LHC Top WG 25th 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)

Universidad de Oviedo

The LHC top WG and its mission

- 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 discussed in Closed meetings attended by conveners, subgroup conveners, contacts and invited experts on specific topics.

Documentation and coordinates

- WG integrated in the LPCC structure at CERN: http://lpcc.web.cern.ch/lhc-working-groups
- LHC top WG contacts:

  Maria Aldaya (CMS), Fabio Maltoni (Theory), Enrique Palencia Cortezon (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

LHC top WG contacts for ongoing combinations …

… and active working groups

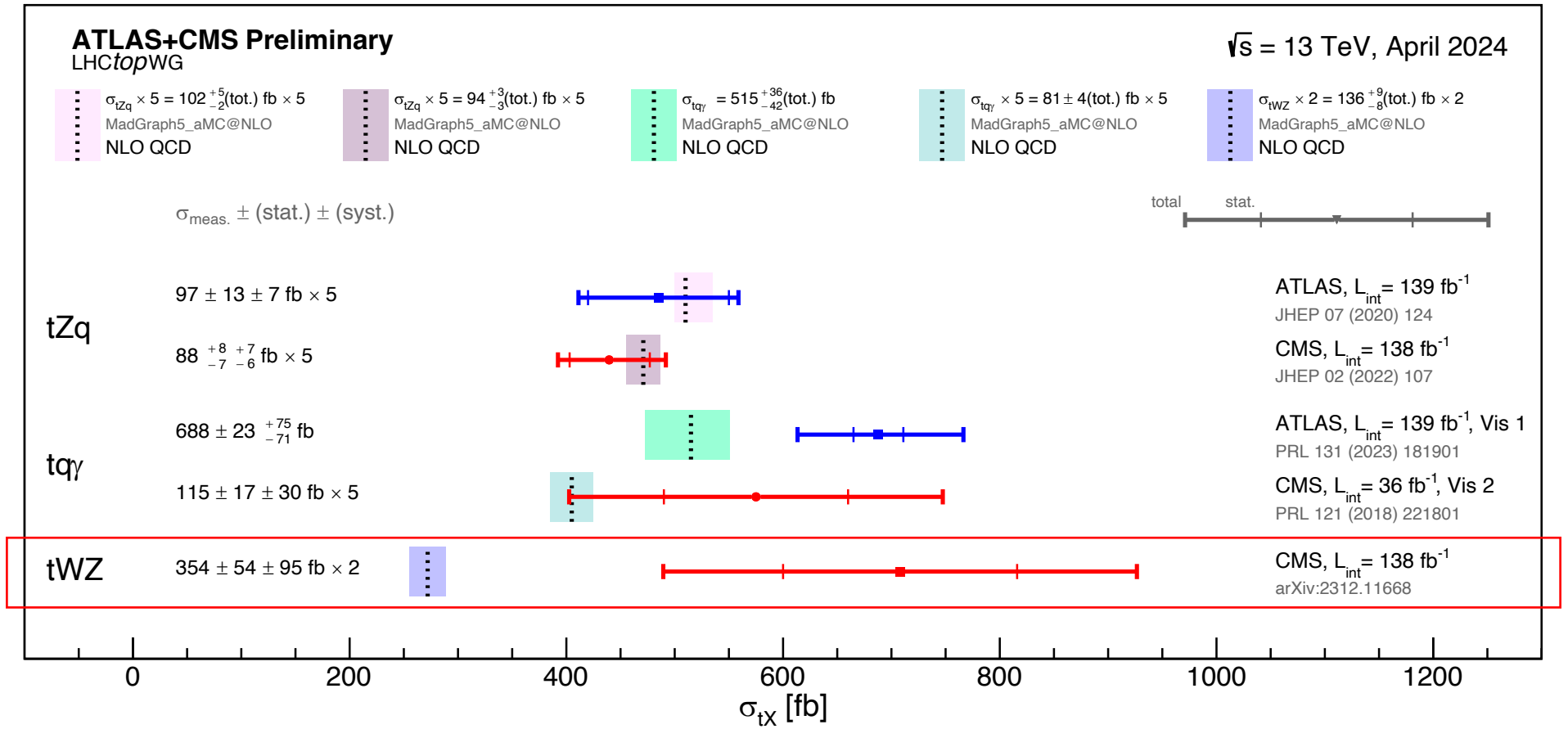
- $\Delta\phi(\ell^+,\ell^-)$ **spin correlation:** Miriam Watson & James Howarth (ATLAS); Giulia Negro, Andreas Jung & Afiq Anuar (CMS)
- **Top mass:** Mark Owen (ATLAS); Martijn Mulders, Matteo Defranchis (CMS) → Run 1 top-quark mass combination submitted to PRL → presentation today by Mark Owen
- **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** (https://lpcc.web.cern.ch/lhc-eft-wg): Jacob Kempster (ATLAS), Robert Schoefbeck (CMS), Ken Mimasu (Theory)
- Also contacts for dedicated topics as needed (JES, b-tagging, generators, pseudo-top definitions, etc).

New since last Open Meeting in November 2023

Summary plots

- Available at: https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCTopWGSummaryPlots *
- New since the last Open Meeting:

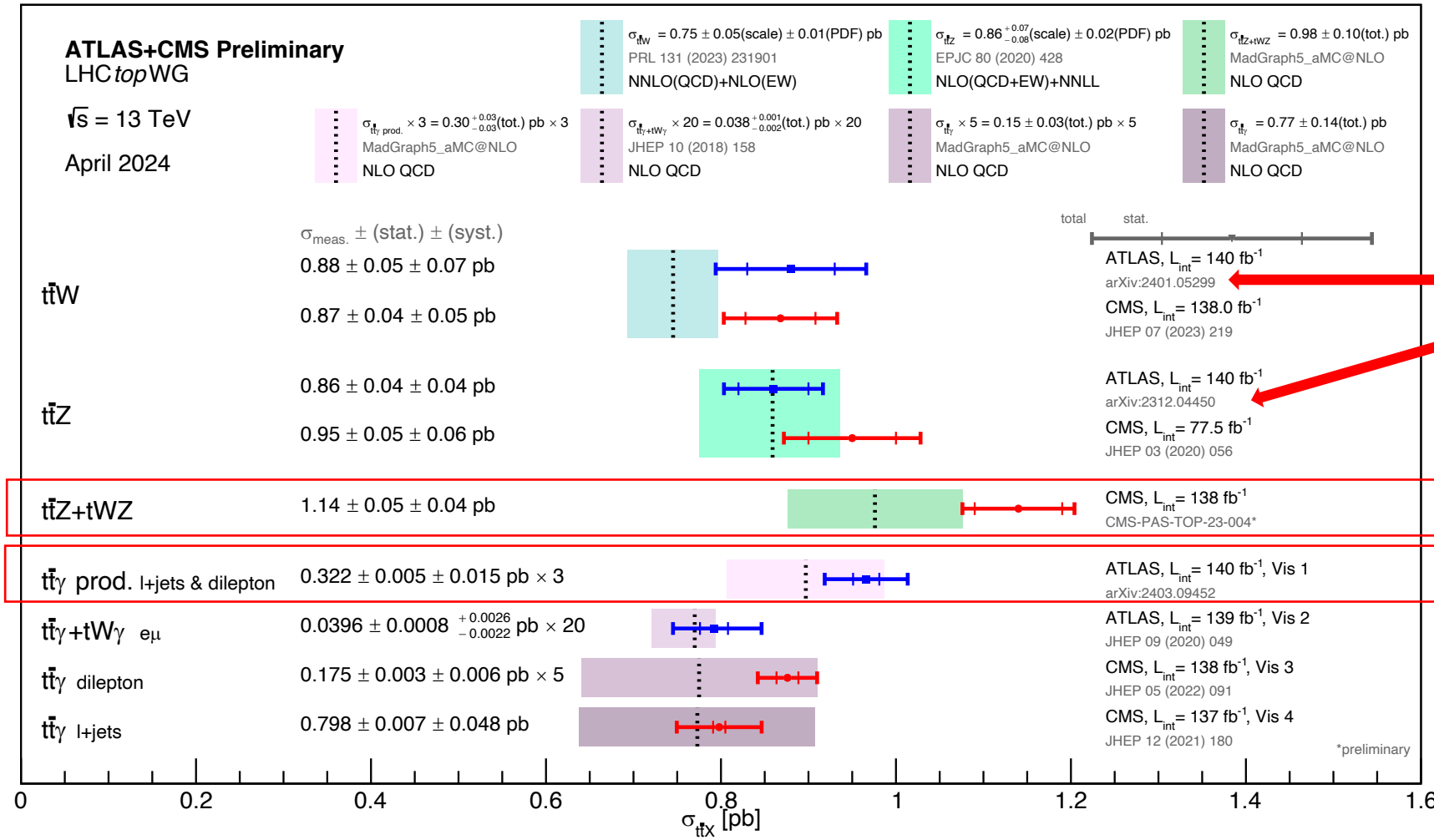
Updated tWZ 👍



* New plots will be added to the Twiki shortly.

Updated by CMS: PAS to arXiv (result changed slightly)

Updated $t\bar{t} + X$ cross-sections plot

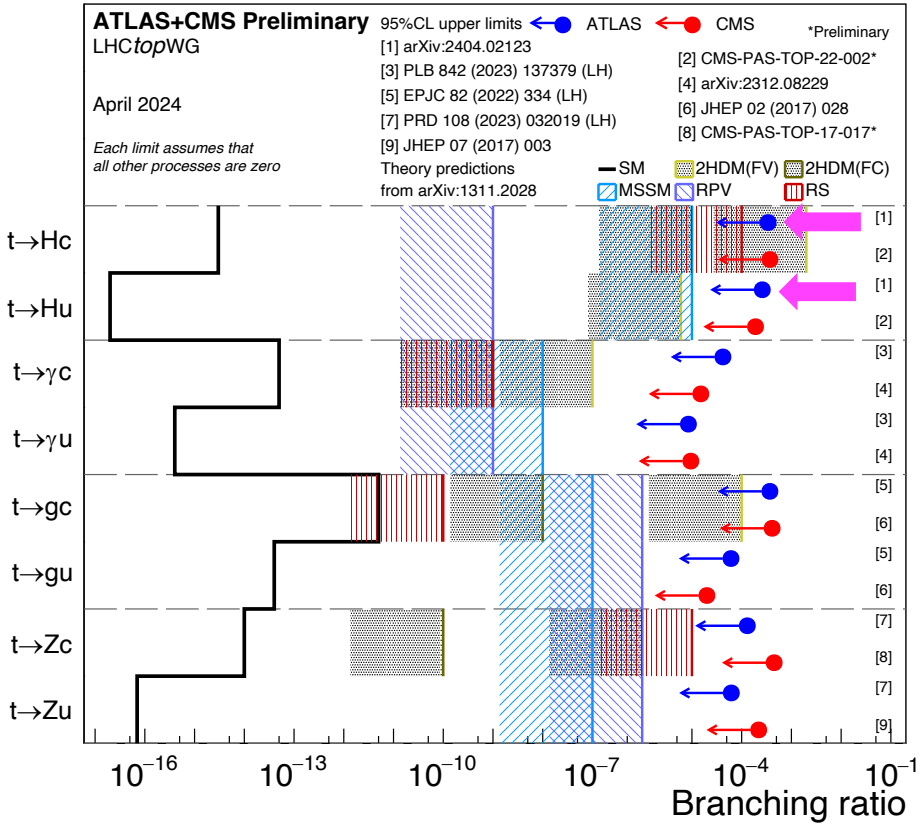


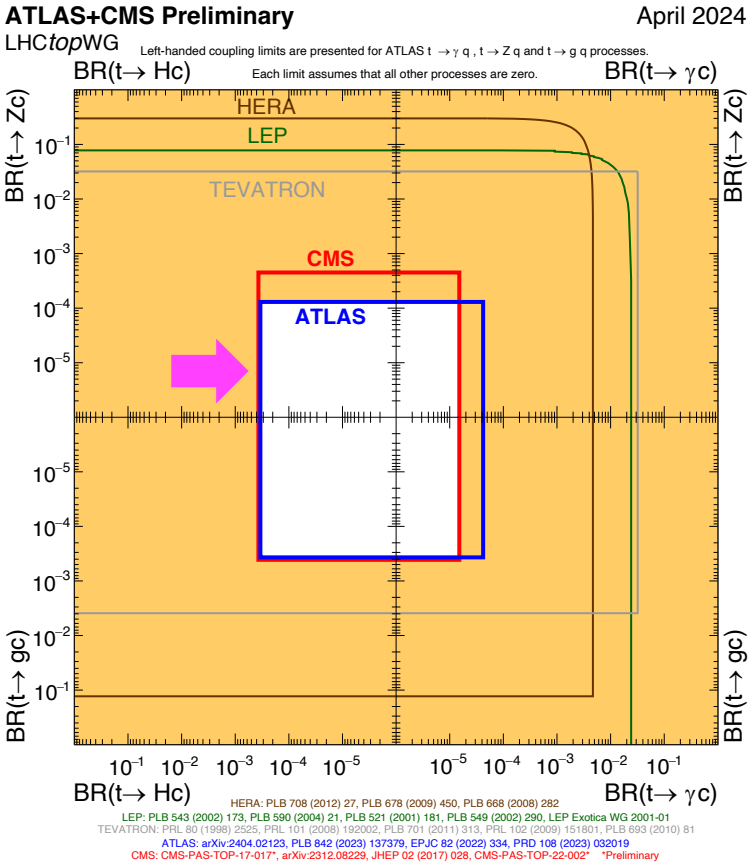
Updated CONF to arXiv

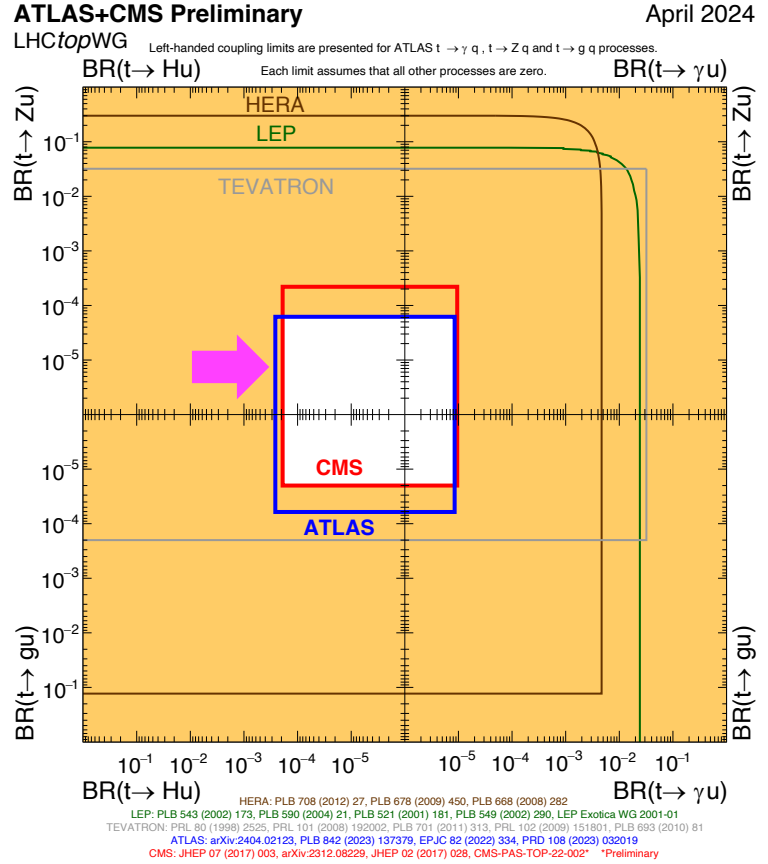
New preliminary CMS result with 138 fb^{-1}, CMS-PAS-TOP-23-004
Talk today by Federica Colombina!

New ATLAS result with 140 fb^{-1}, arXiv: 2403.09452
Talk yesterday by Jan Hahn!

Update of FCNC summary plots

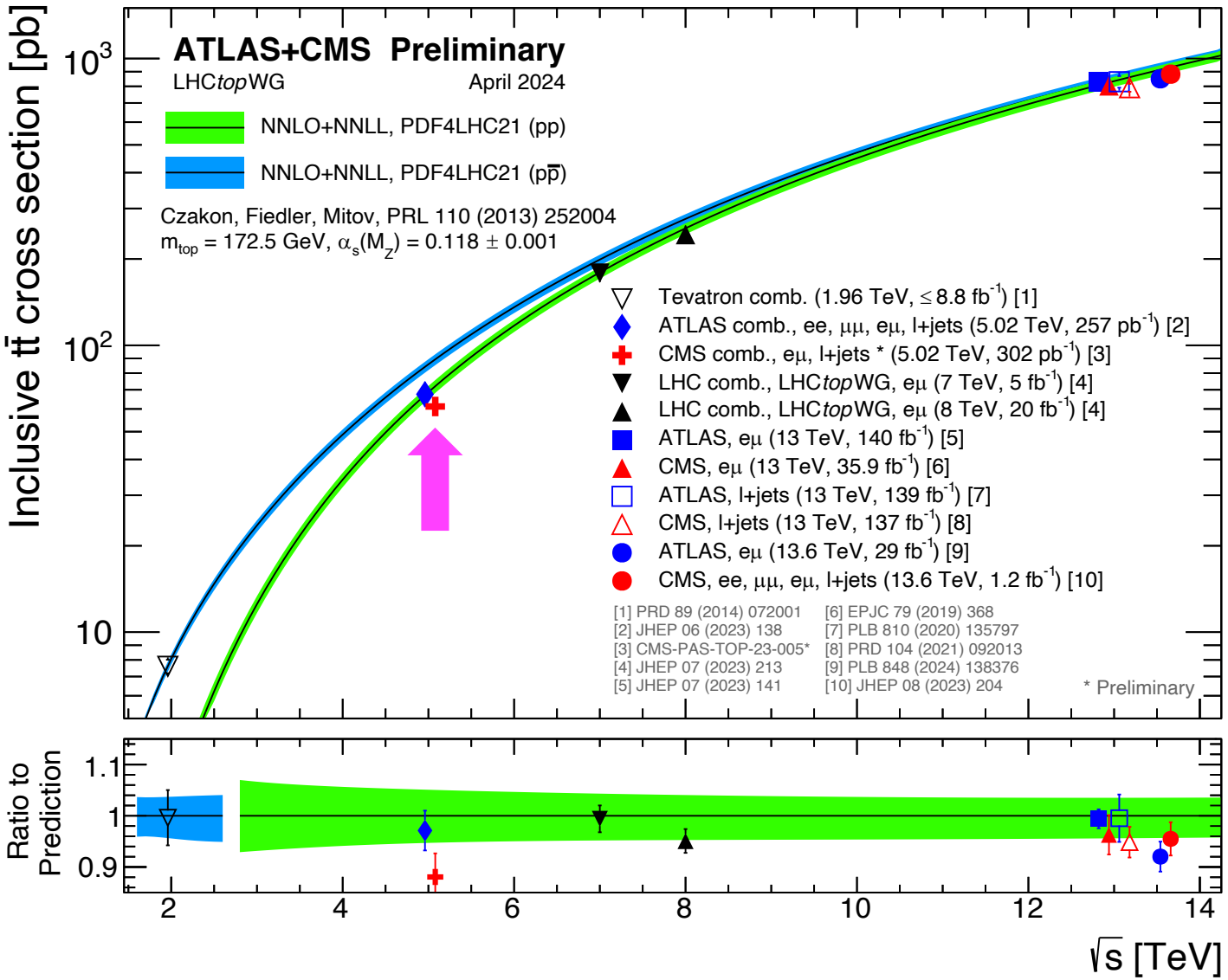






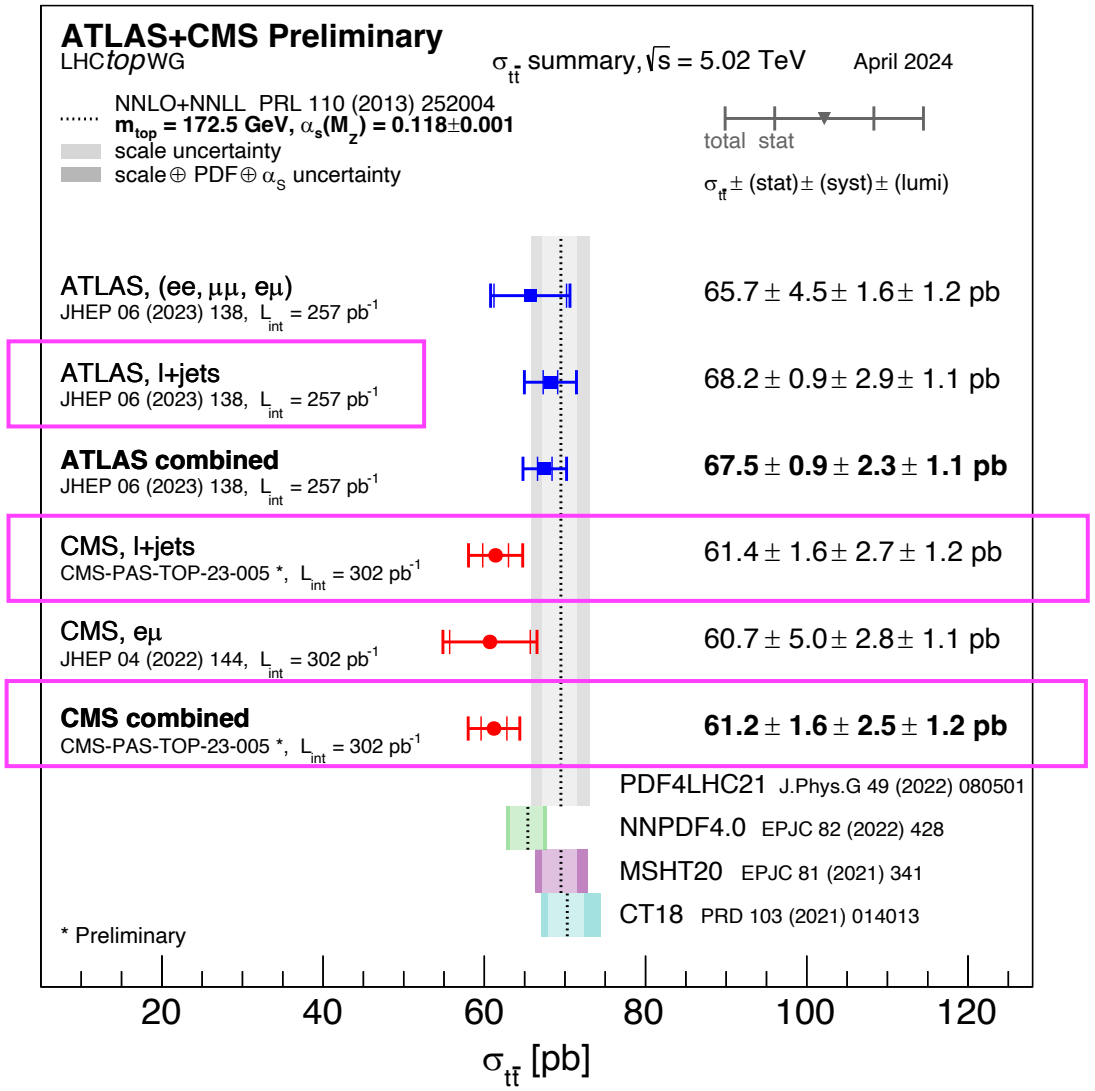
- New ATLAS result on tHq in the multilepton channel, arXiv: 2404.02123. Presentation today in the 2nd morning session by Marvin Geyik as an ATLAS-CMS comparison (Frank Golf as a CMS helper).
- Updated references of CMS results on $tq\gamma$ FCNC (PAS to arXiv).

$t\bar{t}$ cross-section versus $\sqrt{s}$



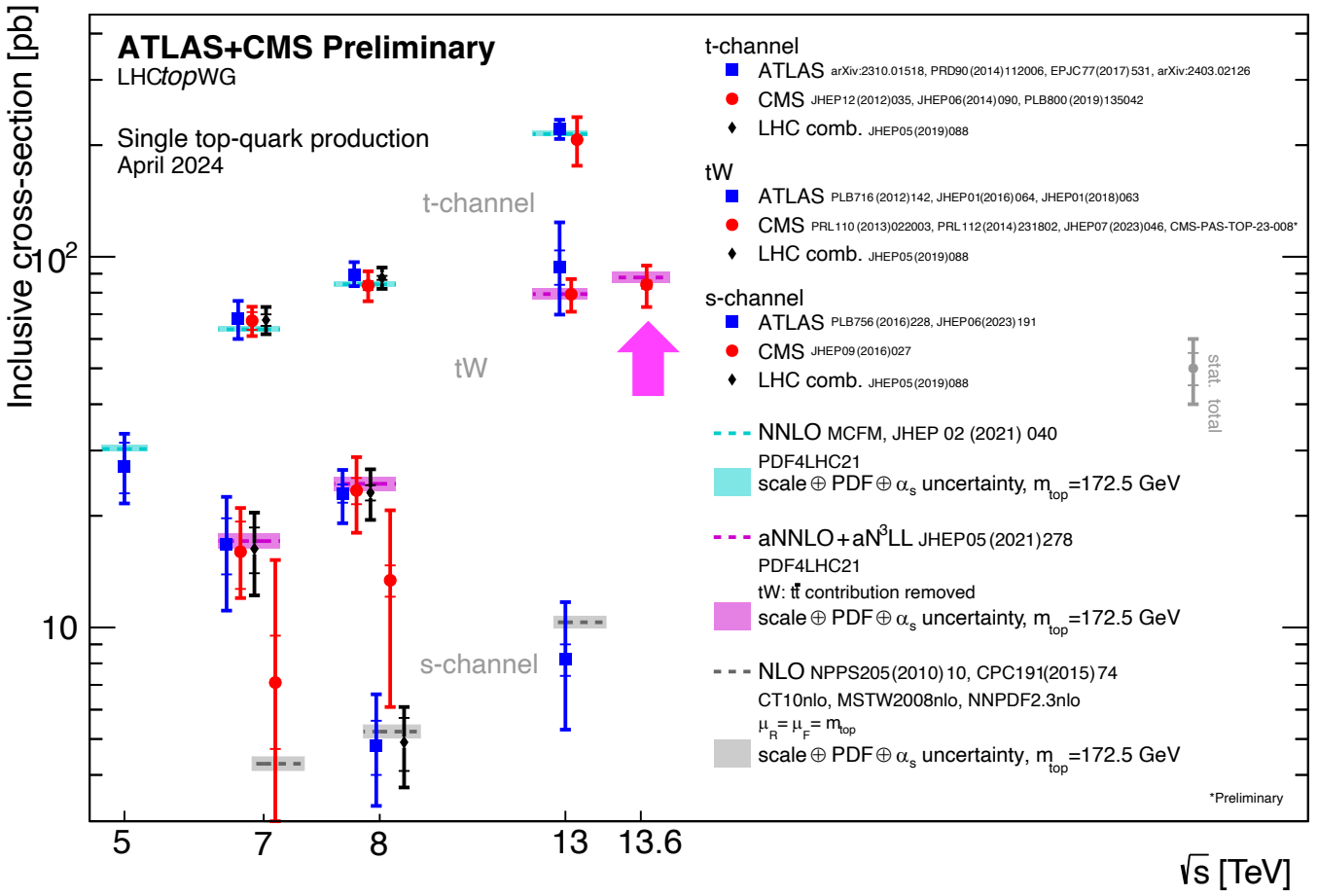
- New CMS measurement at $\sqrt{s} = 5.02$ TeV: Updated l+jets channel + combination. CMS-PAS-TOP-23-005.
  → Presentation by Javier del Riego Badas at 17:00 today
- Updated reference of ATLAS measurement at 13.6 TeV: arXiv → journal
- Fixed wrong integrated luminosity of ATLAS result at $\sqrt{s} =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

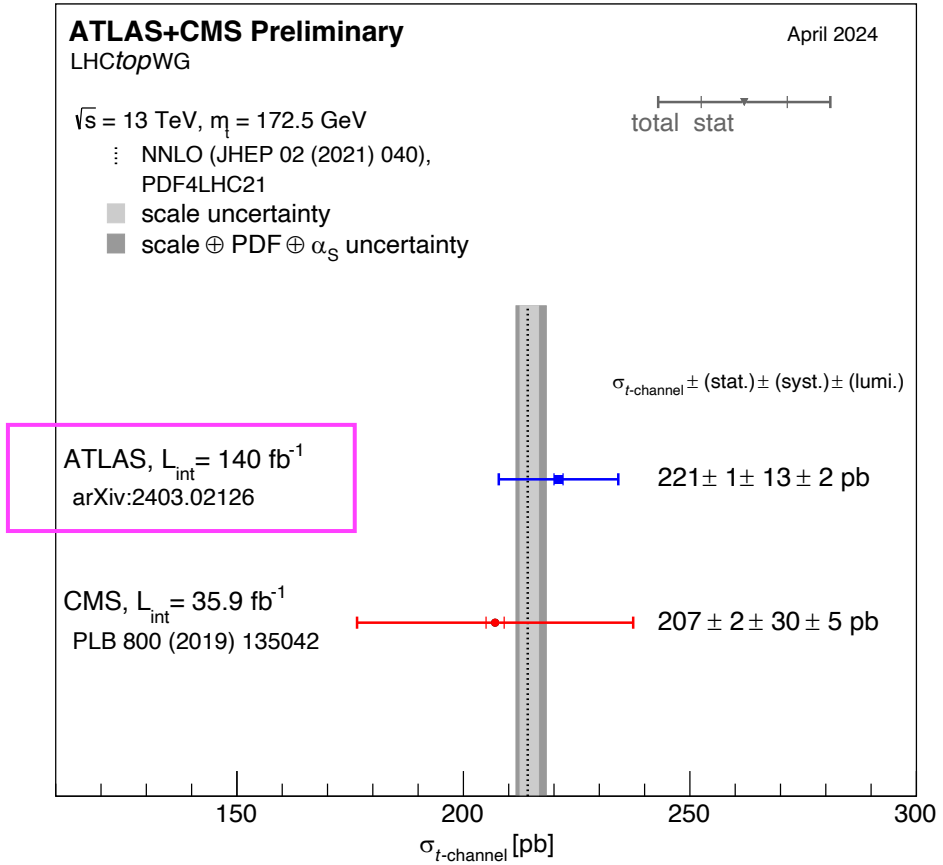
Summary plots: $t\bar{t}$ cross-section



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

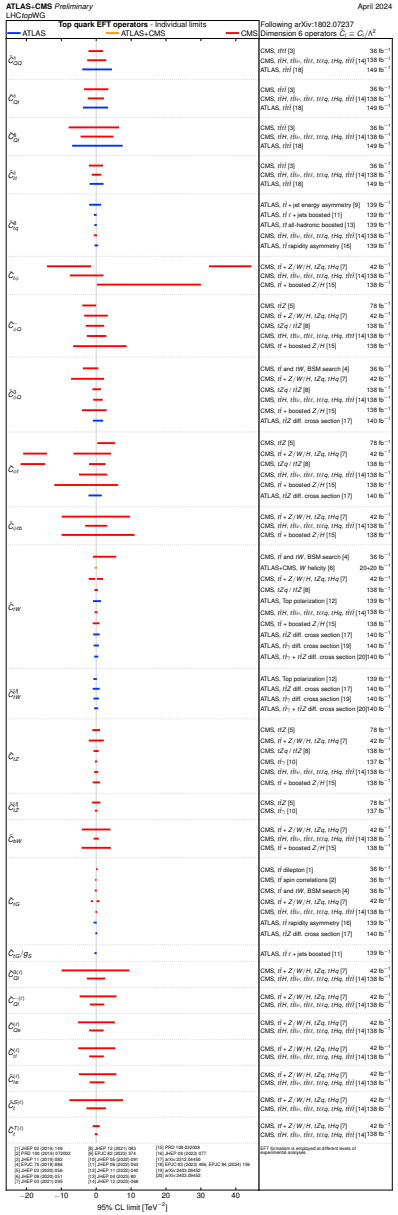
Summary plots: single top-quark production

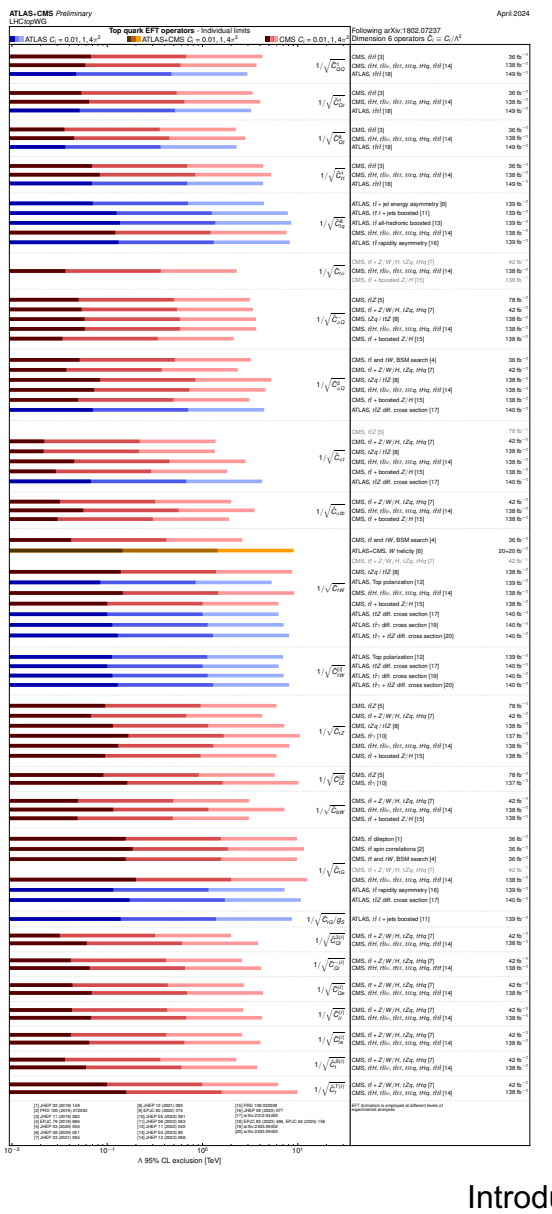




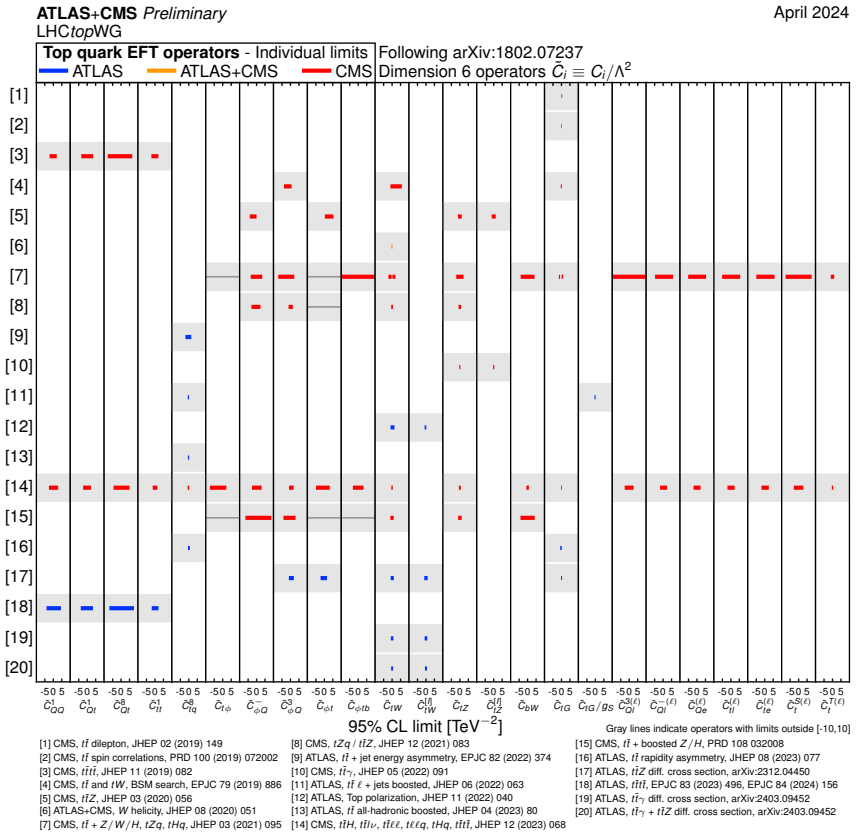
- New CMS result on tW at 13.6 TeV: CMS-PAS-TOP-23-008. Presentation by Alejandro Soto Rodriguez today in the 1st afternoon session.
- Update ATLAS reference of 13 TeV t-channel result: CONF → arXiv

EFT summary plots

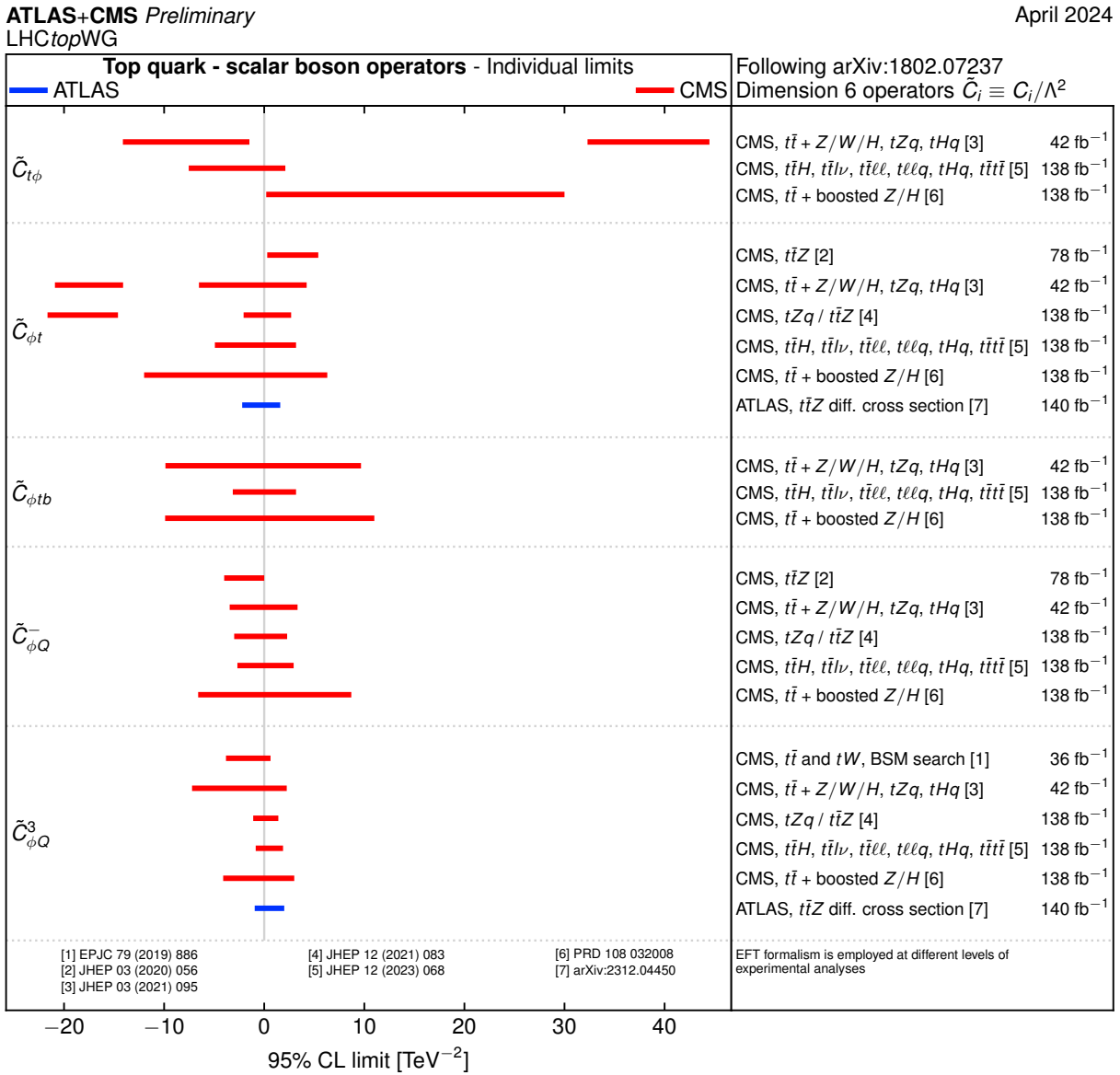




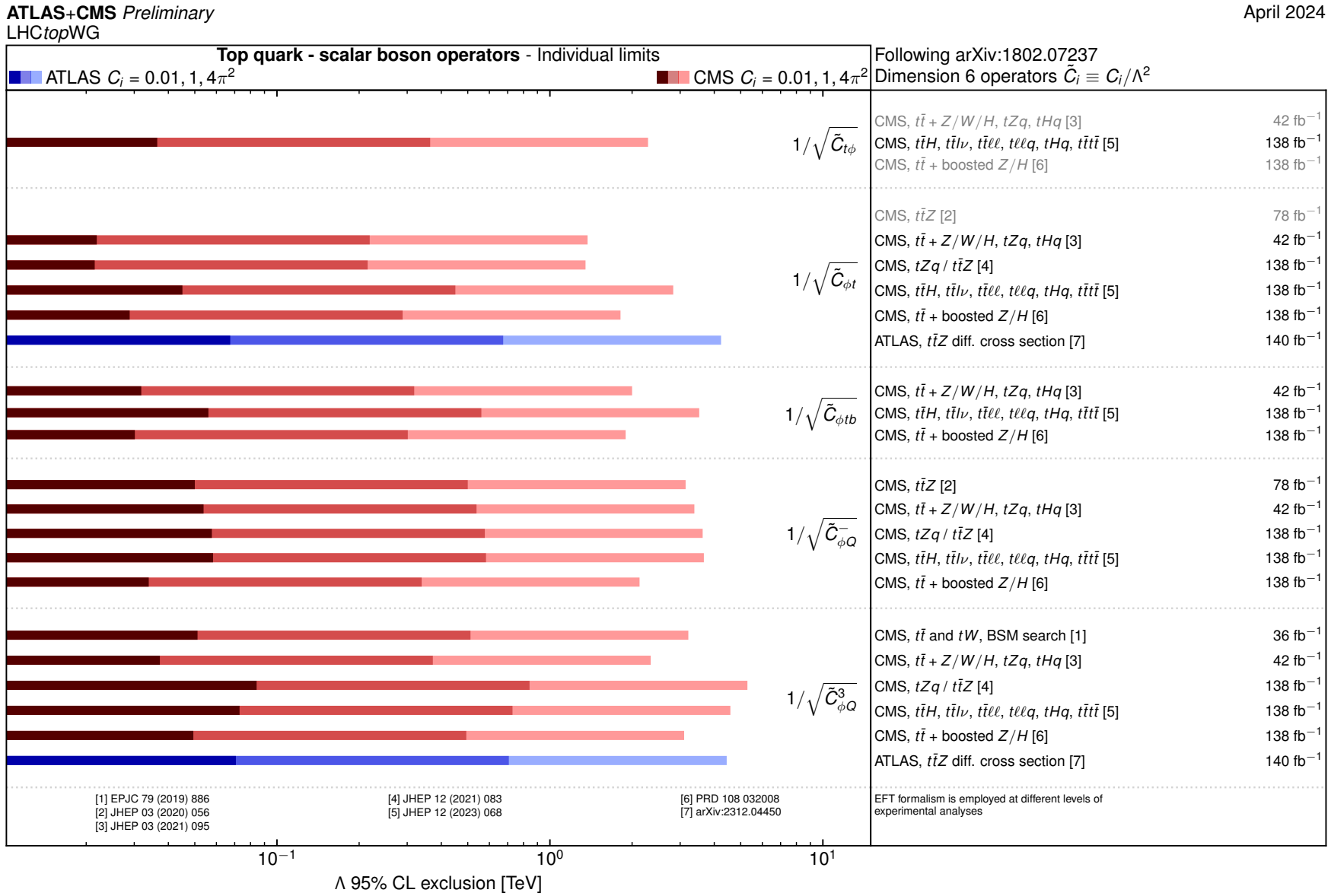
- New (additional) plots showing limits on Λ, rather than the EFT coefficient C!
  - Show probed energy scale
  - Provide limits for three assumptions of C: $C = 0.1$, $C = 1$, and $C = 4\pi^2$



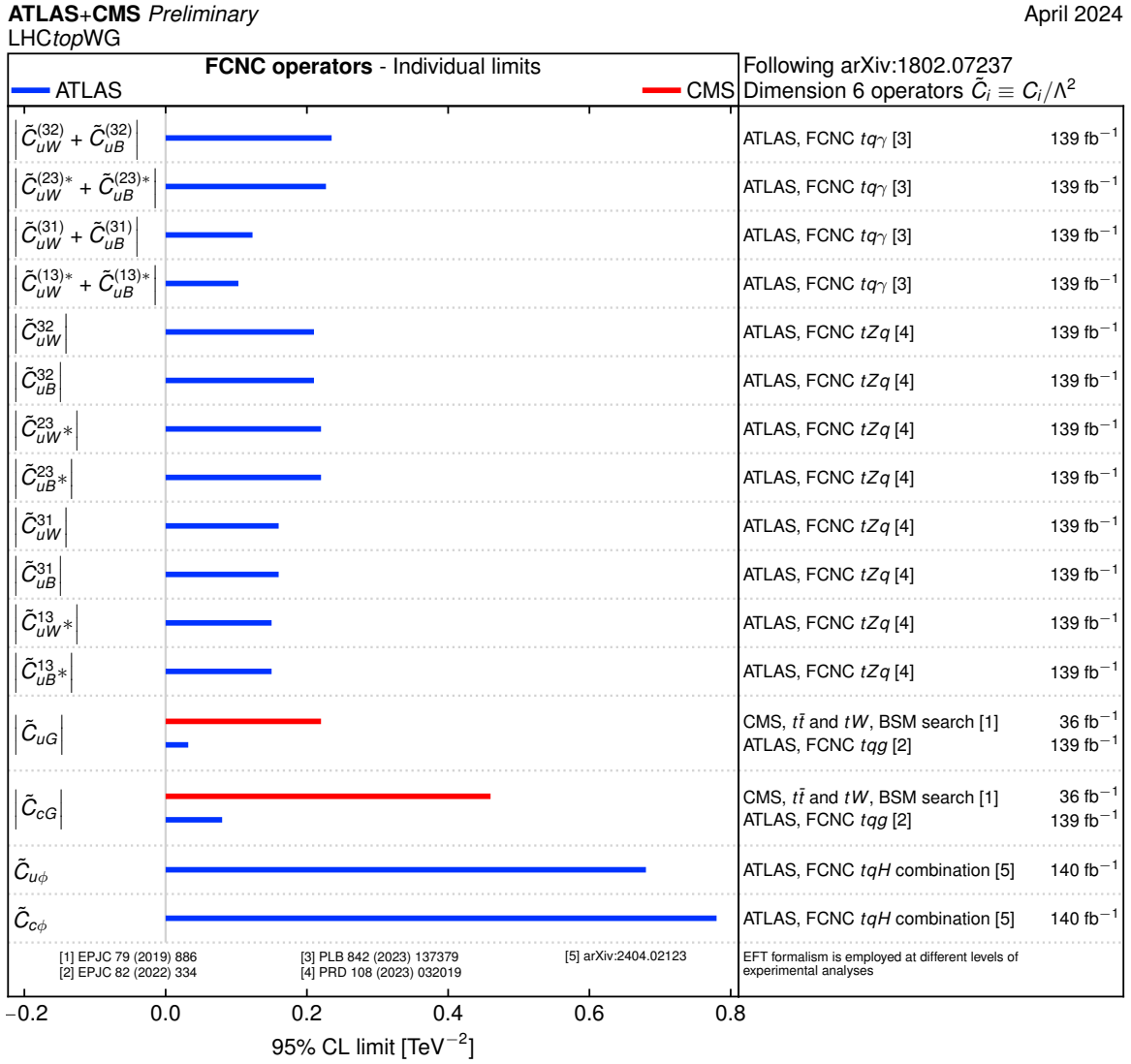
EFT summary plots: top-quark and scalar bosons

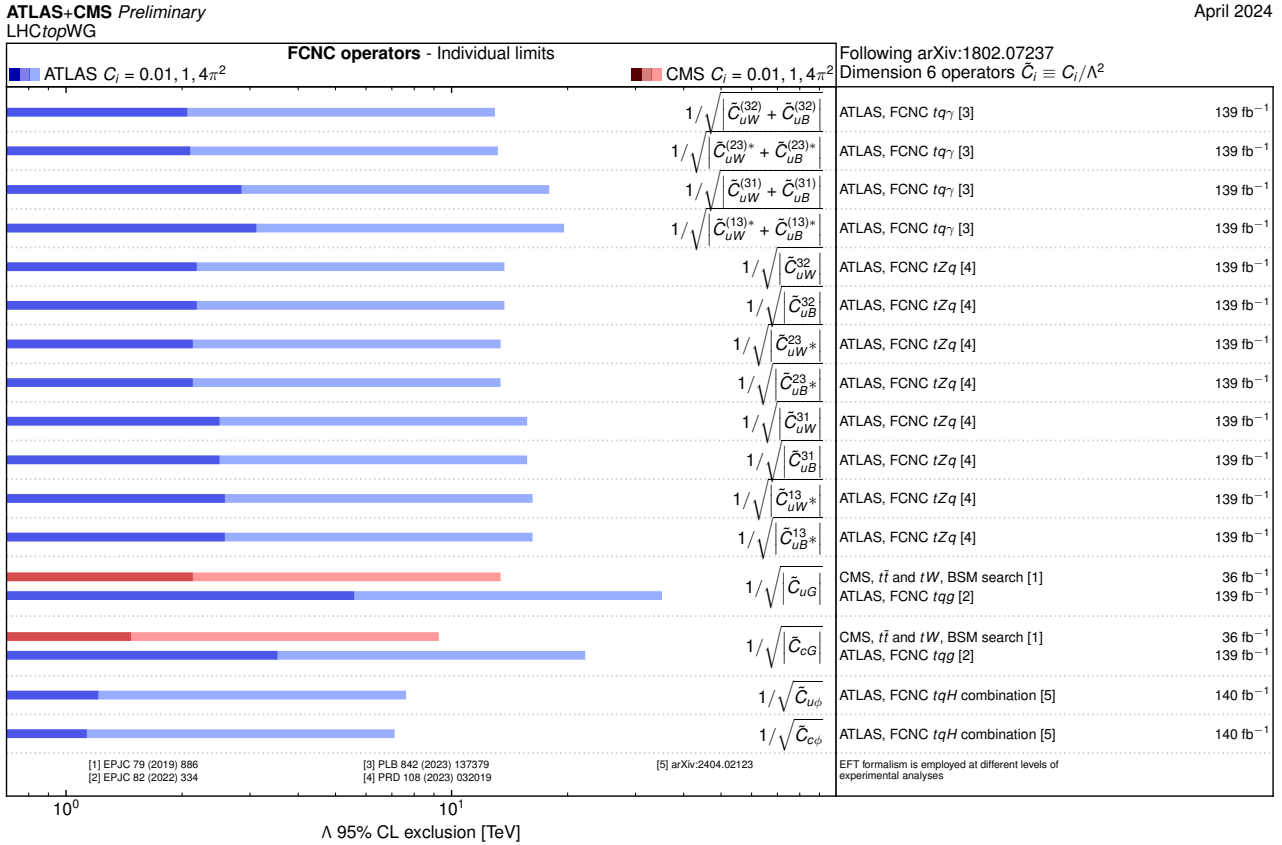


EFT summary plots: top-quark and scalar bosons



EFT summary plots: FCNC operators





- Updated ATLAS FCNC tHq limits to full Run 2 combination (arXiv:2404.02123)

TOP 2024 in Saint-Malo, France

- Venue: Palais des congrès „Le Grand Large“
- Indico page: https://indico.cern.ch/event/1368706/ (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
- Accommodation: to be arranged by attendees independently

Transition of CMS LHC top WG conveners

Handover of CMS convener position

Welcome Enrique!

Maria Aldaya

Thank you very much Maria for almost **5 years** of service to the LHC top WG since November 2019!

Enrique Palencia Cortezon

Universidad de Oviedo

Agenda

Wednesday 24/4 @ Main Auditorium	Thursday 25/4 @ TH conference room	Friday 26/4 @ TH conference room
	Early morning session: **9:00 – 11:00** Topic: **Top-quark mass** (4 presentations)	Early morning session: **9:30 – 11:00** Topic: **4-tops** (3 presentations)
	Coffee break	Coffee break
	Late morning session: **11:30 – 13:00** Topic: **FCNC, lepton flavour universality** (3 presentations)	Late morning session: **11:30 – 13:00** Topic: **Entanglement (**3 presentations)
	Lunch break	
Early afternoon session: **14:00 – 15:30** 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: **16:00 – 18:00** Joint session with the LHC EFT WG **4 theory presentations on EFT**	Late afternoon session: **17:00 – 18:00** Topics: **$t\bar{t}$ + jets, light stops** (2 presentations)	
Joint drinks **18:00 – 19:00** at Salle de pas perdu	**Workshop Dinner** **19:00 – 22:00** at Café de la Place in Meyrin village	

Please register for the dinner at https://terminplaner6.dfn.de/p/d8027f960b09676d72086532386e8c7d-700354
until 10:00 am today = essentially now!