



Contribution ID: 552

Type: Poster

Anisotropic flow of (multi-)strange hadrons and ϕ mesons in Au+Au collisions at $\sqrt{s_{NN}} = 3 - 19.6$ GeV at STAR

Friday 8 April 2022 14:16 (4 minutes)

In low energy heavy-ion collisions, directed and elliptic flow, v_1 and v_2 , are sensitive to the dynamics at the early stage of the system evolution and equation of state of the medium. The triangular flow v_3 provides complementary information on the initial geometry fluctuations and transport properties of the medium. The hadronic interaction cross sections of multi-strange hadrons and ϕ mesons are expected to be small and their freeze-out temperatures are close to the transition temperature between quark and hadronic matter. Hence, these hadrons may provide information primarily from the early stage of the high energy collisions.

From the measurements based on the first phase of RHIC beam energy scan (BES-I), we observed that v_1 slopes (dv_1/dy) at mid-rapidity region for net-proton and net- Λ show a minimum value around $\sqrt{s_{NN}} = 10 - 20$ GeV^[ref3]. The v_2 of ϕ mesons seems to be lower at $\sqrt{s_{NN}} = 7.7$ and 11.5 GeV compared to other charged hadrons^[ref4]. In this talk, with the much enhanced statistics from the second phase of RHIC beam energy scan (BES-II) dataset, we present precision measurements of v_1 , v_2 , and v_3 for (multi-)strange hadrons at $\sqrt{s_{NN}} = 3 - 19.6$ GeV with both fixed-target and collider modes at STAR. Implications of these measurements on the QCD phase structure at high μ_B region are discussed.

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Session Classification: Poster Session 3 T11_3

Track Classification: Heavy flavors, quarkonia, and strangeness production