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Scalar product and event plane methods for measurements of azimuthal anisotropy in Pb+Pb and Xe+Xe collisions with the ATLAS detector at the LHC

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Measurements of the azimuthal anisotropy of charged particles in heavy-ion collisions are sensitive to the detailed properties of the quark-gluon plasma, in particular its dependence on initial conditions, transport coefficients and time evolution. The presented measurements are based on 0.49 nb^{-1} of Pb+Pb data collected by the ATLAS detector in 2015 with center-of-mass energy $\sqrt{s_{NN}} = 5.02$ TeV. The elliptic flow and higher-order Fourier coefficients (v_2 - v_7) are presented in a wide range of transverse momenta ($p_{\mathrm{T}} < 60$ GeV), pseudorapidity ($|\eta| < 2.5$) and 0-80% collision centrality. The collected minimum-bias sample is enhanced by triggers for "ultra-central" collisions, providing an opportunity to perform precise measurements of flow harmonics in the fluctuation-dominated regime. The magnitude of azimuthal anisotropy is estimated by measuring the angular correlations of produced particles using both the scalar product and event plane methods. To suppress non-flow, v_n harmonics are calculated by correlating two flow vectors estimated in two different detectors separated in pseudorapidity (the forward calorimeter $3.2 < |\eta| < 4.8$, or the inner detector $|\eta| < 2.5$), and in the opposite hemispheres. The obtained results are compared to the $v_n(p_{\mathrm{T}})$ values at measured in $\sqrt{s_{NN}} = 2.76$ TeV Pb+Pb collisions and recent $\sqrt{s_{NN}} = 5.44$ TeV Xe+Xe collisions as well as to predictions of hydrodynamical models.

Content type

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