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Evolution of structure functions at NLO without PDFs

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The increasingly precise experimental data from LHC have led to global extractions of parton distribution functions with significantly improved accuracy. While there are ways to approximate some theoretical uncertainties like those arising from the choices of the factorization scale, alternative approaches to tame the remaining theoretical uncertainties may eventually be needed for precision phenomenology and searches for new physics. An option advocated here is to formulate the global analysis of QCD entirely in terms of Deep Inelastic Scattering (DIS) structure functions instead of PDFs. In this talk, we show how to write down the Q^2 dependence of DIS structure functions at NLO with three active quark flavours, what are the novel features with respect to the leading-order case discussed in Ref. [1], and how the independence of the factorization scale and scheme arises in practice. The steps towards the first PDF-free global analysis of QCD including LHC data are outlined.

[1] T. Lappi, H. Mäntysaari, H. Paukkunen and M. Tevio, Evolution of structure functions in momentum space, Eur. Phys. J. C 84.1 (2024) [arXiv:2304.06998 [hep-ph]]

Category

Theory

Collaboration

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