

# Elliptic and triangular flow of (multi-)strange hadrons and $\phi$ mesons in BES-II energies at STAR

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(for the STAR Collaboration)

1 Elliptic flow coefficient,  $v_2$ , is sensitive to the dynamics at the early stages of the system  
2 evolution in heavy-ion collisions and equation of state of the medium. Triangular flow  
3  $v_3$  is particularly sensitive to the initial geometry fluctuations. The hadronic interaction  
4 cross sections of multi-strange hadrons and  $\phi$  mesons are expected to be small. Hence,  
5 anisotropic flow of these hadrons provides information primarily from the early stages of  
6 the high energy collisions.

7 From the measurements based on the first phase of the RHIC beam energy scan (BES-  
8 I), number-of-constituent-quark (NCQ) scaled elliptic flow for  $\phi$  mesons shows about 2  
9  $\sigma$  deviations from other particles [1, 2]. The apparent violation of NCQ scaling may  
10 indicate the dominance of hadronic interactions over partonic interactions at and below  
11  $\sqrt{s_{NN}} = 11.5$  GeV. In this talk, with the enhanced statistics from the second phase of the  
12 RHIC beam energy scan (BES-II) program, we will present measurements with improved  
13 precision of  $v_2$  and  $v_3$  for  $K^\pm$ ,  $K_S^0$ ,  $\phi$ ,  $\Lambda$ ,  $\bar{\Lambda}$ ,  $\Xi^-$ ,  $\bar{\Xi}^+$ ,  $\Omega^-$ , and  $\bar{\Omega}^+$  in Au+Au collisions  
14 at  $\sqrt{s_{NN}} = 3 - 19.6$  GeV from STAR. A test of the NCQ scaling of  $v_2$  and  $v_3$  will be  
15 revisited with high statistics data. Implications of these measurements in the context of  
16 QCD phase structure at high baryon density region will be discussed.

## 17 References

- 18 [1] L. Adamczyk *et al.* (STAR), Phys. Rev. Lett. **110**, 142301 (2013)  
19 [2] L. Adamczyk *et al.* (STAR), Phys. Rev. C **88**, 014902 (2013)