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Higher Moments of Parton Distribution Functions from Lattice QCD at the Physical Point

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Using forward matrix elements of local leading twist operators, we present a determination of the third Mellin moments $\langle x^2 \rangle$ of nucleon's unpolarized, polarized and transversity parton distribution functions.

Two lattice QCD ensembles at the physical pion mass are used: these were generated using a tree-level Symanzik-improved gauge action and 2 + 1 flavor tree-level improved Wilson Clover fermions coupling via 2-level HEX-smearing.

Leveraging a wide set of interpolating operators, two extraction methods for the matrix elements, data driven priors to control excited states in multi-states fits, and the automatic inclusion of model uncertainties via bootstrapped model averages, we are able to extract competitive values of the third Mellin Moments that we can compare to previous lattice results.

The data analysis procedure is explained and the obtained results are discussed.

Parallel Session (for talks only)

Structure of hadrons and nuclei

Author: TAGGI, Emilio (Forschungszentrum Juelich, Bonn University)

Presenter: TAGGI, Emilio (Forschungszentrum Juelich, Bonn University)

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