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# Transverse momentum broadening from NLL BFKL to all orders in pQCD

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We study, to all orders in perturbative QCD, the universal behavior of the saturation momentum $Q_s(L)$ controlling the transverse momentum distribution of a fast parton propagating through a dense QCD medium with large size $L$. Due to the double logarithmic nature of the quantum evolution of the saturation momentum, its large $L$ asymptotics is obtained by slightly departing from the double logarithmic limit of either next-to-leading log (NLL) BFKL or leading order DGLAP evolution equations. At fixed coupling, or in conformal N = 4 SYM theory, we derive the large $L$ expansion of $Q_s(L)$ up to order $\alpha_s^{3/2}$. In QCD with massless quarks, where conformal symmetry is broken by the running of the strong coupling constant, the one-loop QCD $\beta$-function fully accounts for the universal terms in the $Q_s(L)$ expansion. Therefore, the universal coefficients of this series are known exactly to all orders in $\alpha_s$.

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