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Beam energy dependence of d and dbar productions in Au+Au collisions at RHIC

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The production of light nuclei with small binding energy such as deuterons, can be used to study the freeze-out properties and local baryon density in high-energy nuclear collisions. The azimuthal anisotropic results of protons and deuterons have shown that the coalescence is the dominant process for the light nuclei production at later stage of the evolution.

In this talk we present a systematic study of colliding energy, centrality, and transverse momentum dependence of mid-rapidity deuteron and anti-deuteron production, measured by the STAR experiment, from Au+Au collisions at RHIC at $\sqrt{s_{NN}}$ = 7.7, 11.5, 14.5, 19.6, 27, 39, 62.4 and 200 GeV. Deuterons, protons and their anti-particles are identified using the time projection chamber (TPC) and time-of-flight detector (TOF). Proton and anti-proton yields are corrected from Lambda and anti-Lambda decays, respectively. The B_2 parameters, defined as $(N(d)/N^2(p))$, which measure the phase space density for nucleons show a difference between $B_2(d)$ and $B_2(\bar{d})$ and the difference becomes stronger at lower collision energy or higher baryon density region. These observations may imply that baryon and anti-baryon freeze-out at different densities. These new results will be discussed in light of data collected from AGS to LHC energies. In addition, the results will also be compared with transport model calculations.

On behalf of collaboration:

STAR

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