(Anti)Hypertriton production and branching ratio measurements in Zr+Zr and Ru+Ru collisions at $\sqrt{s_{\mathrm{NN}}} = 200\,\mathrm{GeV}$ at STAR

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Hypernuclei are bound states of hyperons (Y) and nucleons (N). There have been numerous measurements on hypernuclei yields and intrinsic properties, to investigate their production mechanisms and constrain the Y-N interactions. By contrast, there is significantly less knowledge about antihypernuclei. In 2018, STAR recorded a huge sample of about 4 billion minimum bias events from Zr+Zr and Ru+Ru collisions at $\sqrt{s_{\mathrm{NN}}} = 200$ GeV, enabling precise measurements of the (anti)hypernuclei and tests of the matter-antimatter symmetry.

In this contribution, we will present new measurements of (anti)hypertriton yields in Zr+Zr and Ru+Ru collisions at $\sqrt{s_{\mathrm{NN}}} = 200$ GeV, using the two-body and three-body decay channels (${}^{3}_{\Lambda}\mathrm{H} \rightarrow {}^{3}\mathrm{He} + \pi^{-}, {}^{3}_{\Lambda}\mathrm{H} \rightarrow \mathrm{d} + \mathrm{p} + \pi^{-}$ and c.c.). The strangeness population factor S_3 and $\bar{\mathrm{S}}_3$ will be shown as a function of multiplicity, which will help distinguish between different production scenarios. In addition, we will present the ${}^{3}_{\bar{\Lambda}}\bar{\mathrm{H}}/{}^{3}_{\Lambda}\mathrm{H}$ ratio in different collision centralities together with other antiparticle-to-particle ratios, to investigate the matter-antimatter imbalance in Zr+Zr and Ru+Ru collisions. Finally, we will present the first measurement of $\bar{\mathrm{R}}_3$, the relative branching ratio of ${}^{3}_{\bar{\Lambda}}\bar{\mathrm{H}}$, which is related to its spin and binding energy. These measurements will provide insight into the internal structure of the (anti)hypertriton. Physics implications on (anti)hypernuclei production mechanism as well as Y-N ($\bar{\mathrm{Y}}$-$\bar{\mathrm{N}}$) interaction will be discussed.