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Heavy quarkonium production via matching of High Energy Factorization and NLO of Collinear Factorization

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The energy dependence of the total inclusive hadroproduction cross section of pseudo-scalar quarkonia and photoproduction cross section of vector quarkonia is computed via matching Next-to-Leading Order (NLO) Collinear-Factorisation (CF) results with resummed higher-order corrections, proportional to $\alpha_s^n ln^{n-1}(1/z)$, to the CF hard-scattering coefficient, where $z = M^2/\hat{s}$ with M and $\hat{s}$ being the quarkonium mass and the partonic center-of-mass energy squared. The resummation is performed using High-Energy Factorisation (HEF) in the Doubly-Logarithmic (DL) approximation, which is a subset of the leading logarithmic ln(1/z) approximation. Doing so, one remains strictly consistent with the NLO and NNLO DGLAP evolution of the PDFs. By improving the treatment of the small-z asymptotics of the CF coefficient function, the resummation cures the unphysical results of the NLO CF calculation. The matching is directly performed in the z-space and, for the first time, by using the Inverse-Error Weighting (InEW) matching procedure. As a by-product of the calculation, the NNLO term of the CF hard-scattering coefficient proportional to $\alpha_s^2 ln(1/z)$ is predicted from HEF.

Based on hep-ph/2112.06789 and ongoing work.

Submitted on behalf of a Collaboration?

No

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