Dynamical transverse momentum fluctuations at high baryon density measured by the STAR Experiment

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The study of event-by-event transverse momentum $< p_T >$ fluctuations and p_T correlations between particles provide insight into the properties of the hot and dense matter created in Au+Au collisions at the Relativistic Heavy-Ion Collider (RHIC). These measures have been proposed as tools to understand the initial state geometry and subsequent evolution of the system as well as quantify some of the thermodynamic properties. As fluctuations in $< p_T >$ and p_T are related to the specific heat of the system, its study as a function of collision energy and centrality may help probe the onset of phase transition and the QCD critical point.

In this talk, we present the first detailed results on two-particle transverse momentum (p_T) correlations for all charged particles within mid rapidity measured in the STAR-FXT (Fixed Target) program. The results are compared with previous STAR measurements from the Beam Energy Scan (BES-I) and measurements by ALICE experiment at the Large Hadron Collider (LHC). We also make comparisons to transport model calculations and thermal model predictions.

In central collisions, the (p_T) correlations show a decrease as a function of collision energy from $\sqrt{s_{NN}} = 3.0$ GeV onwards and then an increase from $\sqrt{s_{NN}} = 7.7$ GeV to 200 GeV. By further investigating this non-monotonous behaviour, we aim to deepen our understanding of how the system evolves across different energy regimes, and whether this non-monotonicity could signal the possible existence of a QCD critical point.