LATTICE 21

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Flavor decomposition for the proton unpolarized, helicity and transversity parton distribution functions

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We present an ab initio calculation of the individual up, down, and strange quark unpolarized, helicity, and transversity parton distribution functions for the proton. The calculation is performed within the twisted mass clover-improved fermion formulation of lattice QCD. We use a $N_f = 2 + 1 + 1$ gauge ensemble simulated with pion mass $M_\pi = 250$ MeV, $M_\pi L \approx 3.8$ and lattice spacing $a = 0.0938$ fm. Momentum smearing is employed in order to improve the signal-to-noise ratio, allowing for the computation of the matrix elements up to nucleon boost momentum $P_3 = 1.24$ GeV. The lattice matrix elements are non-perturbatively renormalized and the final results are presented in the $\overline{\text{MS}}$ scheme at a scale of 2 GeV.

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