

High Energy Physics - Phenomenology

Factorization breaking in high-transverse-momentum charged-hadron production at the Tevatron?

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We compare the transverse momentum (p_T) distribution of inclusive light-charged-particle production measured by the CDF Collaboration at the Fermilab Tevatron with the theoretical prediction evaluated at next-to-leading order in quantum chromodynamics (QCD) using fragmentation functions recently determined through a global data fit. While, in the lower p_T range, the data agree with the prediction within the theoretical error or slightly undershoot it, they significantly exceed it in the upper p_T range, by several orders of magnitude at the largest values of p_T , where perturbation theory should be most reliable. This disagreement is too large to be remedied by introducing additional produced particles into the calculation, and challenges the validity of the factorization theorem on which the parton model of QCD relies.

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