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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 $[p_{\mathrm{T}}]$, $\rho_n(v_n, [p_{\mathrm{T}}])$, and $[p_{\mathrm{T}}]$ fluctuations can probe several ingredients of the initial state. This talk presents precision measurements of $v_n - [p_{\mathrm{T}}]$ correlation for n=2,3 and 4 and high order $[p_{\mathrm{T}}]$ fluctuations in ^{129}Xe+^{129}Xe and ^{208}Pb+^{208}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 $[p_{\mathrm{T}}]$ 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–$[p_{\mathrm{T}}]$ 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

ATLAS Collaboration

Hauptautor: Dr. GNESI, Ivan (CERN, Geneva (Switzerland), INFN LNF Frascati (Italy), CREF Rome (Italy), UniTo Turin (Italy))

Vortragende(r): Dr. GNESI, Ivan (CERN, Geneva (Switzerland), INFN LNF Frascati (Italy), CREF Rome (Italy), UniTo Turin (Italy))

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