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Perturbative QCD, resummation and non-perturbative aspects in SIDIS processes

Tuesday, April 12, 2016 9:30 AM (15 minutes)

I will address the study of semi-inclusive deep inelastic scattering cross sections as functions of the transverse momentum, q_T . Soft gluon resummation is performed using the original Collins-Soper-Sterman (CSS) formalism or, equivalently, the improved Transverse Momentum Dependent (TMD) framework.

The focus of this talk is the matching between the region where fixed order perturbative QCD can successfully be applied and the region where soft gluon resummation is necessary. Interestingly, the commonly used prescription of matching through the so-called Y-factor cannot be applied, at least in the SIDIS kinematical configurations considered. In particular, the non-perturbative component of the resummed cross section turns out to play a crucial role and should not be overlooked even at relatively high energies. Moreover, I will show the theoretical uncertainties of the transverse momentum resummed cross sections in the CSS formalism related to the scale parameters C_1 , C_2 and C_3 , and their interplay with the uncertainties of the non perturbative parameters g_1 , g_2 and g_3 .

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