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Probing nuclear structure in heavy-ion collisions with cumulants of transverse momentum fluctuations

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The structure of atomic nuclei can be described by a multipole expansion of the parton distribution function. Most nuclies generally have intrinsic deformation, where the quadrupole moment carries the most significant contribution. The shape of a quadrupole deformed nuclies is described by the deformation strength β_2, and an axial symmetry component γ. In ultra-relativistic heavy-ion collision, the nuclear shape directly affects the energy density of the created Quark-Gluon-Plasmsa (QGP) and the radial flow blast. We present a direct measurement of cumulants of transverse momentum fluctuation as a fine probe for accessing initial stage properties of deformed nuclies. Using the AMPT model Xe-Xe collisions at $\sqrt{s_{NN}} = 5.44$TeV are simulated with different quadrupole moments defined by both strength β_2, and triaxiality γ. The results show the higher-order cumulant of transverse momentum fluctuation to have a sensitive response to both β_2 and γ.

Field of study

Quantum Physics

Supervisor

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Session Classification: Poster session: Enjoy the posters‼!