Deuteron spectrum and elliptic flow in relativistic heavy ion collisions

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We have extended the hadronic transport model ART [1] to include the production and annihilation of deuterons via the reaction NN→dπ and its inverse reaction as well as the elastic scattering of deuterons with both mesons and baryons in the hadronic matter. The cross sections for these reactions are taken to be those available empirically. Using initial hadron distributions from a blast wave model with temperature T=170 MeV, same as the phase transition temperature between the quark-gluon plasma and hadronic matter, and a flow velocity parameterized in such a way that the final transverse momentum spectrum and elliptic flow of protons in midrapidity from minimum biased Au+Au collisions at $s_{NN}^{1/2}$ = 200 GeV reproduce those measured in experiments at RHIC by the PHENIX [2] and STAR [3] Collaborations, we have studied the effects of hadronic rescattering on the transverse momentum spectrum and elliptic flow of deuterons produced in these collisions. As shown in Fig.1, the resulting transverse momentum spectrum of deuterons agrees reasonably with the experimentally measured one. The elliptic flow of deuterons are also consistent with the experimental data for most transverse momenta

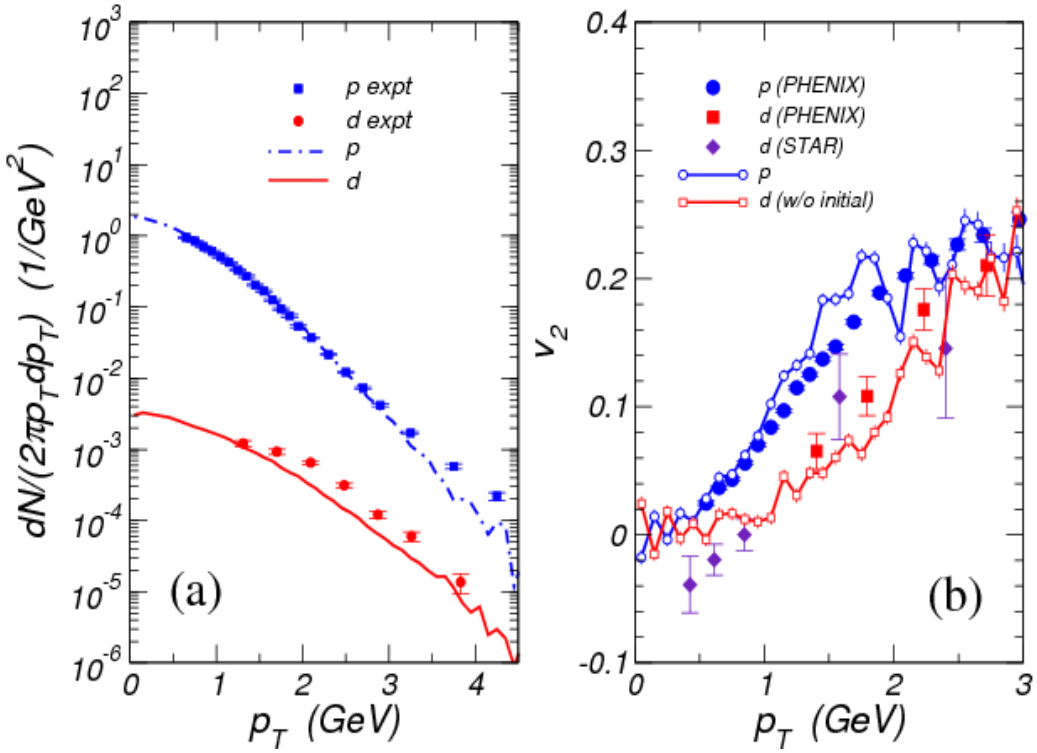

FIG. 1. Transverse momentum spectra (a) and elliptic flow (b) of protons and deuterons in minimum biased Au+Au collisions at $s_{NN}^{1/2}$ = 200 GeV.

except below 1 GeV/c, where the elliptic flow of deuterons is negative in the data but remains positive in our model study. Study is being continued to understand the mechanism for the appearance of negative deuteron elliptic flow at low transverse momentum. Also, the relation between the results from the hadronic transport model and those from the coalescence model [4] is being investigated.

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