Charmed hadron production in an improved quark coalescence model

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Using the charm quark coalescence and fragmentation model with the inclusion of the effect of collective flow on the transverse momentum spectra of produced charmed hadrons, we have studied the transverse momentum spectra of charmed mesons and baryons as well as the Λ_c^+/D_0 ratio [1]. As shown in Fig.1, by tuning the oscillator constants in the charmed hadron Wigner functions in the quark coalescence model, which models their changing sizes in hot dense matter, to use up all the charm quarks

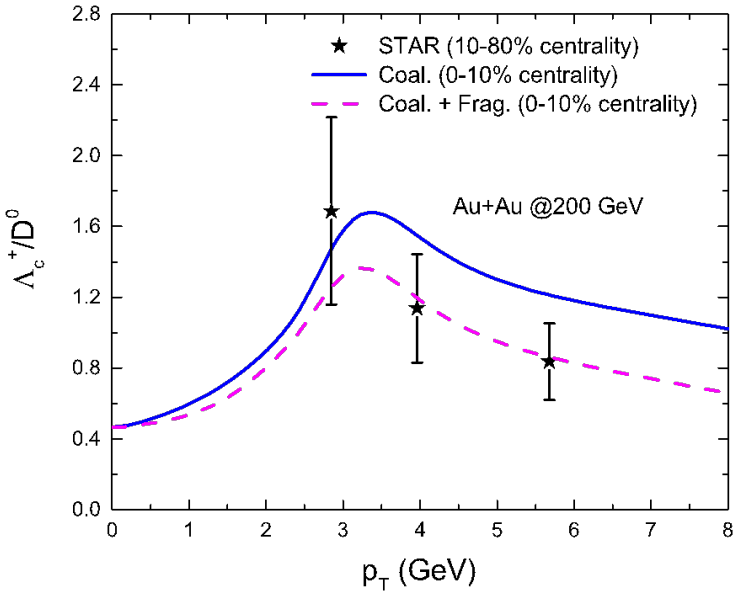

Fig. 1. The yield ratio $\boldsymbol{\Lambda_c^+/D_0}$ as a function of transverse momentum for Au + Au collisions at $\sqrt{s_{NN}} = 200$ GeV. Solid and dashed lines denote the ratio from only charm quark coalescence and the sum of charm quark fragmentation and coalescence contributions at 0-10% centrality. The experimental data from Ref. [2] for the (10-80%) centrality are shown by solid stars with combined statistical and systematic uncertainties.

at $p_T \approx 0$ GeV and fragmenting the remaining charm quarks into charmed hadrons, we have obtained the ratio Λ_c^+/D_0 as a function of p_T (dashed line) that successfully describes the experimental data measured at RHIC (solid stars) [2]. This is in contrast to previous studies that did not include the effect of collective flow on charmed hadrons formed from quark coalescence, which underestimated substantially this ratio at

$p_T > 4.5$ GeV [3]. Compared to results from these studies, the contribution from fragmentation is less important in the present approach. As a result, we have obtained a much larger value for Λ_c^+/D_0 at $p_T > 6$ GeV than that from the conventional approach. Our study thus provides an alternative description of the measured p_T dependence of the ratio Λ_c^+/D_0 at RHIC without the inclusion of a large number of unknown charmed baryon resonances as assumed in Ref. [4].

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