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

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Abstract

Relativistic heavy-ion collisions offer a unique opportunity to probe the deformation of colliding nuclei. The quadrupole deformation parameter (\(\beta_2\)) 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 (\(\beta_4\)) 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 \beta_4 value of Uranium-238 from nuclear structure theory calculations.