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Non-Gaussian eccentricity fluctuations

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The observation of a non-zero $v_n\{4\}$ in systems where anisotropic flow is solely due to fluctuations ($v_2\{4\}$ in p+Pb collisions, $v_3\{4\}$ in Pb+Pb collisions) implies that initial eccentricity (ε_n) fluctuations are not Gaussian.
This is confirmed by simulations using various initial-state models.

It has been argued that non-Gaussianities may not reflect underlying microscopic dynamics. On the contrary, there are indications that they are to a large extent
universal and arise from the global condition $|\varepsilon_n| < 1$.
On the other hand, systematic investigations of second and fourth-order cumulants $\varepsilon_n\{2\}$ and $\varepsilon_n\{4\}$
reveal deviations from this universal behavior in large systems, which suggests that non-Gaussianities may carry non-trivial dynamical information.

In this talk, we present results from Monte Carlo simulations and analytic calculations which we have done in order to investigate what non-Gaussianities tell us about the early stage of heavy-ion collisions.
We find that the non-Gaussianities are essentially universal in p+Pb collisions, but not in large systems like Pb+Pb collisions.
We show that the initial density field has intrinsic non-Gaussianities (in particular a non-trivial 3-point function) which are instrumental in explaining experimental observations.

On behalf of collaboration:

NONE

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