

Lattice calculation of GPDs and twist-3 PDFs of the proton

Wednesday, 5 August 2020 16:40 (20 minutes)

In this talk we present the first lattice QCD calculation of unpolarized and helicity generalized parton distributions (GPDs) for the proton. We use the quasi-distribution approach, which relies on computations of correlation functions that, for sufficiently fast moving hadrons, can be matched to light-cone distributions using perturbation theory. The calculations are performed on an ensemble of $N_f = 2 + 1 + 1$ maximally twisted mass fermions with a clover improvement, at pion mass $m_\pi = 270$ MeV and lattice spacing $a = 0.093$ fm. The proton is boosted up to 1.67 GeV to check momentum convergence. We are able to extract the x -dependence of GPDs, that is mostly unknown so far, with controlled statistical uncertainties. We also present other directions we explore, such as the extraction of the twist-3 parton distribution function $g_T(x)$ and the test of the Wandura-Wilczek approximation.

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Session Classification: Hadron Structure

Track Classification: Hadron Structure