



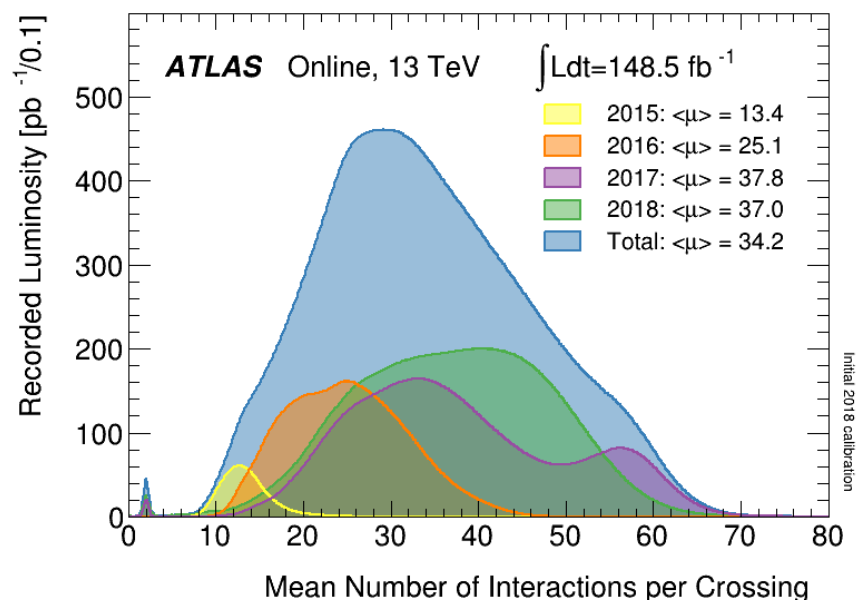
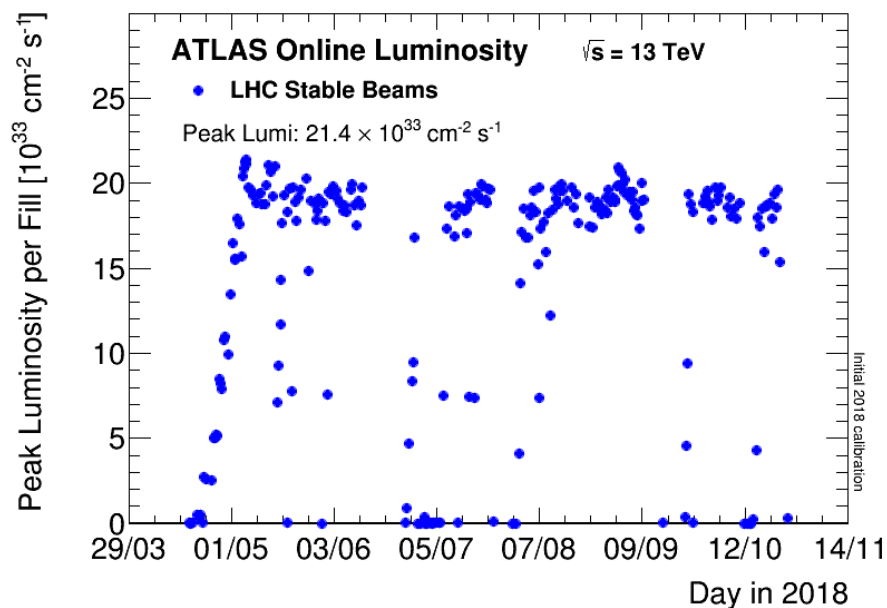
Статус эксперимента ATLAS

Соловьев В.М.

Научная сессия ОФВЭ

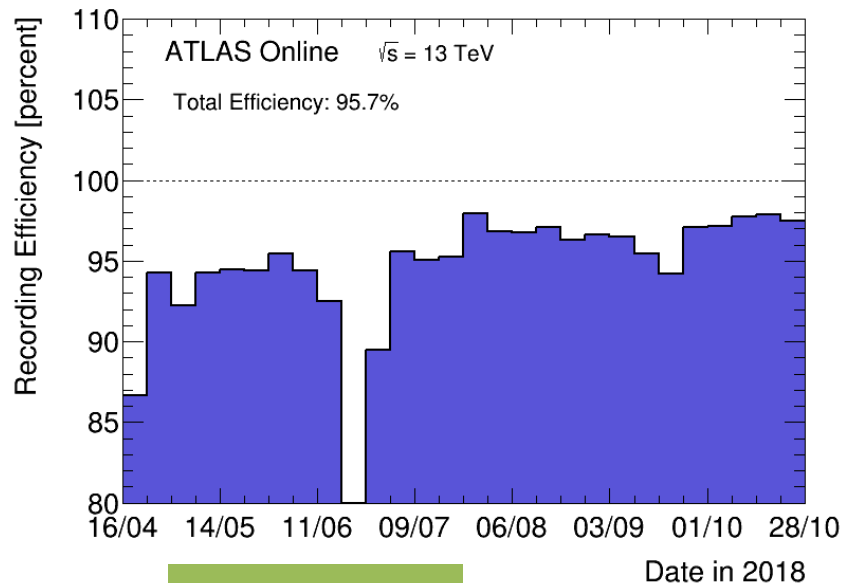
25 декабря 2018

Условия набора данных в 2018 году



- Максимальная светимость: $2.1 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$
- Средняя величина $\mu = 37$
- LHC обеспечил достаточно «комфортные» условия набора данных по сравнению с 2017 годом
- Не потребовалось подстройки (levelling) светимости (как это было сделано в 2017 году) и изменения порогов триггеров

Набор данных в 2018 году



- Эффективность набора данных составила **95.7%**
- Из них **97.5%** пригодны для физических исследований
- **TRT**: эффективность набора данных составила **97.2%**, из них **100%** пригодны для физических исследований

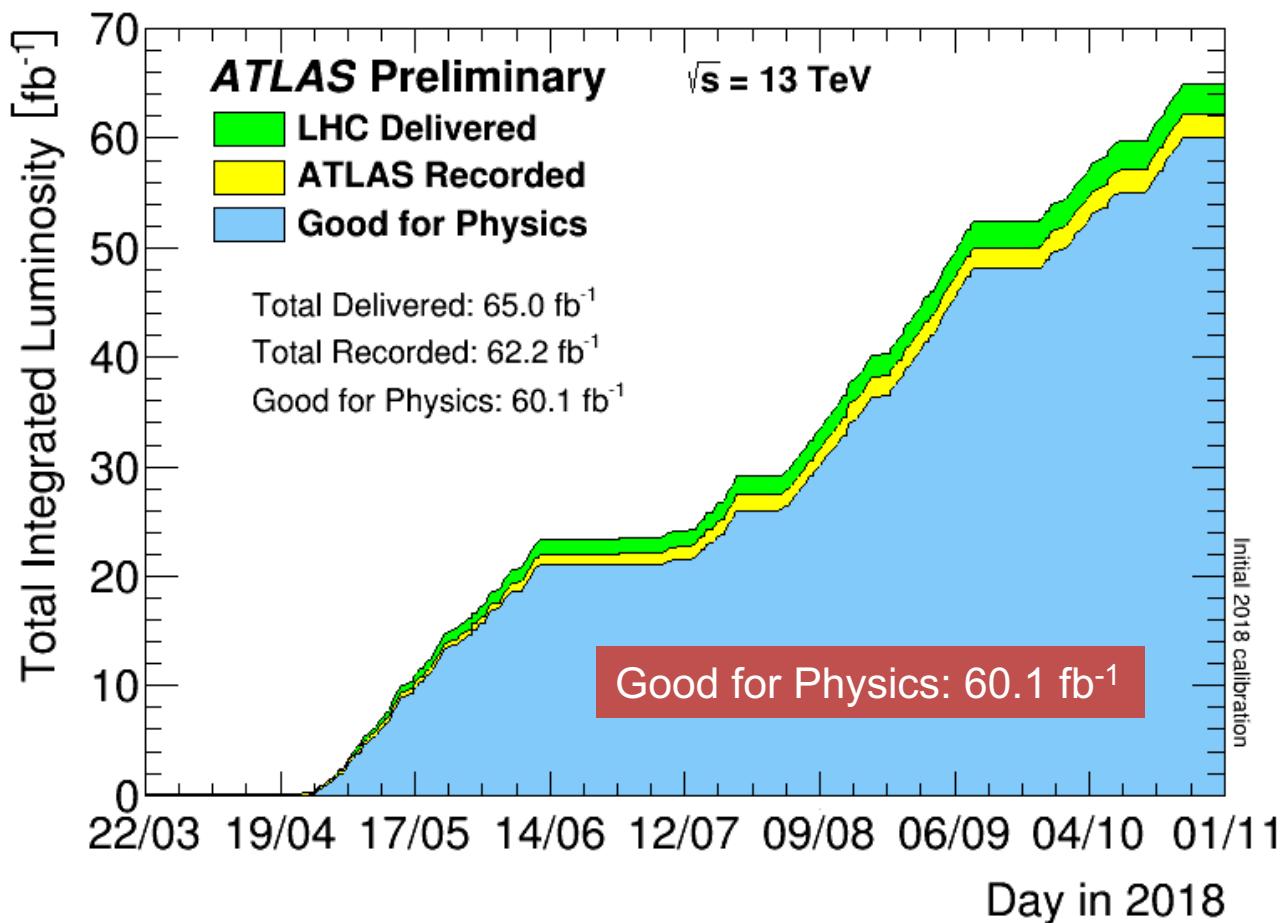
Data quality

ATLAS pp data: April 25-October 24 2018

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

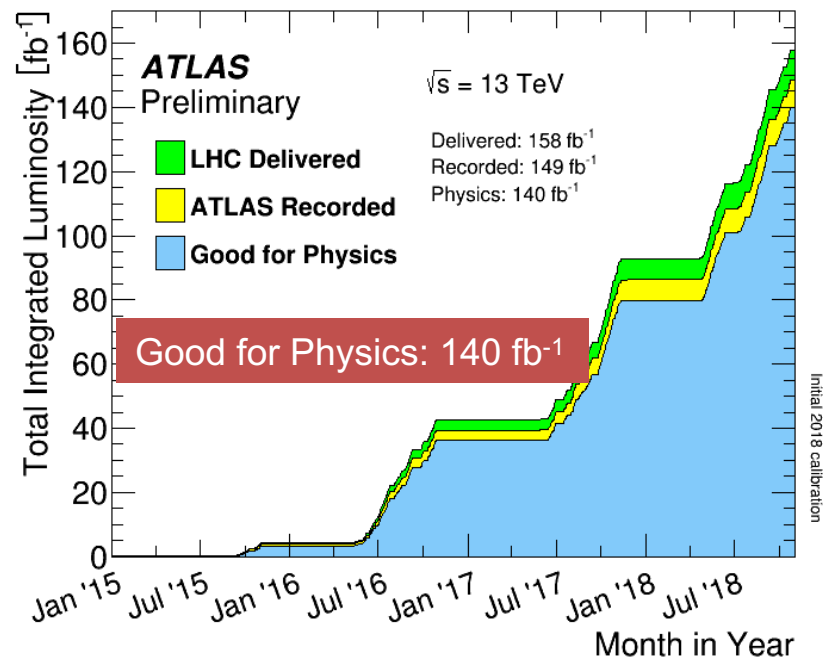
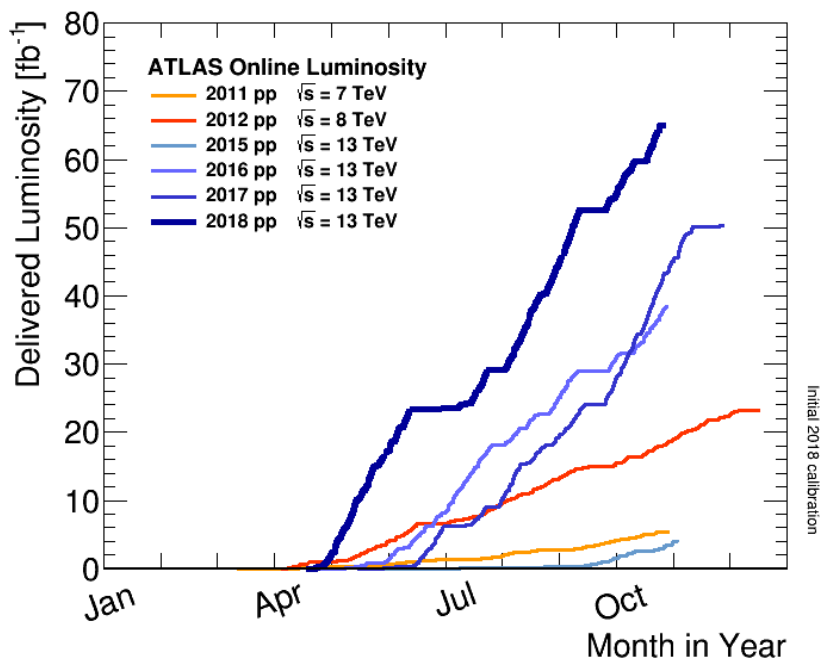
Good for physics: 97.5% (60.1 fb⁻¹)

Полная светимость 2018



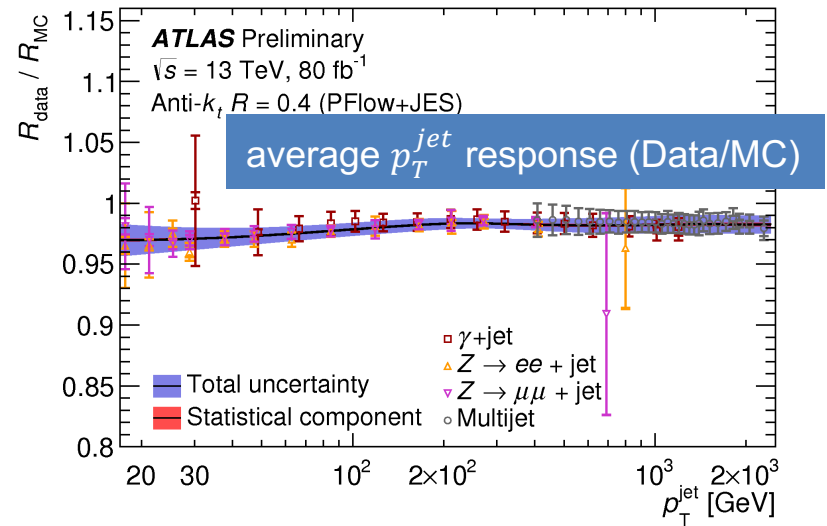
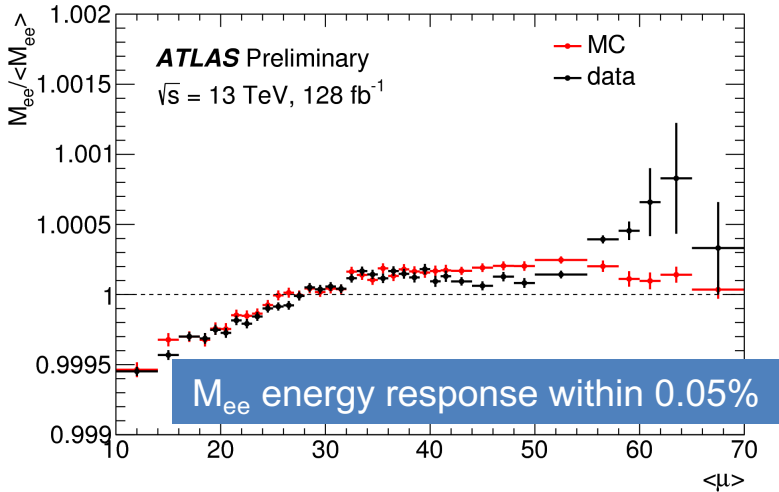
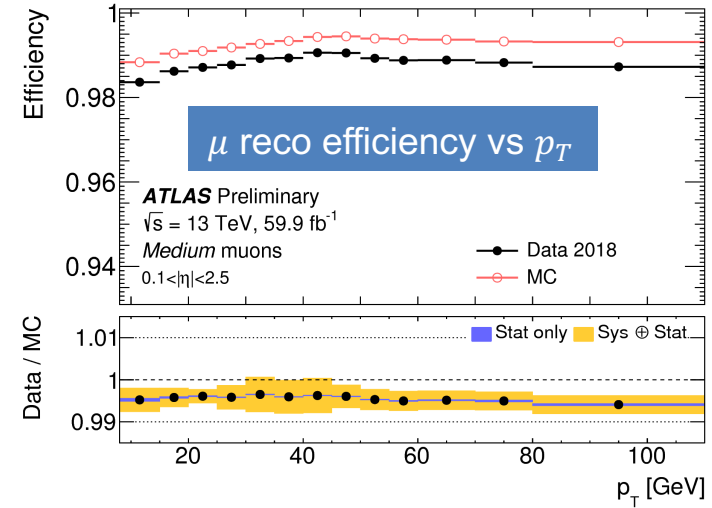
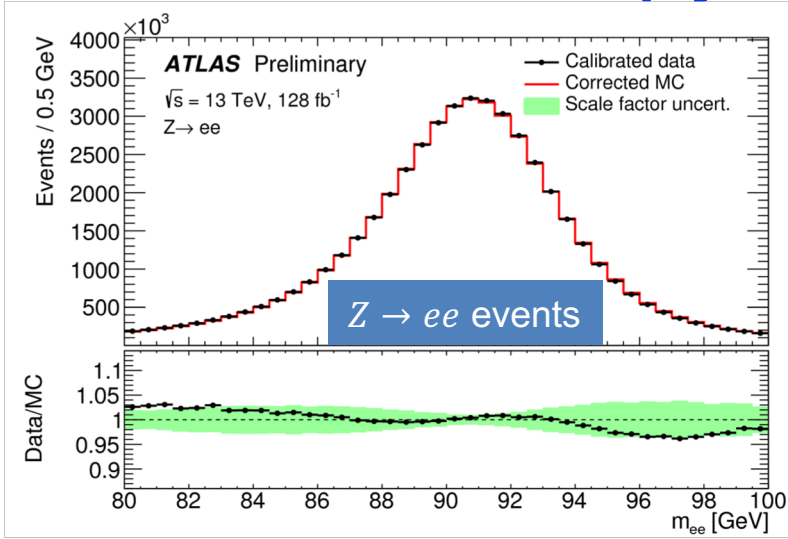
- Пригодные для физических исследований данные соответствуют светимости 60.1 fb^{-1}

Run-II



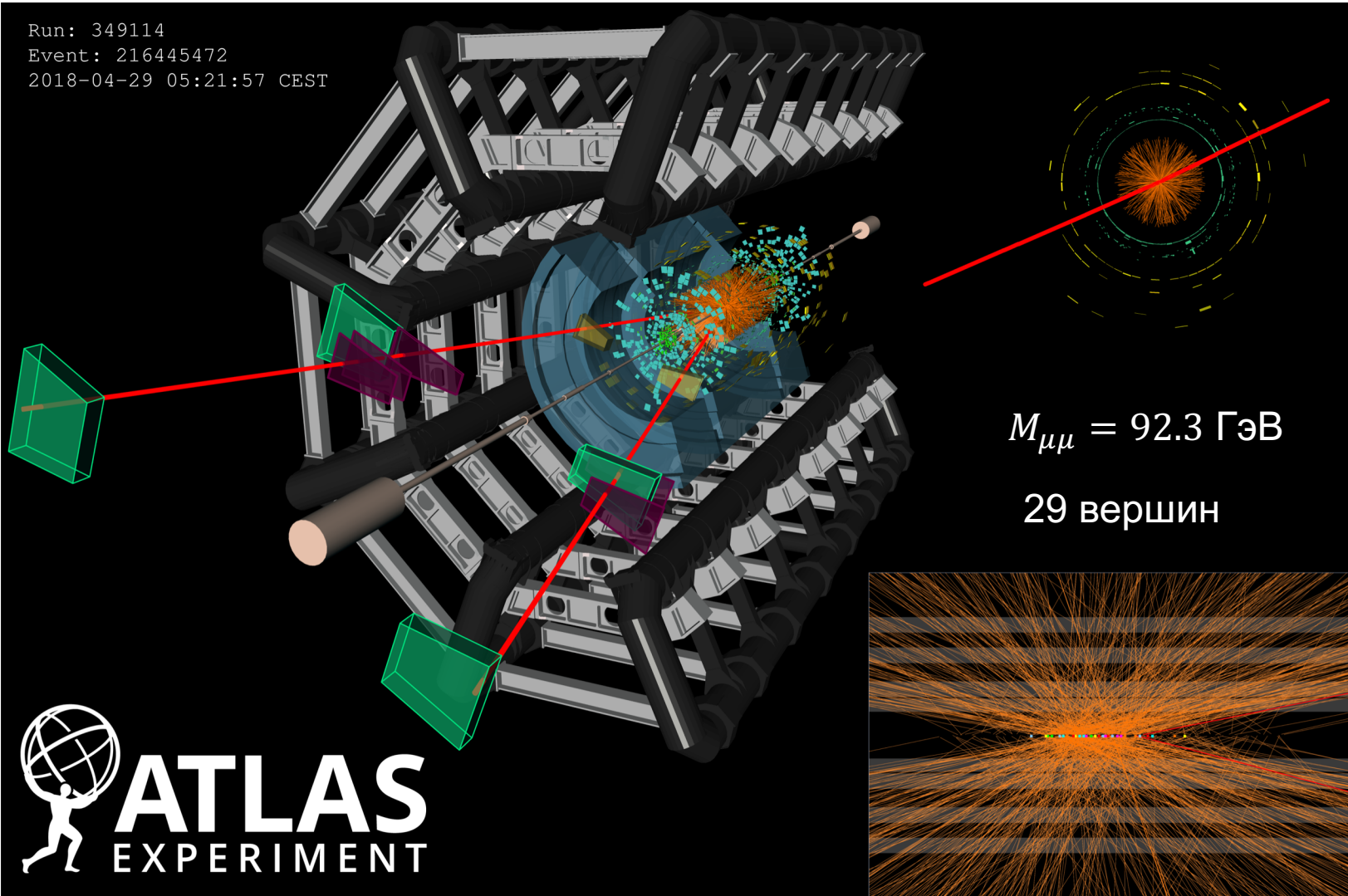
Luminosity	2015	2016	2017	2018
Delivered [fb ⁻¹]	4.2	38.5	50.2	65.0
Recorded [%]	92.1	92.4	93.3	95.7
Good for Physics [%]	87.1	93-95	93.6	97.5

Реконструкция e , μ и струй



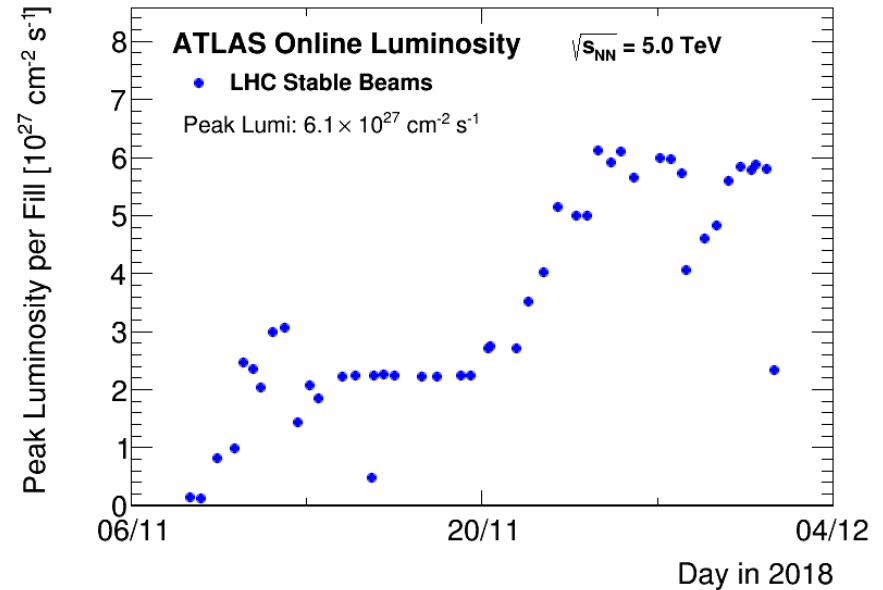
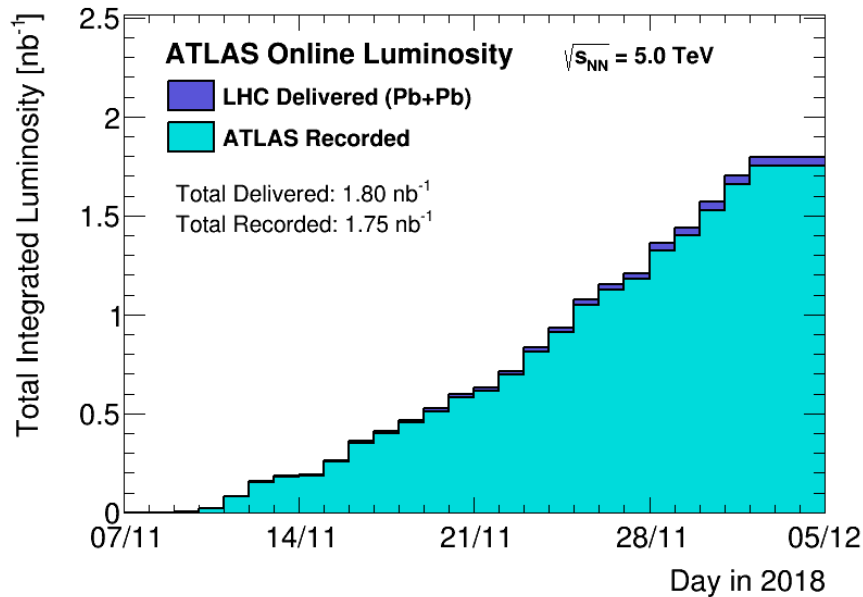
pp столкновения: $Z \rightarrow \mu\mu$

Run: 349114
Event: 216445472
2018-04-29 05:21:57 CEST



 **ATLAS**
EXPERIMENT

Pb-Pb столкновения

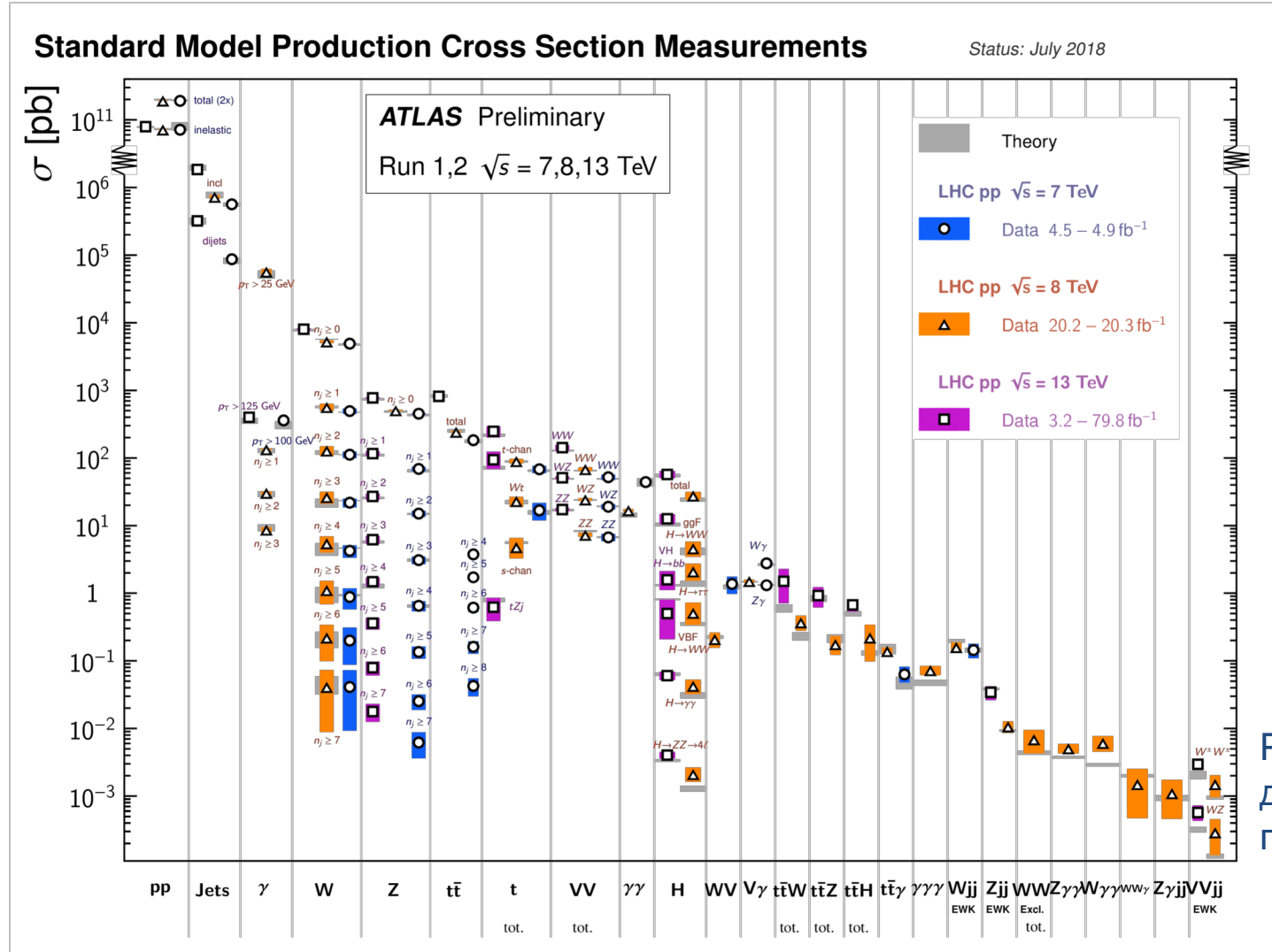


- Pb-Pb столкновения с энергией в СЦМ $\sqrt{s_{NN}} = 5.0 \text{ ТэВ}$
- LHC обеспечил ATLAS данными, соответствующими полной светимости 1.8 нб^{-1}
- Из этих данных набрано ATLAS 1.75 нб^{-1} (т.е. эффективность $> 97.2\%$)
- Максимальная достигнутая светимость: $6.1 \times 10^{27} \text{ см}^{-2} \text{ с}^{-1}$

Физические исследования

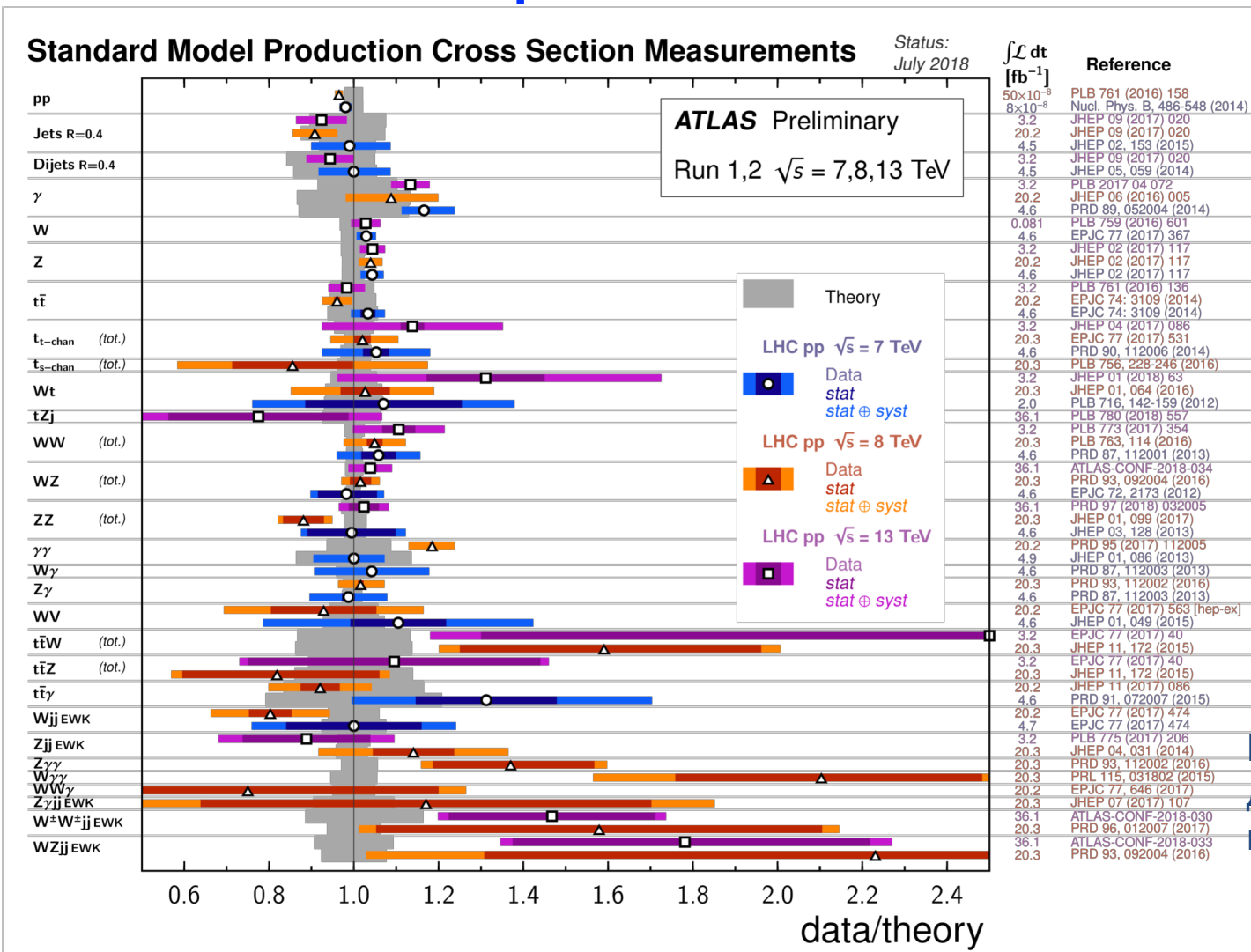
- В эксперименте ATLAS достаточно обширная программа физических исследований
- Физика в рамках Стандартной модели:
 - Изучение свойств Стандартной модели
 - Физика t -кварка
 - Изучение свойств бозона Хиггса
 - Физика тяжелых ионов
- Физика за пределами Стандартной модели:
 - Поиск «экзотических» явлений и частиц (тяжелые калибровочные бозоны, темная материя, модели с дополнительными размерностями и т.д.)
 - Суперсимметрия

Стандартная модель



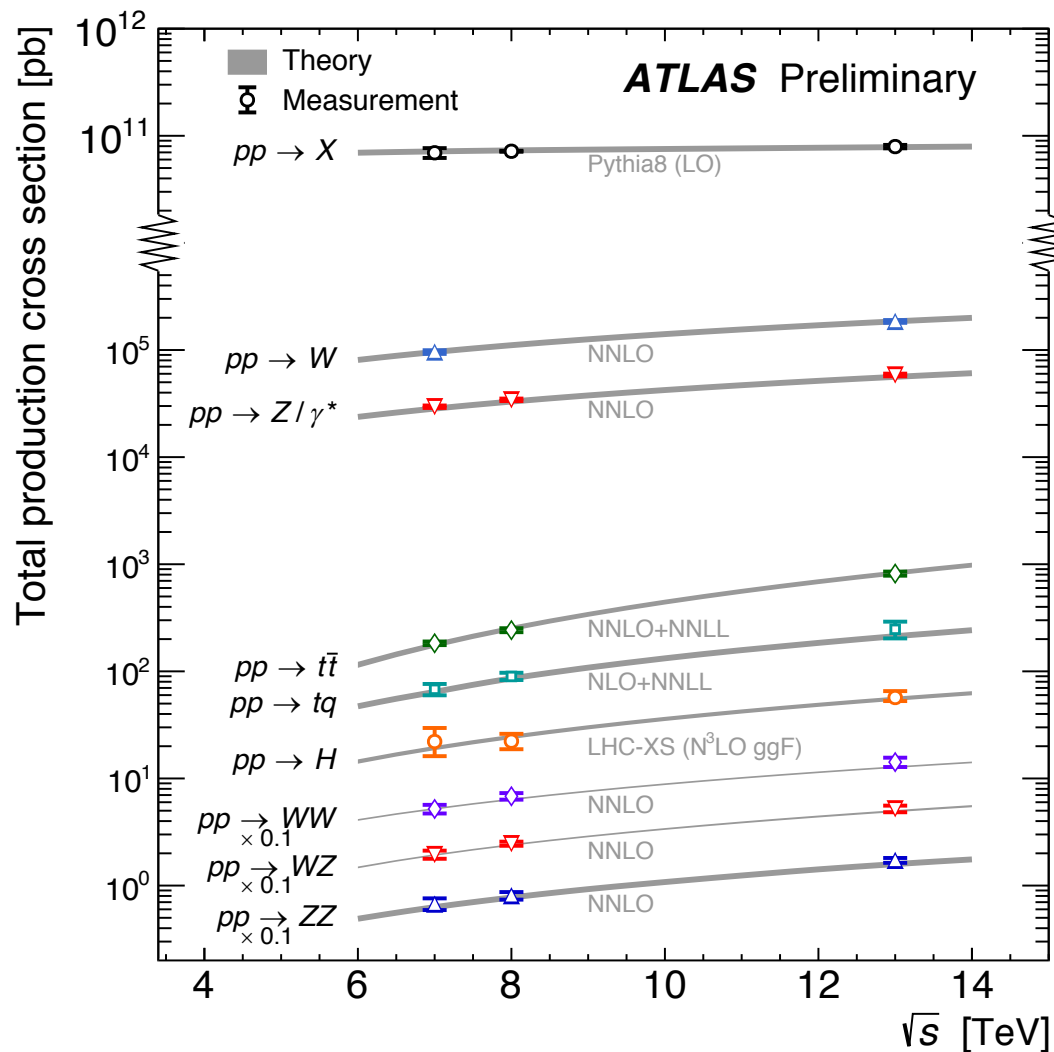
Результаты
доступны
по [ссылке](#)

Стандартная модель



Результаты
доступны
по [ссылке](#)

Стандартная модель



- \square $pp \rightarrow X$
7 TeV, $20 \mu\text{b}^{-1}$, Nat. Commun. 2, 463 (2011)
- \square $pp \rightarrow W$ \square $pp \rightarrow Z/\gamma^*$
8 TeV, $500 \mu\text{b}^{-1}$, Phys.Lett. B761 158 (2016)
- \square $pp \rightarrow W$ \square $pp \rightarrow Z/\gamma^*$
13 TeV, $60 \mu\text{b}^{-1}$, Phys. Rev. Lett. 117 182002 (2017)
- \square $pp \rightarrow W$ \square $pp \rightarrow Z/\gamma^*$
7 TeV, 4.6 fb^{-1} , arXiv:1612.03016 (for Z/W) 8
- \square $pp \rightarrow W$ \square $pp \rightarrow Z/\gamma^*$
8 TeV, 20.2 fb^{-1} , JHEP 02, 117 (2017) (for Z)
- \square $pp \rightarrow W$ \square $pp \rightarrow Z/\gamma^*$
13 TeV, 81 pb^{-1} , PLB 759 (2016) 601 (for W)
- \square $pp \rightarrow W$ \square $pp \rightarrow Z/\gamma^*$
13 TeV, 3.2 fb^{-1} , JHEP 02, 117 (2017) (for Z)
- \square $pp \rightarrow t\bar{t}$
7 TeV, 4.6 fb^{-1} , Eur. Phys. J. C 74:3109 (2014)
- \square $pp \rightarrow t\bar{t}$
8 TeV, 20.3 fb^{-1} , Eur. Phys. J. C 74:3109 (2014)
- \square $pp \rightarrow t\bar{t}$
13 TeV, 3.2 fb^{-1} , arXiv:1606.02699
- \square $pp \rightarrow tq$
7 TeV, 4.6 fb^{-1} , PRD 90, 112006 (2014)
- \square $pp \rightarrow tq$
8 TeV, 20.3 fb^{-1} , arXiv:1702.02859
- \square $pp \rightarrow tq$
13 TeV, 3.2 fb^{-1} , arXiv:1609.03920
- \square $pp \rightarrow H$
7 TeV, 4.5 fb^{-1} , Eur. Phys. J. C76 (2016) 6
- \square $pp \rightarrow H$
8 TeV, 20.3 fb^{-1} , Eur. Phys. J. C76 (2016) 6
- \square $pp \rightarrow H$
13 TeV, 36.1 fb^{-1} , ATLAS-CONF-2017-047
- \square $pp \rightarrow WW$
7 TeV, 4.6 fb^{-1} , PRD 87, 112001 (2013)
- \square $pp \rightarrow WW$
8 TeV, 20.3 fb^{-1} , JHEP 09 029 (2016)
- \square $pp \rightarrow WW$
13 TeV, 3.2 fb^{-1} , arXiv:1702.04519
- \square $pp \rightarrow WZ$
7 TeV, 4.6 fb^{-1} , Eur. Phys. J. C (2012) 72:2173
- \square $pp \rightarrow WZ$
8 TeV, 20.3 fb^{-1} , PRD 93, 092004 (2016)
- \square $pp \rightarrow WZ$
13 TeV, 3.2 fb^{-1} , Phys. Lett. B 762 (2016)
- \square $pp \rightarrow ZZ$
7 TeV, 4.6 fb^{-1} , JHEP 03, 128 (2013)
- \square $pp \rightarrow ZZ$
8 TeV, 20.3 fb^{-1} , JHEP 01, 099 (2017)
- \square $pp \rightarrow ZZ$
13 TeV, 36.1 fb^{-1} , ATLAS-CONF-2017-031

Результаты
доступны
по [ссылке](#)

Поиск «новой» физики

ATLAS Exotics Searches* - 95% CL Upper Exclusion Limits

Status: July 2018

ATLAS Preliminary

$$\int \mathcal{L} dt = (3.2 - 79.8) \text{ fb}^{-1}$$

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

Model	ℓ, γ	Jets†	E_T^{miss}	$\int \mathcal{L} dt [\text{fb}^{-1}]$	Limit	Reference	
Extra dimensions	ADD $G_{KK} + g/q$	0 e, μ	1-4 j	Yes	36.1	M_D 7.7 TeV	$n = 2$
	ADD non-resonant $\gamma\gamma$	2 γ	-	-	36.7	M_S 8.6 TeV	$n = 3$ HLZ NLO
	ADD QBH	-	2 j	-	37.0	M_{th} 8.9 TeV	$n = 6$
	ADD BH high Σp_T	$\geq 1 e, \mu$	$\geq 2 j$	-	3.2	M_{th} 8.2 TeV	$n = 6, M_D = 3 \text{ TeV, rot BH}$
	ADD BH multijet	-	$\geq 3 j$	-	3.6	M_{th} 9.55 TeV	$n = 6, M_D = 3 \text{ TeV, rot BH}$
	RS1 $G_{KK} \rightarrow \gamma\gamma$	2 γ	-	-	36.7	$G_{KK} \text{ mass}$ 4.1 TeV	$k/\bar{M}_{Pl} = 0.1$
	Bulk RS $G_{KK} \rightarrow WW/ZZ$	multi-channel	-	-	36.1	$G_{KK} \text{ mass}$ 2.3 TeV	$k/\bar{M}_{Pl} = 1.0$
	Bulk RS $g_{KK} \rightarrow t\bar{t}$	1 e, $\mu \geq 1 b, \geq 1 J/2j$	Yes	36.1	$g_{KK} \text{ mass}$ 3.8 TeV	$\Gamma/m = 15\%$	
	2UED / RPP	1 e, $\mu \geq 2 b, \geq 3 j$	Yes	36.1	$KK \text{ mass}$ 1.8 TeV	Tier (1,1), $\mathcal{B}(A^{(1,1)} \rightarrow t\bar{t}) = 1$	
	Gauge bosons	SSM $Z' \rightarrow \ell\ell$	2 e, μ	-	-	36.1	$Z' \text{ mass}$ 4.5 TeV
SSM $Z' \rightarrow \tau\tau$		2 τ	-	-	36.1	$Z' \text{ mass}$ 2.42 TeV	
Leptophobic $Z' \rightarrow b\bar{b}$		-	2 b	-	36.1	$Z' \text{ mass}$ 2.1 TeV	
Leptophobic $Z' \rightarrow t\bar{t}$		1 e, $\mu \geq 1 b, \geq 1 J/2j$	Yes	36.1	$Z' \text{ mass}$ 3.0 TeV	$\Gamma/m = 1\%$	
SSM $W' \rightarrow \ell\nu$		1 e, μ	-	Yes	79.8	$W' \text{ mass}$ 5.6 TeV	
SSM $W' \rightarrow \tau\nu$		1 τ	-	Yes	36.1	$W' \text{ mass}$ 3.7 TeV	ATLAS-CONF-2018-017
HVT $V' \rightarrow WW \rightarrow qq\bar{q}\bar{q}$ model B		0 e, μ	2 J	-	79.8	$V' \text{ mass}$ 4.15 TeV	$g_V = 3$
HVT $V' \rightarrow WH/ZH$ model B		multi-channel	-	-	36.1	$V' \text{ mass}$ 2.93 TeV	$g_V = 3$
LRSM $W'_R \rightarrow t\bar{b}$		multi-channel	-	-	36.1	$W' \text{ mass}$ 3.25 TeV	CERN-EP-2018-142
CI		CI $qq\bar{q}\bar{q}$	-	2 j	-	37.0	Λ 21.8 TeV
	CI $\ell\ell q\bar{q}$	2 e, μ	-	-	36.1	Λ 40.0 TeV	η_{LL}
	CI $t\bar{t}t\bar{t}$	$\geq 1 e, \mu$	$\geq 1 b, \geq 1 j$	Yes	36.1	Λ 2.57 TeV	$ C_{4t} = 4\pi$
DM	Axial-vector mediator (Dirac DM)	0 e, μ	1-4 j	Yes	36.1	m_{hmed} 1.55 TeV	$g_a = 0.25, g_s = 1.0, m(\chi) = 1 \text{ GeV}$
	Colored scalar mediator (Dirac DM)	0 e, μ	1-4 j	Yes	36.1	m_{hmed} 1.67 TeV	$g = 1.0, m(\chi) = 1 \text{ GeV}$
	$VV\chi\chi$ EFT (Dirac DM)	0 e, μ	1 J, $\leq 1 j$	Yes	3.2	M_s 700 GeV	$m(\chi) < 150 \text{ GeV}$
LQ	Scalar LQ 1 st gen	2 e	$\geq 2 j$	-	3.2	LQ mass 1.1 TeV	$\beta = 1$
	Scalar LQ 2 nd gen	2 μ	$\geq 2 j$	-	3.2	LQ mass 1.05 TeV	$\beta = 1$
	Scalar LQ 3 rd gen	1 e, μ	$\geq 1 b, \geq 3 j$	Yes	20.3	LQ mass 640 GeV	$\beta = 0$
Heavy quarks	VLQ $TT \rightarrow Ht/Zt/Wb + X$	multi-channel	-	-	36.1	T mass 1.37 TeV	SU(2) doublet
	VLQ $BB \rightarrow Wt/Zb + X$	multi-channel	-	-	36.1	B mass 1.34 TeV	SU(2) doublet
	VLQ $T_{5/3} T_{5/3} T_{5/3} \rightarrow Wt + X$	2(SS)/ $\geq 3 e, \mu \geq 1 b, \geq 1 j$	Yes	36.1	$T_{5/3} \text{ mass}$ 1.64 TeV	$\mathcal{B}(T_{5/3} \rightarrow Wt) = 1, c(T_{5/3} Wt) = 1$	
	VLQ $Y \rightarrow Wb + X$	1 e, $\mu \geq 1 b, \geq 1 j$	Yes	3.2	Y mass 1.44 TeV	$\mathcal{B}(Y \rightarrow Wb) = 1, c(YWb) = 1/\sqrt{2}$	
	VLQ $B \rightarrow Hb + X$	0 e, $\mu, 2 \gamma \geq 1 b, \geq 1 j$	Yes	79.8	B mass 1.21 TeV	$\kappa_B = 0.5$	
	VLQ $QQ \rightarrow WqVq$	1 e, μ	$\geq 4 j$	Yes	20.3	Q mass 690 GeV	
Excited fermions	Excited quark $q^* \rightarrow qg$	-	2 j	-	37.0	$q^* \text{ mass}$ 6.0 TeV	only u' and $d', \Lambda = m(q^*)$
	Excited quark $q^* \rightarrow q\gamma$	1 γ	1 j	-	36.7	$q^* \text{ mass}$ 5.3 TeV	only u' and $d', \Lambda = m(q^*)$
	Excited quark $b^* \rightarrow b\gamma$	-	1 b, 1 j	-	36.1	$b^* \text{ mass}$ 2.6 TeV	
	Excited lepton ℓ^*	3 e, μ, τ	-	-	20.3	$\ell^* \text{ mass}$ 3.0 TeV	$\Lambda = 3.0 \text{ TeV}$
	Excited lepton ν^*	3 e, μ, τ	-	-	20.3	$\nu^* \text{ mass}$ 1.6 TeV	$\Lambda = 1.6 \text{ TeV}$
Other	Type III Seesaw	1 e, μ	$\geq 2 j$	Yes	79.8	$N^0 \text{ mass}$ 560 GeV	ATLAS-CONF-2018-020
	LRSM Majorana ν	2 e, μ	2 j	-	20.3	$N^0 \text{ mass}$ 2.0 TeV	$m(W_R) = 2.4 \text{ TeV, no mixing}$
	Higgs triplet $H^{\pm\pm} \rightarrow \ell\ell$	2,3,4 e, μ (SS)	-	-	36.1	$H^{\pm\pm} \text{ mass}$ 670 GeV	DY production
	Higgs triplet $H^{\pm\pm} \rightarrow \ell\tau$	3 e, μ, τ	-	-	20.3	$H^{\pm\pm} \text{ mass}$ 400 GeV	DY production, $\mathcal{B}(H^{\pm\pm} \rightarrow \ell\tau) = 1$
	Monotop (non-res prod)	1 e, μ	1 b	Yes	20.3	spin-1 invisible particle mass 657 GeV	$a_{\text{anom-}e} = 0.2$
	Multi-charged particles	-	-	-	20.3	multi-charged particle mass 785 GeV	DY production, $ q = 5e$
	Magnetic monopoles	-	-	-	7.0	monopole mass 1.34 TeV	DY production, $ g = 1g_D, \text{spin } 1/2$

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

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

Результаты
доступны
по [ссылке](#)

Суперсимметрия

ATLAS SUSY Searches* - 95% CL Lower Limits					ATLAS Preliminary			
July 2018					$\sqrt{s} = 7, 8, 13 \text{ TeV}$			
Model	e, μ, τ, γ	Jets	E_T^{miss}	$\int \mathcal{L} dt [\text{fb}^{-1}]$	Mass limit	Reference		
					$\sqrt{s} = 7, 8 \text{ TeV}$	$\sqrt{s} = 13 \text{ TeV}$		
Inclusive Searches	$\tilde{q}\tilde{q}, \tilde{q} \rightarrow \tilde{q}\tilde{\chi}_1^0$	0	2-6 jets	Yes	36.1	\tilde{q} [2x, 8x Degen.]	$m(\tilde{\chi}_1^0) < 100 \text{ GeV}$	1712.02332
		mono-jet	1-3 jets	Yes	36.1	\tilde{q} [1x, 8x Degen.]	$m(\tilde{q}) - m(\tilde{\chi}_1^0) = 5 \text{ GeV}$	1711.03301
	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow \tilde{q}\tilde{q}\tilde{\chi}_1^0$	0	2-6 jets	Yes	36.1	\tilde{g}	$m(\tilde{\chi}_1^0) < 200 \text{ GeV}$	1712.02332
						Forbidden	$m(\tilde{\chi}_1^0) = 900 \text{ GeV}$	1712.02332
	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow \tilde{q}\tilde{q}(\ell\ell)\tilde{\chi}_1^0$	3 e, μ	4 jets	-	36.1	\tilde{g}	$m(\tilde{\chi}_1^0) < 800 \text{ GeV}$	1706.03731
		$ee, \mu\mu$	2 jets	Yes	36.1	\tilde{g}	$m(\tilde{g}) - m(\tilde{\chi}_1^0) = 50 \text{ GeV}$	1805.11381
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow qqWZ\tilde{\chi}_1^0$	0	7-11 jets	Yes	36.1	\tilde{g}	$m(\tilde{\chi}_1^0) < 400 \text{ GeV}$	1708.02794	
	3 e, μ	4 jets	-	36.1	\tilde{g}	$m(\tilde{g}) - m(\tilde{\chi}_1^0) = 200 \text{ GeV}$	1706.03731	
$\tilde{g}\tilde{g}, \tilde{g} \rightarrow t\bar{t}\tilde{\chi}_1^0$	0-1 e, μ	3 b	Yes	36.1	\tilde{g}	$m(\tilde{\chi}_1^0) < 200 \text{ GeV}$	1711.01901	
	3 e, μ	4 jets	-	36.1	\tilde{g}	$m(\tilde{g}) - m(\tilde{\chi}_1^0) = 300 \text{ GeV}$	1706.03731	
3 rd gen. squarks direct production	$\tilde{b}_1\tilde{b}_1, \tilde{b}_1 \rightarrow b\tilde{\chi}_1^0/\tilde{t}\tilde{\chi}_1^+$		Multiple		36.1	\tilde{b}_1	$m(\tilde{\chi}_1^0) = 300 \text{ GeV}, \text{BR}(\tilde{b}_1 \rightarrow b\tilde{\chi}_1^0) = 1$	1708.09266, 1711.03301
			Multiple		36.1	\tilde{b}_1	$m(\tilde{\chi}_1^0) = 300 \text{ GeV}, \text{BR}(\tilde{b}_1 \rightarrow b\tilde{\chi}_1^0) = 0.5$	1708.09266
			Multiple		36.1	\tilde{b}_1	$m(\tilde{\chi}_1^0) = 200 \text{ GeV}, m(\tilde{\chi}_1^+) = 300 \text{ GeV}, \text{BR}(\tilde{b}_1 \rightarrow t\tilde{\chi}_1^+) = 1$	1706.03731
	$\tilde{b}_1\tilde{b}_1, \tilde{t}_1\tilde{t}_1, M_2 = 2 \times M_1$		Multiple		36.1	\tilde{t}_1	$m(\tilde{\chi}_1^0) = 60 \text{ GeV}$	1709.04183, 1711.11520, 1708.03247
			Multiple		36.1	\tilde{t}_1	$m(\tilde{\chi}_1^0) = 200 \text{ GeV}$	1709.04183, 1711.11520, 1708.03247
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \rightarrow Wb\tilde{\chi}_1^0$ or $\tilde{t}_1\tilde{\chi}_1^0$	0-2 e, μ	0-2 jets/1-2 b	Yes	36.1	\tilde{t}_1	$m(\tilde{\chi}_1^0) = 1 \text{ GeV}$	1506.08616, 1709.04183, 1711.11520
	$\tilde{t}_1\tilde{t}_1, \tilde{H}$ LSP		Multiple		36.1	\tilde{t}_1	$m(\tilde{\chi}_1^0) = 150 \text{ GeV}, m(\tilde{\chi}_1^+) - m(\tilde{\chi}_1^0) = 5 \text{ GeV}, \tilde{t}_1 \approx \tilde{t}_2$	1709.04183, 1711.11520
			Multiple		36.1	\tilde{t}_1	$m(\tilde{\chi}_1^0) = 300 \text{ GeV}, m(\tilde{\chi}_1^+) - m(\tilde{\chi}_1^0) = 5 \text{ GeV}, \tilde{t}_1 \approx \tilde{t}_2$	1709.04183, 1711.11520
	$\tilde{t}_1\tilde{t}_1, \tilde{H}$ Well-Tempered LSP		Multiple		36.1	\tilde{t}_1	$m(\tilde{\chi}_1^0) = 150 \text{ GeV}, m(\tilde{\chi}_1^+) - m(\tilde{\chi}_1^0) = 5 \text{ GeV}, \tilde{t}_1 \approx \tilde{t}_2$	1709.04183, 1711.11520
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \rightarrow c\tilde{\chi}_1^0/\tilde{c}\tilde{c}, \tilde{c} \rightarrow c\tilde{\chi}_1^0$	0	2c	Yes	36.1	\tilde{t}_1	$m(\tilde{\chi}_1^0) = 0 \text{ GeV}$	1805.01849
	0	mono-jet	Yes	36.1	\tilde{t}_1	$m(\tilde{t}_1, \tilde{c}) - m(\tilde{\chi}_1^0) = 50 \text{ GeV}$	1805.01849	
						$m(\tilde{t}_1, \tilde{c}) - m(\tilde{\chi}_1^0) = 5 \text{ GeV}$	1711.03301	
$\tilde{t}_2\tilde{t}_2, \tilde{t}_2 \rightarrow \tilde{t}_1 + h$	1-2 e, μ	4 b	Yes	36.1	\tilde{t}_2	$m(\tilde{\chi}_1^0) = 0 \text{ GeV}, m(\tilde{t}_1) - m(\tilde{\chi}_1^0) = 180 \text{ GeV}$	1706.03986	
EW direct	$\tilde{\chi}_1^0\tilde{\chi}_2^0$ via WZ	2-3 e, μ	-	Yes	36.1	$\tilde{\chi}_1^0/\tilde{\chi}_2^0$	$m(\tilde{\chi}_1^0) = 0$	1403.5294, 1806.02293
		$ee, \mu\mu$	≥ 1	Yes	36.1	$\tilde{\chi}_1^0/\tilde{\chi}_2^0$	$m(\tilde{\chi}_1^+) - m(\tilde{\chi}_1^0) = 10 \text{ GeV}$	1712.08119
	$\tilde{\chi}_1^0\tilde{\chi}_2^0$ via Wh	$ll(\gamma\gamma)/t\bar{b}\bar{b}$	-	Yes	20.3	$\tilde{\chi}_1^0/\tilde{\chi}_2^0$	$m(\tilde{\chi}_1^0) = 0$	1501.07110
	$\tilde{\chi}_1^0\tilde{\chi}_1^0/\tilde{\chi}_2^0, \tilde{\chi}_1^0 \rightarrow \tilde{\tau}\tilde{\nu}(\tau\tilde{\nu}), \tilde{\chi}_2^0 \rightarrow \tilde{\tau}\tilde{\nu}(\nu\tilde{\nu})$	2 τ	-	Yes	36.1	$\tilde{\chi}_1^0/\tilde{\chi}_2^0$	$m(\tilde{\chi}_1^0) = 0, m(\tilde{\tau}, \tilde{\nu}) = 0.5(m(\tilde{\chi}_1^+) + m(\tilde{\chi}_1^0))$	1708.07875
							$m(\tilde{\chi}_1^+) - m(\tilde{\chi}_1^0) = 100 \text{ GeV}, m(\tilde{\tau}, \tilde{\nu}) = 0.5(m(\tilde{\chi}_1^+) + m(\tilde{\chi}_1^0))$	1708.07875
	$\tilde{t}_L\tilde{t}_L, \tilde{t}_L \rightarrow \tilde{t}_1\tilde{\chi}_1^0$	2 e, μ	0	Yes	36.1	\tilde{t}_L	$m(\tilde{\chi}_1^0) = 0$	1803.02762
	2 e, μ	≥ 1	Yes	36.1	\tilde{t}_L	$m(\tilde{t}_L) - m(\tilde{\chi}_1^0) = 5 \text{ GeV}$	1712.08119	
$\tilde{H}\tilde{H}, \tilde{H} \rightarrow h\tilde{G}/Z\tilde{G}$	0	$\geq 3b$	Yes	36.1	\tilde{H}	$\text{BR}(\tilde{H} \rightarrow h\tilde{G}) = 1$	1806.04030	
	4 e, μ	0	Yes	36.1	\tilde{H}	$\text{BR}(\tilde{H} \rightarrow Z\tilde{G}) = 1$	1804.03602	
Long-lived particles	Direct $\tilde{\chi}_1^0\tilde{\chi}_1^+$ prod., long-lived $\tilde{\chi}_1^+$	Disapp. trk	1 jet	Yes	36.1	$\tilde{\chi}_1^+$	Pure Wino	1712.02118
						$\tilde{\chi}_1^+$	Pure Higgsino	ATL-PHYS-PUB-2017-019
	Stable \tilde{g} R-hadron	SMP	-	-	3.2	\tilde{g}	$m(\tilde{\chi}_1^0) = 100 \text{ GeV}$	1606.05129
	Metastable \tilde{g} R-hadron, $\tilde{g} \rightarrow q\tilde{q}\tilde{\chi}_1^0$		Multiple		32.8	\tilde{g} ($\tau(\tilde{g}) = 100 \text{ ns}, 0.2 \text{ ns}$)	$m(\tilde{\chi}_1^0) = 100 \text{ GeV}$	1710.04901, 1604.04520
GMSB, $\tilde{\chi}_1^0 \rightarrow \gamma\tilde{G}$, long-lived $\tilde{\chi}_1^0$	2 γ	-	Yes	20.3	$\tilde{\chi}_1^0$	$1 < \tau(\tilde{\chi}_1^0) < 3 \text{ ns}$, SPS8 model	1409.55452	
$\tilde{g}\tilde{g}, \tilde{\chi}_1^0 \rightarrow e\tilde{\nu}/\mu\tilde{\nu}/\mu\tilde{\nu}$	displ. $ee/\mu\mu/\mu\mu$	-	-	20.3	\tilde{g}	$6 < \tau(\tilde{\chi}_1^0) < 1000 \text{ mm}$, $m(\tilde{\chi}_1^0) = 1 \text{ TeV}$	1504.05162	
RPV	LFV $pp \rightarrow \tilde{\nu}_c + X, \tilde{\nu}_c \rightarrow e\mu/\tau/\mu/\tau$	$e\mu, e\tau, \mu\tau$	-	-	3.2	$\tilde{\nu}_c$	$A'_{311} = 0.11, A'_{132/133/233} = 0.07$	1607.08079
	$\tilde{\chi}_1^0\tilde{\chi}_1^0/\tilde{\chi}_2^0 \rightarrow WWZ/\ell\ell\nu\nu$	4 e, μ	0	Yes	36.1	$\tilde{\chi}_1^0/\tilde{\chi}_2^0$ [$A'_{333} \neq 0, A'_{124} \neq 0$]	$m(\tilde{\chi}_1^0) = 100 \text{ GeV}$	1804.03602
	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow qq\tilde{\chi}_1^0, \tilde{\chi}_1^0 \rightarrow qq\tilde{\chi}_1^0$	0	4-5 large-R jets	-	36.1	\tilde{g} [$m(\tilde{\chi}_1^0) = 200 \text{ GeV}, 1100 \text{ GeV}$]	Large A'_{112}	ATLAS-CONF-2018-003
			Multiple		36.1	\tilde{g} [$A'_{112} = 2e-4, 2e-5$]	$m(\tilde{\chi}_1^0) = 200 \text{ GeV}$, bino-like	ATLAS-CONF-2018-003
	$\tilde{g}\tilde{g}, \tilde{g} \rightarrow t\bar{b}s/\tilde{g} \rightarrow t\bar{t}\tilde{\chi}_1^0, \tilde{\chi}_1^0 \rightarrow t\bar{b}s$		Multiple		36.1	\tilde{g} [$A'_{112} = 1, 1e-2$]	$m(\tilde{\chi}_1^0) = 200 \text{ GeV}$, bino-like	ATLAS-CONF-2018-003
	$\tilde{t}_1, \tilde{t}_1 \rightarrow t\tilde{\chi}_1^0, \tilde{\chi}_1^0 \rightarrow t\bar{b}s$		Multiple		36.1	\tilde{t}_1 [$A'_{112} = 2e-4, 1e-2$]	$m(\tilde{\chi}_1^0) = 200 \text{ GeV}$, bino-like	ATLAS-CONF-2018-003
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \rightarrow b\tilde{s}$	0	2 jets + 2 b	-	36.7	\tilde{t}_1 [$gg, b\bar{s}$]	$m(\tilde{\chi}_1^0) = 200 \text{ GeV}$, bino-like	1710.07171
	$\tilde{t}_1\tilde{t}_1, \tilde{t}_1 \rightarrow b\tilde{\ell}$	2 e, μ	2 b	-	36.1	\tilde{t}_1	$\text{BR}(\tilde{t}_1 \rightarrow b\tilde{\ell}) > 20\%$	1710.05544

*Only a selection of the available mass limits on new states or phenomena is shown. Many of the limits are based on simplified models, c.f. refs. for the assumptions made.

10⁻¹ 1 Mass scale [TeV]

Результаты
доступны
по [ссылке](#)

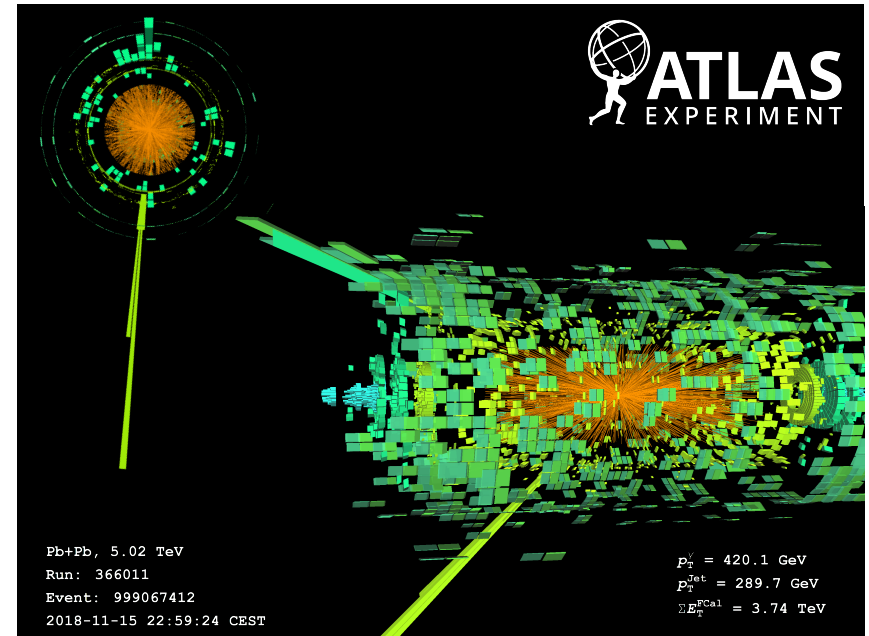
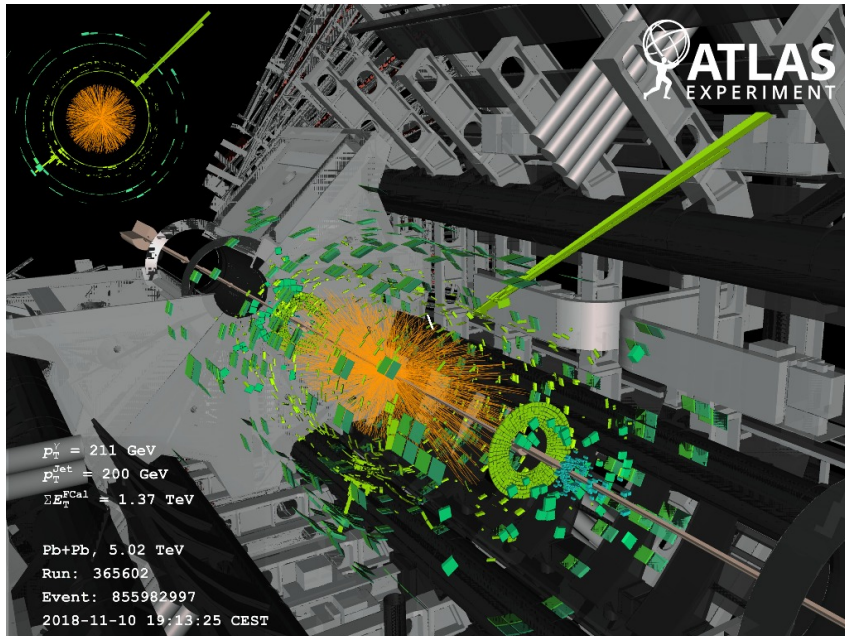
Заключение

- В 2018 году эксперимент ATLAS набрал **62.2 фб⁻¹** данных, из них «хороших» для проведения физических исследований **60.1 фб⁻¹**
- За весь период Run-II набранная статистика составила **149 фб⁻¹**, из них «хороших» для проведения физических исследований **140 фб⁻¹**
- На всем протяжении Run-II детектор ATLAS работал стабильно с хорошей эффективностью набора данных
- В 2018 году было опубликовано **103** статьи (+ принято в печать 12, подано в печать 21) [[ссылка на результаты](#)]

Спасибо за внимание
и
С Новым Годом!

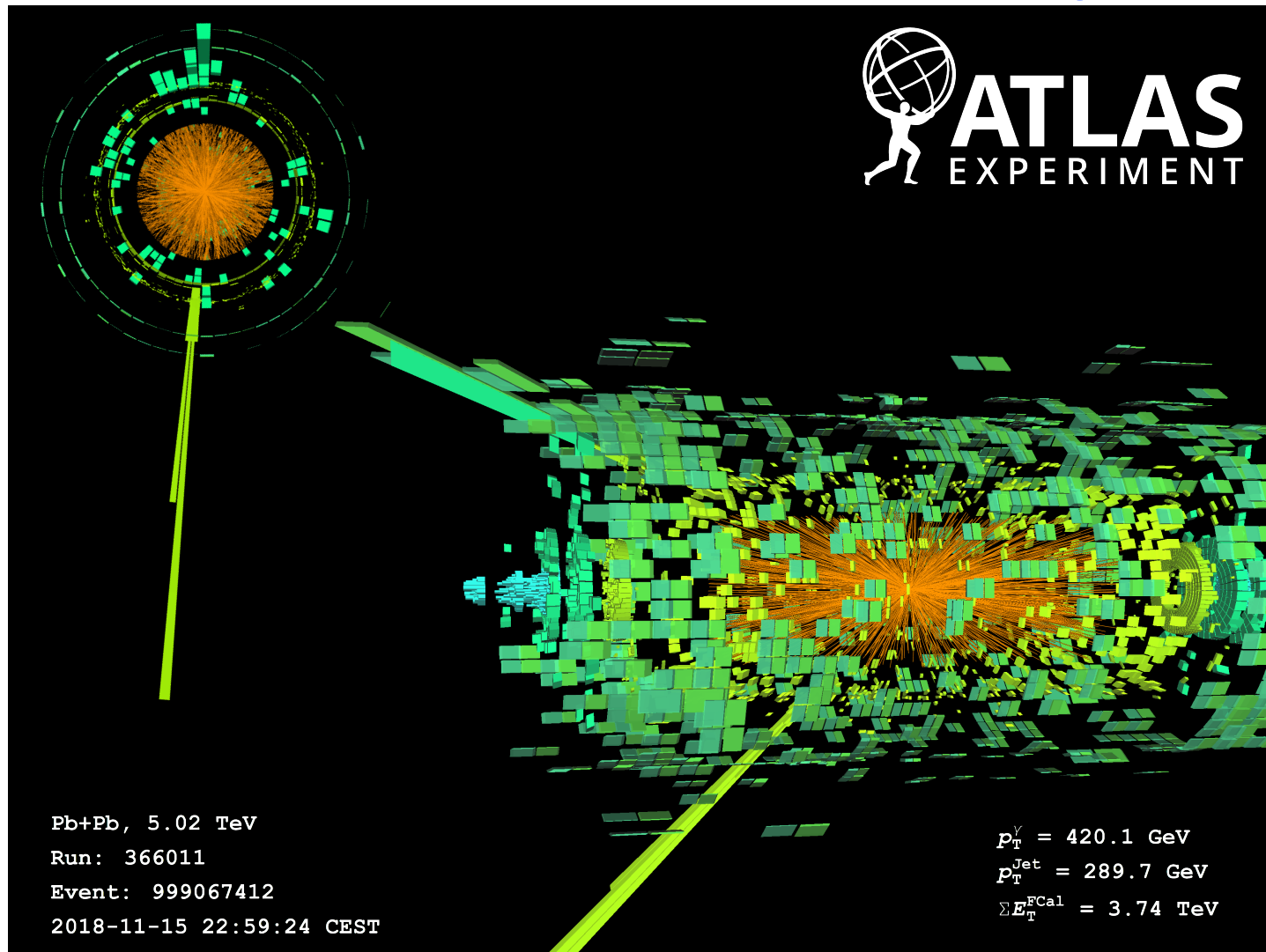


Pb-Pb столкновения: $\gamma + jet$



- Импульсы фотона и струи должны быть сбалансированы
- Однако струя (кварк) теряет часть своей энергии, проходя через кварк-глюонную плазму
- Это приводит нарушению баланса импульсов

Pb-Pb столкновения: $\gamma + jet$



Pb-Pb столкновения: $\gamma\gamma \rightarrow ee$



Run: 365512
Event: 130954442
2018-11-09 07:56:44 CEST

$p_T^{e1} = 8.2 \text{ GeV}$
 $p_T^{e2} = 7.4 \text{ GeV}$

