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Azimuthal anisotropic flow measurements in Au+Au collisions using RHIC BES-II data

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One of the objectives of the STAR experiment is to study the phase transition from hadronic matter to Quark Gluon Plasma (QGP). This can be investigated by studying the collective flow of various particle types produced in heavy-ion collisions, particularly by testing whether the number of constituent quark (NCQ) scaling holds or breaks across different energies. Specifically, the elliptic (v_2) and triangular (v_3) flow coefficients, which represent second- and third-order azimuthal anisotropies in particle momentum distributions, provide insights into the equation of state and transport properties of the medium, the shear viscosity to entropy density ratio (η/s).

Recently, STAR completed data taking for the Beam Energy Scan phase-II (BES-II) with upgraded detector capabilities and extended rapidity coverage. In this presentation, we will showcase high-precision measurements of v_2 and v_3 for various identified hadrons, including $\pi^+(\pi^-)$, $K^+(K^-)$, $p(\bar{p})$, K^0_S, ϕ, $\Lambda(\bar{\Lambda})$, $\Xi^-(\bar{\Xi}^+)$, and $\Omega^-(\bar{\Omega}^+)$, from Au+Au collisions at $\sqrt{s_{NN}}$= 3.0-19.6 GeV. The results will cover the centrality and transverse momentum dependence as well as the NCQ scaling of v_n. Finally, we will discuss the implications of these measurements in understanding onset of partonic collectivity.

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