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Type: **Oral presentation**

Investigating initial state of heavy-ion and pp collisions using $[pT]$ fluctuations and $v_n - [pT]$ correlations in ATLAS

Monday 23 September 2024 16:50 (20 minutes)

This talk presents recent studies of event-wise mean transverse momentum, $[pT]$ that can help differentiate the interplay between the effect of radial collectivity, random thermal motion and deformation in nuclear geometry. In addition, the Pearson Correlation Coefficient (PCC) between flow, v_n and $[pT]$, $\rho(v_n, [pT])$, will be shown. The results bear on aspects of the initial state, such as nuclear deformation and initial momentum anisotropy. This talk presents new precise ATLAS measurements of $[pT]$ cumulants up to 3rd order and $v_n - [pT]$ correlations in Xe+Xe, Pb+Pb and pp collisions. This measurement provides the first experimental handle to isolate initial state and medium evolution contributing to final state momentum fluctuations. The PCC coefficients show a non-monotonic dependence on centrality, $[pT]$ and η , reflecting the fact that different aspects of the initial conditions affect different regions of the phase space. The ratio of $\rho(v_2, [pT])$ between the two systems in the ultra-central region suggests that ^{129}Xe has large quadrupole deformation but with a significant triaxiality. The measurement of $v_n - [pT]$ correlation provides the first measurement of triaxiality in ^{129}Xe using heavy ion collisions and provides new constraints to current models which fail to describe many of the observed trends in data. The measurement in high multiplicity pp collisions is compared to several models and provides information on the initial state contributions to the observed PCC.

Category

Experiment

Collaboration

ATLAS

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