

Measurements of two- and multi-particle cumulants in pp, p-Pb and Pb-Pb collisions

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The formation of the QGP in heavy-ion collisions is well established by numerous measurements and their comparison to hydrodynamic models. This matter was not expected to be formed in smaller systems, such as p-Pb or pp collisions. However, in recent years, a growing number of results in small collision systems suggest that this hot and dense medium can be created in high multiplicity p-Pb collisions. Two- and multi-particle cumulants have proven to be an excellent tool to probe the properties of the Quark-Gluon Plasma created in Pb-Pb collisions. Therefore, these measurements play leading role in the investigation of possible signs of collectivity in p-Pb collisions. Recent observations in high multiplicity pp collisions at 13 TeV produced a lot of excitement after the presence of long-range correlations was observed, as well as the negative sign of the measured 4-particle cumulants, which is an indication of collectivity in small systems. However, there are many caveats which must be considered when performing the cumulants measurements in pp collisions. The most important ones are multiplicity fluctuations and non-flow effects, which are able to mimic the signs of collectivity.

In this talk, we will present ALICE measurements of 2- and multi-particle cumulants across different collision systems, with the main focus on small systems. We will discuss latest developments in cumulant measurements that are able to further suppress non-flow effects. Such phenomena are dominant in small systems, therefore this path in the experimental approach is important for the exploration of novel QCD dynamics in small collision systems. These results shed more light into the nature of the created nuclear medium in high energy pp, p-Pb and Pb-Pb collisions.

List of tracks

Fluctuation in initial conditions, collective flow and correlations

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