PANIC2021 Conference



Contribution ID: 291

Type: Talk

Searches for Chiral Magnetic Effect and Chiral Magnetic Wave in Xe-Xe and Pb-Pb collisions with ALICE

Sunday 5 September 2021 17:26 (18 minutes)

An important property of the strong interaction that is potentially observable in heavy-ion collisions is local parity violation which manifests itself as a charge separation along the direction of the magnetic field. This phenomenon is called the Chiral Magnetic Effect (CME). A similar effect in which the presence of a vector charge (e.g., electric charge) causes a separation of chiralities is the Chiral Separation Effect (CSE). Their coupling leads to a wave propagation of the electric charge called the Chiral Magnetic Wave (CMW), causing a charge-dependent elliptic flow.

In this talk, we present results of the charge-dependent two- and three-particle correlators as function of centrality in Xe–Xe and Pb–Pb collisions at $\sqrt{s_{\rm NN}} = 5.44$ TeV and 5.02 TeV, respectively. The charge dependence of the three-particle correlator is often employed as evidence for the CME. The interpretation of the experimental results is complicated by possible background contributions, associated with local charge conservation (LCC) coupled to elliptic flow. Comparisons with predictions from Anomalous-Viscous Fluid Dynamics simulations and a Blast-wave parametrisation that incorporates LCC are used to estimate background effects. Furthermore, these measurements combined with Monte Carlo Glauber and T_RENTo simulations of the magnetic field are employed to derive an upper limit on the CME contribution for the first time in Xe–Xe collisions. In addition, recent measurements of charge-dependent flow as a function of charge asymmetry are presented and their implications for observation of CMW are discussed.

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Session Classification: QCD, spin physics and chiral dynamics

Track Classification: QCD, spin physics and chiral dynamics