Elliptic and triangular flow of light (anti-)nuclei in Au+Au collisions in the BES-II energies using the STAR detector

Rishabh Sharma *(for the STAR Collaboration)*
Indian Institute of Science Education and Research (IISER) Tirupati

The formation of light nuclei in heavy-ion collisions can be explained by two models: the thermal model and the coalescence model. The thermal model proposes that light nuclei originate from a thermal source where they are in equilibrium with other particles in the fireball. However, due to their low binding energies, the formed nuclei are unlikely to survive the high-temperature conditions of the fireball. In contrast, the coalescence model suggests that light nuclei are formed later in time by the coalescence of protons and neutrons near the kinetic freeze-out surface. The final-stage coalescence of nucleons would lead to the mass number scaling, where the anisotropic flow of light nuclei scaled by their mass numbers follows closely the anisotropic flow of nucleons. Therefore, comparing the anisotropic flow of light nuclei with protons will help us experimentally test the coalescence model hypothesis. Moreover, compared to elliptic flow (v_2), triangular flow (v_3) of light nuclei has a better sensitivity to the fluctuating initial conditions as well as the properties of the created systems. This information will provide us with tighter constraints on the theoretical models that describe the production mechanism of light nuclei.

In this talk, we will present the transverse momentum (p_T) and centrality dependence of v_2 and v_3 of d, t, and ^{3}He, as well as their corresponding antinuclei, in Au+Au collisions at energies of $\sqrt{s_{NN}} = 7.7 - 54.4$ GeV from the Beam Energy Scan phase II (BES-II) program at RHIC-STAR. We will discuss the mass number scaling study of v_2 and v_3 of light nuclei in the BES-II energies. Additionally, we will compare the experimental results with model calculations that use specific initial conditions and/or nucleon coalescence.