Recent results and highlights from the ATLAS experiment

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3 Summary and conclusions

ATLAS at the LHC

The ATLAS collaboration

- ~3000 physicists
- 180 institutions
- 38 countries

The Large Hadron Collider

- two rings 27 km long
- 1,232 superconducting dipoles
- dipole operating temperature: -271.3°C
- ultrahigh vacuum: 10^{-13}atm
- 2010/11: 7 TeV, 2012: 8 TeV, 2015/16: 13 TeV
- 40 MHz collision rate

The ATLAS detector

The ATLAS detector

- Inner Detector: Pixel, SCT, TRT
- Calorimeters: LAr (EM + hadronic + forward), TileCal (hadronic)
- Muon Spectrometers: barrel and endcaps
- Forward detectors: AFP, ALFA, LUCID, ZDC
- 2 magnetic fields: solenoidal (ID) and toroidal (MS)
- $150 \cdot 10^6$ read-out channels

The ATLAS trigger system

- Three levels: L1 is fully hardware, implemented in the calorimeters and the Muon Spectrometer
- L2 and the Event Filter (EF) are software based: the L2 accepts data from defined Regions Of Interests (ROI) of L1
- EF provides a full event reconstruction on computer farms
- 10^{14} B/s raw data flux

Overall data-taking efficiency and detector status

- 3.9 fb⁻¹ pp at 13TeV recorded in 2015 (92% DAQ efficiency)
- 19.3 fb⁻¹ pp at 13TeV recorded in 2016 (as of August 15th)
- peak luminosity delivered by LHC: $1.15 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ (greater than design value $1 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$)

Overall data-taking efficiency and detector status

ATLAS pp 25ns run: April-July 2016

Inner Tracker			Calorimeters		Muon Spectrometer				Magnets	
Pixel	SCT	TRT	LAr	Tile	MDT	RPC	CSC	TGC	Solenoid	Toroid
98.9	99.9	100	99.8	100	99.6	99.8	99.8	99.8	99.7	93.5

Good for physics: 91-98% ($10.1\text{-}10.7\text{ fb}^{-1}$)

Luminosity weighted relative detector uptime and good data quality efficiencies (in %) during stable beam in pp collisions with 25ns bunch spacing at $\sqrt{s}=13$ TeV between 28th April and 10th July 2016, corresponding to an integrated luminosity of 11.0 fb^{-1} . The toroid magnet was off for some runs, leading to a loss of 0.7 fb^{-1} . Analyses that don't require the toroid magnet can use that data.

- fraction of operational channels $>96\%$
- DQ losses $<1\%$ for each individual system

Detector performance

Eur. Phys. J. C 76 (2016): 292

Momentum scale and resolution of the Muon Spectrometer studied in detail using $J/\psi \rightarrow \mu\mu$ and $Z \rightarrow \mu\mu$ decays

Jet energy scale uncertainty at the level of 2012 data

W and Z production at 13 TeV

- both absolute cross sections and ratios measured
- measurements of cross-section ratios benefit from the cancellation of some experimental uncertainties, and are powerful tools to constrain PDF fits
- $\frac{W^+}{W^-}$: sensitive to u and d quark valence distribution, measured to a precision of 0.8%
- $\frac{W^{+/-}}{Z}$: sensitive to strange quark content

- test of the SM at TeV scale
- important for background estimations needed for many measurements
- new physics could manifest in $W^{\pm}Z$ final states as a modification of the TGC and QGC strength
- precise knowledge of the $W^{\pm}Z$ production cross section is necessary in the search for new physics
- only a short selection shown here: more results available

Di-boson production: WZ

- Run-1 results were above the NLO predictions
- Run-2 total cross-section found to be consistent with very recent NNLO calculations

Di-boson production: WW

- cross-section measurement of $W^+W^- \rightarrow e^\pm \nu \mu^\mp \nu$ production at 13 TeV
- agreement with NNLO prediction at 13 TeV

ATLAS-CONF-2016-090

Top quark

- heaviest of the known fundamental particles
- at LHC, with luminosity $\sim 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$, top pair production rate is $\sim 8 \text{ pairs/s}$
- it decays before hadronisation: its properties are transferred directly to its decay products (information on “bare quarks”)
- the Standard Model predicts all its properties given the mass
 - deviations may point to “new physics”
 - ttH coupling studied also in ttH production: precision measurements of Higgs boson coupling to top quarks can reveal BSM effects

Top pair production cross-section

- inclusive top pair production in good agreement with NNLO prediction
- experimental measurements have reached the theoretical calculation

$$\sigma_{t\bar{t}} = 818 \pm 8 \text{ (stat)} \pm 27 \text{ (syst)} \pm 19 \text{ (lumi)} \pm 12 \text{ (beam)} \text{ pb at } \sqrt{s} = 13 \text{ TeV}$$

Top quark mass

Measured both directly from invariant mass and derived from cross-section (pole mass determination)

Recent direct measurement
from $t\bar{t} \rightarrow \text{dilepton}$ at 8 TeV

Pole mass determination

$$m_{\text{top}} = 172.84 \pm 0.34 \text{ (stat)} \pm 0.61 \text{ (syst)} \text{ GeV} = 172.84 \pm 0.70 \text{ GeV}$$

Top couplings with Z and W

- associated production of $t\bar{t}$ with a Z boson allow to extract information on the neutral current coupling of the top quark
- production rate of a top-quark pair with a massive vector boson could be altered in the presence of physics beyond the Standard Model (vector-like quarks, strongly coupled Higgs bosons or technicolor)
- at 13 TeV the SM cross sections of the $t\bar{t}Z$ and $t\bar{t}W$ processes increase by factors of 3.5 and 2.4, respectively, compared to 8 TeV

both measurements consistent with the NLO QCD theoretical calculations
 ATLAS-CONF-2016-003

Higgs

- 2015+2016 data
- fiducial and differential cross section measurements
- event categories enhancesensitivity to measurement of production mode cross sections: σ_{ggH} , σ_{VBF} , ...

ATLAS-CONF-2016-067

ATLAS-CONF-2016-079

Combining $\gamma\gamma + 4l$ channels (combination of fiducial cross sections):

$$\sigma(pp \rightarrow H + X, 13 \text{ TeV}) = 59.0^{+9.7}_{-9.2}(\text{stat.})^{+4.4}_{-3.5}(\text{syst.}) \text{ pb}$$

- SM prediction: $55.5^{+2.4}_{-3.4} \text{ pb}$
- overall significance at 13 TeV: $\sim 10 \sigma$

ttH production

- direct probe of top Yukawa coupling
- cross-section at 13 TeV 4 times larger than at 8 TeV

ATLAS-CONF-2016-080

ATLAS-CONF-2016-068

Summary of selected SM results

Selected summary of Exotics results

only a representative selection of the available results is shown

ATLAS Exotics Searches* - 95% CL Exclusion

Status: August 2016

ATLAS Preliminary

$$\int \mathcal{L} dt = (3.2 - 20.3) \text{ fb}^{-1} \quad \sqrt{s} = 8, 13 \text{ TeV}$$

*Only a selection of the available mass limits on new states or phenomena is shown. Lower bounds are specified only when explicitly not excluded.

† Small-radius (large-radius) jets are denoted by the letter j (J).

H/A $\rightarrow \tau\tau$

Some MSSM models predict high mass scalar decaying in high mass $\tau\tau$:

- two decay modes: lepton + hadron and hadron-hadron
- main backgrounds: $Z\tau\tau$ and multijets

Diphoton resonances

2015 data:

- excess at 750 GeV (after reprocessing, at 730 GeV)
- local significance 3.9σ , global 2.1σ (after reprocessing: local significance 3.4σ)

2015+2016 data:

- small excess at 710 GeV
- local significance 1.4σ , global $<1\sigma$

Selected summary of Supersymmetry results

only a representative selection of the available results is shown

ATLAS SUSY Searches* - 95% CL Lower Limits

Status: August 2016

ATLAS Preliminary

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

	Model	$\epsilon, \mu, \tau, \gamma$	Jets	E_{T}^{miss}	$\mathcal{L} \text{ dt} [\text{fb}^{-1}]$	Mass limit	$\sqrt{s} = 7, 8 \text{ TeV}$	$\sqrt{s} = 13 \text{ TeV}$	Reference
Inclusive Searches	ISUGRA/CMSM	$0.3, \mu, 1/2, \tau$	2-10 jets/1 $\tilde{\chi}_1^0$	Yes	20.3	4.2	1.85 TeV	$m(\tilde{\chi}_1^0) \geq 0$	1907.55525
	$\tilde{\chi}_1^0 \tilde{\chi}_1^0$	0	2-6 jets/1 $\tilde{\chi}_1^0$	Yes	13.3	1.33 TeV	$m(\tilde{\chi}_1^0) \geq 208 \text{ GeV}, m(\tilde{g}) \geq 208 \text{ GeV}$	ATLAS-CONF-2016-078	
	$\tilde{\chi}_1^0 \tilde{\chi}_1^0$ (compressed)	mono-jet	1-3 jets	Yes	3.2	808 GeV	$m(\tilde{g}) \geq 1015 \text{ GeV}$	1804.07773	
	$\tilde{\chi}_1^0 \tilde{\chi}_1^0$	0	2-6 jets	Yes	13.3	1.86 TeV	$m(\tilde{\chi}_1^0) \geq 0 \text{ GeV}$	ATLAS-CONF-2016-076	
	$\tilde{\chi}_1^0 \tilde{\chi}_1^0 \rightarrow \tilde{\chi}_1^0 \tilde{\chi}_1^0$	0	2-6 jets	Yes	13.3	1.83 TeV	$m(\tilde{\chi}_1^0) \geq 400 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	ATLAS-CONF-2016-076	
	$\tilde{\chi}_1^0 \tilde{\chi}_1^0 \rightarrow \tilde{\chi}_1^0 \tilde{\chi}_1^0$	3-4 μ	4 jets	-	13.2	1.7 TeV	$m(\tilde{\chi}_1^0) \geq 400 \text{ GeV}$	ATLAS-CONF-2016-087	
	$\tilde{\chi}_1^0 \tilde{\chi}_1^0$	2 τ, μ (SS)	0-3 jets	Yes	13.2	1.0 TeV	$m(\tilde{\chi}_1^0) \geq 500 \text{ GeV}$	ATLAS-CONF-2016-097	
	GMSB (fNLSP)	$1/2, \tau + 0-1 \tilde{\chi}_1^0$	0-2 jets	Yes	3.2	2.0 TeV	$m(\tilde{\chi}_1^0) \geq 0 \text{ GeV}$	1807.55079	
	GGM (bino NLSP)	2 τ	1 $\tilde{\chi}_1^0$	Yes	3.2	1.83 TeV	$m(\tilde{\chi}_1^0) \geq 200 \text{ GeV}$	1806.09190	
	GGM (Higgsino bino NLSP)	2 τ	1 $\tilde{\chi}_1^0$	Yes	20.3	1.37 TeV	$m(\tilde{\chi}_1^0) \geq 200 \text{ GeV}, m(\text{NLSP}) \geq 1 \text{ TeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1907.55483	
GGM (Higgsino NLSP)	2 τ, μ ($\tilde{\chi}_1^0$)	2 jets	Yes	13.3	1.8 TeV	$m(\tilde{\chi}_1^0) \geq 880 \text{ GeV}, m(\text{NLSP}) \geq 1 \text{ TeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	ATLAS-CONF-2016-068		
Gravitino LSP	0	mono-jet	Yes	20.3	900 GeV	$m(\text{NLSP}) \geq 430 \text{ GeV}$	1503.32000		
						$\tilde{g} \tilde{g}^*$ scale	$m(\tilde{g}) \geq 1.8 \times 10^4 \text{ GeV}, m(\tilde{\chi}_1^0) \geq 1.5 \text{ TeV}$	1502.01518	
1st gen. squarks, direct production	$\tilde{q} \tilde{q}^*$	0	3 $\tilde{\chi}_1^0$	Yes	14.8	1.86 TeV	$m(\tilde{q}) \geq 0 \text{ GeV}$	ATLAS-CONF-2016-082	
	$\tilde{q} \tilde{q}^*$	0-1 $\tilde{\chi}_1^0$	3 $\tilde{\chi}_1^0$	Yes	14.8	1.96 TeV	$m(\tilde{q}) \geq 0 \text{ GeV}$	ATLAS-CONF-2016-082	
	$\tilde{q} \tilde{q}^*$	0-1 $\tilde{\chi}_1^0$	3 $\tilde{\chi}_1^0$	Yes	20.1	1.37 TeV	$m(\tilde{q}) \geq 300 \text{ GeV}$	1407.0603	
	$\tilde{q} \tilde{q}^*$	0	2 $\tilde{\chi}_1^0$	Yes	3.2	840 GeV	$m(\tilde{q}) \geq 100 \text{ GeV}$	1806.08772	
	$\tilde{q} \tilde{q}^*$	2 τ, μ (SS)	1 $\tilde{\chi}_1^0$	Yes	13.2	323-603 GeV	$m(\tilde{q}) \geq 100 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	ATLAS-CONF-2016-097	
	$\tilde{q} \tilde{q}^*$	0-2 $\tilde{\chi}_1^0$	1-2 $\tilde{\chi}_1^0$	Yes	4.7/13.3	10-170 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1504.08616, ATLAS-CONF-2016-077	
	$\tilde{q} \tilde{q}^*$	0-2 $\tilde{\chi}_1^0$	1-2 $\tilde{\chi}_1^0$	Yes	4.7/13.3	90-180 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}$	1504.08616, ATLAS-CONF-2016-077	
	$\tilde{q} \tilde{q}^*$	0	mono-jet	Yes	3.2	88-323 GeV	$m(\tilde{q}) \geq 50 \text{ GeV}$	1804.07773	
	$\tilde{q} \tilde{q}^*$ (natural GMSB)	2 τ, μ ($\tilde{\chi}_1^0$)	1 $\tilde{\chi}_1^0$	Yes	20.3	130-200 GeV	$m(\tilde{q}) \geq 150 \text{ GeV}$	1403.5222	
	$\tilde{q} \tilde{q}^*$	3 τ, μ ($\tilde{\chi}_1^0$)	1 $\tilde{\chi}_1^0$	Yes	13.3	200-700 GeV	$m(\tilde{q}) \geq 300 \text{ GeV}$	ATLAS-CONF-2016-098	
EW direct	$\tilde{q} \tilde{q}^*$	1 $\tilde{\chi}_1^0$	6 jets + 2 $\tilde{\chi}_1^0$	Yes	20.3	320-420 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}$	1506.09816	
	$\tilde{q} \tilde{q}^*$	2 τ, μ	8	Yes	20.3	90-315 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}$	1403.5294	
	$\tilde{q} \tilde{q}^*$	2 τ, μ	8	Yes	20.3	140-475 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1403.5294	
	$\tilde{q} \tilde{q}^*$	2 τ	8	Yes	20.3	333 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1407.0383	
	$\tilde{q} \tilde{q}^*$	3 τ, μ	8	Yes	20.3	713 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1402.7029	
	$\tilde{q} \tilde{q}^*$	2-3 τ, μ	0-2 jets	Yes	20.3	425 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1403.5294, 1402.7029	
	$\tilde{q} \tilde{q}^*$	4 τ, μ	0-2 $\tilde{\chi}_1^0$	Yes	20.3	278 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1504.07710	
	$\tilde{q} \tilde{q}^*$	4 τ, μ	8	Yes	20.3	935 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1504.07710	
	GGM (bino NLSP) weak prod.	1 τ, μ + γ	-	Yes	20.3	115-370 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1907.55483	
	GGM (bino NLSP) weak prod.	2 τ	-	Yes	20.3	390 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1907.55483	
Long-lived particles	Direct $\tilde{q} \tilde{q}^*$ prod., long-lived $\tilde{q}$	Diapp. bkg	1 jet	Yes	20.3	278 GeV	$m(\tilde{q}) \geq 180 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1310.5675	
	Direct $\tilde{q} \tilde{q}^*$ prod., long-lived $\tilde{q}$	dE/dx bkg	Yes	16.4	495 GeV	$m(\tilde{q}) \geq 180 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1504.05332		
	Stable, stopped $\tilde{q}$ hadron	1-5 jets	-	Yes	27.9	830 GeV	$m(\tilde{q}) \geq 180 \text{ GeV}, 10 \text{ ps}(\tau) \geq 100 \text{ fs}$	1310.6084	
	Stable $\tilde{q}$ hadron	bkg	-	3.2	-	1.36 TeV	$m(\tilde{q}) \geq 180 \text{ GeV}, 10 \text{ ps}(\tau) \geq 100 \text{ fs}$	1806.05120	
	Metastable $\tilde{q}$ hadron	dE/dx bkg	-	3.2	-	1.37 TeV	$m(\tilde{q}) \geq 180 \text{ GeV}, 10 \text{ ps}(\tau) \geq 100 \text{ fs}$	1804.54520	
	GMSB, stable $\tilde{q}$	$\tilde{q} \rightarrow \tilde{q} \tilde{g}$	1 $\tilde{\chi}_1^0$	Yes	19.1	537 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1411.6735	
	GMSB, $\tilde{q} \rightarrow \tilde{q} \tilde{g}$, long-lived $\tilde{q}$	2 τ	-	Yes	20.3	440 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1402.5645	
	$\tilde{q} \tilde{q}^*$	diapp. bkg	diapp. bkg	-	20.3	1.0 TeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1504.05162	
	GGM $\tilde{q} \tilde{q}^* \rightarrow \tilde{q} \tilde{g}$	diapp. bkg	diapp. bkg	-	20.3	1.0 TeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1504.05162	
	RPV	LFV $\mu \mu \rightarrow \tilde{q} \tilde{q}^* + \tilde{q} \tilde{q}^* \mu \mu$	diapp. bkg	-	3.2	-	1.3 TeV	$m(\tilde{q}) \geq 11 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1807.58079
Bilinear RPV CMSSM		2 τ, μ (SS)	0-3 $\tilde{\chi}_1^0$	Yes	20.3	1.4 TeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1404.2001	
$\tilde{q} \tilde{q}^*$		4 τ, μ	-	Yes	13.3	400 GeV	$m(\tilde{q}) \geq 400 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	ATLAS-CONF-2016-075	
$\tilde{q} \tilde{q}^*$		3 τ, μ	-	Yes	20.3	1.14 TeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	1403.5088	
$\tilde{q} \tilde{q}^*$		0	4-5 large $\tilde{q}$ jets	Yes	14.8	1.88 TeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	ATLAS-CONF-2016-067	
$\tilde{q} \tilde{q}^*$		0	4-5 large $\tilde{q}$ jets	Yes	14.8	1.35 TeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	ATLAS-CONF-2016-067	
$\tilde{q} \tilde{q}^*$		2 τ, μ (SS)	0-3 $\tilde{\chi}_1^0$	Yes	13.2	1.3 TeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	ATLAS-CONF-2016-097	
$\tilde{q} \tilde{q}^*$		2 τ	2 jets + 2 $\tilde{\chi}_1^0$	Yes	15.4	410 GeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	ATLAS-CONF-2016-025, ATLAS-CONF-2016-084	
$\tilde{q} \tilde{q}^*$		0	2 jets + 2 $\tilde{\chi}_1^0$	Yes	20.3	0.4-1.0 TeV	$m(\tilde{q}) \geq 0 \text{ GeV}, m(\tilde{g}) \geq 1015 \text{ GeV}$	ATLAS-CONF-2015-015	
Other		Scalar charm, $\tilde{q} \rightarrow \tilde{q} \tilde{g}$	0	2 $\tilde{\chi}_1^0$	Yes	20.3	318 GeV	$m(\tilde{q}) \geq 200 \text{ GeV}$	1501.01325

*Only a selection of the available mass limits on new particles is shown.

10⁻¹

1

Mass scale [TeV]

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

10⁻¹ 1 Mass scale [TeV]

Jets + E_T^{miss} (0ℓ)

- expect large increase of SUSY cross-sections going from 8 $\rightarrow$ 13 TeV: $\sigma(\tilde{g}\tilde{g}) \times 30$ for $m(\tilde{g}) = 1.4$ TeV
- signature: 0 lepton + jets (2 to 6) + E_T^{miss}
- main backgrounds: Z/W+jets and $t\bar{t}$
- example: M_{eff} analysis

Jets + E_T^{miss} (0ℓ)

- final limits in 0ℓ final states with 2-6 jets
- no significant excesses
- new Recursive Jigsaw Reconstruction (RJR) technique implemented (not shown here)

- signature: 1 lepton + jets + E_T^{miss}
- main backgrounds: Z/W+jets and $t\bar{t}$
- largest excess: 3.3σ (local)

ATLAS-CONF-2016-050

stop

summary of the dedicated ATLAS searches for top squark (stop) pair production based on 13 fb⁻¹ of pp collision data taken at $\sqrt{s} = 13$ TeV

the yellow limit shows the result of the analysis discussed in the previous slide

Dark matter

- searches for weakly-interacting dark matter production in association with other SM particles
- distinct signature of significant missing transverse momentum
- example: $E_T^{\text{miss}} + ZZ (\rightarrow \ell\ell)$

ATLAS-CONF-2016-056

- no significant excesses observed
- limits have been set, search continues

Summary and conclusions

- ATLAS is coping very well with LHC approaching (and overcoming) design luminosity
- many results already available:
 - Higgs properties
 - towards a $t\bar{t}H$ coupling measurement: observed significance of 2.8σ (combined photon, multilepton, and b-quark decays)
 - increased sensitivity to BSM searches
 - almost 600 publications
- no significant excesses yet, more data coming soon
- expect more exciting Run-2 results within next 2 years: 100 fb⁻¹ expected