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Collins-Soper kernel from lattice QCD with NNLO and NNLL LaMET matching

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This work presents a determination of the quark Collins-Soper kernel from quasi-TMDs using lattice QCD and LaMET. The kernel is extracted in the range of transverse momentum scales $240 \text{ MeV} < q_T < 1.6 \text{ GeV}$ for hadron momenta $P < 2.2 \text{ GeV}$, using quark masses corresponding to a close-to-physical value of the pion mass. An analysis of LaMET matching, including for the first time next-to-next leading order accuracy and next-to-next leading logarithmic resummations, indicates perturbative convergence for q_T less than 550 MeV and increasing sensitivity to the associated power corrections in q_T at larger transverse momenta.

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