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Transverse Momentum Resummation for single top quark production at the LHC

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We study the effect of multiple soft gluon radiation on the kinematical distributions of the *t*-channel single top quark production at the LHC. By applying the transverse momentum dependent factorization formalism, large logarithms (of the ratio of large invariant mass Q and small total transverse momentum q_{\perp} of the single-top plus one-jet final state system) are resummed to all orders in the expansion of the strong interaction coupling at the accuracy of next-to-leading logarithm, including the complete next-to-leading order corrections. We show that the main difference from PYTHIA prediction lies on the inclusion of the exact color coherence effect between the initial and final states in our resummation calculation, which becomes more important when the final state jet is required to be in the forward region. We further propose a new experimental observable ϕ^* to test the effect of multiple gluon radiation in the single-top events. The effect of bottom quark mass is also discussed.

Summary

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