

Theory and computation highlights in January, 2022
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The glue binds us all. The gluons are responsible for holding quarks together to form the protons and neutrons, which are the fundamental building blocks of all atomic nuclei in our visible universe. A new paper by the JAM Collaboration [arXiv:2201.02075] reports the first simultaneous global QCD analysis of spin-averaged and spin-dependent parton distribution functions (PDFs), including jet production data from unpolarized and polarized hadron collisions. The paper critically assesses the impact of SU(3) flavor symmetry and PDF positivity assumptions on the quark and gluon helicity PDFs and finds strong bias from these, particularly on the gluon polarization. The simultaneous analysis for the first time extraction of individual helicity-aligned and antialigned PDFs with a consistent treatment of uncertainties.

Quantum corrections to a particular higher-twist gluonic function have been calculated in a recent paper by A. Radyushkin [arXiv:2201.02181]. This gluonic function describes the momentum distribution of the "topological charge" inside the nucleon. The results are a necessary ingredient for a future lattice extraction of this type of gluon distribution.