



News & Introduction

Fabio Maltoni¹, Marcel Vos², Enrique Palencia³, Wolfgang Wagner⁴
¹Louvain/Bologna, ²Valencia, ³Oviedo, ⁴Wuppertal

LPCC
LHC Physics Centre at CERN

LHCtopWG 26th meeting

LHCtopWG

November 11, 2024

UCLouvain



IFIC
INSTITUT DE FÍSICA
CORPUSCULAR



Universidad de Oviedo



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Welcome!

❖ Welcome to the second open session of 2024

- As the first one, in hybrid mode (in person AND zoom)
- <https://indico.cern.ch/event/1444046>

 Starts 11 Nov 2024, 14:00
Ends 13 Nov 2024, 20:00
Europe/Zurich

 CERN
28/S-029

We will use 2 different rooms for this meeting:
Monday (11/11) afternoon 14:00 - 18:00: 28/S-029
Tuesday (12/11) morning 9:00 - 13:00: Salle Bohr 40/S2-B01
Tuesday afternoon: 14:00 - 18:00: Salle Bohr 40/S2-B01
Wednesday (13/11) morning: 9:00 -13:00: Salle Bohr 40/S2-B01
[Go to map](#)

❖ Today's session will take place in building 28

- Tuesday and Wednesday in building 40 (Salle Bohr)

The LHCtopWG and its mission (I)

- ❖ 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 **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

The LHCtopWG and its mission (II)

- ❖ Provide **summary plots** of experimental results in comparison to theory predictions
- ❖ Provide recommendations and guidelines
 - **Reference cross sections** as a common basis for measurements
 - **Harmonize prescriptions** to facilitate comparisons and combinations
- ❖ Experimental details are discussed in Closed meetings attended by conveners, subgroup conveners, contacts and invited experts on specific topics

Documentation

- ❖ Provide a [forum](#) for discussions between the theory and exp. community at the LHC
 - Open meetings twice a year and on-demand specific seminars
- ❖ LHCtopWG contacts (lhc-toplhcwg-admin@cern.ch)
 - Fabio Maltoni (Theory), Enrique Palencia (CMS), Katharina Müller (LHCb), Wolfgang Wagner (ATLAS)
- ❖ Agendas available at <https://indico.cern.ch/categoryDisplay.py?categId=4463>
- ❖ Public summary plots at <https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCTopWGSummaryPlots>
- ❖ Public Twiki page at <https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCTopWG>
- ❖ Main open mailing list: lhc-toplhcwg@cern.ch

Contacts for ongoing work

- ❖ **$\Delta\phi$ (ℓ^+ , ℓ^-) spin correlation**: Miriam Watson & James Howarth (ATLAS); Giulia Negro, Andreas Jung & Afiq Anuar (CMS)
- ❖ **EFT**: Abhishek Sharma & Tom Stevenson (ATLAS); Sergio Sánchez Cruz, Kirill Skovpen & Jon Wilson (CMS)
- ❖ **Common MC**: Dominic Hirschbühl & Reinhard Schwienhorst (ATLAS); Giulia Negro, Andris Potrebko & Markus Seidel (CMS)
- ❖ **Harmonization of modelling uncertainties**: Federica Fabbri & Katharina Voss (ATLAS); Efe Yazgan, Jan van der Linden & Carlos Vico (CMS)
- ❖ **Global EFT effort** within the LHC EFT WG (<https://lpsc.web.cern.ch/lhc-eft-wg>): Carmen Diez (ATLAS), Robert Schoefbeck (CMS), Ken Mimasu (Theory)
- ❖ Also contacts for dedicated topics as needed (JES, b-tagging, generators, pseudo-top definitions, etc).

Summary plots

- ❖ Decided not to have new summary plots for this meeting
- ❖ Agreed to have a new round of plots for the next open meeting (Spring 2025)

Future of LHCTopWG Open Meetings

- ❖ So far, we have been having two in-person/hybrid open meetings per year
 - April/May and November typically
- ❖ We believe this is ok but we would like to know if people is happy with this and/or if changes would be appreciated
 - Twice a year is too much?
 - November meeting too close to Top conference?
 - Both meetings hybrid (in-person)? One each?
 - Any other thing?
- ❖ Please **share your thoughts** with us (lhc-toplhwcwg-admin@cern.ch)

Agenda

MONDAY 11 NOVEMBER	
14:00 → 14:20	Introduction Speakers: Jose Enrique Palencia Cortezon (Universidad de Oviedo (ES)), Marcel Vos (IFIC Valencia (ES)), Wolfgang Wagner (Bergische Universität Wuppertal (DE))
14:20 → 14:30	Questions and discussion
14:30 → 15:00	Measurement of $t\bar{t}$ production in association with additional b-jets in the $e\gamma$ final state and measurement of top-quark pair production in association with charm quarks in proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector and comparison with the corresponding measurements at CMS ARXiv links: https://arxiv.org/abs/2407.13473 https://arxiv.org/abs/2409.11305 Speakers: Jan van der Linden (Ghent University (BE)), Mahsana Haleem (Julius-Maximilians-Universität Würzburg (DE))
15:00 → 15:10	Discussion
15:10 → 15:30	Associated production of a top quark pair and a Higgs boson Speaker: Chris Scheufen (Université de Genève (CH))
15:30 → 15:45	Discussion
15:45 → 16:15	Coffee break
16:15 → 17:45	Session: Theory of $t\bar{t}$ + HF
16:15	Five-flavour scheme predictions for $t\bar{t}$ + $b\bar{b}$ at next-to-leading order accuracy ARXiv Link: https://arxiv.org/abs/2409.11305 Speakers: Rikkert Frederix (Lund University), Tetiana Moskalets (Southern Methodist University (US))
16:35	Discussion
16:45	tt+HF modelling Speaker: Judith Katzy (Deutsches Elektronen-Synchrotron (DE))
17:05	Discussion

TUESDAY 12 NOVEMBER	
09:00 → 10:30	Session
09:00	Hadronic Top Quark Polarimetry with ParticleNet and Analytical Insights on Hadronic Top Quark Polarimetry e-Print: 2407.01663 [hep-ph] and e-Print: 2407.07147 [hep-ph] Speaker: Alberto Navarro (Indiana State University)
09:20	Discussion
09:30	Measurements of inclusive and differential cross sections for top quark production in association with a Z boson in proton-proton collisions at $\sqrt{s} = 13$ TeV https://arxiv.org/abs/2410.23475 Speaker: Beatriz Ribeiro Lopes (CERN)
09:50	Discussion
10:00	Top-quark pair production as a probe of light top-philic scalars and anomalous Higgs interactions e-Print: 2406.06694 [hep-ph] Speaker: Simone Tentori (UCLA)
10:20	Discussion
10:30 → 11:00	Coffee break
11:00 → 12:30	Session
11:00	Constraining HEFT(SMEFT) coefficients involving t-quarks from bound-states and the Hartree-Fock method Paper Link: https://inspirehep.net/literature/2827955 Speaker: Felipe J. Llanes-Estrada
11:15	Discussion
11:25	Search for pair production of heavy particles decaying to a top quark and a gluon in the lepton+jets final state in proton-proton collisions at $\sqrt{s} = 13$ TeV at CMS ARXiv: https://arxiv.org/abs/2410.20901 Speaker: Finn Jonathan Labe (Universität Hamburg)
11:45	Discussion
11:55	Search for same-sign top-quark production in ATLAS
12:15	Discussion
12:30 → 14:00	Lunch break

12:30 → 14:00	Lunch break
14:00 → 15:30	Session: $t\bar{t}$ production in heavy-ion collisions
14:00	$t\bar{t}$ production in heavy-ion collisions with the ATLAS and CMS detectors Speakers: Dr. Georgios Kiriakas (The University of Kansas (US)), Patrycja Anna Potpeja (Ghent University of Krakow (PL))
14:20	Discussion
14:30	Probing the Time Structure of the Quark-Gluon Plasma with Top Quarks, Phys. Rev. Lett. 120, 232301 – Published 8 June 2018, https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.120.232301 Speaker: Dr. Guilherme Milhano (LIP Lisbon & CERN TH)
14:50	Discussion
15:00	NNLO PDFs driven by top-quark data ARXiv: https://arxiv.org/abs/2407.00545 Speaker: Maria Vittoria Garzelli (Hamburg University (DE))
15:20	Discussion
15:30 → 16:00	Coffee break
16:00 → 17:00	Session
16:00	Combined effective field theory interpretation of Higgs boson, electroweak vector boson, top quark, and multi-jet measurements CMS-PAS-SMP-24-003, https://cds.cern.ch/record/2911229 Speaker: Fabian Stäger (University of Zurich (CH))
16:20	Discussion
16:30	A summary of the Oxford workshop on entanglement Speaker: r. Demina (University of Rochester (US))
16:50	Discussion

WEDNESDAY 13 NOVEMBER	
09:00 → 10:40	Session: Toponium at the LHC
09:00	Introduction Speaker: Fabio Maltoni (Université Catholique de Louvain (BE))
09:15	Discussion
09:20	Hunting toponium at the LHC Speaker: Juan Antonio Aguilar Saavedra (Consejo Superior de Investigaciones Científicas (ES))
09:35	Discussion
09:40	Search for heavy pseudoscalar and scalar bosons decaying to top quark pairs in proton-proton collisions at $\sqrt{s} = 13$ TeV CMS-PAS-HIG-22-013, http://cds.cern.ch/record/2911775 Speaker: Laurids Jeppé (Deutsches Elektronen-Synchrotron (DE))
10:00	Discussion
10:10	Precision toponium physics Speaker: Yuichiro Kiyo
10:30	Discussion
10:40 → 11:10	Coffee break
11:10 → 12:40	Session
11:10	QCD MC friendly predictions for toponium at the LHC Speaker: Benjamin Fuks
11:30	Discussion
11:40	TBC
12:00	Discussion
12:10	ESPPU Speaker: Monica Dunford (Heidelberg University (DE))
12:30	Discussion

LHCtopWG dinner

- ❖ As usual, we plan to have dinner together tomorrow (Tuesday) at around 19.00-19.30
- ❖ Place to be decided yet, most likely not far from CERN
- ❖ If interested, add your name [here](#) before tomorrow noon (but the sooner the better)

Transition of ATLAS LHCtopWG conveners

- ❖ Wolfgang Wagner has been the ATLAS LHCtopWG contact since March 2021
 - ... but is now stepping down



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Thank you very much Wolfgang for
these years of service to the LHCTopWG



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- ❖ Marcel Vos has kindly agreed to replace him!
 - Welcome!!!

