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Critical analysis of Bayesian approaches to PDF uncertainties

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We present a comprehensive review of existing Monte Carlo methods used in global QCD analyses of parton distribution functions. We critically examine the interpretability of uncertainties on extracted parton distributions against nested sampling and the more traditional Hessian approach. We show how in some cases the inclusion of resampling, partition, and cross-validation of the data can inflate uncertainties on the fitted distributions, and formulate criteria to assess incompatibilities of data sets included in a fit.

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