

# The effect of baryon conservation and nucleon-nucleon correlation on the light nuclei production at $\sqrt{s_{NN}} = 3 \text{ GeV}$

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The yield ratio of light nuclei produced in heavy-ion collisions, defined as  $N_t \times N_p / N_d^2$ , is a promising probe for the critical endpoint in the QCD phase diagram. In the coalescence model of light nucleus production, the triton yield  $N_t$  and deuteron yield  $N_d$  are sensitive to the relative distance  $\Delta r$  between each pair of nucleons in the Wigner function. However, the effect of the two-nucleon distribution  $\rho(\Delta r)$  in the colliding nucleus on the yield ratio has not been extensively investigated. In this work, we developed a method to sample nucleons in the  $^{197}\text{Au}$  nucleus satisfying both the single-particle distribution  $f(r)$  and the two-nucleon distribution function  $\rho(\Delta r)$ . Using these sampled  $^{197}\text{Au}$  nucleus, we calculated the proton, deuteron and triton yields in Au+Au collisions at  $\sqrt{s_{NN}} = 3 \text{ GeV}$  using the SMASH transport model simulations. The calculated yield ratios, differential  $p_T$  distributions and mean transverse momentum  $\langle p_T \rangle$  different centrality regions and rapidity windows agree well with experimental measurements from the STAR experiment. Our results suggest that initial nucleon-nucleon correlations have a visible effect on light particle production, indicating that the yield ratio of light nuclei in heavy ion collisions might provide a good probe for nucleon-nucleon correlation in the nuclear structure.

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