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TMDPDFs in twisted-mass lattice QCD

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We present a lattice QCD calculation of the unpolarized transverse-momentum dependent parton distribution function (TMD PDF) of the nucleon using Large Momentum Effective Field Theory. The calculation is based on the evaluation of three key ingredients entering the TMD factorization formula: the quasi-TMD PDF, the Collins–Soper kernel, and the reduced soft function. We employ three $N_f = 2 + 1 + 1$ twisted-mass fermion ensembles, including an ensemble at the physical pion mass. Our study relies on matrix elements of asymmetric staple-shaped quark bilinear operators and includes a nonperturbative renormalization analysis using two complementary schemes.

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