Discussion on calibration systematic model

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March 6, 2017

Introduction

- Calibration uncertainties include ~85 sources
- Minimal model (ALL)
  - Conservative (Δ m_H=0.47%)
  - Over-constrained
- Maximal model has too many NP
  - Realistic (Δ m_H=0.27%)
  - Too many parameters
- Need a middle ground
  - Realistic
  - Few parameters
  - Easy to combine
- Status of systematics :
  - `https://indico.cern.ch/event/607537/contributions/2453161/attachments/1401546/2139318/Couplings.pdf`
  - `https://indico.cern.ch/event/613697/contributions/2475511/attachments/1411833/2159897/manzoni_13_2_2017.pdf`

Model Pre-fit

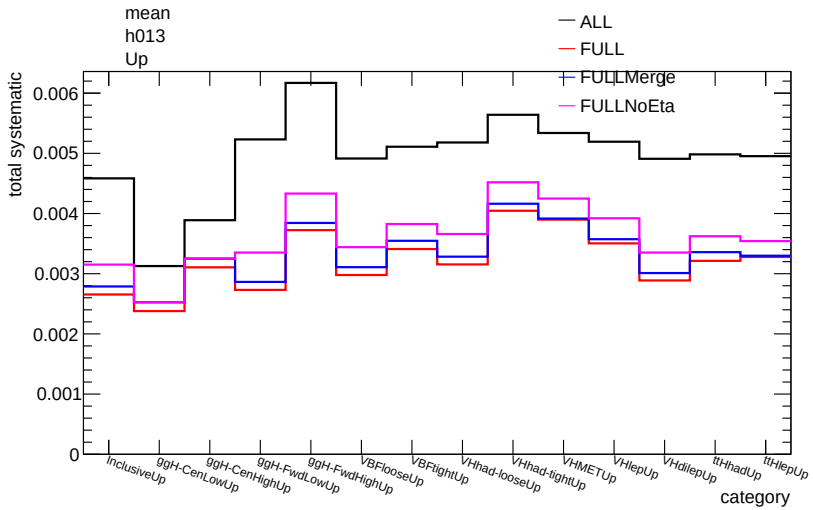
Merge a selection of NP at the tool level (similar to current ALL model). Model naively thought to be used when reading ATL-COM-PHYS-2013-1654.

Pros :

- Easy to use for analyses (change tool option)
- Unique definition of NP for combination ($\gamma\gamma$ and 4l)

Cons :

- Increase the total uncertainty
- Must find a model which minimise the increase for all analyses



- FULLMerge : merging a set of NP
- FULLNoEta : merging all dependencies in η

Model Post-fit

Merge a selection of NP after evaluation of effect on mass distribution. Done in run 1 : ATL-COM-PHYS-2014-018. vPros :

- Inclusive uncertainty strictly equals the full model (categorised uncertainty less trivial)
- Optimisation of merging can be adapted in each analysis

Cons :

- Recommandations must be provided and followed for combination.
- Does not reduce statistical fluctuations impact on uncertainties.

Diagonalisation

- Diagonalise covariance matrix and define new NP as eigen-vectors
- Keep N higher eigen-values and merge remaining ones (as either model 1 or 2)

Pros :

- Merged parameters are the ones having the less impact

Cons :

- Loss of physical meaning of NP

Conclusion

- h015 calibration systematic samples appearing
- Need to define a strategy for HGam analyses (and H4l)
  - Physical or eigen-vectors NP
  - Merging pre- or post- mass distribution fit