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Precision Phenomenology of Unpolarized Semi-Inclusive Deep Inelastic Scattering in Effective Field Theory

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Factorization of Semi-Inclusive Deep Inelastic Scattering (SIDIS) has been derived in multiple ways using the methods of perturbative QCD, and more recently soft collinear effective theory (SCET). In this work, we carry out precision phenomenology for Jefferson Lab experiments and possible experiments at the electron-ion collider. We work to next-to-leading order in matching, and next-to-next-to-leading logarithm in the resummation of singular terms. The resummation is carried out in the hybrid formalism which avoids the Landau pole. We introduce profile functions in the renormalization scale and rapidity scale that automatically turn off the resummation in the large transverse momentum region, and result in a smooth transition from the resummation region at small transverse momentum to the collinear factorization region at larger transverse momentum.

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