

1 Study of first-order event plane correlated anisotropic flow in
2 heavy-ion collisions at high baryon density region

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6 Anisotropic flow parameters (v_n) are important observables as they provide insight into the
7 collective expansion and transport properties of the medium produced in relativistic heavy-ion col-
8 lisions. Among these parameters, directed flow (v_1) describes the collective sideward motion of
9 produced particles in heavy-ion collisions. It is an important probe to study the in-medium dy-
10 namics as it is predicted to be sensitive to the equation of state (EoS) of the produced medium.
11 Minimum in the slope of directed flow (dv_1/dy) as a function of collision energy has been proposed
12 as a signature of the first-order phase transition between hadronic matter and Quark-Gluon Plasma
13 (QGP). Triangular flow (v_3) typically arises from the initial state fluctuations and is expected to
14 be uncorrelated with the reaction plane. However, recent measurements at lower collision energies
15 (higher baryon chemical potential (μ_B)) of $\sqrt{s_{NN}} = 2.4$ and 3 GeV, show a correlation between v_3
16 and the first-order event plane angle (Ψ_1).

17 In this presentation, we will report the measurements of $v_1\{\Psi_1\}$ and $v_3\{\Psi_1\}$ for π , K, p , net-kaon,
18 net-proton, d , t , and 3He in Au+Au collisions at $\sqrt{s_{NN}} = 3.2, 3.5, 3.9,$ and 4.5 GeV taken in fixed-
19 target mode from the second phase of the beam energy scan (BES-II) program at RHIC-STAR.
20 We will show the dependencies of $v_1\{\Psi_1\}$ and $v_3\{\Psi_1\}$ on rapidity, p_T , centrality, and collision en-
21 ergy, and subsequently, discuss their physics implications. The experimental measurements will be
22 compared with the results from the JAM model to understand the the transport properties of the
23 medium at low collision energies.