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Higher-order fiducial distributions within the transverse momentum resummation formalism

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We present high-accuracy QCD predictions for the transverse-momentum (qT) distribution and fiducial cross sections of Drell-Yan lepton pairs produced in hadronic collisions. At small values of qT we resum to all perturbative orders the logarithmically enhanced contributions up to next-to-next-to-next-to-leading logarithmic (N3LL) accuracy, including all the next-to-next-to-next-to-leading order (N3LO) terms. Our resummed calculation has been implemented in the public numerical program DYTurbo, which produces fast and precise predictions with the full dependence on the final-state lepton kinematics. We consistently combine our resummed results with the known $O(a_S^3)$ fixed-order predictions at large values of qT obtaining full N3LO accuracy for fiducial cross sections. We show numerical results for Z production at LHC energies discussing the reduction of the perturbative uncertainty with respect to lower-order calculations.

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