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Latest Anisotropic Flow Measurements in Pb–Pb Collisions with ALICE: New Insights into QGP Properties

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Characterizing the quark–gluon plasma (QGP) created in ultrarelativistic heavy-ion collisions requires identifying observables sensitive to different stages of the collision. Recent studies show that measuring collective anisotropic flow and the complex interplay between its Fourier harmonics (v_n) and (Ψ_n) can effectively disentangle contributions from various collision phases, providing insights into QGP transport properties and the initial state of the system.

In this talk, the latest flow measurements from ALICE for Pb–Pb collisions at the highest center-of-mass collision energy, $\sqrt{s_{\mathrm{NN}}}$ = 5.36 TeV, ever achieved in a laboratory are presented. This includes the flow coefficient v_n, and mixed harmonic cumulants. Added to this are the first measurements of multiharmonic correlations using symmetric cumulants for hexagonal flow harmonics and new symmetry plane correlators, totaling 25 correlators—16 of which are newly introduced with enhanced estimators. Differential results for selected observables are also provided as a function of kinematic variables, alongside standard centrality dependence. In particular, p_{T}-differential flow is further extended to extremely high-p_{T} regions, providing new inputs for hard processes. These results are compared with state-of-the-art hydrodynamic calculations, offering unique insights for future model developments and further constraining the properties of QCD matter in heavy-ion collisions. Furthermore, multi-particle elliptic flow measurements in ultra-central Pb–Pb collisions will be discussed, evaluating higher-order flow coefficients and the role of octupole deformation in shaping the initial state of the system.

Category

Experiment

Collaboration (if applicable)

ALICE

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