${}^{3}_{\Lambda}\mathrm{H}$ and ${}^{4}_{\Lambda}\mathrm{H}$ directed flow measurement in $\sqrt{s_{NN}} = 3$ GeV Au+Au collisions from STAR

Chenlu Hu (for STAR Collaboration)

Institute of Modern Physics, China

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Abstract: Collective flow has been commonly used for studying the properties of matter created in high-energy heavy-ion collisions, due to its high sensitivity on early stage collision dynamics. The first-order Fourier coefficient of azimuthal distributions of produced particles v_1, also called directed flow, has been analyzed for different particle species from the lightest mesons to light nuclei in such collisions. In this talk, we report the first observation of the hyper-nuclei ${}^{3}_{\Lambda}\mathrm{H}$ and ${}^{4}_{\Lambda}\mathrm{H}$ directed flow v_1 from $\sqrt{s_{NN}} = 3$ GeV mid-central (5–40%) Au+Au collisions at RHIC. This is a part of the beam energy scan program (fixed target mode) carried by the STAR experiment in 2018. About 2700 and 4200 ${}^{3}_{\Lambda}\mathrm{H}$ candidates from its two-body and three-body π^- decay respectively, and about 5300 ${}^{4}_{\Lambda}\mathrm{H}$ candidates from its two-body π^- decay are used in this analysis. The directed flow of ${}^{3}_{\Lambda}\mathrm{H}$ and ${}^{4}_{\Lambda}\mathrm{H}$ are compared with those of the copiously produced particles such as p, Λ, d, t,^{3}He and ^{4}He. It is observed that the slope of v_1 at midrapidity for the hyper-nuclei ${}^{3}_{\Lambda}\mathrm{H}$ and ${}^{4}_{\Lambda}\mathrm{H}$ follows a baryon number scaling implying that coalescence process is a dominant mechanism for the hyper-nuclei production in this collisions.