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## New advancements in symmetry plane correlations and multiharmonic fluctuations in heavy-ion collisions with ALICE

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The study of collective phenomena in ultrarelativistic heavy-ion collisions is nowadays to a great extent built on the so-called flow amplitudes  $v_n$  and symmetry planes  $\Psi_n$ . Both appear as two distinct degrees of freedom in the parametrization of the azimuthal distribution of the produced particles, which is used in the study of the quark-gluon plasma (QGP). Investigating the complex interplay of these quantities allows one to further constrain our current knowledge of this exotic state of matter. While analyses techniques for flow amplitudes  $v_n$  have advanced over the past years, observables used for measuring symmetry planes  $\Psi_n$  are often plagued by built-in biases. The most important of them arises from the neglect of the correlations between different flow amplitudes, which were shown by the ALICE Collaboration to exist even between three amplitudes. Recent developments for the measurement of symmetry plane correlations (SPC) take these correlations into account and provide a new and more precise analysis technique - the so-called Gaussian Estimator (GE).

In this talk, we highlight the new results for higher-order multiharmonic flow fluctuations obtained with ALICE in heavy-ion collisions. These results show the presence of complex correlations between multiple flow amplitudes of different order, and also emphasize their importance in the measurement of SPC. Taking this into account, the first experimental results of SPC measured with the newly developed GE using Pb-Pb collisions data are presented. All results are compared to theoretical predictions for the initial coordinate space provided by the T<sub>R</sub>ENTo model and for the momentum space obtained with the state-of-the-art model iEBE-VISHNU.

### In-person participation

Yes

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