



Contribution ID: 1055

Type: Poster

The non-linear response coefficient $\chi_{4,22}$ in Au+Au and U+U collisions

Relativistic heavy-ion collisions offer a unique opportunity to probe the deformation of colliding nuclei. The quadrupole deformation parameter (β_2) has been extensively studied through the flow coefficient v_2 in such collisions, as well as through low-energy measurements of the electric quadrupole transition probabilities, $B(E2)$. In contrast, the hexadecapole deformation (β_4) has often been neglected in modeling heavy-ion collisions, primarily due to large experimental and theoretical uncertainties. In this poster, we present measurements of the non-linear response coefficient between v_4 and v_2 , ($\chi_{4,22}$), in Au+Au and U+U collisions at $\sqrt{s_{NN}} = 200$ GeV and 193 GeV, respectively. A deviation from 1 of the ratio of $\chi_{4,22}$ between U+U and Au+Au collisions would suggest sizeable hexadecapole deformation in Uranium-238. These results will be compared with iEBE-VISHNU hydrodynamic and AMPT model studies, which incorporate the β_4 value of Uranium-238 from nuclear structure theory calculations.

Category

Experiment

Collaboration (if applicable)

STAR collaboration

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Track Classification: Initial state of hadronic and electron-ion collisions & nuclear structure