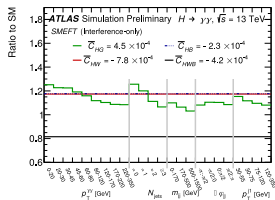


# Report on recent EXP-TH discussion on SMEFT

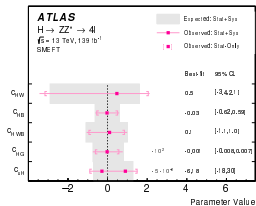
**Ilaria Brivio & Gauthier Durieux**

# Input from experiments

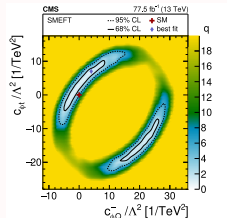
SMEFT interpretation has been included in experimental analyses



ATLAS-CONF-2019-029



2004.03447



CMS-TOP-18-009

**Warsaw basis:** common ground for combination across sectors

signal typically simulated with MadGraph\_aMC@NLO using available UFO models

- ▶ **SMEFTsim** tree level, complete warsaw basis
- ▶ **SMEFT@NLO** NLO QCD, flavor struc. consistent with **Top XS WG** recomm.
- ▶ ...


1802.07237

# Focus: interplay of tree/loop SMEFT predictions


→ questions directed to theory community

- \* technical: motivated by simulation and analysis strategy
- \* also raised conceptual points


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 preliminary TH meeting <https://indico.cern.ch/event/897136/>

- status of loop calculations in SMEFT & open TH issues
- agreement on a few baseline points

 **EXP-TH meeting** <https://indico.cern.ch/event/907129/>

- both ATLAS and CMS
- interest from Higgs, top and EW groups

 exchange still ongoing

# Topics discussed

1. Estimating uncertainties
  - higher order QED/QCD corrections
  - propagated unc. through SM inputs
  - basis/truncation dependence
2. Scheme / input parameters dependence
3. Interplay of available tools
  - caveats when combining predictions from SMEFTsim and SMEFT@NLO
  - possible implementation of (semi)analytic NLO SMEFT results for  $h \rightarrow \gamma\gamma$  and consistency with other calculations
4. SMEFT effects in the determination of  $\alpha_s$  and PDFs
5. Role of quadratic contributions in Wilson coefficients
6. Technical questions on how to operate the codes

# Basic theory agreement

- ▶ The  $\{m_W, m_Z, G_F\}$  input scheme for the EW sector has notable advantages (for LHC observables)
  - avoids gauge-invariance issues in  $W$  propagators
  - SMEFT corrections to  $m_W$  are easier to determine (wrt hadronic contributions to  $\alpha_{em}(m_Z)$ )
  - simpler structure of loop corrections and smaller logs
- ▶ Within combinations, all predictions need to be **consistent** to ensure scheme dependence cancellations etc
- ▶ The more contributions (operators / loops ) are included the better
  - better accuracy
  - less ambiguities

# Technical discussions about simulations for SMEFT

- arose organically at experimentalists' request
- aim to address questions like those just listed
- are open to everyone
- could be integrated in the LHC EFT WG, if desired on both sides