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Measurements of first-order event plane correlated directed and triangular flow from fixed- target energies at RHIC-STAR

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Anisotropic flow parameters (v_n) are important observables as they provide insight into the collecIve expansion and transport properIes of the medium produced in relaIvisIc heavy-ion collisions. Among these parameters, directed flow (v_1) describes the collecIve sideward motion of produced parIcles in heavy-ion collisions. It is an important probe to study the in-medium dynamics as it is sensiIve to the equaIon of state (EoS) of the produced medium. Minimum in the slope of directed flow (dv_1/dy) as a funcIon of collision energy has been proposed as a signature of the first-order phase transiIon between hadronic maPer and Quark-Gluon Plasma (QGP). Triangular flow (v_3) typically arises from the iniIal state fluctuaIons and is expected to be uncorrelated with the reacIon plane. However recent measurements at lower collision energies show a correlaIon between v_3 and the first- order event plane angle (Ψ_1).

In this presentaIon, we will report the measurements of Ψ_1 correlated v_1 and v_3 for π, K, p, net-kaon, net-proton, d, and t in Au+Au collisions at $\sqrt{s_{NN}}$ = 3.2, 3.5, 3.9, and 4.5 GeV taken in fixed-target mode from the second phase of the beam energy scan (BES-II) program at RHIC-STAR. We will show the dependencies of v_1 and v_3 on rapidity, centrality, and collision energy, and subsequently, discuss their physics implicaIons. The experimental measurements will be compared with the results from the JAM transport model to understand the underlying physics mechanisms at low collision energies.

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