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Soft-gluon effective coupling

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We consider the extension of the CMW soft-gluon effective coupling in the context of soft-gluon resummation for QCD hard-scattering observables beyond the next-to-leading logarithmic accuracy. We present two proposals of a soft-gluon effective coupling that extend the CMW coupling to all perturbative orders. Although both effective couplings are well-defined in the physical four-dimensional space time, we examine their behaviour in $D=4-2\ep$ space time dimensions. We uncover an all-order perturbative relation with the cusp anomalous dimension: the (four dimensional) cusp anomalous dimension is equal to the D-dimensional soft-gluon effective coupling at the conformal point $\ep=D(\as)$. We present the explicit expressions of the two soft-gluon couplings up to $O(\as^2)$.
In the four-dimensional case we compute the two soft couplings up to $O(\as^3)$.

Secondary track (number)

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