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Recent Results on Multi-Particle Azimuthal Correlations in High-Multiplicity pp and pPb Collisions in CMS

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In nucleus-nucleus collisions, the Quark-Gluon Plasma behaves like a perfect fluid and the azimuthal anisotropy of the observed particle final-state distributions reflects its properties. This anisotropic flow, arising mainly from initial-state geometry and its fluctuations, highlights the collective behavior of the particles produced in the collision. It is well-described by hydrodynamics and explains the long-range near-side correlations, known as the “ridge”, observed experimentally in AA collisions and, more recently, in small systems such as pp or pA collisions. The CMS experiment has studied this correlation in details by extracting the momenta of the Fourier decomposition of azimuthal particle-distribution in the final state (vn, n=2—4). The vn are extracted using di-hadron correlation and multi-particle cumulant methods in both pp and pPb collisions. In this talk, results from CMS on the ridge in small systems are shown and compared with those in PbPb collisions, demonstrating that the collective nature of the ridge is present also in small systems. The correlation between different Fourier coefficients is further investigated using a symmetric cumulant analysis and compared across colliding systems. The latest results on vn correlations in pp at 13 TeV and pPb at 8.16 TeV collisions are also discussed. All these results give us a better understanding of collective effects from small to large colliding systems and provide more insights on the nature of the ridge in pp and pPb collisions.

Experimental Collaboration

CMS

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