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DBL (Dibosons, Multileptons and Extra Dimensions) Subgroup

- **Conveners** : Dominik Duda and Ines Ochoa
- **DBL mailing list** : [atlas-phys-hdbs-dbl](#) (old list: [hn-atlas-exotics-dbx](#) ([archive](#)))
- **Meetings** : Weekly on **Wednesdays 15:30 CERN time**. [Diboson/Multilepton Subgroup Meetings](#)
- **DBL Contacts** : [atlas-phys-hdbs-dbl-contacts](#)

The DBL group searches for new physics with two or more electroweak bosons or multileptons. Main topics of interest include new heavy gauge bosons decaying to diboson, heavy neutrinos, technicolor, Randall-Sundrum Gravitons, inclusive same-sign dilepton, tri-/four-lepton inclusive searches, together with interpretations for relevant new physics models. We also provide a forum for discussing models of extra dimensions, e.g. RS models predicting TeV-scale gravitons.

Ideas for New Searches

- *%NEW%* **Looking for a topic?** See list of uncovered analyses or consider contributing to one of the active analyses.

Active analyses

Analysis	Person-Power	Meetings	Contacts	eGroup	Wiki
Fully hadronic Final States					
VV JJ		Tue 12h	A. Giannini, S. Schramm	atlas-phys-hdbs-VVres-JJ	VVJJFullF
Vh qqbb		Fri 17h	Z. Meadows	atlas-phys-hdbs-VHres-qqbb	VhqqbbFull
Y Xh qqbb		Fri 15h	J. Gonski	atlas-phys-hdbs-XHres-JJ	VhqqbbFull
H /V		Thur 14h	H : Bo Liu, Boping Chen, V : Bo Liu, Shu Li	atlas-phys-hdbs-BosonGamma-hadronic	VgammaFull
Dark Jet Resonances		Wedn 11h	E. Hansen,D. Portillo	atlas-phys-hdbs-DarkJetResonances	DarkJetResF
Semi-leptonic Final States					
Vh semi-leptonic / A Zh (125 GeV)		Frid 14.30h	D, Duda, W. Fisher	atlas-phys-hdbs-VHres-semileptonic	VhSemileptonic
A ZH (not 125 GeV)		Tues 15h	X. Sun	atlas-phys-hdbs-A-Zh-hHeavy	AZHFullF
VH for Generic Heavy Higgs			Yue Xu, Ke Li	atlas-phys-hdbs-VH-GenericHeavyHiggs	VHGenericHea
VHH		Mon 17h	Matthew Klein, Lianliang Ma	atlas-phys-hdbs-VHH-Vlep4b	
Other Analyses					
WZ lvll		Wed 13h	J. Manjarres, M. Lu	atlas-phys-hdbs-WZres-lvll	WZlvllFull
Y ZX (Z ll)			K. Han, D. Zhang	atlas-phys-hdbs-ZXresonances-semilep	ZXresFull
Combination			DBL-specific: R. Les, Overall: K. Terashi, D. Hayden	atlas-phys-exotics-hbinterpretations	DBLcomboFi

Public Results

Publications with full Run 2 dataset

Analysis	Contacts	eGroup	Wiki	Derivation	A
Fully hadronic Final States					
VV JJ	DBL Conveners	atlas-phys-hdbs-VVres-JJ	VVJJFullRun2	EXOT3	
VBF HH 4b	Yu Nakahama, M. Swiatlowski	atlas-phys-hdbs-DiBoson-4b	hh4bFullRun2	EXOT8	
CWoLa Hunting	A. Cukierman, B. Nachman	atlas-phys-hdbs-CWoLaHunting-hadronic	XYZ_CWoLa_FullRun2		
Semi-leptonic Final States					
VV semi-leptonic	T. Nobe, L. Xu	atlas-phys-hdbs-VVres-semileptonic	VVSemileptonicFullRun2	HIGG5D1 HIGG5D2 HIGG2D4	C

Publications based on 2015+2016 dataset

Show list Hide list

Analysis	Meeting	Contact(s)	eGroup	Wiki
Inclusive Analyses				
General search	Fri 11h00	(2015) S. Amoroso, M. Rotaru	atlas-phys-susy-generalsearch	GeneralSearch
WW/WZ/ZZ/VH resonances				
VBF/VBS WW 1 1		(2015) J. Zhu	atlas-phys-exotics-diboson-vbf atlas-phys-higgs-hww-highmass	VbfVbs2015
WZ 1 ll	Mon 15h30	J. Manjarres,S. Hassani	atlas-phys-exotics-vvres-run2-lvll	WZlvllSearchRun2
ZV llqq/vvqq	Thurs 14h00	F. Dias F. Lo Sterzo L. Xu	atlas-phys-higgs-exotics-VV-llqqvvqq	DibosonResonancesllqqvvqq2016
WV 1 qq	Tues 17h00	T. Nobe	atlas-phys-exotics-vvres-run2-lvqq-llqq	DibosonResonanceslvqq2015 DibosonResonanceslvqq2016
VV JJ	Thurs 14h30	Y. Gao	atlas-phys-exotics-vvres-run2-JJ	DibosonResonancesJJ2015, DibosonResonancesJJ2016
VH semileptonic	Tues 15h00	G. Halladjian, S. Argyropoulos	atlas-phys-higgs-exotics-VHreso-lepbb	VhResonances2015, VhResonancesLepbb2016
VH qqbb	Thurs 16h00	I. Ochoa	atlas-phys-exotics-VHreso-run2-qqbb	VhqqbbResonances2015 VhqqbbResonances2016
V /H	Wed 13h30	Z. Liang, S. Li	atlas-phys-exotics-Xgamma-run2	VgammaResonanceSearches2015 VgammaResonanceSearches2016
Combination	Wed 17h00	V. Cavaliere, R. Camacho	atlas-phys-exotics-vv-vh-res-run2-comb	2015: DBCombRun2 , 2016: VVVHCombRun2
Other				

W' Xh JJ		K. Iordanidou	
A ZH (not 125)	Fri 14h00	X. Sun	atlas-phys-higgs-AZH-analysis ↗
HH 4b	Fri 14h30	M. Kagan D. Wardrope, Jana Schaarschmidt	atlas-phys-exotics-diboson4b ↗

Run 1: Publications with the 8 TeV dataset

Show list [▾](#) Hide list [▾](#)

Analysis	Meeting	Contact(s)	eGroup	Wiki
Inclusive Analyses				
SS dilepton	informal meeting ↗	E. Lytken, K. Hamano	atlas-phys-exotics-2012ssdilepton	PrelimAnal2012
Multi(≥ 3)-leptons	Informal meeting ↗	P.O. Deviveiros	atlas-phys-exotics-multilepton	MultiLeptons8TeV
Mono-Z($\ell\ell$) dark matter	Informal meeting ↗	A. Nelson	atlas-phys-exotics-monoz	ZllDarkMatter
Heavy Leptons				
Heavy neutrino	Informal meeting ↗	J. Klinger	atlas-phys-exotics-majorana	WrHeavyMajoranaNeutrinoAnalysis
Type-III Seesaw: dilepton	Informal meeting ↗	F. De Lorenzi	atlas-phys-exotics-t3seesaw	
Type-III Seesaw: 3+ leptons	Informal meeting ↗	L. Wiik-Fuchs, D. Yu	atlas-phys-exotics-t3seesaw	
WW/WZ/ZZ resonances				
WZ 1 $\ell\ell$		H. Wang	atlas-phys-exotics-vvres-lvll	20fb-1 WZResonanceSearchAt8TeVFull2013fb-1 WZResonanceSearchAt8TeV
ZV $\ell\ell qq$	Informal meeting ↗	K. Terashi	atlas-phys-exotics-vvres-2l2j	DibosonResonanceslljjWithllJ2012 DibosonResonancesLLJJ2013
WV 1 qq	Informal meeting ↗	A. Ruiz Martinez	atlas-phys-exotics-vvres-lvjj	DibosonResonanceslvjj2012
VV JJ	Informal meeting ↗	E. Kajomovitz	atlas-phys-exotics-dbres-JJ	DibosonResonancesJJ2012
VV Combination	Informal Meeting ↗	M. Hance	atlas-phys-exotics-dbx-comb ↗	

VH/Vjj	Informal meeting ↗	V. Cavaliere	atlas-phys-exotics-dbx-Vjj	TechnicolorSearch2012
Wgamma/Zgamma	Informal meeting ↗	H. Abreu	atlas-phys-exotics-vgamma	VgammaResonanceSearches
Exotic Higgs decays				
H ZZ_{dark}		T. Lagouri	atlas-phys-higgs-hzprimezprime4l	
H $Z_{\text{dark}}Z_{\text{dark}}$			atlas-phys-higgs-hzprimezprime4l	

Run 1 Archive

See our DBL Run 1 archive for information on analyses performed with 7 TeV and partial 8 TeV data samples.

Latest HL-LHC Prospect Studies

Channel	Public Lnk	Glance
VV Search and Measurement	ATL-PHYS-PUB-2018-022 ↗	PUB-EXOT-2018-24 ↗
HH 4b	ATL-PHYS-PUB-2018-028 ↗	PUB-EXOT-2018-42 ↗

Signal models and main MC generators

Signal Models

Theory Model	Contact	Ref.
VBF Charged Higgs	Haleh Hadavand	arXiv:1507.02549
Heavy Higgs bosons/Scalar resonances		arXiv:0706.4311
Heavy Vector Triplet	Georges Azuelos	arXiv:1402.4431
Bulk RS Graviton	Stephane Willocq	arXiv:0701186

Monte Carlo Generators

- MC4BSM
- DEWSB
- Technicolor: Strawman model in PYTHIA6 / PYTHIA8
- Minimal Walking TC: in process of implementation in CalcHEP and SHERPA
- HVT models in HVT
- VB Scattering: Helac-PHEGAS , VBFNLO , WHIZARD

Resources

- Git: repository [↗](#)
- On EOS: `/eos/atlas/atlascerngroupdisk/phys-hdbs/dbl/`
- HDBS approval steps: twiki
- Guidelines for contacts: twiki
- Blinding policy: link
- Guidelines for significant digits: document [↗](#)
- Material from previous publications (e.g. workspaces) can be found on the `phys-hdbs/dbl eos space` and on tape:
 - ◆ 2015 combination: `group.phys-exotics.combination_dbx_2015`

MC Validation Requirements

- Guidelines for validation of new MC samples (to be presented at a DBL meeting): twiki
- Please check the PMG known-issues page to make sure generator versions and Athena releases are valid: twiki
- There is also a dedicated HDBS area with known issues: twiki

framework

- Twiki: CxAOD Framework
- Mailing list: `atlas-phys-higgs-hsg5framework` [↗](#)
- Volunteers from the DBL group: A, Hoenle, D. Lack, T. Nobe, V. Pascuzzi, I. Siral, M. Yamatani, M. Sousa

Statistical Frameworks and Guidelines

- Twiki: Diboson Resonances Statistical Framework
- Statistical terms introduction: N. Berger talk [↗](#)
- Recommendations on likelihood checks:
 - ◆ page [↗](#)
 - ◆ N. Morange talk [↗](#)
- Everything you need to know about pulls: link [↗](#)
- Better than zero problem: reading [↗](#)
- Recommendations for global significances: guidelines from the statistics forum

Analysis methods

- How to combine MC16 samples? CombiningMC16
- Methods for jet triggers efficiency evaluation: Steven Schramm's talk [↗](#)
- Asymptotic significance formulae for optimization: link [↗](#)

Theory Uncertainties

- Signal uncertainties (a complete description lives here):
 - ◆ Consider only PDF and ISR/FSR impact on the selection acceptance, not on the x-section!
 - ◆ For PDFs, follow the recommendations from PMG
https://twiki.cern.ch/twiki/bin/view/AtlasProtected/PdfRecommendations#Using_LHAPDF

Relevant hands-on sessions and tutorials

- RECAST by L. Heinrich: [link](#)
- Trigger studies by B. Carlson and E. Tolley: [agenda](#)
- Functional-form fits (including functional decomposition, gaussian processes): [agenda](#)

-- InesOchoa - 2020-05-29

This topic: Sandbox > TestDBL

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