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Next-to SV resummed Drell-Yan cross section beyond leading-logarithm

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We present the resummed predictions for inclusive cross section for Drell-Yan (DY) production up to next-to-next-to leading logarithmic ($\overline{\mathrm{NNLL}}$) accuracy taking into account both soft virtual (SV) and next-to SV (NSV) threshold logarithms. We restrict ourselves to resummed contributions only from quark anti-quark ($q\bar{q}$) initiated channels. The resummation is performed in Mellin-N space. We derive the N-dependent coefficients and the N-independent constants to desired accuracy for our study. The resummed results are matched through the minimal prescription procedure with the fixed order results. We find that the resummation, taking into account the NSV terms, appreciably increases the cross section while decreasing the sensitivity to renormalisation scale. We observe that, at 13 TeV LHC energies, the SV+NSV resummation at $\overline{\mathrm{NLL}}(\overline{\mathrm{NNLL}})$ gives about 8\% (2\%) corrections respectively to the NLO (NNLO) results for the considered Q range: 150-3500 GeV. In addition, the absence of quark gluon initiated contributions to NSV part in the resummed terms leaves large factorisation scale dependence indicating their importance at NSV level. We also study the numerical impact of N-independent constants and explore the ambiguity involved in exponentiating them.Finally we present our predictions for the neutral Drell-Yan process at various center of mass of energies.

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