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Lifetime measurements of light hypernuclei in Au+Au collisions from STAR experiment

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Hypernuclei are bound nuclear systems of correlated nucleons and hyperons. Therefore, the production of hypernuclei in heavy-ion collisions provides an experimental avenue for studying hyperon−nucleon (Y-N) interaction, which is an important ingredient, not only in the equation-of-state 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. For example, light Λ-hypernuclei containing one hyperon are conventionally understood as a weakly bound system of a Λ and a nucleus, suggesting their lifetimes are close to the free-Λ lifetime.

In heavy-ion collisions, light hypernuclei are expected to be abundantly produced at low collision energies due to the high baryon density. In this presentation, we will report precise lifetime measurements of ${}^{3}_{\Lambda}\mathrm{H}$, ${}^{4}_{\Lambda}\mathrm{H}$, and ${}^{4}_{\Lambda}\mathrm{He}$ in Au+Au collisions at $\sqrt{s_{NN}}$ = 3 GeV and 7.2 GeV, recorded by the STAR experiment at RHIC in the fixed-target mode in 2018. The results will be compared with model calculations and physics implications will be discussed.

Present via

Online

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