Azimuthal anisotropy measurement of multi-strange hadrons in Au+Au collisions at $\sqrt{s_{NN}}$ = 27 and 54.4 GeV at STAR

Prabhupada Dixit (for the STAR Collaboration)
Indian Institute of Science Education and Research, Berhampur

Abstract

One of the main goals of the STAR experiment is to study the properties of QCD matter at various temperatures and/or baryon densities. With this motivation, the STAR experiment has collected data in the nuclear collisions at centre-of-mass energies ($\sqrt{s_{NN}}$) = 3.0-200 GeV. The azimuthal anisotropy of multi-strange hadrons plays an important role in characterizing the properties (particularly, the ratio of shear viscosity to entropy density η/s) of the QGP. Moreover, higher-order anisotropic flow coefficients (v_3, v_4 etc) are found to be more sensitive to η/s. Elliptic flow (v_2) of identified hadrons has been extensively measured at top RHIC energy and well as RHIC Beam energy scan program. However, measurement of azimuthal anisotropy of multi-strange hadrons is limited by the statistics at low RHIC energies, especially v_3 of multi-strange hadrons remains unexplored.

The STAR experiment recorded high statistics data for Au+Au collisions at $\sqrt{s_{NN}}$ = 54.4 GeV (∼600 million events) and 27 GeV (∼350 million events). In this talk, we will present new results on the second-order flow coefficient (v_2) and the third-order flow coefficient (v_3) of multi-strange hadrons such as ϕ, Ξ, and Ω measured at midrapidity ($|y|$ <1.0) as a function of transverse momentum (p_T) and centrality at $\sqrt{s_{NN}}$= 27 and 54.4 GeV. The number of constituent quark scaling will be studied and ratios v_2/v_3 will be presented for all these particles. We will show the comparison of the new results with the existing data on other particle species ($\pi^{\pm}$, $K^{\pm}$, K^0_S, Λ) and energies from the Beam Energy Scan phase-I. Finally, the physics implications of these measurements in the context of the evolution of partonic collectivity with collision energy will be discussed. This new high statistics measurements, along with available measurement at 200 GeV, can help to understand the temperature dependence of η/s.