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Measurements of ${}^{3}_{\Lambda}H$ production and branching ratio fraction R_3 by the STAR experiment

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Hypernuclei are bound states of nucleons and hyperons, and thus naturally correlated hyperon-baryon systems. Hypernuclei are regarded a unique laboratory to study the hyperon-nucleon (Y-N) interaction. The Y-N interaction is an important ingredient, not only in the equation-of-state (EoS) of astrophysical objects such as neutron stars, but also in the description of the hadronic phase of a heavy-ion collision. The strength of the Y-N interaction can be investigated by measuring the properties of hypernuclei. Precise determination of hypernucei structure parameters, such as Λ separation energy B_Λ, lifetime, and branching ratios, may also shed light on the role that two-body Y-N and three-body Y-N-N interactions play in the density regime of neutron stars.

In this talk, we report precision measurements of the lifetime of ${}^{3}_{\Lambda}$H, ${}^{4}_{\Lambda}$H and ${}^{4}_{\Lambda}$He obtained from Au+Au collisions collected by STAR during the Beam Energy Scan Phase-II program. Hypernuclei are reconstructed via charged pion decay channels including both two-body and three-body decay modes. We also present the relative branching ratio R_3 of ${}^{3}_{\Lambda}$H and ${}^{4}_{\Lambda}$H, where R_3 is the fraction of the two-body decay rate out of the sum of two-body and three-body decay rates. The results will be compared with model calculations and physics implications will be discussed.

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