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Approximate N³LO PDFs and implications for Higgs production at the LHC

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We discussion an extension of the NNPDF4.0 parton distribution functions (PDFs) to approximate N³LO. We assess the perturbative stability of the resulting PDFs and study the impact of missing higher order uncertainties, NLO QED corrections and the photon PDF, and we compare our results to the aN³LO PDFs from the MSHT group. We present predictions for the total inclusive cross-section for Higgs production in gluon fusion, vector boson fusion, and associated production. For the gluon fusion and vector boson fusion channels, the corrections that arise when using correctly matched aN³LO PDFs with N³LO cross section calculations, compared to using NNLO PDFs, are significant, in many cases larger than the PDF uncertainty, and generally larger than the differences between the two aN³LO PDF sets currently available.

Secondary track

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