Anisotropic Flow of Identified Particles in Au+Au Collisions at $\sqrt{s_{NN}}$ = 3.0 - 4.5 GeV from RHIC-STAR

Xing Wu (for the STAR Collaboration)

In heavy-ion collisions, directed flow (v_1) and elliptic flow (v_2) represent the first and second harmonic coefficients in the Fourier expansion of the final-state particle azimuthal distribution. These coefficients are sensitive to the equation of state (EoS) and the degrees of freedom in the produced medium. The measurement of v_1 and v_2 for identified particles provides a powerful tool for investigating the properties of nuclear matter created in heavy-ion collisions.

Using data collected by the STAR experiment during the second phase of the Beam Energy Scan (BES-II), we will present a systematic analysis of v_1 and v_2 for identified particles in Au+Au collisions at $\sqrt{s_{NN}}$ = 3.0 - 4.5 GeV. Number of Constituent Quark Scaling is observed to break down at $\sqrt{s_{NN}} \leq 3.2$ GeV, indicating a hadronic interactions dominated equation of state. However, the scaling is gradually restored as the collision energy increases to 4.5 GeV, signaling the dominance of partonic interactions. In addition, negative v_1 slopes for kaons are observed in the low p_T region ($p_T < 0.6$ GeV/c). A comparison with JAM model calculations, with and without spectators, suggests that the observed kaon anti-flow at low p_T can be explained by the shadowing effect of spectators in non-central collisions in the high baryon density region.