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Resolving negative NLO cross sections problem in quarkonium production via matching with High-Eenrgy Factorization

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We continue the investigation of the problem of negative NLO cross sections of heavy quarkonium production at high collision energies, started in [1]. The problem arises due to unphysical behaviour of the high partonic energy asymptotics of NLO partonic coefficient function in collinear factorisation, which can be cured via matching of the NLO calculation with Leading-Logarithmic resummation of partonic center-of-mass energy logarithms. The latter resummation is done using the formalism of High Energy Factorisation by Catani, Ciafaloni and Hautmann. The new results to be reported in the talk include the treatment of the porblem for the case of J/ψ photoproduction (see also Ref. [2] for the alternative treatment of the problem via scale-fixing approach) and η_c rapidity distributions.

[1] J.P. Lansberg, M. Nefedov and M.A. Ozcelik, Matching next-to-leading-order and high-energy-resummed calculations of heavy-quarkonium-hadroproduction cross sections JHEP 05, 083 (2022) doi:10.1007/JHEP05(2022)083 [arXiv:2112.06789 [hep-ph]].

[2] A.Colpani Serri, Y.Feng, C.Flore, J.P. Lansberg, M.A. Ozcelik, H.S. Shao and Y. Yedelkina, Revisiting NLO QCD corrections to total inclusive J/ψ and Υ photoproduction cross sections in lepton-proton collisions, [arXiv:2112.05060 [hep-ph]].

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