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Constraining nuclear quadrupole deformation in relativistic heavy-ion collisions from a multiphase transport model

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Collective phenomena in heavy-ion collisions are very sensitive to initial geometry including nuclei deformation effects. Recent hydrodynamic calculations and preliminary data by the STAR Collaboration show such deformation effects can be probed by studying the correlation between event-wise average transverse momentum $[p_T]$ and harmonic flow v_n. In particular, due to prolate shape of the uranium nuclei, significant difference between Au+Au and U+U collisions is expected for these observables. This talk presents the systematic study of nuclear deformation on Pearson correlation coefficient $\rho(v_n, [p_T])$ from Au+Au at $\sqrt{s_{NN}}$ = 200 GeV and U+U at $\sqrt{s_{NN}}$ = 193 GeV collisions using a Multi-Phase Transport model (AMPT). A quantitative description of this new phenomenon can be achieved to help constrain the quadrupole deformation of the colliding species. The contamination from short-range correlation are also suppressed using the subevent cumulant method by calculating the azimuthal correlation between two or more longitudinal pseudorapidity ranges.

Preferred track

Collectivity & Multiple Scattering

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