

Unveiling the Collins-Soper kernel in inclusive DIS at threshold and implications at Jlab 22

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abstract: Factorization of deep inelastic scattering (DIS) cross sections is revisited to highlight the importance of tracking off-lightcone effects in the proof of collinear factorization theorems. In inclusive DIS at large Bjorken x , particle production develops around two opposite near lightcone directions just like in transverse momentum dependent processes, and the Collins-Soper kernel emerges as a universal function in the rapidity evolution of the relevant parton correlators. This new factorization analysis clarifies outstanding issues regarding the role played by soft radiation and the treatment of rapidity divergences, and offers a solid framework for phenomenological analyses. The 22 GeV upgrade of Jefferson Lab will be crucial for investigating the endpoint kinematics, where the differences between standard and off-lightcone factorization can be tested. A sound and solid factorization framework, such as the one presented here, is crucial in order to match the accuracy of phenomenological analyses with the expected experimental precision from 12 GeV and 22 GeV inclusive DIS data sets.

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