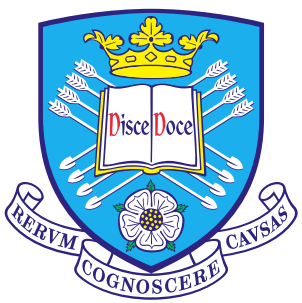
# ATLAS feedback on input parameter scheme and truncation recommendations

## LHC EFT WG Area 1 Meeting

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# Introduction

- Feedback on LHC EFT WG Area 1 documents on
  - EW input parameters
  - Truncation, validity, uncertainties
- Based on feedback from the ATLAS EFT community

# Feedback input parameter schemes

On the EW input parameter schemes

- Overall, we find this note very clear
- Our understanding is that two schemes should be compared(?) but we would like to avoid to work with even more
- The note does not recommend a baseline scheme or a hierarchy. Clearly, all have advantages and this might depend on the case, but *it would be good to have a recommendation for global fits at the LHC*.
- The $m_W, m_Z, G_F$ and $\alpha, G_F, m_Z$ schemes are already implemented in MC tools, could that be the two main schemes of choice?
- The $m_W, m_Z, G_F$ scheme is widely used in ATLAS, this would be our preference for a "nominal" choice

# Feedback truncation and validity (1/6)

On the multidimensional likelihood information (mainly proposals A and B)

- We always try to provide multidimensional information, in particular correlation matrices
- For quadratic fits, errors+correlations are not enough and finding a format is more challenging
- It is not entirely clear how the full likelihood is related to validity
- Would the full likelihood be needed for all $M_{\text{cut}}$ and linear vs quadratic scenarios?

# Feedback truncation and validity (2/6)

On quadratic terms (proposals A, B, and C)

- Linear vs quadratic comparisons is something usually provided already now, usually easy to do
- It is not clear to us to which extent a quadratic dimension six prediction is ”well-defined”, this seems to be controversial
- In A&B it is argued quadratic terms should be part of the “nominal” prediction while in C this is linear only – while this might only be a question of labelling this adds to the confusion regarding quadratic terms and the choice influences analysis designs.

# Feedback truncation and validity (3/6)

On $M_{\text{cut}}$ (proposals A and B)

- Consistently implementing a sliding upper energy cut across a large number of measurements and analysis teams is a lot of work and difficult to coordinate
- In practice, this can only be enforced if the merit is clear and there is no good alternative
- Is the also discussed option of a truth level only cut would be an alternative? This could be implemented by experiments with considerably less effort.

# Feedback truncation and validity (4/6)

On Proposal C

- The absence of the $M_{\text{cut}}$ requirement makes it easier to implement, without redoing/redesigning experimental analyses
- Proposal C should be continuously improved with better estimates or full calculation of $1/\Lambda^4$ effects and uncertainties as they become available
- The proposal would benefit from references and more detailed explanation on the derivation of the error term

# Feedback truncation and validity (5/6)

On the relationship of the two proposals

- Up to a point (the generation of linear+quadratic parametrizations) they agree in terms of what the experimental collaboration need to do, this is helpful
- Will both proposals be developed further in parallel?
- Are there cases when one should be preferred over the other? E.g. for which cases is the $M_{\text{cut}}$ crucial?

# Feedback truncation and validity (6/6)

On our preference

- *Our initial preference goes in the direction of proposal C, since it allows for an account of uncertainties (and thus EFT validity) during the fit*
  - Fits better in ATLAS workflow
  - In the short term (Run 2 data), only possible option
  - Is something that can be improve continuously (e.g. with more accurate $1/\Lambda^4$ estimates)