Probing nuclear structure using elliptic flow of strange and multi-strange hadrons in isobar collisions

Priyanshi Sinha (for the STAR collaboration)
Indian Institute of Science Education and Research (IISER) Tirupati

Abstract

Isobar collisions, $^{96}_{44}$Ru+$^{96}_{44}$Ru and $^{96}_{40}$Zr+$^{96}_{40}$Zr, at $\sqrt{s_{\rm NN}} = 200$ GeV have been performed at RHIC in order to study the charge separation along the magnetic field, called the Chiral Magnetic Effect (CME). The difference in nuclear deformation and structure between the two isobar nuclei may result in a difference in the flow magnitudes. Hence, elliptic flow measurements for these collisions give direct information about the initial state anisotropies. Strange and multi-strange hadrons have a small hadronic cross-section compared to light hadrons, making them an excellent probe for understanding the initial state anisotropies of the medium produced in these isobar collisions. The collected datasets include approximately two billion events for each of the isobar species and provide a unique opportunity for statistics hungry measurements.

In this presentation, we will report the elliptic flow (v_2) measurement of K^0_s, Λ, $\overline{\Lambda}$, ϕ, Ξ^-, $\overline{\Xi}^+$, Ω^-, and $\overline{\Omega}^+$ at mid-rapidity for Ru+Ru and Zr+Zr collisions at $\sqrt{s_{\rm NN}} = 200$ GeV. The centrality and transverse momentum (p_T) dependence of v_2 of (multi-)strange hadrons will be shown. System size dependence of v_2 will be shown by comparing the v_2 results obtained from Cu+Cu, Au+Au, and U+U collisions. The number of constituent quark (NCQ) scaling for these strange hadrons will also be tested. We will also compare the p_T-integrated v_2 for these two isobar collisions. Transport model calculations will be compared to data to provide further quantitative constraints on the nuclear structure.