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Energy dependence of elliptic flow in high energy heavy-ion collisions

Content :

Elliptic flow is a measure of the azimuthal angular anisotropy of the particle distribution in momentum space with respect to the reaction plane. The elliptic flow is sensitive to the properties of the dense matter formed during the initial stage of heavy-ion collision and partons dynamics. Experimentally, elliptic flow has been measured as functions of transverse momentum, rapidity and collision centrality in Au + Au collisions at Relativistic Heavy Ion Collider (RHIC) in Brookhaven National Laboratory (BNL). We have compared the experimental data on charged particle elliptic flow parameter (v2) in Au + Au collisions at midrapidity for $\sqrt{s}$ =9.2, 19.6, 62.4 and 200 GeV with results from various models in heavy-ion collisions like UrQMD, AMPT, HIJING. We have observed that the average v2 from the transport model UrQMD agrees well with the experimental value at $\sqrt{s}$ = 9.2 GeV but at $\sqrt{s}$ = 200 GeV the difference in average v2 being of the order of 60%. The AMPT with default settings gives a average v2 value of about 4% for all beam energies studied, which is in contrast to increase in average v2 with beam energy for experimental data. The AMPT with string melting scenario successfully describes the average v2 at $\sqrt{s}$ = 200 GeV. The average v2 result from HIJING is consistent with zero. These studies shows that the experimental average v2 has substantial contribution from partonic interactions at $\sqrt{s}$ = 200 GeV. We have also compared the available experimental data on the transverse momentum (pT) and pseudorapidity (η) dependence of v2 to those from the above model. We have seen that the models qualitatively reproduces the trends of v2 values increasing with increase in pT and decreasing with increase in $|\eta|$.

Primary authors : Mr. NASIM, MD (Variable Energy Cyclotron Centre, Kolkata-64, India,)

Co-authors : Dr. KUMAR, Lokesh (Kent State University, Kent, Ohio 44242,USA) ; Dr. KUMAR NETRAKANTI, Pawan (Bhabha Atomic Research Centre, Mumbai 400085, India) ; Dr. MOHANTY, Bedangadas (Variable Energy Cyclotron Centre, Kolkata-64, India,)

Presenter : Mr. NASIM, MD (Variable Energy Cyclotron Centre, Kolkata-64, India,)

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