

Pion and kaon transverse momentum-dependent parton distribution functions in lattice QCD

We evaluate the transverse momentum-dependent parton distribution functions for the pion and kaon by computing the quasi-beam functions with asymmetric staple-shaped quark bilinear operators and combine it with the soft function and Collins-Soper kernels. These are computed within lattice QCD using an $\mathcal{N}_f = 2 + 1 + 1$ twisted mass fermion ensemble of lattice size $24^3 \times 48$, lattice spacing $a = 0.093$ fm, pion mass of 350 MeV and kaon mass of 554 MeV. We study the mixing pattern of the extended operators composed of an asymmetric staple-shaped Wilson line through symmetry arguments and implement non-perturbative renormalization within both the RI/MOM scheme and a variant scheme, where the renormalization factors are computed at short distances.

Primary authors: Mr SEN, Aniket (Rheinische Friedrich-Wilhelms-Universität at Bonn); ALEXANDROU, Constantia (University of Cyprus & Cyprus Institute); STEFFENS, Fernanda (DESY - Zeuthen); SPANOUEDES, Gregoris (University of Cyprus); TARELLO, Jacopo (The Cyprus Institute); CICHY, Krzysztof (Adam Mickiewicz University, Faculty of Physics); CONSTANTINO, Martha (Temple U.); BACCHIO, Simone

Presenter: TARELLO, Jacopo (The Cyprus Institute)

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