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Lattice QCD calculations of nucleon transverse momentum-dependent parton distributions (TMDs) at 170 MeV pion mass

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An exploration of nucleon TMD observables at a substantially lower pion mass, 170 MeV, than used in previous lattice TMD calculations is presented. On a corresponding RBC/UKQCD DWF ensemble, TMDs are extracted from nucleon matrix elements of a bilocal quark operator containing a staple-shaped gauge link. Appropriate TMD ratios are constructed to cancel divergences associated with the gauge link. In particular, time-reversal odd observables associated with the Sivers and Boer-Mulders effects are considered. The results are compared with previous DWF calculations at 297 MeV pion mass with a view to exploring whether these observables vary strongly as a function of pion mass in the chiral regime.

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