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Light-cone PDFs using Lattice QCD: an overview of results, successes and challenges[1]

MARTHA CONSTANTINOU, Temple University

Lattice QCD is a theoretical non-perturbative approach for the study of QCD dynamics numerically from first principles. The lattice formulation is widely used for hadron structure calculations and is becoming a reliable tool, striving for control of various sources of systematic uncertainties. Parton distribution functions (PDFs) have a central role in understanding hadron structure, and have been calculated in lattice QCD mainly via their Mellin moments. In this talk we will present results for alternative new methods to access PDFs, that is, quasi-PDFs, pseudo-PDFs and good lattice cross sections. The main focus of the talk is to demonstrate the successes and challenges in these approaches and the need of a careful investigation of systematic uncertainties. Lattice data will be compared against results from global fits of PDFs. Of particular importance are the lattice results on the transversity PDFs, which are not well-constrained experimentally. This presents a major success for the emerging field of direct calculations of distribution functions using lattice QCD.

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