${}^{4}_{\Lambda}$He Production in $\sqrt{s_{NN}}$ = 3 GeV Au+Au Collisions

Fengyi Zhao

(for the STAR Collaboration)

March 18, 2025

Abstract

Hypernuclei, bound states of nuclei with one or more hyperons, serve as a natural laboratory to investigate the hyperon-nucleon (YN) interaction. High-baryon density matter can be created in heavy-ion collisions at a collision energy of a few GeV/u, which provides a unique opportunity to study the YN interaction and production mechanism of hypernuclei. Comparison of ${}^{4}_{\Lambda}$He yield with its isobar ${}^{4}_{\Lambda}$H may shed light on the Λ-t and Λ-^{3}He interactions.

In this talk, we will present the new results on the ${}^{4}_{\Lambda}$He differential yield as a function of rapidity and transverse momentum. The yield is measured in $\sqrt{s_{NN}}$ = 3 GeV Au+Au 0-50% central collisions, and the data is collected by the STAR experiment with fixed-target mode. ${}^{4}_{\Lambda}$He is reconstructed via its three-body decay channel ${}^{4}_{\Lambda}\mathrm{He}\rightarrow{}^{3}\mathrm{He}+p+\pi^{-}$. We find that the rapidity distributions of ${}^{4}_{\Lambda}$He are similar to those of ${}^{4}_{\Lambda}$H, and the differential yield ratios of ${}^{4}_{\Lambda}$He/${}^{4}_{\Lambda}$H are consistent to those of ^{3}He/t within uncertainties. The observed yield ratios can be described by both the JAM plus a coalescence afterburner and the canonical thermal model.