Nonperturbative Transverse Momentum Effects in Dihadron and Direct Photon-Hadron Angular Correlations

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Abstract

Two-particle angular correlations have long been used as an observable for measuring the initial-state partonic transverse momentum k_T. Sensitivity to this small transverse momentum scale allows nonperturbative transverse momentum dependent (TMD) effects to be probed in high p_T dihadron and direct photon-hadron correlations. The observable p_{out}, the out-of-plane transverse momentum component from a near-side π^0 or direct photon, is sensitive to initial-state k_T and final-state fragmentation transverse momentum j_T and thus can probe nonperturbative TMD effects. In the TMD framework, nearly back-to-back particle production in p+p collisions with a measured final-state hadron has been predicted to break factorization due to the possibility of gluon exchange with colored remnants in the initial and final states. For this reason, the interacting partons are predicted to be correlated; however, there is so far no quantitative prediction for the magnitude of such effects. In this talk, recent measurements of dihadron and direct-photon hadron correlations in p+p collisions at $\sqrt{s}$=510 GeV at the PHENIX experiment will be presented.