16th Open LHCtopWG Meeting

Nov 14-15, 2019

Introduction

Maria Aldaya (DESY)
Michelangelo Mangano (CERN)
Martijn Mulders (CERN)
Reinhard Schwienhorst (Michigan State)

LHCtopWG : Introduction

- 16th open session of the LHC Top Working Group
  - Forum for public discussions (ATLAS+CMS+LHCb+TH) on combination and interpretation of top physics measurements at the LHC
  - Open sessions (twice per year) – aim always to allow time for discussion

- Documentation and coordinates
  - Integrated in the LPCC structure at CERN: http://lpcc.web.cern.ch/lhc-working-groups
  - Agendas available at https://indico.cern.ch/categoryDisplay.py?categId=4463
  - Public summary plots at https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCTopWGSummaryPlots
  - Subscribe to main open mailing list lhc-toplhcwg@cern.ch

- Welcome to the second open session of 2019!

LHCtopWG Contacts

- **Theory:** Michelangelo Mangano
- **ATLAS:** Reinhard Schwienhorst
- **CMS:** Maria Aldaya
- **LHCb:** Steve Farry

- **CMS:** Maria Aldaya is taking over from Martijn Mulders

Contacts for combinations / working groups (in flux…):

- **W helicity:** Mohammad Kareem (ATLAS), Mara Senghi (CMS)
- **Top pair cross section:** Veronique Boisvert (ATLAS), Jan Kieseler (CMS)
- **Top mass:** Mark Owen (ATLAS), Steve Wimpenny (CMS)
- **Top pair differential cross sec. 8 TeV:** Francesco Spanò & Riccardo Di Sipio (ATLAS), Maria Aldaya & Jan Kieseler (CMS)
- **Top pair differential cross sec. 13 TeV:** James Howarth (ATLAS), Otto Hindrichs (CMS)
- **EFT:** Nuno Castro & Alison Lister (ATLAS), Nadjieh Jafari & Alexander Groshjean (CMS)
- **Common MC:** Kyle Cormier (ATLAS), Javier Fernandez Menendez (CMS)

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

Ongoing Combinations, aiming for publication:

(-> see talk by M. Kareem this afternoon)

Ongoing combinations under review within the collaborations:

- **W helicity measurement**
- **Top quark pair cross-section 7 & 8 TeV** + extraction top pole mass & α_s

Planned Run 1 combinations that are a bit further away:

- **Top mass:** preparatory discussions and studies ongoing
- **Differential ttbar** distributions (started with comparisons)

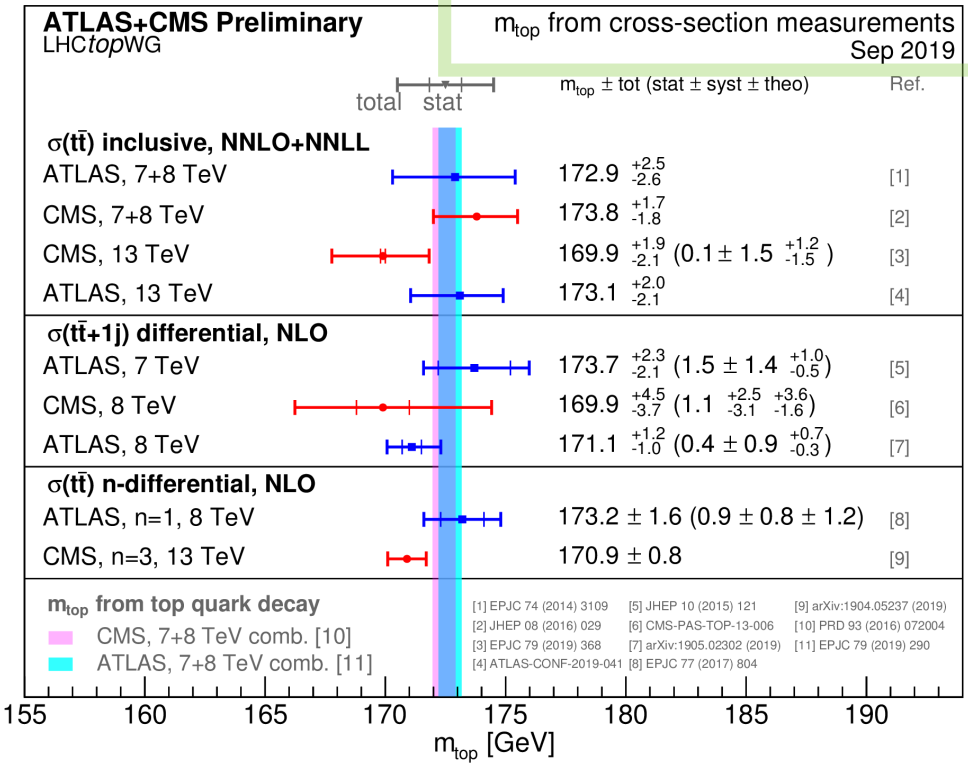
Efforts towards Run 2 combinations:

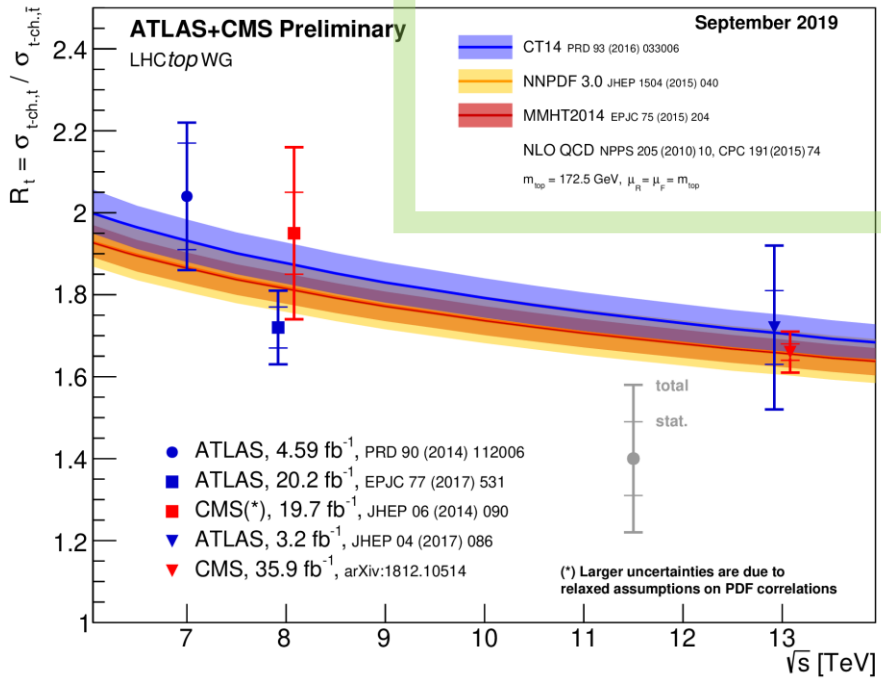
- **Common MC Sample studies** (plots)
- **Discussion on harmonization of systematic uncertainties**
- **Di-lepton $\Delta\varphi$(ll):** good test case for (preliminary) comparison & combination
- **Revisiting phase space definitions** ATLAS, CMS & theory (eg NNLO + top decay)

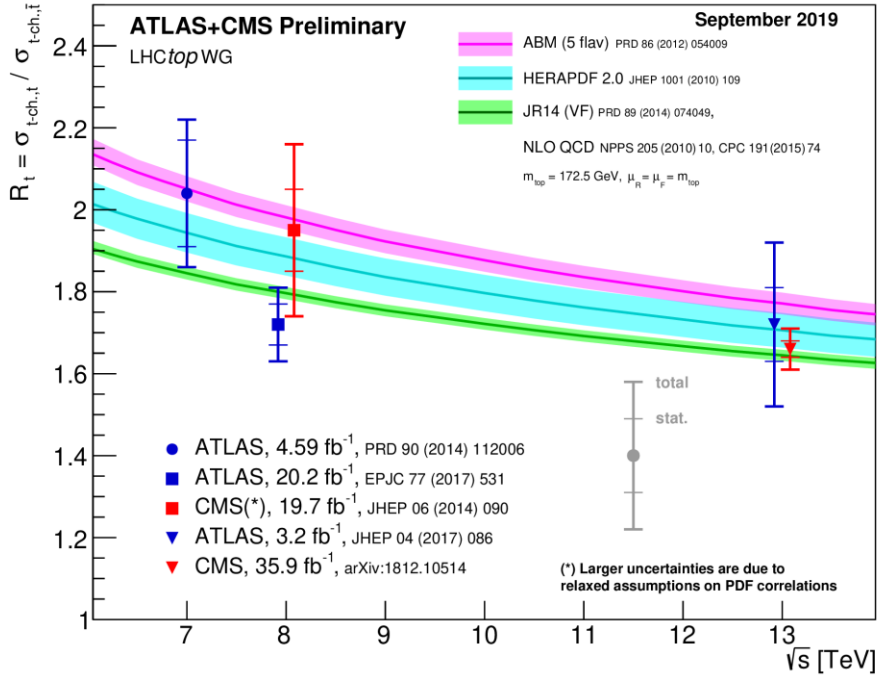
Summary Plots

https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCTopWGSummaryPlots

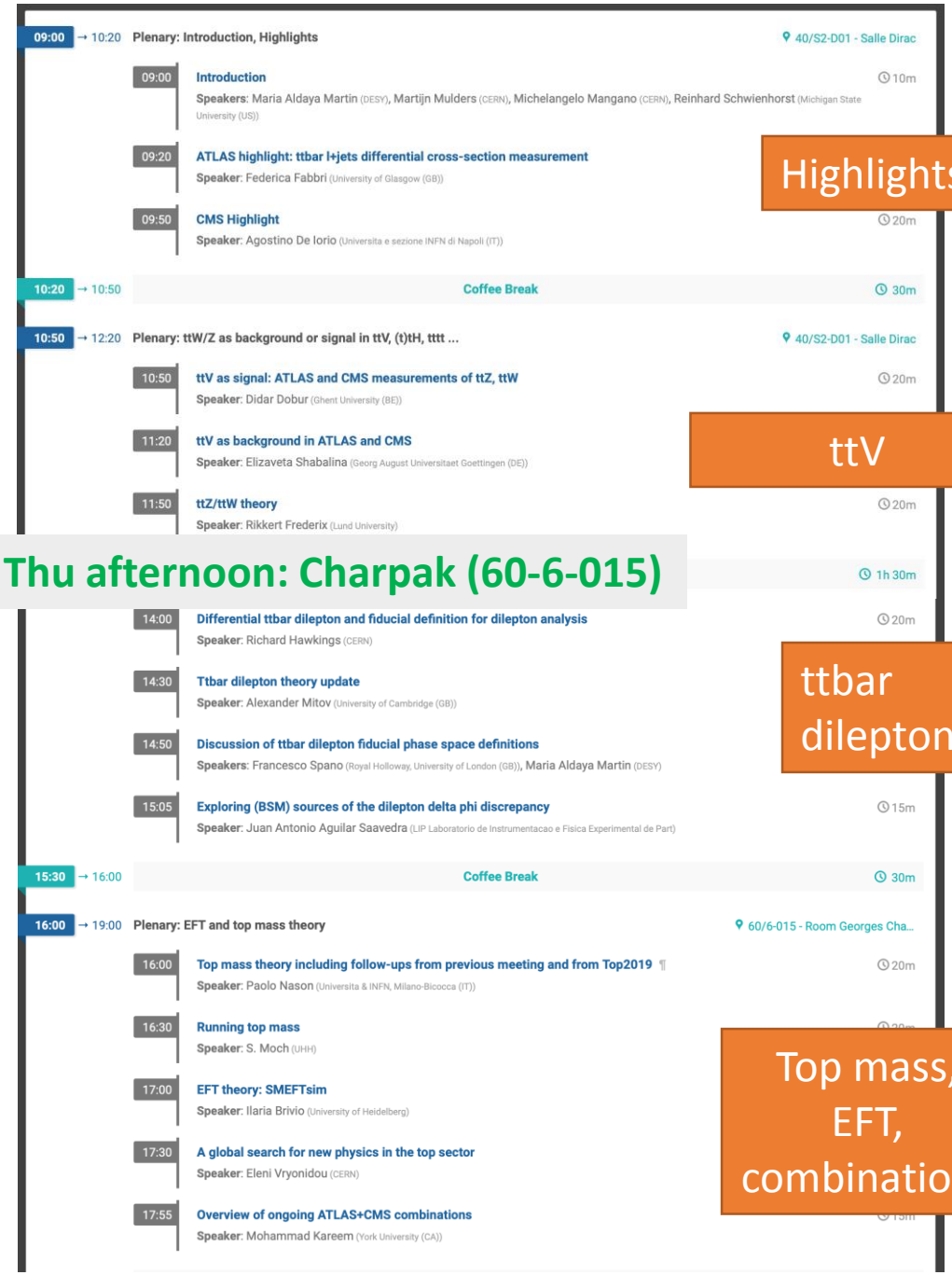
New plots since the last Open LHCTopWG meeting (in addition to a few other updates):







Thu morning: Salle Dirac (40-S2-D01)



09:00 → 10:20 Plenary: Introduction, Highlights — 40/S2-D01 - Salle Dirac

- 09:00 **Introduction** (10m)
  Speakers: Maria Aldaya Martin (DESY), Martijn Mulders (CERN), Michelangelo Mangano (CERN), Reinhard Schwienhorst (Michigan State University (US))
- 09:20 **ATLAS highlight: ttbar l+jets differential cross-section measurement**
  Speaker: Federica Fabbri (University of Glasgow (GB))
- 09:50 **CMS Highlight** (20m)
  Speaker: Agostino De Iorio (Universita e sezione INFN di Napoli (IT))

10:20 → 10:50 Coffee Break (30m)

10:50 → 12:20 Plenary: ttW/Z as background or signal in ttV, (t)tH, tttt ... — 40/S2-D01 - Salle Dirac

- 10:50 **ttV as signal: ATLAS and CMS measurements of ttZ, ttW** (20m)
  Speaker: Didar Dobur (Ghent University (BE))
- 11:20 **ttV as background in ATLAS and CMS**
  Speaker: Elizaveta Shabalina (Georg August Universitaet Goettingen (DE))
- 11:50 **ttZ/ttW theory** (20m)
  Speaker: Rikkert Frederix (Lund University)

Highlights

ttV

Thu afternoon: Charpak (60-6-015)

1h 30m

- 14:00 **Differential ttbar dilepton and fiducial definition for dilepton analysis** (20m)
  Speaker: Richard Hawkings (CERN)
- 14:30 **Ttbar dilepton theory update**
  Speaker: Alexander Mitov (University of Cambridge (GB))
- 14:50 **Discussion of ttbar dilepton fiducial phase space definitions**
  Speakers: Francesco Spano (Royal Holloway, University of London (GB)), Maria Aldaya Martin (DESY)
- 15:05 **Exploring (BSM) sources of the dilepton delta phi discrepancy** (15m)
  Speaker: Juan Antonio Aguilar Saavedra (LIP Laboratorio de Instrumentacao e Fisica Experimental de Part)

15:30 → 16:00 Coffee Break (30m)

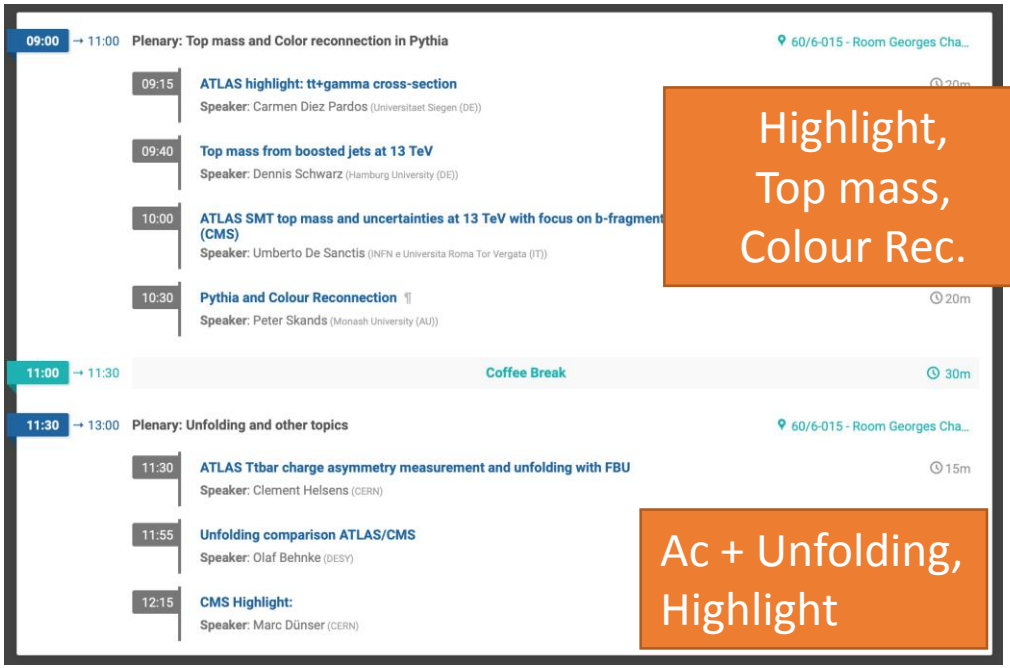
16:00 → 19:00 Plenary: EFT and top mass theory — 60/6-015 - Room Georges Cha...

- 16:00 **Top mass theory including follow-ups from previous meeting and from Top2019** ¶ (20m)
  Speaker: Paolo Nason (Universita & INFN, Milano-Bicocca (IT))
- 16:30 **Running top mass**
  Speaker: S. Moch (UHH)
- 17:00 **EFT theory: SMEFTsim**
  Speaker: Ilaria Brivio (University of Heidelberg)
- 17:30 **A global search for new physics in the top sector**
  Speaker: Eleni Vryonidou (CERN)
- 17:55 **Overview of ongoing ATLAS+CMS combinations**
  Speaker: Mohammad Kareem (York University (CA))

ttbar dilepton

Top mass, EFT, combinations

Fri morning: Charpak (60-6-015)



09:00 → 11:00 Plenary: Top mass and Color reconnection in Pythia — 60/6-015 - Room Georges Cha...

- 09:15 **ATLAS highlight: tt+gamma cross-section**
  Speaker: Carmen Diez Pardos (Universitaet Siegen (DE))
- 09:40 **Top mass from boosted jets at 13 TeV**
  Speaker: Dennis Schwarz (Hamburg University (DE))
- 10:00 **ATLAS SMT top mass and uncertainties at 13 TeV with focus on b-fragment (CMS)**
  Speaker: Umberto De Sanctis (INFN e Universita Roma Tor Vergata (IT))
- 10:30 **Pythia and Colour Reconnection** ¶ (20m)
  Speaker: Peter Skands (Monash University (AU))

11:00 → 11:30 Coffee Break (30m)

11:30 → 13:00 Plenary: Unfolding and other topics — 60/6-015 - Room Georges Cha...

- 11:30 **ATLAS Ttbar charge asymmetry measurement and unfolding with FBU** (15m)
  Speaker: Clement Helsens (CERN)
- 11:55 **Unfolding comparison ATLAS/CMS**
  Speaker: Olaf Behnke (DESY)
- 12:15 **CMS Highlight:**
  Speaker: Marc Dünser (CERN)

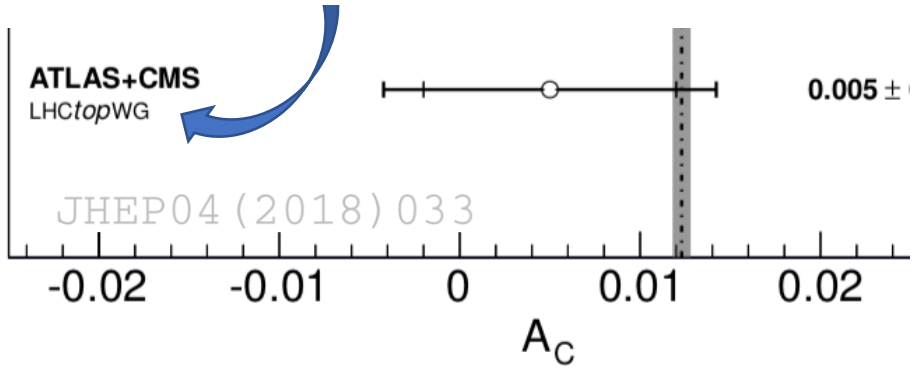
Highlight, Top mass, Colour Rec.

Ac + Unfolding, Highlight

Thanks !!

for 5 years of…

LHCtopWG ⟵ ~~TopLHCWG~~



- Constructive discussions;
- The first LHCTopWG (ATLAS+CMS) publications;
- Exciting new topics, mysteries and challenges!

often leading to:

fruitful discussions with theory friends,

(generally) improved understanding,

(sometimes) new agreement(s),

and the occasional white paper

ttbar A_c ; single top + V_{tb}

Top p_T ?

$\Delta\varphi(ll)$?

ttV ?

LHC δE_{beam}

Scale choice

pseudo top

NNLO

LPCC-2018-01 ; LPCC-2019-02

running

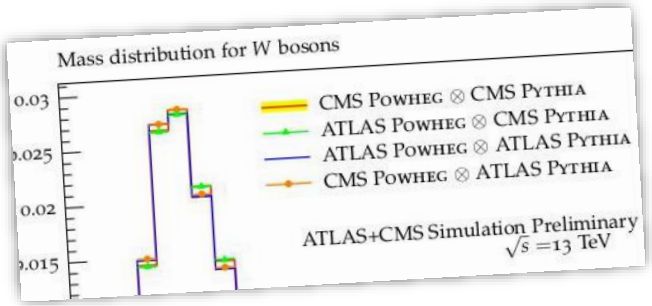
Pole?

Top mass

EFT

Renormalon?

Parton Shower



… Common MC samples