

Theory Uncertainties in PDF Fits

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- Bayesian formalism: “the Theory Covariance matrix” ; added to experimental systematics [arXiv:1801.04842](#)
- Applied to nuclear uncertainties (heavy nuclei + deuteron): empirical prior from nuclear data. [arXiv:1812.09074](#)
[arXiv:2011.00009](#)
- Applied to missing higher order uncertainties (MHOU): theoretical prior using scale variation; implemented in NLO NNPDF3.1 [arXiv:1905.04311](#)
[arXiv:1906.10698](#)
- Nuclear uncertainties implemented in NNPDF4.0 [arXiv:2109.02653](#)
- Issue of correlations between MHOU in PDFs and predictions (HLT) resolved [arXiv:1811.08434](#)
[arXiv:2105.05114](#)
- NNPDF4.1 will include NNLO MHOU
- Will be used to determine global α_s + MHOU (and eventually N3LO)
- Inclusion of theoretical uncertainties leads to more accurate and precise predictions