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Search for the Strange Dibaryons with Baryon Correlations at STAR

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Dibaryons, exotic states composed of six quarks, have long been a subject of interest in understanding the strong interaction beyond conventional hadrons. Among these, strange dibaryons, which contain strange quarks, offer an important role of studying the hyperon-nucleon (YN) and hyperon-hyperon (YY) interactions . Of particular interest are the spin-0 H (S = -2) and the spin-2 $N\Omega$ (S = -3) dibaryon state, which are considered promising candidates for the strange dibaryon bound state. In heavy-ion collisions, two-particle femtoscopy is a powerful and unique method for extracting information about the spatio-temporal properties of the source, characterising the final state interactions (FSI), and searching for the possible bound states.

In this talk, we will present the measurements of baryon-baryon correlation functions, including p-Ξ^-, Λ-Λ and p-Ω^- pairs, in Isobar (Ru+Ru, Zr+Zr) and Au+Au collisions. The correlation functions are analyzed within the Lednicky-Lyuboshitz formalism. The extracted scattering length and effective range will be presented. Those measured parameters will be compared with recent Lattice QCD and effective theory model calculations. Most importantly, the physics implications for the formation of strange dibaryon (S = -2 and S = -3) bound state will be discussed.

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