Elliptic flow of light (anti-)nuclei in Au+Au collisions at $\sqrt{s_{NN}}$ = 14.6, 19.6, 27, and 54.4 GeV using the STAR detector

Rishabh Sharma (for the STAR Collaboration)

Indian Institute of Science Education and Research (IISER) Tirupati

Abstract

Loosely bound light nuclei are produced in abundance in heavy-ion collisions. There are two main possible models to explain their production mechanism - the thermal model and the coalescence model. Thermal model suggests that the light nuclei are produced from a thermal source, where they are in equilibrium with other species present in the fireball. However, due to the small binding energies, the produced nuclei are not likely to survive the high temperature conditions of the fireball. The coalescence model tries to explain the production of light nuclei by assuming that they are formed at later stages by the coalescence of protons and neutrons near the kinetic freeze-out surface. The final-state coalescence of nucleons will lead to the mass number scaling of the elliptic flow (v_2) of light nuclei. This scaling states that the v_2 of light nuclei scaled by their respective mass numbers will follow very closely the v_2 of nucleons. Therefore, studying the v_2 of light nuclei and comparing it with the v_2 of protons will help us in understanding their production mechanism.

In this talk, we will present the transverse momentum (p_T) and centrality dependence of v_2 of d, t, and ^{3}He and their antiparticles in Au+Au collisions at $\sqrt{s_{NN}}$ = 14.6, 19.6, 27, and 54.4 GeV. Mass number scaling of $v_2(p_T)$ of light (anti-)nuclei will be shown and physics implications will be discussed.