

# Reduction strategies for the combination of PDF sets (20+10min)

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The current PDF4LHC recommendation to estimate uncertainties due to parton distribution functions (PDFs) in theoretical predictions for LHC processes involves the combination of separate predictions computed using PDF sets from different groups, each of which comprises a relatively large number of either Hessian eigenvectors or Monte Carlo (MC) replicas. While many fixed-order and parton shower programs allow the evaluation of PDF uncertainties for a single PDF set at no additional CPU cost, this feature is not universal, and moreover the a posteriori combination of the predictions using at least three different PDF sets is still required. In this work, we present a strategy for the statistical combination of individual PDF sets, based on the MC representation of Hessian sets, followed by a compression algorithm for the reduction of the number of MC replicas. We illustrate our strategy with the combination and compression of the recent NNPDF3.0, CT14 and MMHT14 NNLO PDF sets. The resulting Compressed Monte Carlo PDF (CMC-PDF) sets are validated at the level of parton luminosities and LHC inclusive cross-sections and differential distributions. We determine that 40 replicas provide an adequate representation of the probability distribution for the original combined PDF set, suitable for general applications to LHC phenomenology.

**Primary author:** ROJO CHACON, Juan (University of Oxford (GB))

**Presenter:** ROJO CHACON, Juan (University of Oxford (GB))

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