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Probing QCD medium with the measurements of Symmetric 2- harmonics 4-particle cumulant and moments of flow distributions in heavy-ion collisions in STAR.

Relativistic heavy-ion collision experiments aim to study the formation and evolution of a strongly interacting matter called Quark Gluon Plasma (QGP). Initial spatial anisotropy and/or quantum fluctuations of the positions of the colliding nucleons lead to development of anisotropic collective expansion of the QGP medium. The magnitude of anisotropic flow harmonics (v_n) fluctuates from collision to collision. Correlations between different order flow harmonics are predicted to be sensitive to transport properties of the produced medium in heavy-ion collision. Magnitudes of measured flow fluctuation are also found to be sensitive to the initial condition and transport properties of QCD medium. Therefore, measurement of such correlations and fluctuation can be used to probe the QCD medium created after the heavy-ion collision. Such measurements can also provide stronger constraints on initial conditions in theoretical models in combination with standard v_n measurements.

We present the magnitude of correlations between different order flow harmonics by measuring Symmetric 2-harmonics 4-particle cumulant in Au+Au collisions. Results will be presented as a function of centrality and center-of-mass energy. Flow fluctuation will be studied using moments of flow distributions as a function of centrality and beam energy starting from 200 GeV to 7.7 GeV. Physics implication of such results will be discussed. Comparison with theoretical model will be shown to extract more information about QCD medium e.g. specific viscosity.

Preferred Track

Collective Dynamics

Collaboration

STAR

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