



PCC

### LHC Top WG 25<sup>th</sup> Open Meeting

April 24 – 26, 2024

Indico:

#### Introduction

Maria Aldaya (DESY), Fabio Maltoni (Louvain / Bologna), Enrique Palencia Cortezon (Oviedo) and Wolfgang Wagner (Wuppertal) Welcome to the first Open Session of 2024!

> In hybrid mode (in person + Zoom)





- LHCtopwg
- Provide a forum for discussions between the theory and experimental community at the LHC.
  - Present new theory results with time for questions and discussions.
  - Open meetings twice a year and on-demand specific seminars.
- Provide summary plots of experimental results in comparison to theory predictions.
- Provide combinations of LHC top-quark physics results (mainly by ATLAS and CMS, potentially by LHCb).
  - Reach highest precision and provide a unified experimental answer to the theory community.
  - Compare results in a coherent way and understand possible differences.
    - Requires detailed understanding of analysis methodology, theoretical models used, categories of systematic uncertainties and correlations
- Provide recommendations and guidelines
  - Reference cross sections as a common basis for measurements.
  - Harmonize prescriptions to facilitate comparisons and combinations
- Experimental details are cursed in Older envotings attended by conveners, subgroup conveners, contacts and invited experts on specific topics.



- LHCtopwg
- WG integrated in the LPCC structure at CERN: <u>http://lpcc.web.cern.ch/lhc-working-groups</u>
- LHC top WG contacts:
  - Maria Aldaya (CMS), Fabio Maltoni (Theory), Enrique Palencia Cortezon (CMS), Katharina Müller (LHCb), Wolfgang Wagner (ATLAS)
- Agendas available at <u>https://indico.cern.ch/categoryDisplay.py?categId=4463</u>
- Public summary plots at <u>https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCTopWGSummaryPlots</u>
- Public Twiki page at <u>https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCTopWG</u>
- Main open mailing list: <a href="https://www.uc.eo/internation.com">https://www.uc.eo/internation.com</a>



LHC top WC contacts of cong combinations ...



#### ... and active working groups

- Δφ(ℓ<sup>+</sup>, ℓ<sup>-</sup>) spin correlation: Miriam Watson & James Howarth (ATLAS); Giulia Negro, Andreas Jung & Afiq Anuar (CMS)
- Top mass: Mark Owen (ATLAS); Martijn Mulders, Matteo Defranchis (CMS) → Run 1 top-quark mass combination submitted to PRL → presentation today by Mark Owen
- EFT: Jacob Kempster, Baptiste Ravina & Tom Stevenson (ATLAS); Sergio Sanchez Cruz, Kirill Skovpen & Jon Wilson (CMS)
- Common MC: Michael Fenton, Dominic Hirschbühl & Reinhard Schwienhorst (ATLAS); Giulia Negro, Andris Potrebko & Markus Seidel (CMS)
- Harmonization of modelling uncertainties: Federica Fabbri & Katharina Voss (ATLAS); Efe Yazgan & Enrique Palencia, Jan van der Linden, Carlos Vico (CMS)
- Global EFT effort within the LHC EFT WG (<u>https://lpcc.web.cern.ch/lhc-eft-wg</u>): Jacob Kempster (ATLAS), Robert Schoefbeck (CMS), Ken Mimasu (Theory)

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Also contacts for dedicated topics as needed (JES, b-tagging, generators, pseudo-top definitions, etc).







New since last Open Meeting in November 2023





Available at: <a href="https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCTopWGSummaryPlots">https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCTopWGSummaryPlots</a>



Introduction - Open Meeting April 25, 2024

\* New plots will be added to the Twiki

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- New ATLAS result on *tHq* in the multilepton channel, arXiv: <u>2404.02123</u>. Presentation today in the 2<sup>nd</sup> morning session by Marvin Cevik art ATLAS-CMS comparison (Frank Golf as a CMS helper).
- Updated references of CMS
   Updated references of CMS
   Updated references of CMS
   Updated references of CMS
   Updated references of CMS







- New CMS measurement at  $\sqrt{s} = 5.02$  TeV: Updated I+jets channel + combination. <u>CMS-PAS-TOP-23-005</u>.
  - → Presentation by Javier del Riego Badas at 17:00 today
- Updated reference of ATLAS measurement at 13.6 TeV: arXiv → journal
- Fixed wrong integrated luminosity of ATLAS result at  $\sqrt{s} = 5.02$  TeV



 $\sigma_{...}$  summary,  $\sqrt{s} = 5.02 \text{ TeV}$ 

April 2024

**ATLAS+CMS** Preliminary

LHC*top*WG



- Updated reference of ATLAS I+jets result: arXiv → paper
- New CMS measurement at  $\sqrt{s} = 5.02$  TeV: Updated I+jets channel + combination. <u>CMS-PAS-TOP-23-005</u>.



## Summary pots in distance ark production





New CMS result on tW at 8.6 TeV: CMS-PAS-TOP-23-008. Presentation by Alejandro Soto Rodriguez today in the terms sesic Louvain
 Update ATLAS reference of 13 TeV t-channel result: CONF -> arXiv





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ALDAD		CMS. If II II 36
Ĉ <sub>ao</sub>	<u> </u>	CMS, iİH, iİw, iler, tetq, tHq, iİti [14]138 ATLAS, tİti [18] 149
Ĉ <sup>i</sup> ar	=	CMS, tříř [3] 36 CMS, tříř, třív, třít, tříq, tříq, tříř [14]138 ATLAS, tříř [18] 149
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		ATLAS, ITI [18] 149 ATLAS, IT + jet energy asymmetry [9] 139
$\tilde{C}^{0}_{lq}$		ATLAS, IT 4 - JBIO DOBBED [11] 139 ATLAS, IT 41 - HARCinc boosted [13] 139 CMS, ITH, Illo, Iter, Iter, Iter, IHq, Itel [14]138 ATLAS, IT napidity asymmetry [16] 139
Č10		CMS, tî + Z/W/H, iZq, iHq [7] 42 CMS, tî H, iîu, îtêr, tira, itêq, tîtê [14]138 CMS, tî + boosted Z/H [15] 138
	-	CMS, riZ [5] 78
Č_;0		CMS, IT + Z/W/H, IZq, IHq [7] 42 CMS, IZq / IZ / IZ / I CMS, ITH, ITW, IHC, IHC, IHC, IHC / IHC / I CMS, IT + boosted Z/H [15] 138 CMS, IT + boosted Z/H [15] 138
		CMS, If and IW, BSM search (4) 36
õ1	<u> </u>	CMS, tl + Z/W/H, tZq, tHq [7] 42 CMS, tZq / tlZ [8] 138
cia.	+	CMS, tř.H., tř.G., tř.t., tř.t.q., tř.t.[14]138 CMS, tř.+ boosted Z/H [15] 138 ATLAS, tř.Z. díl. cross section [17] 140
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č.,		CMS, II + 2/W/H, IZq, IHq [7] 42 CMS, IZq / IIZ[8] 138
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	+	CMS, t1 + Z/W/H, tZq, tHq [7] 42 CMS, t2c/t1Z [8] 138
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	÷	CMS, IT, Hoosted Z/H [15] 138 ATI AS 17 - Hoosted Z/H [15] 138
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Č <sub>1Z</sub>	Ŧ	CMS, II + 2 / W/H, IZQ, IHQ [7] 42 CMS, IZQ / IIZ [8] 138 CMS, IZQ / IIZ [8] 139
	÷	CMS, <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i>tH</i> , <i></i>
$\hat{C}^{IA}_{1Z}$	=	CMS, tř.2 [5] 78 CMS, tř. [10] 137
Ĉ <sub>ow</sub>	-	CMS, tř + Z / W / H, tZq, tHq [7] 42 CMS, třH, tỉlu, třit, tttq, tHq, třtỉ [14]138 CMS, tř + boosted Z / H [15] 138
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0,6		CMS, II + 2 / W / Tr. Act, III 4 / 118 CMS, If H, IIIv, Titt, III4, III4, III1 138 ATLAS, If rapidly saymenty [16] 139 ATLAS, If 2 HI cross section [17] 140
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Č <sup>(1)</sup>		CMS, tl + Z/W/H, tZq, tHq [7] 42 CMS, tl H, tlu, tlti, tttq, tHq, tltl[14]138
Ĉ <sup>(1)</sup>		CMS, tl + Z/W/H, tZq, tHq [7] 42 CMS, tlH, tliv, tlet, tEq, tHq tl1118
$\tilde{C}_{t}^{S(t)}$		CMS, If + Z/W/H, IZq, IHq [7] 42 CMS, IŤH, IŤu-, IŤU, IŤU, IŤI [14]138
$\tilde{C}_{t}^{T(t)}$	+	CMS, If + Z/W/H, IZq, IHq [7] 42 CMS, IfH ITL: IV. IV. IV. IV. IV. IV. IV. IV. IV. IV.
[1] JHEP 02 (2018) [2] PRD 120 (2018) [3] JHEP 11 (2018) [4] EPLC 11 (2018) [5] JHEP 03 (2028) [6] JHEP 08 (2028)	149 (F) 440-12 (227) (943 (F) 440- 15000 (F) 452 (227) (943 (F) 454- 842 (F) 446-14 (2202) (94 (F) 44- 848 (F) 1446-14 (2202) (94 (F) 44) 848 (F) 1446-14 (2202) (94 (F) 44) 848 (F) 1446-14 (2202) (94 (F) 44) 848 (F) 1446-14 (2202) (94 (F) 42) 849 (F) 1440-14 (F) 1400-14 0-1400-1400-1400-1400-1400-1400	108 E3008 CT 2015 ALL CT 2015

Top quark EFT operators - individual limits ATLAS C = 0.01.1.4 + <sup>2</sup>	C = 0.01.1.4+ <sup>2</sup>	Following arXiv:1802.07237 Dimension 6 operators $\hat{C}_i = C_i / \Lambda^2$			_	N.L.
	$1/\sqrt{C_{QQ}^{1}}$	CMS, thi [3] CMS, thi, the, the, the, the, thi [14] ATLAS, thi [18]	36 fb <sup>-1</sup> 138 fb <sup>-1</sup> 149 fb <sup>-1</sup>			IN (
	$1/\sqrt{\tilde{C}_{QY}^1}$	CMS, thi [3] CMS, thi, the, the, theq, thig, thi [14] ATLAS, thi [18]	35 fb <sup>-1</sup> 138 fb <sup>-1</sup> 149 fb <sup>-1</sup>			E
	$1/\sqrt{\overline{O}_{QY}^{B}}$	CMS, if il [3] CMS, if H, the, the, theq, tHq, thi [14] ATLAS, thi [18]	36 fb <sup>-1</sup> 138 fb <sup>-1</sup> 149 fb <sup>-1</sup>			
	$1/\sqrt{\tilde{C}_{ff}^1}$	CMS, titl [3] CMS, titl, tilo, tite, tteq, tHq, titl [14] ATLAS, titl [18]	35 fb <sup>-1</sup> 138 fb <sup>-1</sup> 149 fb <sup>-1</sup>			
	$1/\sqrt{\tilde{C}_{1q}^0}$	ATLAS, If + jot energy asymmetry [9] ATLAS, If 4 - jets boosted [11] ATLAS, If all-textroic boosted [13] CMS, If H, Ibu, fitt, Ettq, IHq, Iftl [14] ATLAS, If repidly asymmetry [16]	139 fb <sup>-1</sup> 139 fb <sup>-1</sup> 139 fb <sup>-1</sup> 138 fb <sup>-1</sup> 139 fb <sup>-1</sup>			I
	$1/\sqrt{\overline{C}_{t\phi}}$	CMS, 11 + 2/W/H, 12q, 1Hq [7] CMS, 1H, 1lbv, flct, 16cq, 1Hq, 1H[14] CMS, 1l + boosted 2/H [15]	42 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup>			
	$1/\sqrt{\hat{C}_{\phi Q}^{-}}$	CMS, if 2 [5] CMS, if 2 Z/W/H, iZq, thiq [7] CMS, if 2 Z/W/H, iZq, thiq [7] CMS, if 1, thu, if it, iteq, thiq, if if [14] CMS, if 4 boosted Z/H [15]	78 fb <sup>-1</sup> 42 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup>			
	$1/\sqrt{C_{\phi Q}^2}$	CMS, if and IW, BSM search [4] CMS, if and IW, BSM search [4] CMS, if a 21W/h, IZq, Hiq [7] CMS, if a 24 i IZ [8] CMS, if h, Ids., fitst, Itsg, Hq, if [14] CMS, if a bootsel 27 H [15] ATLAS, fiZ diff. cross section [17]	35 fb <sup>-1</sup> 42 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup> 140 fb <sup>-1</sup>			
	$1/\sqrt{\tilde{C}_{\mu \ell}}$	CMS, If Z [5] CMS, If + Z/W/H, IZq, IHq [7] CMS, If + Z/W/H, IZq, IHq [7] CMS, If + Ibw, IfIt, IIIq, IHq [14] CMS, If + boosted Z/H [15] ATLAS, If Z diff. cross section [17]	78 fb <sup>-1</sup> 42 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup> 140 fb <sup>-1</sup>			
	$1/\sqrt{\tilde{C}_{\phi tb}}$	CMS, il + Z/W/H, tZq, tHq [7] CMS, ilH, tilu, fitt, tEq, tHq, fill [14] CMS, il + boosted Z/H [15]	42 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup>			
	$1/\sqrt{C_{eW}}$	CMS, if and HW, BSM search [4] ATLAS-CASE, W Indice [6] CMS, 22, 47, 47, 47, 42, 464 (7] CMS, 22, 47, 28, 141, 42, 464 (7] CMS, 47, 35, particular and 17, 161 CMS, 41, 450, 474, 474, 474, 474, 474, 474, 474, 47	35 fb <sup>-1</sup> 20+20 fb <sup>-1</sup> 42 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup> 140 fb <sup>-1</sup> 140 fb <sup>-1</sup>			
	$1/\sqrt{\mathcal{O}_{rW}^{[1]}}$	ATLAS, Top polarization [12] ATLAS, HZ diff. cross section [17] ATLAS, H7 diff. cross section [19] ATLAS, H7 + HZ diff. cross section [20]	139 fb <sup>-1</sup> 140 fb <sup>-1</sup> 140 fb <sup>-1</sup> 140 fb <sup>-1</sup>			
	$1/\sqrt{C_{12}}$	CMS, $\vec{n} Z$ [5] CMS, $\vec{n} + Z$ [W/H, tZq, tHq [7] CMS, $\vec{n} + Z$ [W/H, tZq, tHq [7] CMS, $\vec{n} + [10]$ CMS, $\vec{n} + , \vec{n} +$	78 65 <sup>-1</sup> 42 65 <sup>-1</sup> 138 65 <sup>-1</sup> 137 65 <sup>-1</sup> 138 65 <sup>-1</sup> 138 65 <sup>-1</sup>			
	$1/\sqrt{C_{lZ}^{[l]}}$	CMS, riZ [5] CMS, ri <sub>7</sub> [10]	78 fb <sup>-1</sup> 137 fb <sup>-1</sup>			
	$1/\sqrt{\hat{C}_{bW}}$	CMS, il + Z/W/H, tZq, tHq [7] CMS, ilH, tliv, fict, tEq, tHq, tHq [14] CMS, il + boosted Z/H [15]	42 fb <sup>-1</sup> 138 fb <sup>-1</sup> 138 fb <sup>-1</sup>			
	$1/\sqrt{\tilde{C}_{1G}}$	CMS, if alignen [1] CMS, if spin correlations [2] CMS, if and MV, BSM starch [4] CMS, if a 2/W/h. L2a, thiq [7] CMS, if h, ilbe, rite, LUD, Mag, ritil [14] ATLAS, if a cipiddy symmetry [16] ATLAS, if a circum section [17]	35 fb <sup>-1</sup> 35 fb <sup>-1</sup> 35 fb <sup>-1</sup> 42 fb <sup>-1</sup> 138 fb <sup>-1</sup> 139 fb <sup>-1</sup> 140 fb <sup>-1</sup>			
	$1/\sqrt{\hat{C}_{\rm rG}/g_S}$	ATLAS, tř ℓ + jets boosted [11]	139 fb <sup>-1</sup>			
	$1/\sqrt{\tilde{C}_{Ql}^{3(l)}}$	CMS, il + Z/W/H, tZq, tHq [7] CMS, ilH, thu, the, teeq, tHq, ilil [14]	42 fb <sup>-1</sup> 138 fb <sup>-1</sup>			
	$1/\sqrt{\tilde{C}_{Ql}^{-(l)}}$	CMS, tl + Z/W/H, tZq, tHq [7] CMS, tH, ttbs, ttt, tttq, tHq, tHt [14]	42 fb <sup>-1</sup> 138 fb <sup>-1</sup>			
	$1/\sqrt{\tilde{C}_{Qe}^{(l)}}$	CMS, if + Z/W/H, tZq, tHq [7] CMS, tH, thu, tht, tEq, tHq, tHi [14]	42 fb <sup>-1</sup> 138 fb <sup>-1</sup>			
	$1/\sqrt{\overline{C}_{S}^{[l]}}$	CMS, tl + Z/W/H, tZq, tHq [7] CMS, tlH, tBv, tlct, tCq, tHq, tHl [14]	42 fb <sup>-1</sup> 138 fb <sup>-1</sup>			
	$1/\sqrt{\tilde{G}_{2\sigma}^{(\ell)}}$	CMS, il + Z/W/H, tZq, tHq [7] CMS, ilH, thv, tlct, ttcq, tHq, ilil [14]	42 fb <sup>-1</sup> 138 fb <sup>-1</sup>	_		
	$1/\sqrt{\tilde{C}_{1}^{S(l)}}$	CMS, il + Z/W/H, tZq, tHq [7] CMS, ilH, thv, titt, tttq, tHq, iHl [14]	42 fb <sup>-1</sup> 138 fb <sup>-1</sup>		UC	
	$1/\sqrt{\tilde{C}_{t}^{T(t)}}$	CMS, tl + Z/W/H, tZq, tHq [7] CMS, tlH, tbv, tltt, tEq, tHq, tHq [14]	42 fb <sup>-1</sup> 138 fb <sup>-1</sup>			
[1] JAGP 40 (2011)         [16] JAGP 10 (2001)         [16] JAGP 10 (2002)         [16] JAGP 10 (2002) <th[16] (2002)<="" 10="" jagp="" th="">         [16] JAGP 10 (2002)</th[16]>	6 (2)(2)(6 1)(6	SPT tomation is employed at different levels of experimental analysis				

- New (additional) plots showing limits on Λ, rather than the EFT coefficient C!
  - Show probed energy scale
  - Provide limits for three assumptions of C:
    - $C = 0.1, C = 1, \text{ and } C = 4\pi^2$



# EFT summary plots the preserve and scalar bosons

LHCtopwg

	$\frac{1}{1}$
	CMS, $t\bar{t} + Z/W/H$ , $tZq$ , $tHq$ [3] 42 fb <sup>-</sup>
$\tilde{C}_{t\phi}$	CMS, <i>ttH</i> , <i>ttlν</i> , <i>ttℓℓ</i> , <i>tℓℓ</i> q, <i>tH</i> q, <i>tttt</i> [5] 138 fb <sup>-</sup>
	CMS, $t\bar{t}$ + boosted Z/H [6] 138 fb <sup>-</sup>
	CMS, <i>t</i> t̄Z [2] 78 fb <sup>-</sup>
	CMS, $t\bar{t} + Z/W/H$ , $tZq$ , $tHq$ [3] 42 fb <sup>-</sup>
õ <b>——</b>	CMS, $tZq / t\bar{t}Z$ [4] 138 fb <sup>-</sup>
	CMS, $t\bar{t}H$ , $t\bar{t}l\nu$ , $t\bar{t}\ell\ell$ , $t\ell\ell q$ , $tHq$ , $t\bar{t}t\bar{t}$ [5] 138 fb <sup>-</sup>
	CMS, $t\bar{t}$ + boosted Z/H [6] 138 fb <sup>-</sup>
	ATLAS, $t\bar{t}Z$ diff. cross section [7] 140 fb <sup>-</sup>
	CMS, $t\bar{t} + Z/W/H$ , $tZq$ , $tHq$ [3] 42 fb <sup>-</sup>
$ ilde{C}_{\phi tb}$	CMS, $t\bar{t}H$ , $t\bar{t}l\nu$ , $t\bar{t}\ell\ell$ , $t\ell\ell q$ , $tHq$ , $t\bar{t}t\bar{t}$ [5] 138 fb <sup>-</sup>
	CMS, $t\bar{t}$ + boosted Z/H [6] 138 fb <sup>-</sup>
	CMS, <i>tīZ</i> [2] 78 fb <sup>-</sup>
	CMS, $t\bar{t} + Z/W/H$ , $tZq$ , $tHq$ [3] 42 fb <sup>-</sup>
$\tilde{C}_{\phi Q}^{-}$	CMS, $tZq / t\bar{t}Z$ [4] 138 fb <sup>-</sup>
	CMS, $t\bar{t}H$ , $t\bar{t}l\nu$ , $t\bar{t}\ell\ell$ , $t\ell\ell q$ , $tHq$ , $t\bar{t}t\bar{t}$ [5] 138 fb <sup>-</sup>
	CMS, $t\bar{t}$ + boosted Z/H [6] 138 fb <sup>-</sup>
	CMS, $t\bar{t}$ and $tW$ , BSM search [1] 36 fb <sup>-</sup>
	CMS, $t\bar{t} + Z/W/H$ , $tZq$ , $tHq$ [3] 42 fb <sup>-</sup>
õ3	CMS, $tZq / t\bar{t}Z$ [4] 138 fb <sup>-</sup>
	CMS, $t\bar{t}H$ , $t\bar{t}l\nu$ , $t\bar{t}\ell\ell$ , $t\ell\ell q$ , $tHq$ , $t\bar{t}t\bar{t}$ [5] 138 fb <sup>-</sup>
	CMS, $t\bar{t}$ + boosted Z/H [6] 138 fb <sup>-</sup>
<u>+</u>	ATLAS, $t\bar{t}Z$ diff. cross section [7] 140 fb <sup>-</sup>
[1] EPJC 79 (2019) 886 [4] JHEP 12 (2021) 083 [6] PRD 108 032 [2] JHEP 03 (2020) 056 [5] JHEP 12 (2023) 068 [7] arXiv:2312.04 [3] JHEP 03 (2021) 095	008 EFT formalism is employed at different levels of 450 experimental analyses

## EFT summary to the precerk and scalar bosons



TLAS+CMS Preliminary HCtonWG			April 202
<b>Top quark - scalar boson operators</b> - Individual limit ATLAS $C_i = 0.01, 1, 4\pi^2$	ts CMS $C_i = 0.01, 1, 4\pi^2$	Following arXiv:1802.07237 Dimension 6 operators $\tilde{C}_i \equiv C_i / \Lambda^2$	
	$1/\sqrt{ ilde{C}_{t\phi}}$	CMS, $t\bar{t} + Z/W/H$ , $tZq$ , $tHq$ [3] CMS, $t\bar{t}H$ , $t\bar{t}l\nu$ , $t\bar{t}\ell\ell$ , $t\ell\ell q$ , $tHq$ , $t\bar{t}t\bar{t}$ [5] CMS, $t\bar{t}$ + boosted $Z/H$ [6]	42 fb <sup>−</sup> <b>138 fb</b> <sup>−</sup> 138 fb <sup>−</sup>
	$1/\sqrt{ ilde{C}_{\phi t}}$	CMS, $t\bar{t}Z$ [2] CMS, $t\bar{t} + Z/W/H$ , $tZq$ , $tHq$ [3] CMS, $tZq / t\bar{t}Z$ [4] CMS, $t\bar{t}H$ , $t\bar{t}l\nu$ , $t\bar{t}\ell\ell$ , $t\ell\ell q$ , $tHq$ , $t\bar{t}t\bar{t}$ [5] CMS, $t\bar{t}$ + boosted $Z/H$ [6] ATLAS, $t\bar{t}Z$ diff. cross section [7]	78 fb <sup></sup> 42 fb <sup></sup> 138 fb <sup></sup> 138 fb <sup></sup> 138 fb <sup></sup> 140 fb <sup></sup>
	$1/\sqrt{ ilde{C}_{\phi tb}}$	CMS, $t\bar{t} + Z/W/H$ , $tZq$ , $tHq$ [3] CMS, $t\bar{t}H$ , $t\bar{t}l\nu$ , $t\bar{t}\ell\ell$ , $t\ell\ell q$ , $tHq$ , $t\bar{t}t\bar{t}$ [5] CMS, $t\bar{t}$ + boosted $Z/H$ [6]	42 fb <sup></sup> 138 fb <sup></sup> 138 fb <sup></sup>
	$1/\sqrt{ ilde{C}_{\phi Q}^-}$	CMS, $t\bar{t}Z$ [2] CMS, $t\bar{t} + Z/W/H$ , $tZq$ , $tHq$ [3] CMS, $tZq / t\bar{t}Z$ [4] CMS, $t\bar{t}H$ , $t\bar{t}I\nu$ , $t\bar{t}\ell\ell$ , $t\ell\ell q$ , $tHq$ , $t\bar{t}t\bar{t}$ [5] CMS, $t\bar{t}$ + boosted $Z/H$ [6]	78 fb <sup>−</sup> 42 fb <sup>−</sup> 138 fb <sup>−</sup> 138 fb <sup>−</sup> 138 fb <sup>−</sup>
	$1/\sqrt{ ilde{C}_{\phi Q}^3}$	CMS, $t\bar{t}$ and $tW$ , BSM search [1] CMS, $t\bar{t} + Z/W/H$ , $tZq$ , $tHq$ [3] CMS, $tZq / t\bar{t}Z$ [4] CMS, $t\bar{t}H$ , $t\bar{t}I\nu$ , $t\bar{t}\ell\ell$ , $t\ell\ell q$ , $tHq$ , $t\bar{t}t\bar{t}$ [5] CMS, $t\bar{t}$ + boosted $Z/H$ [6] ATLAS, $t\bar{t}Z$ diff. cross section [7]	36 fb <sup></sup> 42 fb <sup></sup> 138 fb <sup></sup> 138 fb <sup></sup> 138 fb <sup></sup> 140 fb <sup></sup>
[1] EPJC 79 (2019) 886 [4] JHEP 12 (2021) 083 [2] JHEP 03 (2020) 056 [5] JHEP 12 (2023) 068 [3] JHEP 03 (2021) 095	[6] PRD 108 032008 [7] arXiv:2312.04450	EFT formalism is employed at different levels of experimental analyses	
10 <sup>-1</sup> 10 <sup>0</sup>	10 <sup>1</sup>		

## EFT summery plots CLECC perators



ATLAS+CMS Pre	eliminary	/	April 2024	ATLAS+CMS Preliminary				April 2024
ATLAS	FCNC operators - Individual limits	Following arXiv:1802.07237 CMS Dimension 6 operators $\tilde{C}_i \equiv C$	$C_i/\Lambda^2$	<b>ATLAS</b> $C_i = 0.01, 1, 4\pi^2$	FCNC operators - Individual limits	CMS $C_i = 0.01, 1, 4\pi$	Following arXiv:1802.07237 <sup>2</sup> Dimension 6 operators $\tilde{C}_i \equiv C_i / \Lambda^2$	
$\left \tilde{c}^{(32)},\tilde{c}^{(32)}\right $			120 fb <sup>-1</sup>			$1/\sqrt{\left \tilde{C}_{uW}^{(32)}+\tilde{C}_{uB}^{(32)}\right }$	ATLAS, FCNC $tq\gamma$ [3]	139 fb <sup>-1</sup>
$ C_{uW} + C_{uB} $		AILAS, FONG $lq\gamma$ [3]	di 661			$1/\sqrt{\left \tilde{C}_{uW}^{(23)*}+\tilde{C}_{uB}^{(23)*}\right }$	ATLAS, FCNC $tq\gamma$ [3]	139 fb <sup>-1</sup>
$\left\ \tilde{C}_{uW}^{(23)*}+\tilde{C}_{uB}^{(23)*}\right\  =$		ATLAS, FCNC $tq\gamma$ [3]	139 fb <sup>-1</sup>			$1/\sqrt{\left \tilde{C}_{uW}^{(31)}+\tilde{C}_{uB}^{(31)} ight }$	ATLAS, FCNC $tq\gamma$ [3]	139 fb <sup>-1</sup>
$\left  \tilde{C}_{uW}^{(31)} + \tilde{C}_{uB}^{(31)} \right $		ATLAS, FCNC $tq\gamma$ [3]	139 fb <sup>-1</sup>			$1/\sqrt{\left \tilde{C}_{uW}^{(13)*} + \tilde{C}_{uB}^{(13)*}\right }$	ATLAS, FCNC $tq\gamma$ [3]	139 fb <sup>-1</sup>
$ \tilde{C}^{(13)*} + \tilde{C}^{(13)*} $		ATLAS ECNC $ta \sim [3]$	139 fb <sup>-1</sup>			$1/\sqrt{\left \tilde{C}_{uW}^{32}\right }$	ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>
						$1/\sqrt{ ilde{C}_{uB}^{32}}$	ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>
$\left C_{UW}^{32}\right $		ATLAS, FCNC <i>tZq</i> [4]	139 fb <sup>-1</sup>			$1/\sqrt{\left  \tilde{C}_{uW}^{23} * \right }$	ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>
$ ilde{C}^{32}_{uB}$		ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>			$1/\sqrt{\left \tilde{C}_{uB}^{23}*\right }$	ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>
$\left  \tilde{C}^{23}_{uuu*} \right $		ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>			$1/\sqrt{\left \tilde{C}_{uW}^{31}\right }$	ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>
			400 %-1			$1/\sqrt{\left \tilde{C}_{uB}^{31}\right }$	ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>
		AILAS, FONG $t \ge q$ [4]	139 10			$1/\sqrt{\left  \tilde{C}_{uW}^{13} * \right }$	ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>
$\tilde{C}^{31}_{uW}$		ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>			$1/\sqrt{\left  ilde{C}^{13}_{uB}* ight }$	ATLAS, FCNC <i>tZq</i> [4]	139 fb <sup>-1</sup>
$\left  \tilde{C}_{uB}^{31} \right $		ATLAS, FCNC <i>tZq</i> [4]	139 fb <sup>-1</sup>			$1/\sqrt{\left \tilde{C}_{uG} ight }$	CMS, <i>t</i> t and <i>tW</i> , BSM search [1] ATLAS, FCNC <i>tqg</i> [2]	36 fb <sup>-1</sup> 139 fb <sup>-1</sup>
$\left  ilde{C}^{13}_{uW}* ight $		ATLAS, FCNC tZq [4]	139 fb <sup>-1</sup>			$1/\sqrt{\left \tilde{C}_{cG}\right }$	CMS, <i>tī</i> and <i>tW</i> , BSM search [1] ATLAS, FCNC <i>tqg</i> [2]	36 fb <sup>-1</sup> 139 fb <sup>-1</sup>
$ ilde{C}^{13}_{uB}*$		ATLAS, FCNC <i>tZq</i> [4]	139 fb <sup>-1</sup>			$1/\sqrt{\tilde{C}_{\mu\phi}}$	ATLAS, FCNC tqH combination [5]	140 fb <sup>-1</sup>
lā l		CMS, $t\bar{t}$ and $tW$ , BSM search [1]	36 fb <sup>-1</sup>			$1/\sqrt{\tilde{C}_{c\phi}}$	ATLAS, FCNC tqH combination [5]	140 fb <sup>-1</sup>
	-	ATLAS, FCNC tqg [2]	139 fb <sup>-1</sup>	[1] EPJC 79 (2019) 886 [2] EPJC 82 (2022) 334	[3] PLB 842 (2023) 137379 [4] PRD 108 (2023) 032019	[5] arXiv:2404.02123	EFT formalism is employed at different levels of experimental analyses	
$\left  \tilde{C}_{cG} \right $		CMS, <i>tī</i> and <i>tW</i> , BSM search [1] ATLAS, FCNC <i>tqg</i> [2]	36 fb <sup>-1</sup> 139 fb <sup>-1</sup>	10 <sup>0</sup>	10 <sup>1</sup> Λ 95% CL exclusion [TeV]			
$ ilde{C}_{u\phi}$		ATLAS, FCNC tqH combination [5]	140 fb <sup>-1</sup>					
$ ilde{C}_{c\phi}$ -		ATLAS, FCNC tqH combination [5]	140 fb <sup>-1</sup>	Updated	ATLAS FCNC	tHa limits to	o full Run 2	
[1] EPJC 79 (2019) [2] EPJC 82 (2022)	886 [3] PLB 842 (2023) 137379 [5] arXiv:2404.0212 334 [4] PRD 108 (2023) 032019	23 EFT formalism is employed at different levels of experimental analyses		combina	ation (arXiv:240	4.02123)		
-0.2 0.0	0 0.2 0.4 0.6 95% CL limit [TeV <sup>-2</sup> ]	0.8	)	uvain		/		







- Venue: Palais des congrès "Le Grand Large"
- Indico page: <u>https://indico.cern.ch/event/1368706/</u> (registration is open)
- Early registration open until June 15.
- Conference fee of 600 Euros covers: lunches, coffee breaks, welcome cocktail, finger food during the poster session, excursion, and conference dinner
  - Reduced fee for students: 450 Euros BERGISCHE
- Accommodation to be an independently
   Accommodation to be an independently

# Transition of CMS MG LOCCVG conveners





Handover of CMS convener position

















Universidad de Oviedo







Wednesday 24/4 @ Main Auditorium	Thursday 25/4 @ TH conference room	Friday 26/4 @ TH conference room				
	Early morning session:9:00 - 11:00Topic:Top-quark mass(4 presentations)	Early morning session: 9:30 – 11:00 Topic: 4-tops (3 presentations)				
	Coffee break	Coffee break				
	Late morning session: <b>11:30 – 13:00</b> Topic: <b>FCNC, lepton flavour universality</b> (3 presentations)	Late morning session: 11:30 – 13:00 Topic: Entanglement (3 presentations)				
	Lunch break					
Early afternoon session: <b>14:00 – 15:30</b> Joint session with the LHC EFT WG $t\bar{t}\gamma$ , flavour and baryon no. violation	Early afternoon session: 14:30 – 16:30 Topics: Top+X, top decay (4 presentations)					
Coffee break	Coffee break					
Late afternoon session: <b>16:00 – 18:00</b> Joint session with the LHC EFT WG <b>4 theory presentations on EFT</b>	Late afternoon session: Topics: $t\bar{t} + jets$ , light stops (2 presentations)17:00 - 18:00					
Joint drinks18:00 – 19:00at Salle de pas perdu	Workshop Dinner19:00 – 22:00at Café de la Place in Meyrin village					
Please register for the dinner at http://www.eneratdfn.de/UGLOUVOU0676072086532386e8c7d-700354 until 10:00 am today = essentially now!						