



Exotic Run 2 Searches from ATLAS & CMS: Midterm Report.

Tuesday, 17 April 2018
DESY Auditorium, 16:45 h

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ATLAS Exotics Searches* - 95% CL Upper Exclusion Limits
Status: July 2017

$\int \mathcal{L} dt = (3.2 - 37.0) \text{ fb}^{-1}$ **ATLAS Preliminary**
 $\sqrt{s} = 8, 13 \text{ TeV}$

Model	ℓ, γ	Jets [†]	E_{miss}	$[\mathcal{L} dt] [\text{fb}^{-1}]$	Limit	Reference	
Extra dimensions	ADD $G_{KK} + g/g$	$0 e, \mu$	$1-4j$	Yes	36.1	M_{Pl} 2.75 TeV	ATLAS-COBF-2017-090
	ADD non-resonant $\gamma\gamma$	2γ	-	-	36.7	M_{Pl} 8.6 TeV	CERN-EP-2017-132
	ADD QBH	-	$2j$	-	37.0	M_{Pl} 8.9 TeV	1703.0817
	ADD BH high Σp_T	$\geq 1 e, \mu$	$\geq 2j$	-	3.2	M_{Pl} 8.2 TeV	1606.0295
	ADD BH multijet	-	$\geq 3j$	-	3.6	M_{Pl} 9.55 TeV	1512.0286
	RS1 $G_{KK} \rightarrow \gamma\gamma$	2γ	-	-	36.7	$G_{KK} \text{ mass}$ 4.1 TeV	CERN-EP-2017-132
Gauge bosons	Bulk RS $G_{KK} \rightarrow WW \rightarrow qq/\nu$	$1 e, \mu$	$1j$	Yes	36.1	$G_{KK} \text{ mass}$ 1.75 TeV	ATLAS-COBF-2016-051
	ZUED/RPP	$1 e, \mu$	$\geq 2 b, \geq 3j$	Yes	13.2	$KK \text{ mass}$ 1.6 TeV	ATLAS-COBF-2016-104
	SSM $Z' \rightarrow \ell\ell$	$2 e, \mu$	-	-	36.1	$Z' \text{ mass}$ 4.9 TeV	ATLAS-COBF-2017-027
	SSM $Z' \rightarrow \tau\tau$	2τ	-	-	36.1	$Z' \text{ mass}$ 2.4 TeV	ATLAS-COBF-2017-090
	Leptophobic $Z' \rightarrow bb$	-	$2 b$	-	3.2	$Z' \text{ mass}$ 1.5 TeV	1603.08781
	Leptophobic $Z' \rightarrow \ell\ell$	$1 e, \mu$	$\geq 1 b, \geq 1, 2j$	Yes	3.2	$Z' \text{ mass}$ 2.0 TeV	ATLAS-COBF-2016-014
	SSM $W' \rightarrow \ell\nu$	$1 e, \mu$	Yes	-	36.1	$W' \text{ mass}$ 5.1 TeV	1706.04786
	HVT $V' \rightarrow WW \rightarrow qqqq$ model B	$0 e, \mu$	$2j$	-	36.7	$V' \text{ mass}$ 3.5 TeV	CERN-EP-2017-147
	HVT $V' \rightarrow WW/ZH$ model B	$0 e, \mu$	$2j$	-	36.1	$V' \text{ mass}$ 2.93 TeV	ATLAS-COBF-2017-055
	LRSM $W'_2 \rightarrow tb$	$1 e, \mu$	$2 b, 0-1j$	Yes	20.3	$W' \text{ mass}$ 1.92 TeV	1410.4103
LRSM $W'_2 \rightarrow tb$	$0 e, \mu$	$\geq 1 b, 1j$	-	20.3	$W' \text{ mass}$ 1.76 TeV	1408.0686	
CI	CI qqq	-	$2j$	-	37.0	A 21.6 TeV η_{CI}	1703.0817
	CI lqq	$2 e, \mu$	-	-	36.1	A 30.1 TeV η_{CI}	ATLAS-COBF-2017-027
	CI $lutt$	$2(SB)/2(3 e, \mu \geq 1 b, \geq 1j)$	Yes	-	20.3	A 4.9 TeV	1504.04605
DM	Scalar-vector mediator (Dirac DM)	$0 e, \mu$	$1-4j$	Yes	36.1	θ_{max} 1.3 TeV	ATLAS-COBF-2017-060
	Vector mediator (Dirac DM)	$0 e, \mu, 1 \gamma$	$\leq 1j$	Yes	36.1	θ_{max} 1.2 TeV	1704.03849
LQ	VV_{LL} EFT (Dirac DM)	$0 e, \mu, 1 \gamma$	$\leq 1j$	Yes	3.2	M_{LQ} 700 GeV	1608.02372
	Scalar LQ 1 st gen	$2 e$	$\geq 2j$	-	3.2	LQ mass 1.1 TeV	1605.06035
	Scalar LQ 2 nd gen	2μ	$\geq 2j$	-	3.2	LQ mass 1.05 TeV	$\beta = 1$ 1605.06035
Heavy quarks	Scalar LQ 3 rd gen	$1 e, \mu$	$\geq 1 b, \geq 3j$	Yes	20.3	LQ mass 840 GeV	$\beta = 0$ 1608.04735
	VLO $TT \rightarrow Ht + X$	$0 \text{ or } 1 e, \mu \geq 2 b, \geq 3j$	Yes	13.2	T mass 1.2 TeV	$\beta(T \rightarrow Ht) = 1$ ATLAS-COBF-2016-104	
	VLO $TT \rightarrow Zt + X$	$1 e, \mu \geq 1 b, \geq 3j$	Yes	36.1	T mass 1.16 TeV	$\beta(T \rightarrow Zt) = 1$ 1705.10751	
	VLO $TT \rightarrow Wt + X$	$1 e, \mu \geq 1 b, \geq 1, 2j$	Yes	36.1	T mass 1.45 TeV	$\beta(T \rightarrow Wt) = 1$ CERN-EP-2017-094	
	VLO $BB \rightarrow Hb + X$	$1 e, \mu \geq 2 b, \geq 3j$	Yes	20.3	B mass 700 GeV	$\beta(B \rightarrow Hb) = 1$ 1605.04508	
	VLO $BB \rightarrow Zb + X$	$2 \text{ or } 3 e, \mu$	$\geq 2 \text{ or } 1 b$	-	20.3	B mass 700 GeV	$\beta(B \rightarrow Zb) = 1$ 1408.05050
Excited fermions	VLO $BB \rightarrow Wt + X$	$1 e, \mu \geq 1 b, \geq 1, 2j$	Yes	36.1	B mass 1.25 TeV	$\beta(B \rightarrow Wt) = 1$ CERN-EP-2017-094	
	VLO $QQ \rightarrow WqWq$	$1 e, \mu \geq 4j$	Yes	20.3	Q mass 690 GeV	1509.04261	
	Excited quark $q^* \rightarrow qq$	-	$2j$	-	37.0	$q^* \text{ mass}$ 6.0 TeV	only u^* and d^* , $\Lambda = m(q^*)$ 1703.09107
	Excited quark $q^* \rightarrow q\gamma$	1γ	$1j$	-	36.7	$q^* \text{ mass}$ 5.3 TeV	CERN-EP-2017-148
	Excited quark $q^* \rightarrow b\gamma$	$1 \text{ or } 2 e, \mu$	$1 b, 1j$	-	13.3	$q^* \text{ mass}$ 2.3 TeV	ATLAS-COBF-2016-060
	Excited quark $q^* \rightarrow Wq$	$1 \text{ or } 2 e, \mu$	$1 b, 2 \text{ or } 1j$	Yes	20.3	$q^* \text{ mass}$ 1.5 TeV	$\xi = \xi_c = \xi_b = 1$ 1510.02664
	Excited lepton l^*	$3 e, \mu, \tau$	-	-	20.3	$l^* \text{ mass}$ 3.0 TeV	$\Lambda = 3.0 \text{ TeV}$ 1411.2921
	Excited lepton ν^*	$3 e, \mu, \tau$	-	-	20.3	$\nu^* \text{ mass}$ 1.4 TeV	$\Lambda = 1.6 \text{ TeV}$ 1411.2921
	LRSM Majorana ν	$2 e, \mu$	$2j$	-	20.3	$\nu^* \text{ mass}$ 2.0 TeV	$m(\nu^*) = 2.4 \text{ TeV}$, no mixing 1506.06203
	Higgs triplet $H^{\pm\pm} \rightarrow \ell\ell$	$2, 3, 4 e, \mu$ (SS)	-	-	36.1	$H^{\pm\pm} \text{ mass}$ 870 GeV	DY production, $\beta(H^{\pm\pm} \rightarrow \ell\ell) = 1$ ATLAS-COBF-2017-053
Higgs triplet $H^{\pm\pm} \rightarrow \ell\nu$	$3 e, \mu, \tau$	-	-	20.3	$H^{\pm\pm} \text{ mass}$ 800 GeV	1411.2921	
Monopole (non-res prod)	$1 e, \mu$	$1 b$	Yes	20.3	M_{monopole} 785 GeV	$\kappa_{\text{monopole}} = 0.2$ 1410.5404	
Multi-charged particles	-	-	-	20.3	$M_{\text{multi-charged particle}}$ 785 GeV	DY production, $ \eta = 5e$ 1504.04188	
Magnetic monopoles	-	-	-	7.0	$M_{\text{magnetic monopole}}$ 1.41 TeV	DY production, $ \eta = 1_{\text{GeV}}, \text{spin } 1/2$ 1509.08059	

*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).

Many theories beyond the Standard Model predict new phenomena accessible by the Large Hadron Collider (LHC). So far, no evidence for new physics has been seen but the LHC has collected only a small fraction of the total expected pp collision dataset. Aspects of the ATLAS & CMS Exotics search program will be discussed in terms of the current status and the prospects in the near future.

- Coffee, tea and cookies will be served at 16:30h
- After the colloquium there is a chance for private discussions with the speaker over wine and pretzels

