Flow measurements and selection of body-body and tip-tip enhanced samples in U+U collisions at STAR

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The azimuthal anisotropy of particle production is commonly used in high-energy nuclear collisions to study the early evolution of the expanding system. The prolate shape of uranium nuclei provides the possibility to study how the initial geometry of the nuclei affects the azimuthal distributions. It also provides a unique opportunity to understand the initial conditions for particle production at mid-rapidity in heavy ion collisions.

In this talk, the two- and four- particle cumulant, $v_2(v_2^2$ and $v_2^4$), from U+U collisions at $\sqrt{s_{NN}} = 193$ GeV and Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV for inclusive charged hadrons will be presented. The STAR Zero Degree Calorimeter is used to subdivide the 0-1% centrality bin into even finer centralities. Differences were observed between the multiplicity dependence of $v_2^2$ for most central Au+Au and U+U collisions. Data was compared with a Monte Carlo Glauber model and it was seen that this model cannot explain the multiplicity dependence of $v_2^2$ in central collisions. It has also been demonstrated that ZDC and multiplicity in combination provide a way to select body-body or tip-tip enhanced samples of central U+U collisions. We will also present preliminary $v_1$ and $v_2$ results for inclusive charged hadrons from Au+Au and U+U collisions, with the first-order event plane determining from spectator neutrons. This type of event plane represents the reaction plane instead of the participant plane as used in other methods, this analysis provides an alternative approach to examine the eccentricity-scaling to reveal the QGP properties.

On behalf of collaboration:

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