Directed and Elliptic Flow of Light and Strange Hadrons in Au + Au Collisions at $\sqrt{s_{\rm NN}}$ = 3.0 - 3.9 GeV from the Fixed-Target program at RHIC-STAR

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Directed and elliptic flow (v_1, v_2) are the first and second harmonic coefficients in the Fourier expansion of the final state particle azimuthal distribution measured in heavy-ion collisions. They are sensitive to the equation of state (EoS) and degree of freedom of the produced medium. The number of constituent quark (NCQ) scaling of v_2 of identified hadrons, indicating the partonic degree of freedom in the medium, is found to hold for collision energies at $\sqrt{s_{NN}}$ = 7.7 GeV and above, but is broken at $\sqrt{s_{NN}}$ = 3.0 GeV. Systematic study of the identified hadron v_2 between collision energies of 3.0 and 7.7 GeV will help better understand the nature of the produced medium and its EoS.

With the data from STAR fixed-target program, we will present v_1 and v_2 results of light and strange hadrons as a function of p_T, rapidity, and centrality in Au + Au collisions at $\sqrt{s_{NN}}$ = 3.0, 3.2, 3.5, and 3.9 GeV, corresponding to baryon chemical potential (μ_B) ranges between 630 - 760 MeV. Furthermore, the kaon v_1 will be presented as a function of transverse momentum (p_T), predicted to be sensitive to kaon mean-field interactions at these energies. The NCQ scaling of v_2 will be tested to probe the degree of freedom of the medium. Our measurements and model comparisons will help to infer the QCD phase structure and nuclear matter EoS in the high baryon density region.