LHC-EFT WG Area 4

Informal ATLAS-CMS Area 4 comparison exercise discussion

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Area 4 Topics

Topics covered by the activity area

This activity area covers issues which are either generic, i.e. they don’t depend on specific final states, or that concern the interpretation, preparation and performance of global fits of ATLAS, CMS, LHCb results, together with additional existing measurements, future projections, experimental systematics related to EFT.

- Experimental EFT fits: ATLAS+CMS+... combination of H+EW+Top
- Inputs and outputs, fitting procedures and tools
  - Practical considerations of limited time and experimental input
  - Fitting benchmarks for synchronisation
  - Comparisons of input information between experimental results
  - Compare fits: experimental/theory, among different groups
  - Consideration of common WG fit, framework and/or approaches
- Comparison to, and inclusion of, non-LHC constraints (LEP, Tevatron, flavor, g-2, EDM, etc.) in fits and/or to set priorities among targeted measurements/operators and in sensitivity optimization
- Theoretical systematics, and their correlations (see Area 2.)
- Experimental systematics, and their correlations (see Area 3.)
- Presentation of EFT Fits: multi-D likelihoods, covariance, flat directions, etc...
- Projections of EFT fit constraining power
Fit exercise “playground”

ATLAS/CMS “playground” combination based on public information

Example code from CMS takes HepData Inputs + derive scaling functions (MG5&SMEFTsim/HEL+Rivet)

Simple $\chi^2$ fit to extract results (just using RooFit, plans to optionally use pure Python implementation)
Possible Target Studies (see 5th General meeting slides)

**Area 1 Target (see Ilaria’s slides)** – testing the truncation and uncertainty prescriptions
- Public note contains 4/5 proposals, does not make recommendations
- We can directly experiment with each proposal and make comparisons to converge towards the most robust approach(s)

**Area 3 Target (see Anke’s slides)** – testing pre-trained ML models for optimal observables
- This should be tested on single analyses / EFT coefficients first
- But existing Area 4 combination fit is an ideal testing ground for extension to multiple processes

**Area 5 Target (see Kristin’s slides)** – fit benchmark UV complete models mapped to SMEFT
- This should be tested on single analyses / EFT coefficients first
- But existing Area 4 combination fit is an ideal testing ground for extension to multiple processes