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Anisotropic Flow of Identified Hadrons in O+O Collisions at $\sqrt{s_{\rm NN}} = 200$ GeV

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Recent measurements of charged hadron azimuthal anisotropies in both asymmetric and symmetric small collision systems have far-reaching implications for the origins of final state momentum anisotropy driven by nucleonic as well as sub-nucleonic fluctuations present during the initial state. The creation of Quark-Gluon Plasma (QGP) in small collision systems is a topic of active research, given their extremely short lifetime and the question of formation of a thermalized medium in such collisions. During the data taking in 2021, STAR recorded a large statistics of minimum bias and high multiplicity events of O+O collisions at $\sqrt{s_{\rm NN}} = 200$ GeV. We present the anisotropic flow (v_n) of the identified hadrons, $\pi^{\pm}$, $K^{\pm}$, and $p(\overline{p})$, as well as the strange hadrons, $K^0_{\rm S}$, $\Lambda(\overline{\Lambda})$, and ϕ in O+O collisions using the sub-event Q-cumulant method. In particular, we study the transverse momentum ($p_{\rm T}$) dependence of elliptic (v_2) and triangular (v_3) flow coefficients in order to test the number-of-constituent-quark (NCQ) scaling hypothesis in central O+O collisions. This will provide valuable insights regarding the influence of partonic phase on the origins of collectivity in such a small collision system. The system size dependence of $v_2(p_{\rm T})$ and $v_3(p_{\rm T})$ is also shown by comparing with existing measurements in relatively larger systems (e.g., Cu+Cu, Au+Au, and U+U) at similar collision energies. This is expected to help in understanding the effect of initial state spatial anisotropies, characterized by the eccentricities (ε_n), on the final state momentum anisotropies.

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