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Factorization and Resummation for PDFs at threshold

We study factorization at next-to-leading power (NLP) in deep inelastic scattering (DIS) in the endpoint region within the framework of soft-collinear effective theory (SCET). The full QCD process is matched onto two SCET currents, whose matrix elements factorize into individual component functions. By employing endpoint reshuffling theorems that relate these component functions at endpoint kinematics, we remove all endpoint divergences. We then derive the relevant renormalization-group (RG) equations and solve them at leading order in RG-improved perturbation theory, thereby resumming large logarithms to all orders. Our main finding is that, in the endpoint limit, new structures emerge for the parton distribution functions (PDFs). We argue that a non-minimal subtration scheme is well-suited to subtract both UV and endpoint divergences at the same time.

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