

High-Energy factorization and matching to NLO for quarkonium production

Friday 26 May 2023 15:00 (20 minutes)

The p_T -integrated cross section of inclusive hadro and photo-production of heavy quarkonia when computed up to NLO in Collinear Factorisation(CF) shows a perturbative instability at high hadronic or photon-hadron collision energies – the cross section could turn negative for reasonable factorisation/renormalisation scale-choices. We solve this problem by resummation of the subset of LLA higher-order corrections $\sim \alpha_s^n \ln^{n-1}(\hat{s}/M^2)$, where $\hat{s}$ is the *partonic* center of mass energy squared, using High-Energy Factorisation(HEF) formalism. We use doubly-logarithmic approximation for the resummation factors $\sim \alpha_s^n [\ln(\hat{s}/M^2) \ln(q_T/\mu_F)]^{n-1}$, for consistency with NLO DGLAP evolution of PDFs. The DLA HEF result is then matched with the full NLO CF calculation to provide uniformly accurate description at low and high collision energies.

The phenomenological results for η_c total and rapidity-differential cross sections will be presented, as well as for J/ψ inclusive photoproduction will be presented. The calculation of loop corrections to $\gamma + R(q_T) \rightarrow c\bar{c}[^1S_0^{[8]}]$ coefficient function of HEF, which is necessary to go beyond the DLA, will be discussed.

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Session Classification: Small-x