Collision Energy Dependence of Hypertriton Production in Au+Au Collisions at RHIC

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Despite extensive measurements on the production yields of light nuclei in heavy-ion collisions, a consensus on their formation mechanism remains elusive. In contrast to normal nuclei, hypernuclei carries strangeness and can offer an additional dimension for such studies. In particular, the hypertriton ${}^{3}_{\Lambda}$H, a bound state consisting of a proton, neutron and Λ hyperon, is the lightest known hypernucleus with a very small binding energy of ∼130 keV. Currently, published measurements of the ${}^{3}_{\Lambda}$H yield are scarce and are limited to very low ($\sqrt{s_{NN}} < 5$ GeV) or very high collision energies (≥ 200 GeV). Precise measurements on the energy dependence of ${}^{3}_{\Lambda}$H production will give invaluable information on hypernuclei production mechanisms due to its unique intrinsic properties.

In this presentation, we will present comprehensive measurements of the collision energy dependence of ${}^{3}_{\Lambda}$H transverse momentum p_T and p_T-integrated yield at mid-rapidity in Au+Au collisions at ten collision energies between 3 and 27 GeV. It is found that thermal model calculations under-predict the ${}^{3}_{\Lambda}$H yield and the ${}^{3}_{\Lambda}$H/Λ ratio by a factor of ∼2 in the reported energy region, while coalescence calculations are closer to data. We will also present the mean p_T of ${}^{3}_{\Lambda}$H as a function of collision energy. The mean p_T of ${}^{3}_{\Lambda}$H is observed to be lower than the Blast-Wave expectation using the same freeze-out parameters from light hadrons. These observations suggest that similar to light nuclei, hypertritons are formed at a later stage than light hadrons possibly through nucleon/hyperon coalescence during these collisions.