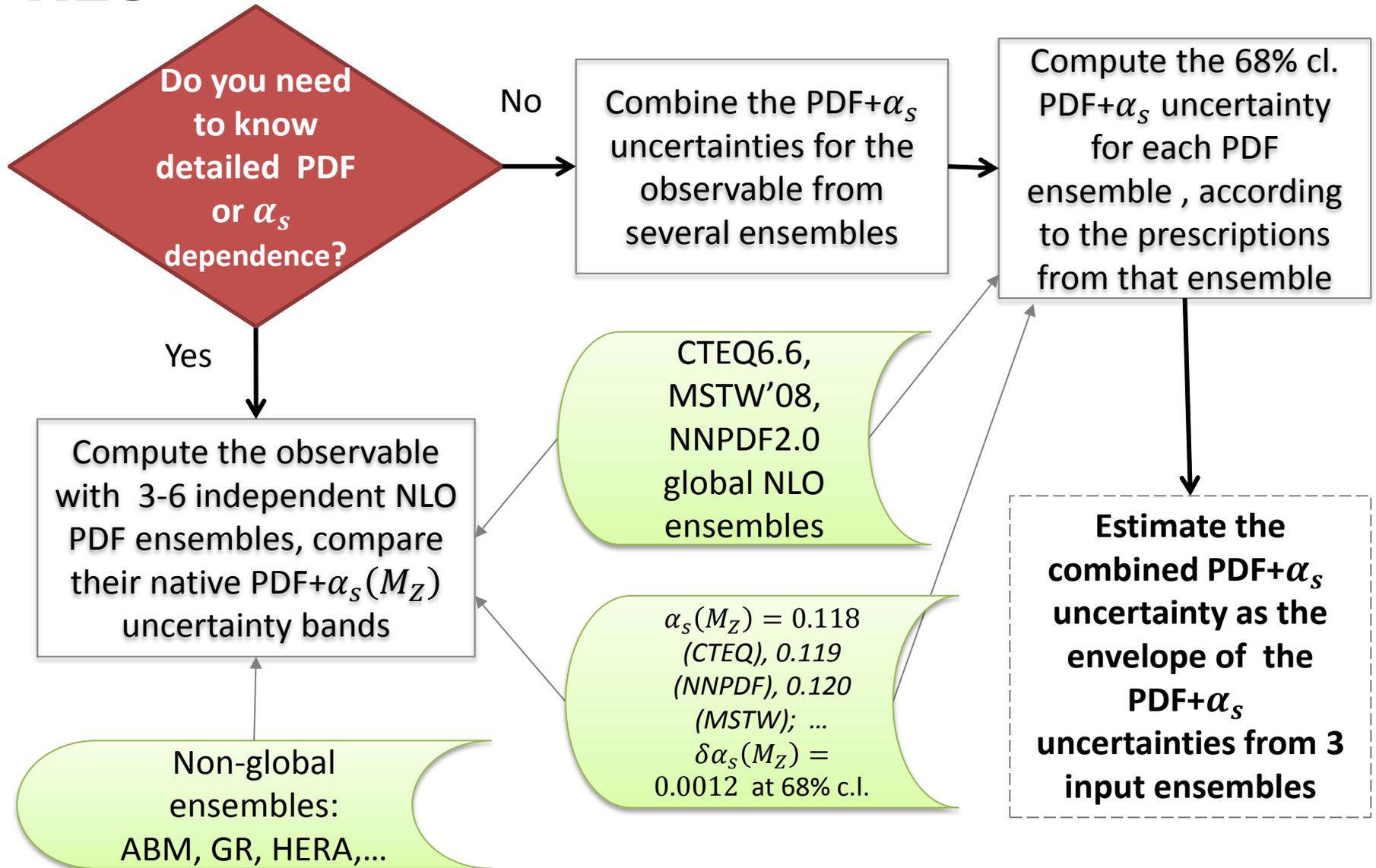


Toward a new PDF4LHC recommendation

Pavel Nadolsky

with recent inputs from S. Carrazza, A. Cooper-Sarkar, S. Forte, J. Gao, J. Huston, R. Thorne,...

2010 PDF4LHC recommendation for an LHC observable: NLO



2010 PDF4LHC recommendation for an LHC observable: NNLO

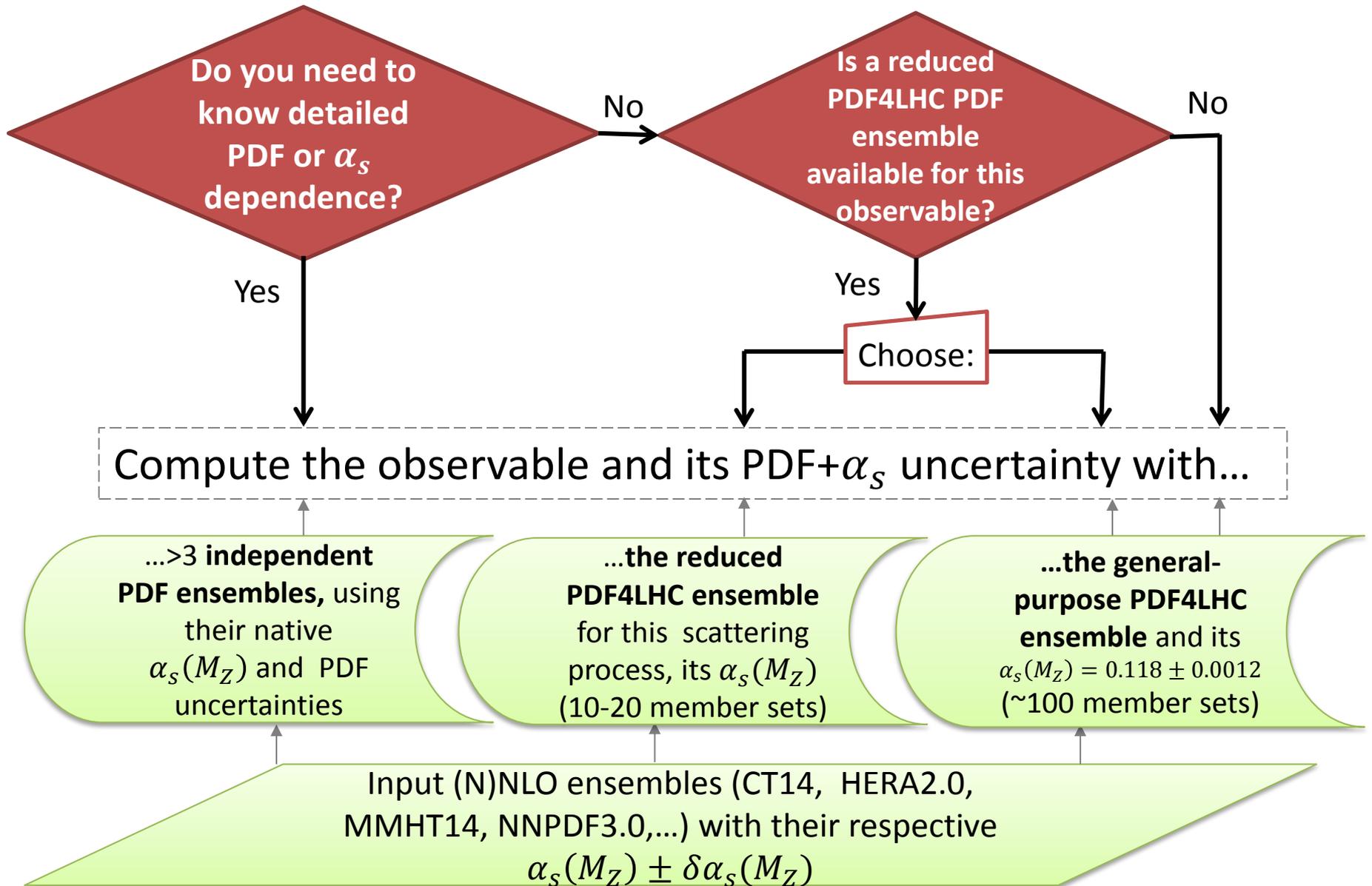
2010: M. Botje et al., arXiv:1101.0538

As a central value, use the MSTW08 prediction. As an uncertainty, take the same percentage uncertainty on this NNLO prediction as found using the NLO uncertainty prescription given above. However, if the interest of the user is in the difference of an NLO and NNLO prediction, rather than in the uncertainties, then the same PDF must be used for both evaluations. The current recommendation would be to use the MSTW08 predictions for both.

2014, Note added (see also Ball et al., arXiv:1211.5142)

Since the first documented recommendation several more up to date official versions of PDF sets became available and we therefore update the recommendation above to use these data sets, e.g., the use of CT10 instead of CTEQ6.6, NNPDF2.3 instead of NNPDF2.1. We also extend the same [NLO PDF4LHC] recommendation to use these sets for NNLO uncertainty bands.

A concept for a new PDF4LHC recommendation



This procedure applies both at NLO and NNLO

Combination of the PDFs into the future PDF4LHC ensemble

PDFs from several groups are combined into a PDF4LHC ensemble of error PDFs **before** the LHC observable is computed. This simplifies the computation of the PDF+ α_s uncertainty and will likely cut down the number of the PDF member sets and the CPU time needed for simulations.

The same procedure is followed at NLO and NNLO. The combination may be simplest for mutually consistent PDF ensembles, e.g., CT, HERA, MSTW, NNPDF. As time goes by, it can be extended to include even more PDF ensembles.

The PDF uncertainty at 68% c.l. is computed from error PDFs at central $\alpha_s(M_Z)$.

Two additional error PDFs are provided with either PDF4LHC ensemble to compute the α_s uncertainty using $\alpha_s(M_Z) = 0.118 \pm 0.0012$ at the 68% c.l.

Procedures for the combination of the PDFs into the future PDF4LHC ensemble

In the discussion, we will review two possible methods for the construction of the combined PDF4LHC ensemble:

1. Unweighting/compression of Monte-Carlo replicas

(G. Watt, R. Thorne, 1205.4024; R. Ball et al., 1108.1758; S. Forte, G. Watt, 1301.6754; talk by J. Latorre and S. Carrazza)

2. Meta-parametrizations + MC replicas + Hessian data set diagonalization

(J. Gao, J. Huston, P. Nadolsky; talk by P.N.)