Measurement of nuclear deformation in high-energy isobaric ^{96}Ru+^{96}Ru and ^{96}Zr+^{96}Zr collisions at STAR

Chunjian Zhang, for the STAR Collaboration

The isobaric ^{96}Ru+^{96}Ru and ^{96}Zr+^{96}Zr collisions, arguably, the most unique colliding systems so far in high energy experiments, provide a valuable experimental test of nuclear structure. In this talk, we will present the precision measurements of bulk observables such as anisotropic flow v_n, non-linear mode coupling coefficients χ_n, fluctuations of mean transverse momentum $c_{n,[p_T]}$, and Pearson correlation coefficients $\rho(v_n^2, [p_T])$ in ^{96}Ru+^{96}Ru and ^{96}Zr+^{96}Zr collisions at $\sqrt{s_{NN}}$ = 200 GeV. We will discuss how the significant deviations of the ratios of aforementioned observables in Ru+Ru collisions over Zr+Zr collisions from unity are indicative of large quadrupole and octuple deformations, and different neutron surface diffuseness in Ru and Zr nuclei, respectively. Furthermore, we will discuss how the comparison of such data with state-of-the-art hydrodynamic models infers the shape of the colliding nuclei and quantitatively constrains the nuclear structure parameters.