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Flow and transverse momentum fluctuations in Pb+Pb and Xe+Xe collisions with ATLAS: assessing the initial condition of the QGP

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Constraining the initial condition of the QGP using experimental observables is one of the most important challenges in our field. Recent studies show that the Pearson Correlation Coefficient (PCC) between v_n and event-wise mean transverse momentum $[p_T]$, $\rho_n(v_n, [p_T])$, and $[p_T]$ fluctuations can probe several ingredients of the initial state. This talk presents precision measurements of $v_n - [p_T]$ correlation for $n=2,3$ and 4 and high order $[p_T]$ fluctuations in $^{129}\text{Xe}+^{129}\text{Xe}$ and $^{208}\text{Pb}+^{208}\text{Pb}$ collisions, and they are found to be small in the mid-central and central collisions in these systems. The ρ_n and variance and skewness of $[p_T]$ fluctuations show non-monotonic dependence on centrality, p_T and η . It was also found that the result depends on the centrality estimator used in the analysis, indicating a strong influence of volume fluctuations. In central collisions, where models generally show good agreement, the $v_2 - [p_T]$ correlations are sensitive to the triaxiality of the quadrupole deformation. A comparison of the model with the Pb+Pb and Xe+Xe data confirms that the ^{129}Xe nucleus is a highly deformed triaxial ellipsoid that has neither a prolate nor oblate shape. This provides strong evidence for a triaxial deformation of the ^{129}Xe nucleus from high-energy heavy-ion collisions.

Experiment/Theory

ATLAS

Affiliation

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