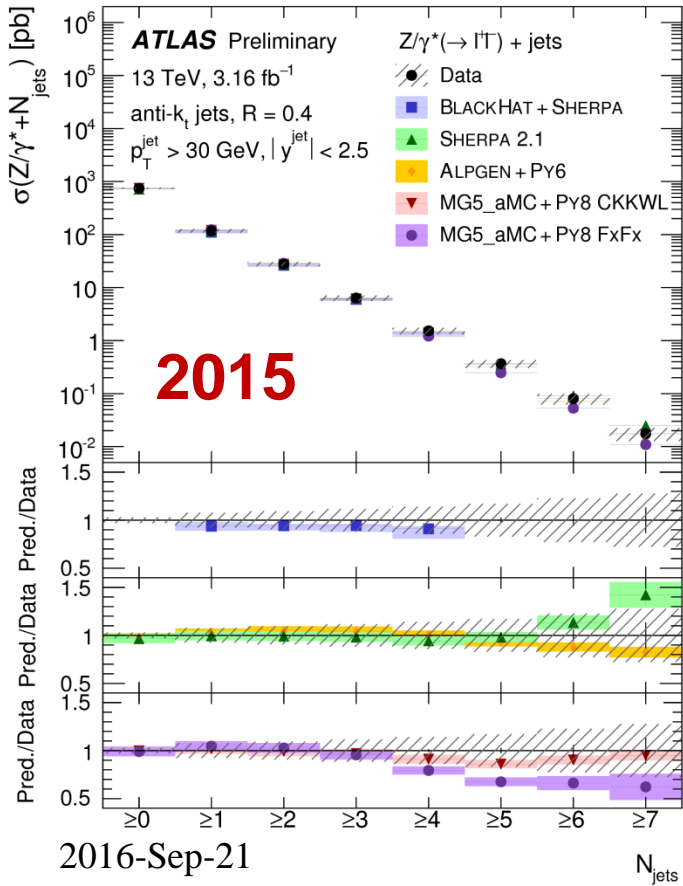
- Intensive work to establish physics performance with 2016 data
- Develop and demonstrate robust handling of pile-up



Z+jets: tests of NLO Generators

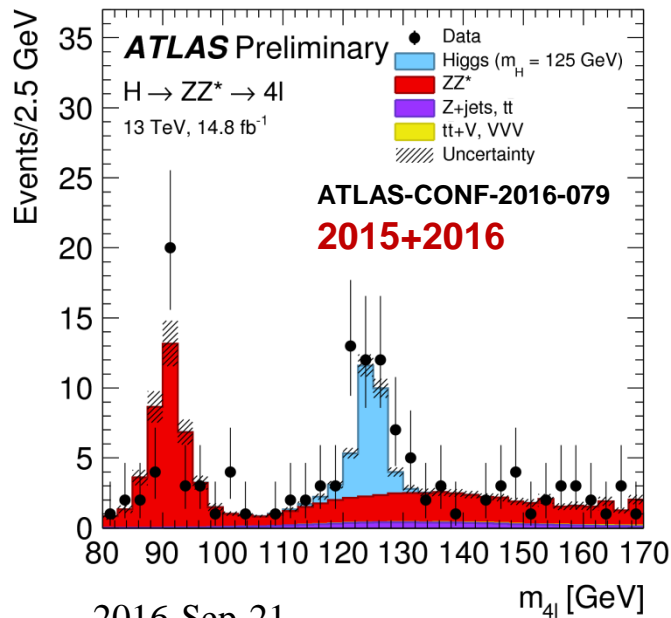
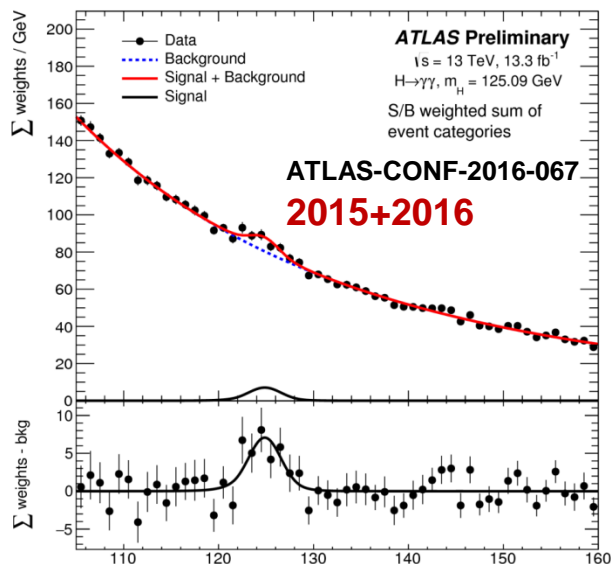


- ATLAS-CONF-2016-046
- Measure high jet multiplicities in 13 TeV data
 - Test NLO generators
 - V+jets are major backgrounds in searches



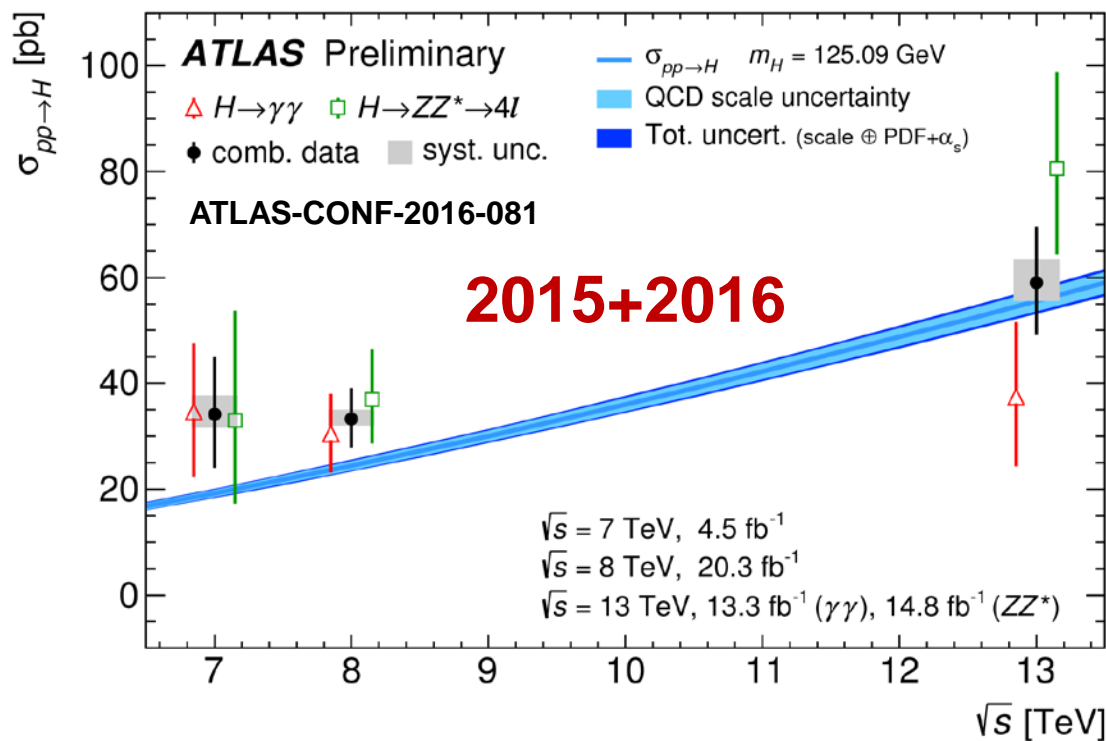
- Jet multiplicity
 - Main NLO generators good up to 6 jets
- Leading jet p_T
 - LO generators over predict high p_T tails
 - NLO provide better description

H(125) $\rightarrow \gamma\gamma, 4\ell$ & Combination



2016-Sep-21

- Combining $\gamma\gamma$ and 4ℓ channels
- Overall significance at 13 TeV: $\approx 10\sigma$

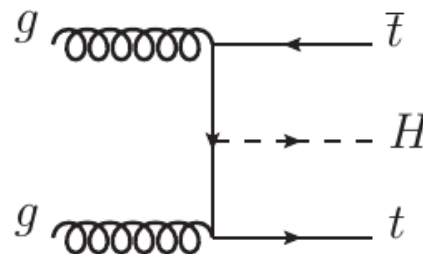
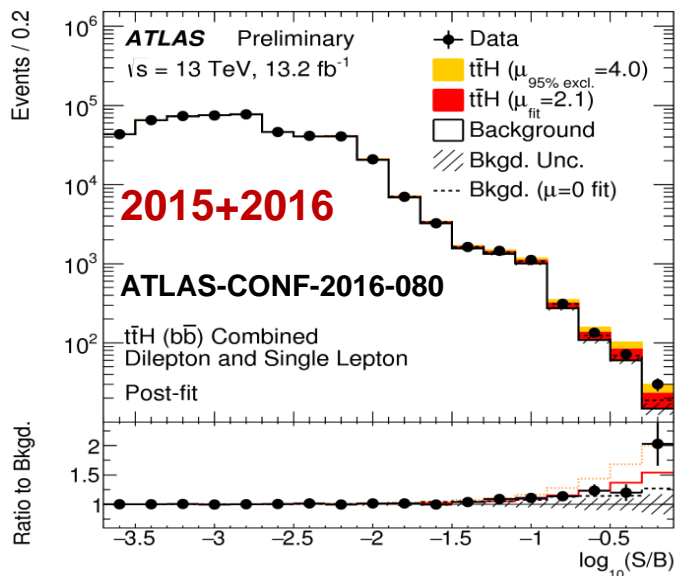


$$\sigma = 59.0^{+9.7}_{-9.2} \text{ (stat)}^{+4.4}_{-3.5} \text{ (sys)} \text{ pb}$$

$$\text{(SM: } 55.5^{+2.4}_{-3.4} \text{ pb)}$$

Search for ttH

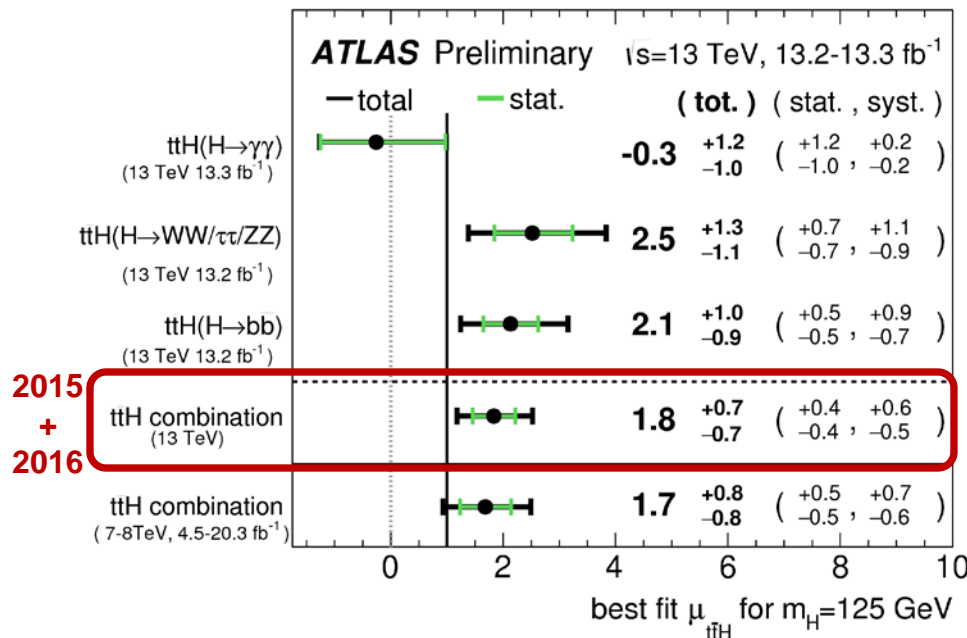
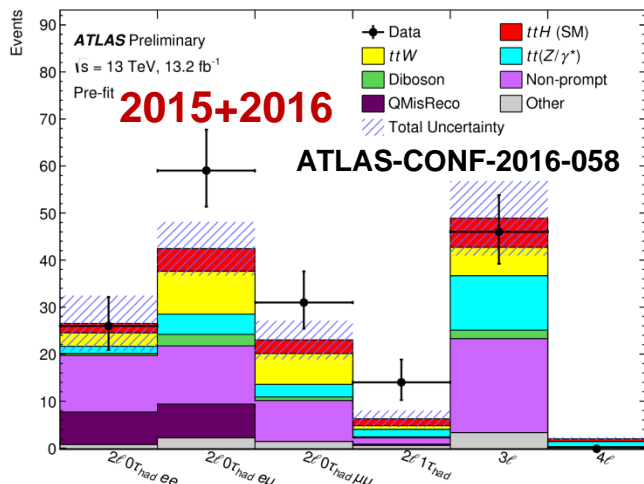
ttH, H → bb



- Combine three 13 TeV channels
- Observed: 2.8σ (expect 1.8σ)

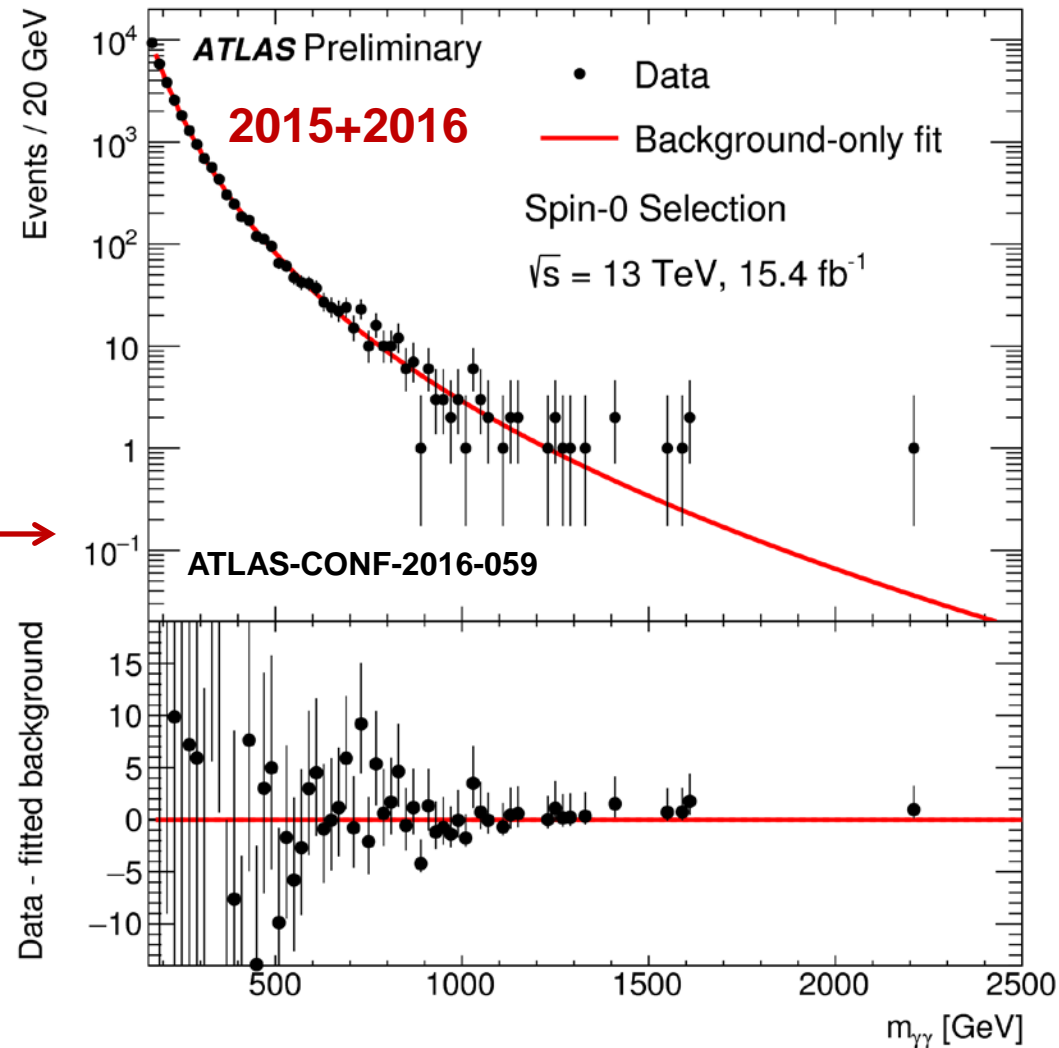
ATLAS-CONF-2016-068

ttH multilepton (esp H → WW, ττ)



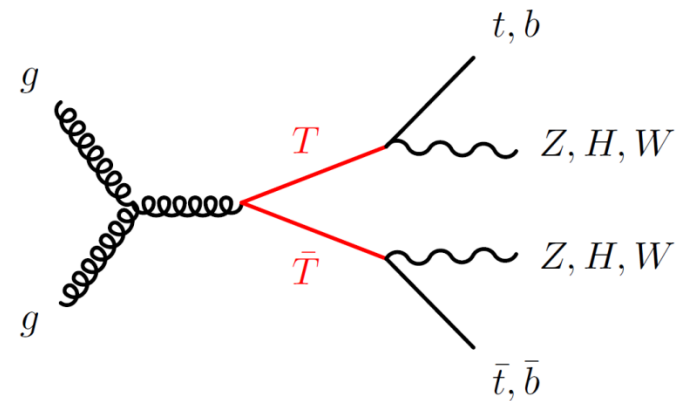
Searches for Diphotons

- **2015: moderate excess**
 ≈ 750 GeV 2.1σ global
- **2016: no clustering at any mass despite 3.8x more data**
- **2016 data consistent with 2015 at 2.7σ level**
- **Combined 2015+2016:** \longrightarrow
excess largely gone
- **2015 excess appears to have been a statistical fluctuation**

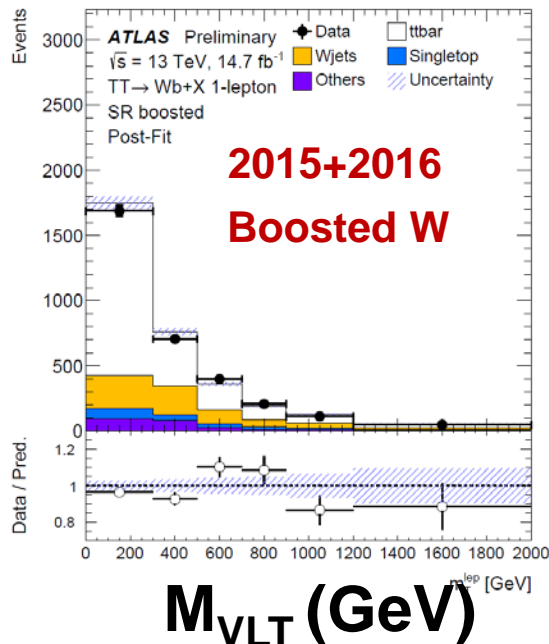


Vector-like Quarks

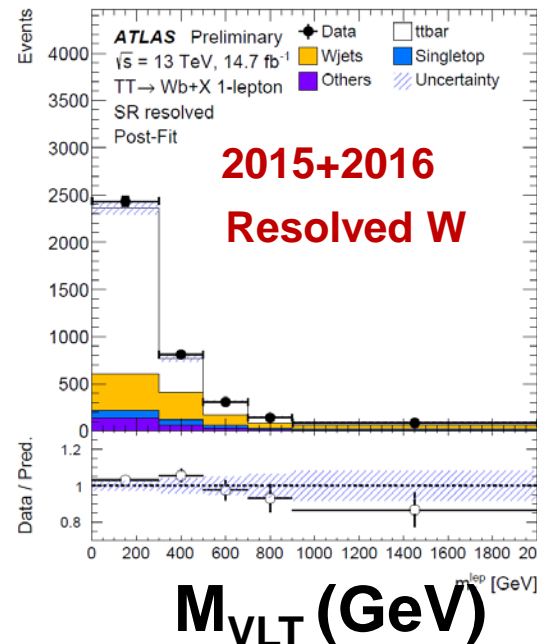
- **New: VLQ (colour-triplet, L&R-handed)**
 - Little Higgs, Composite Higgs models, ...
 - ATLAS has three **new** results in VLQ searches
 - Eg: $TT \rightarrow (W b) X \rightarrow (\text{jet jet } b) (\ell + \text{jets})$



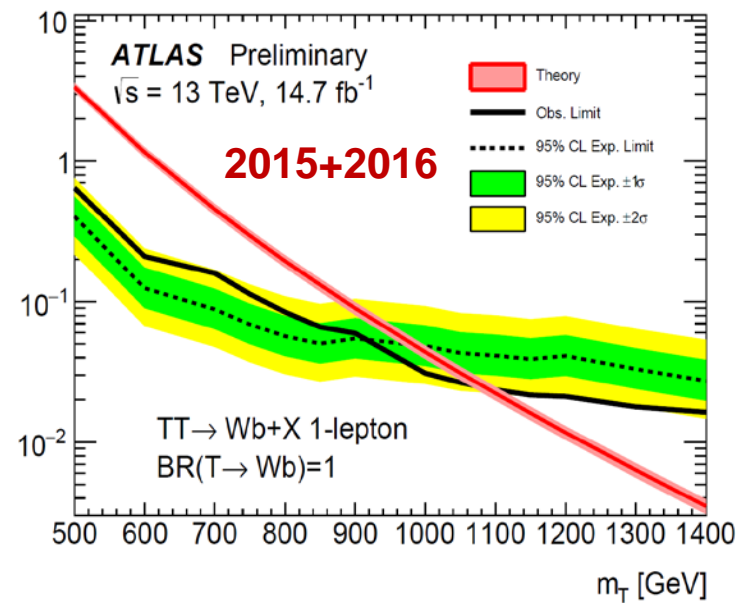
ATLAS-CONF-2016-080



2016-Sep-21



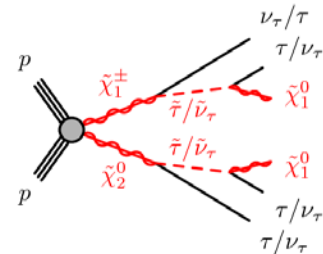
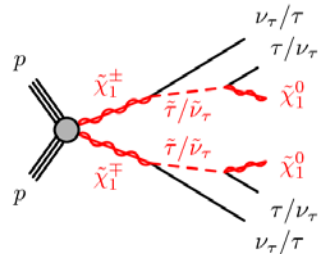
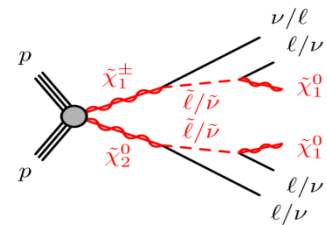
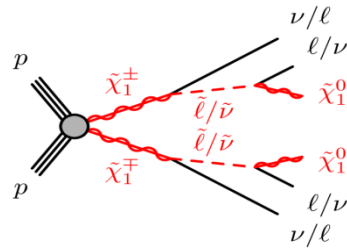
Rob McPherson



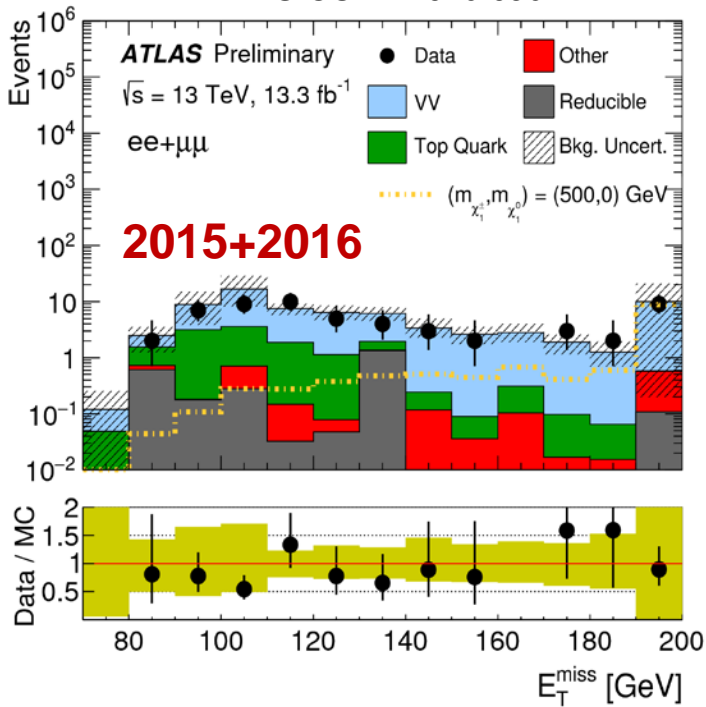
27

SUSY: Electroweak Production

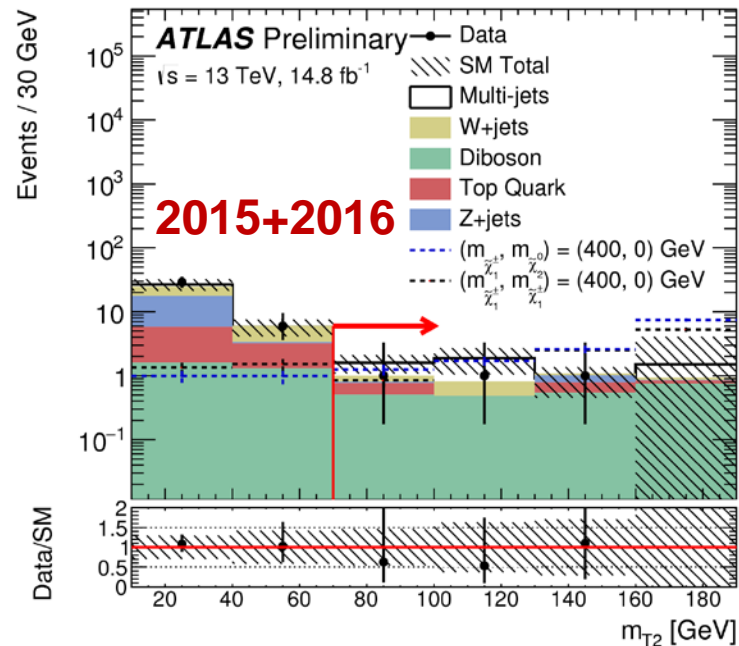
- **New results (since ICHEP)** on electroweak production of charginos and neutralinos
- **2 or 3 leptons + E_T^{Miss}**
- **Multi τ -leptons (hadronic decays) + E_T^{Miss}**



ATLAS-CONF-2016-096

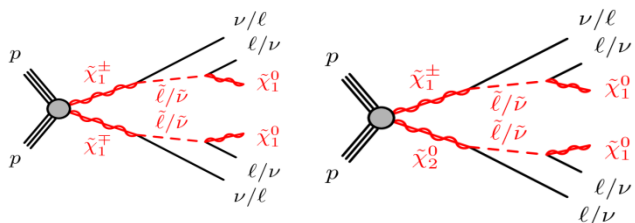


ATLAS-CONF-2016-093

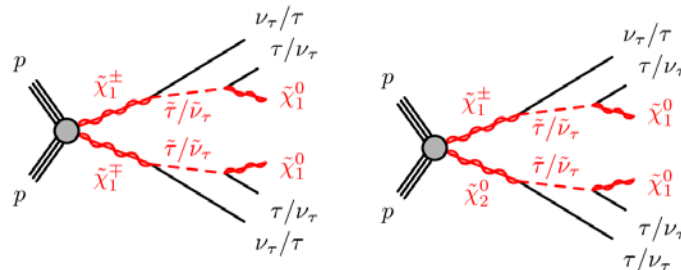


SUSY EW Production: constraints

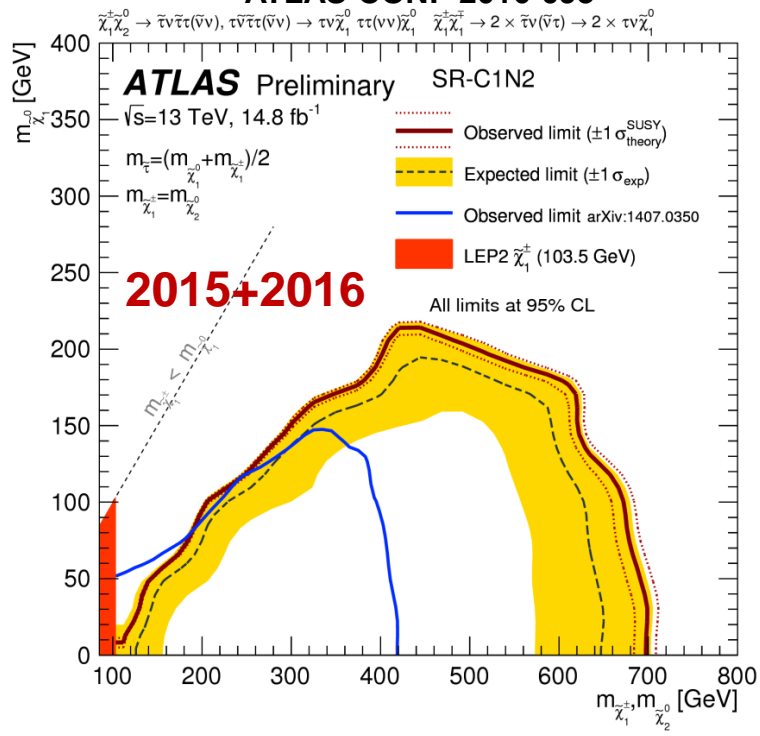
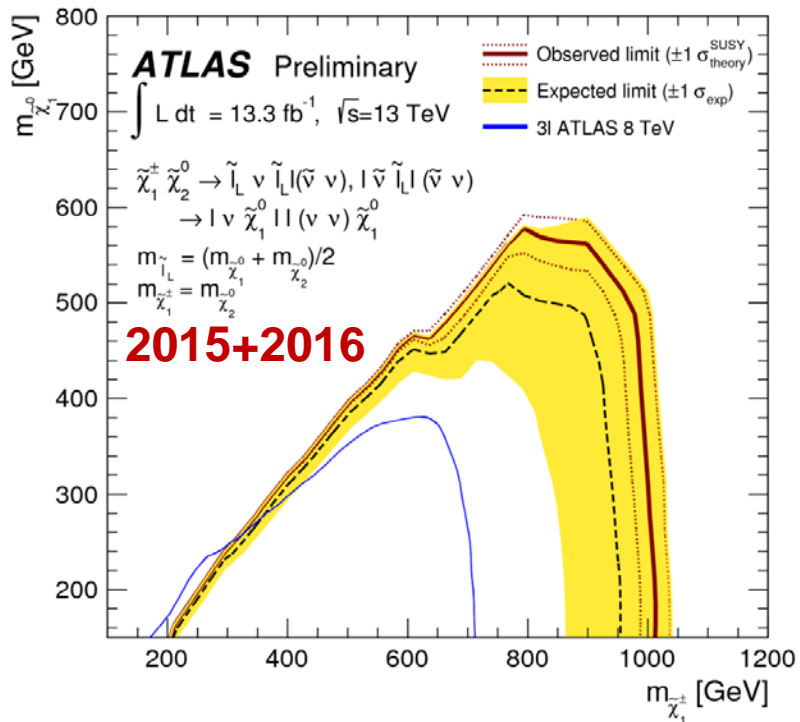
- Use Simplified Models to interpret results
 - Can be re- interpreted for specific models, mass spectra, etc.



ATLAS-CONF-2016-096



ATLAS-CONF-2016-093



SUSY: strong 2ℓ Search

- Two complementary searches

1. “on shell” $Z(\rightarrow\ell\ell) + \text{jets} + E_T^{\text{Miss}}$

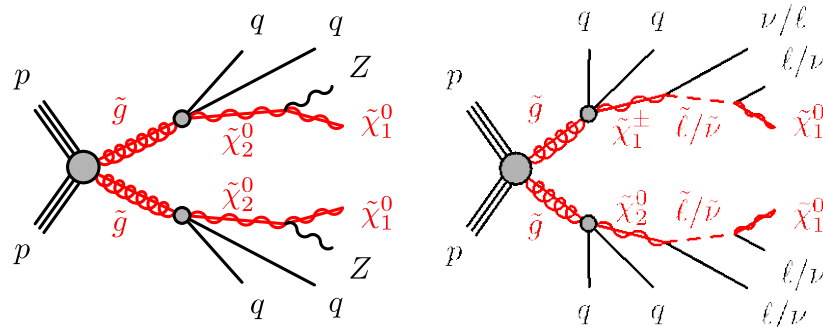
- One-region counting experiment

2. 2ℓ “edge” + jets + E_T^{Miss}

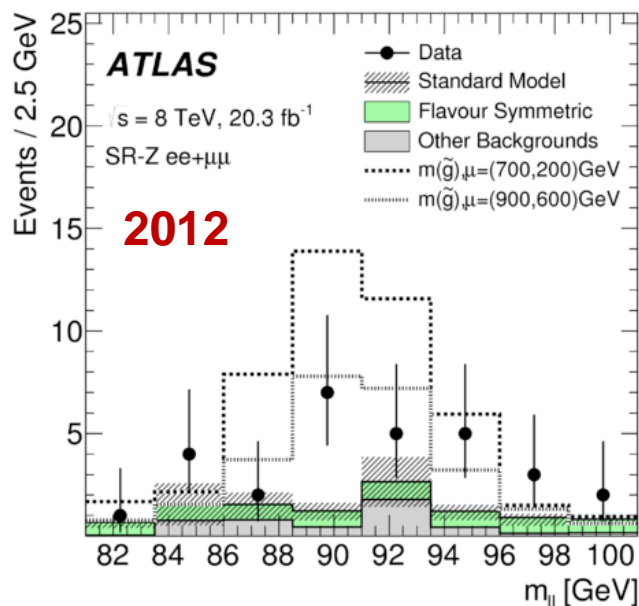
- Many signal regions

- Cuts on E_T^{Miss} , N_{jet} , H_T

- $Z + E_T^{\text{Miss}}$: excesses in 2012 (8 TeV) and 2013 (13 TeV)

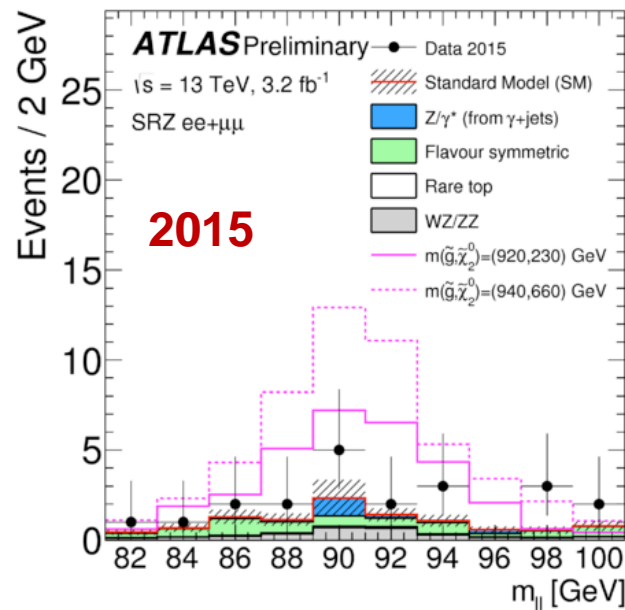


$Z + E_T^{\text{Miss}}$: 3σ excess at 8 TeV



Eur. Phys. J. C75 (2015) 463

$Z + E_T^{\text{Miss}}$: 2.2σ excess at 13 TeV (2015)



Rob McPherson

ATLAS-CONF-2015-082

SUSY: strong $2l$ Results

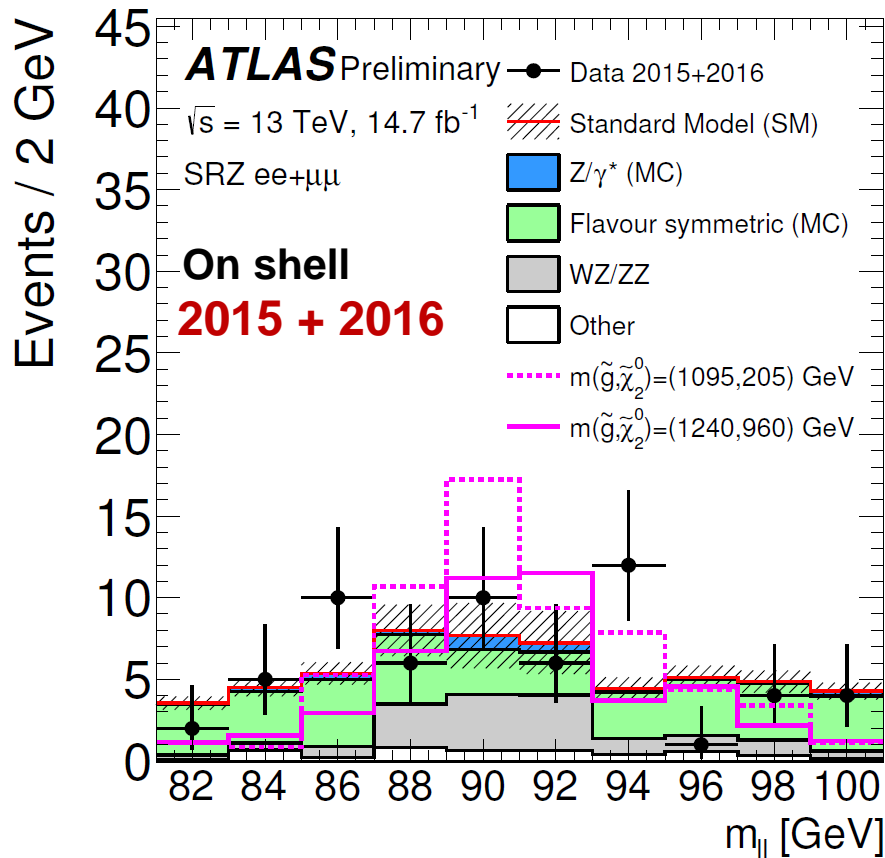
- New results: no significant excess in 2016**

Z + E_T^{Miss} + jets

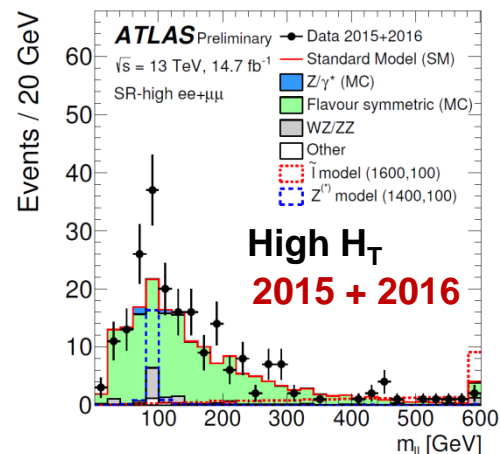
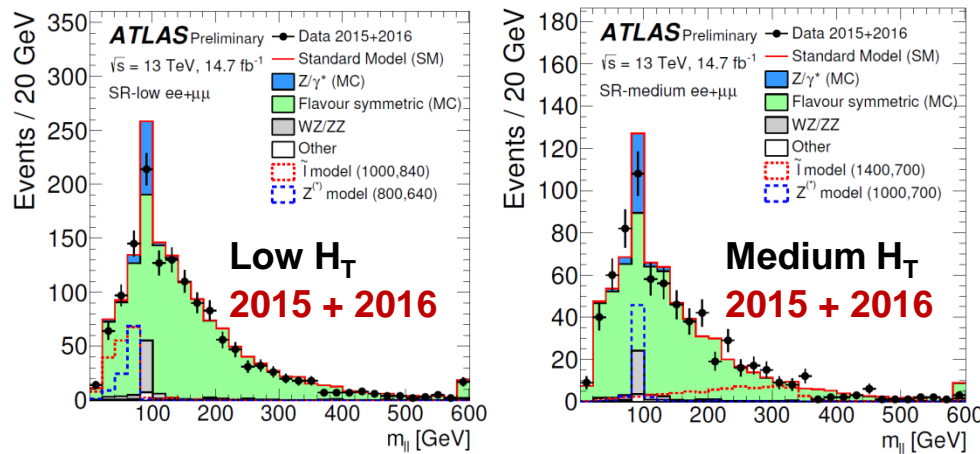
60 observed, 53.5 ± 9.3 expected

$2l$ edge + E_T^{Miss} + jets

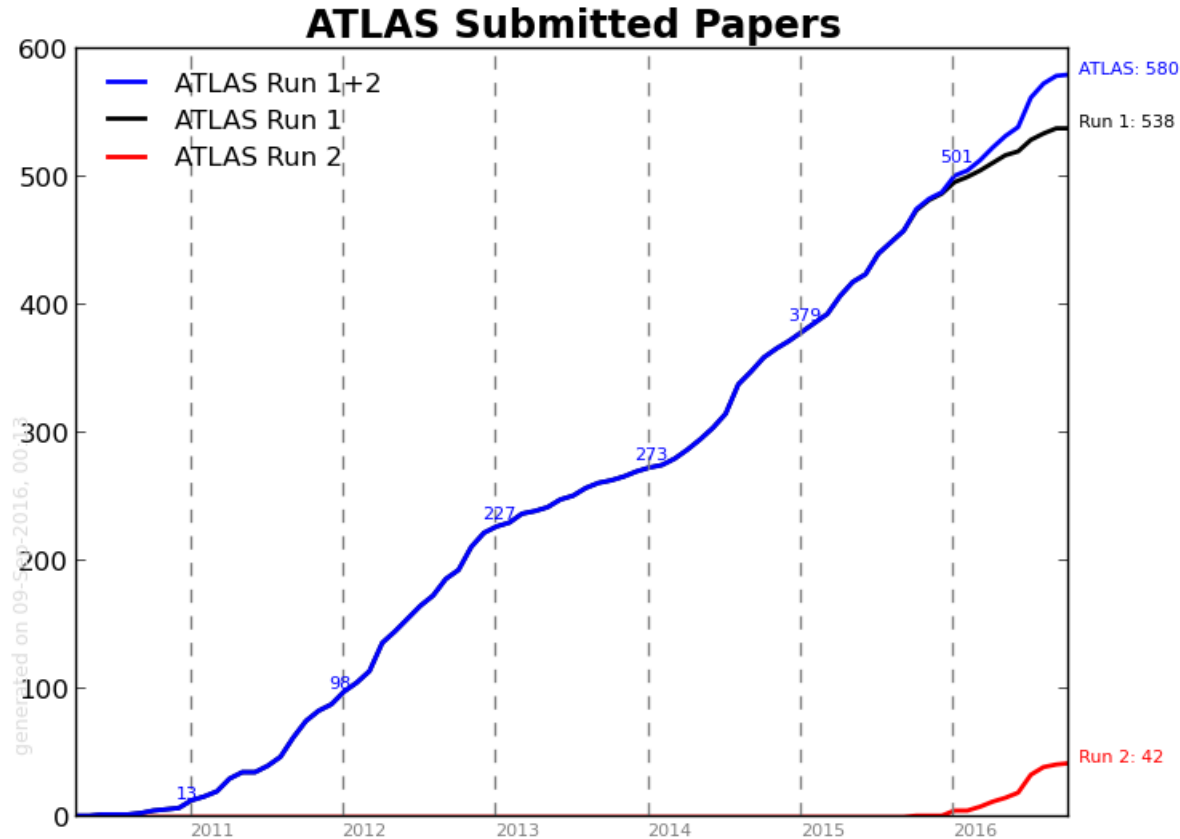
ATLAS-CONF-2016-098



ATLAS-CONF-2016-098



Collision Data Papers



- **42 papers on Run-2 data published or submitted**
- **Run-1 analyses still being published at strong rate**

Outline of Talk

- ATLAS data-taking
- ATLAS detector status and issues
- Computing challenges for Run-2
- Selected physics analysis highlights
- **ATLAS Open Data**
- Summary

ATLAS Open Data

- Run-1 ATLAS data public release

- Data: $1 \text{ fb}^{-1} \sqrt{s}=8 \text{ TeV}$ from 2012
- Monte Carlo:

- SM: W, Z, diboson, ttbar, H(125)
- BSM: eg: Z' \rightarrow ttbar

- Aimed at university students (eg, lab courses) and postgrad researchers

- Forum for questions/feedback

- 3 analysis levels with documentation

1. Simple visualization
2. Web-based Jupyter framework
3. Full download & python analysis

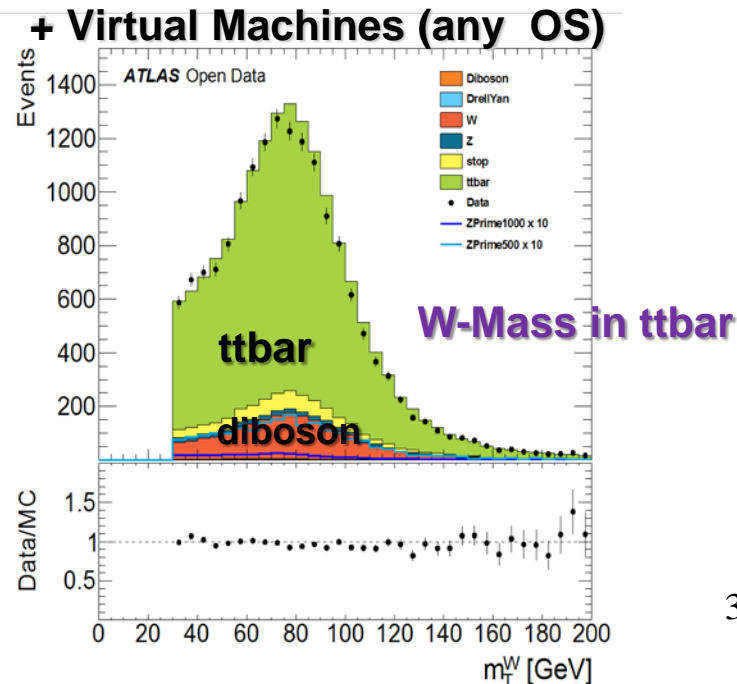
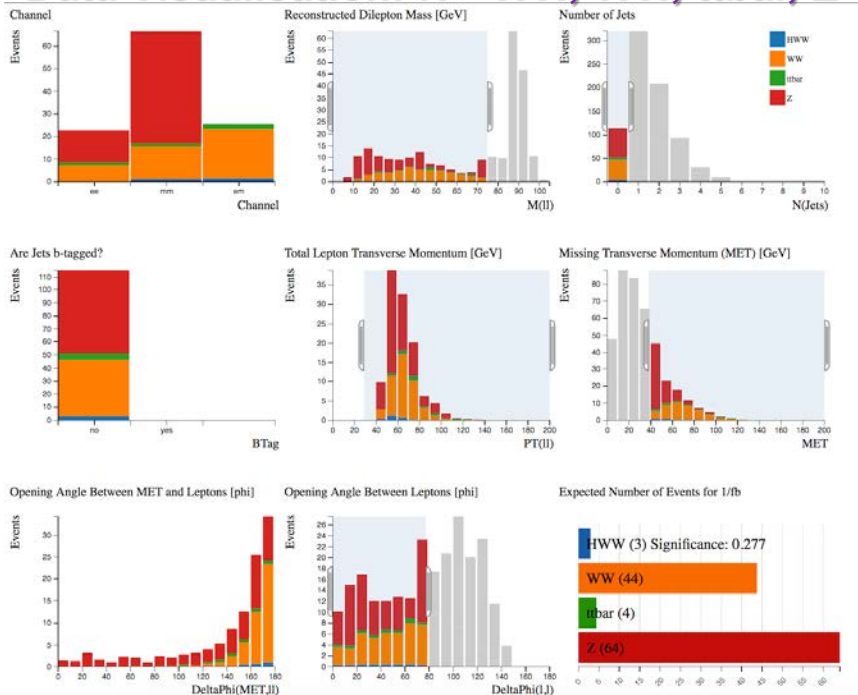
- Technical info & Tools

- ROOT tree format
- Single charged lepton preselection
- Web-based ana -- ROOTbooks
- Python based analysis

- GitHub or CERN open data portal

- + Virtual Machines (any OS)

Data Visualisation: $H \rightarrow WW, WW, \text{ttbar}, Z$



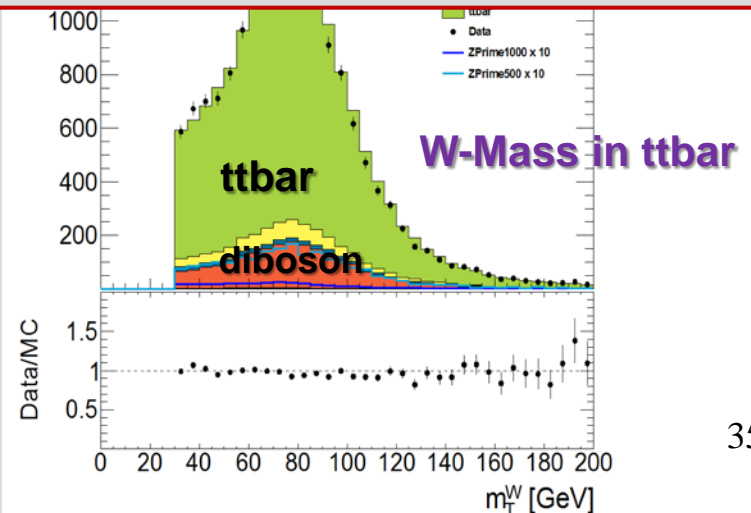
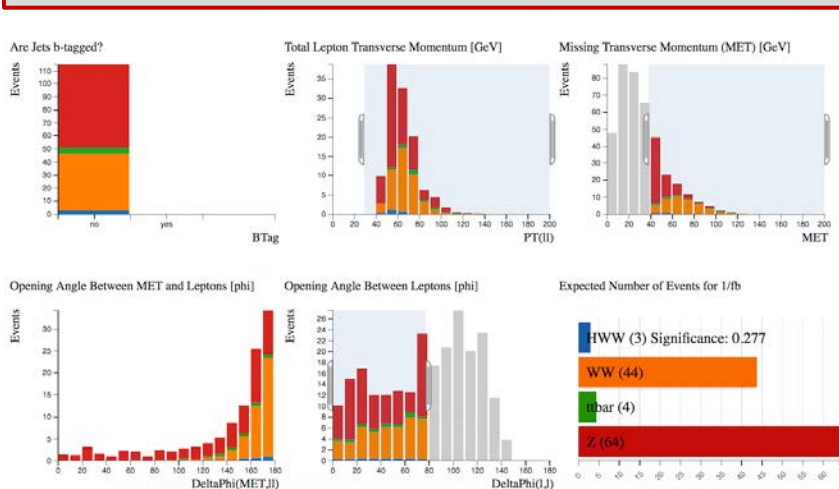
ATLAS Open Data

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 - Data: $1 \text{ fb}^{-1} \sqrt{s}=8 \text{ TeV}$ from 2012
 - Monte Carlo:
 - **SM: W, Z, diboson, ttbar, H(125)**
 - **BSM: Z' \rightarrow ttbar**
- **3 analysis levels with documentation**
 1. Simple visualization
 2. Web-based Jupyter framework
 3. Full download & python analysis
- **Technical info & Tools**

See:

Open Data web page at <http://atlas-opendata.web.cern.ch>

ATL-OREACH-PUB-2016-001 (analysis plot examples) at <https://cds.cern.ch/record/2203649>



Outline of Talk

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- **Summary**

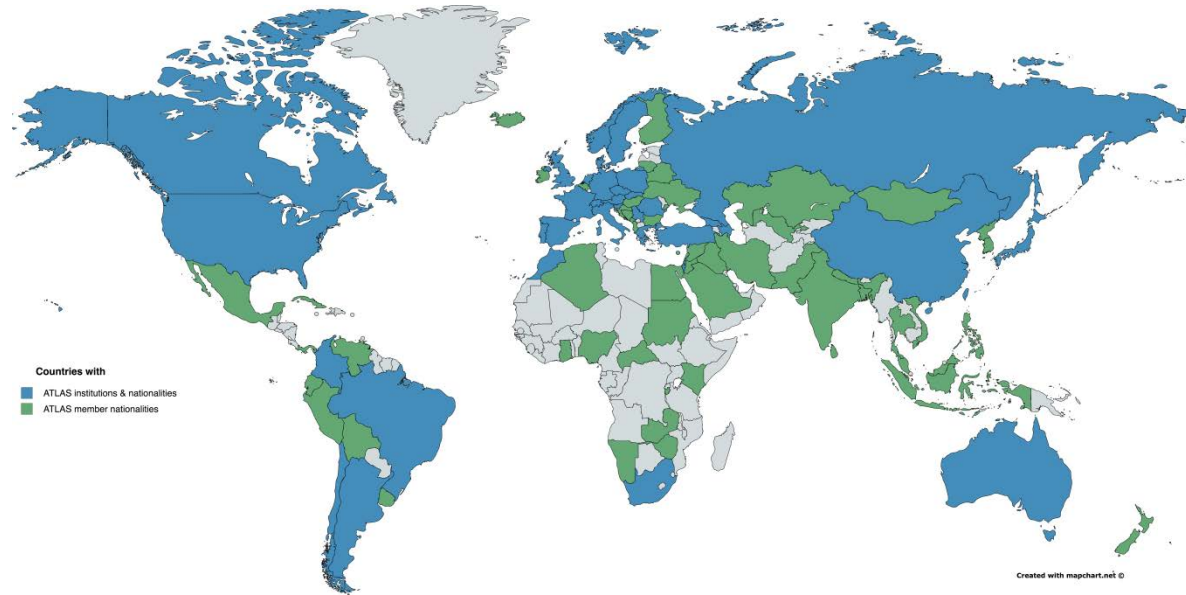
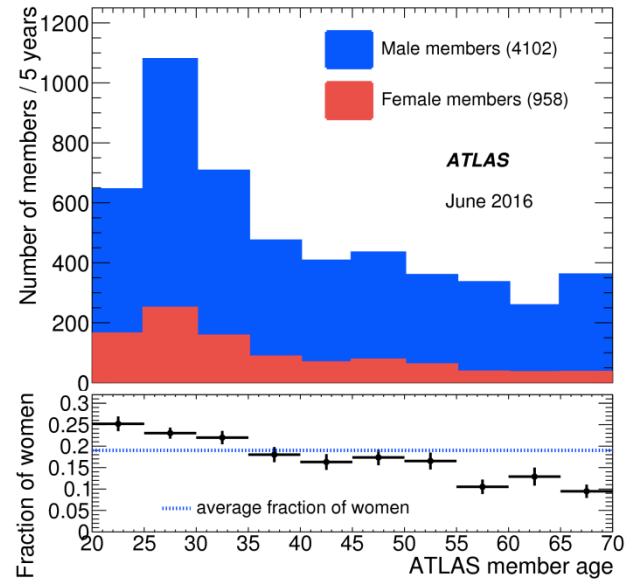
Summary

- **ATLAS detector, trigger, data preparation, computing and analysis are coping well with luminosities approaching twice LHC design**
- **Many measurements from 13 TeV data**
 - **Challenging theory calculations in many final states**
 - **Starting Run-2 measurements of H(125)**
 - **Closing in on SM ttH sensitivity and other H(125) processes**
- **Huge range of searches for BSM physics**
 - **No significant excesses have persisted so far**
- **We are approaching sensitivities for new, weakly-coupled electroweak-scale physics of any form**
- **ATLAS Upgrade programme also very active (no time to discuss today)**
- **Huge credit and thanks to the LHC and injector teams who are delivering extraordinary luminosities!**

ATLAS Demographics and Diversity

ATL-GEN-PUB-2016-001

- Released note on studies of gender and geographic diversity for ICHEP: <https://cds.cern.ch/record/2202392>



Selected conclusions

- 94 nationalities represented in ATLAS
- Fraction of women ~19%
 - Decrease with age
 - Represented proportionally in positions in ATLAS

Fraction of women in leadership positions

