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Search for the Chiral Magnetic Wave using the ALICE detector in Pb–Pb collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV

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In heavy-ion collisions, a strong magnetic field ($\sim 10^{15}$ T) is expected to be created, which together with the presence of a non-zero electric and axial charge density, can lead to vector and axial currents in the produced system called the Chiral Magnetic Effect (CME) and Chiral Separation Effect (CSE), respectively. Their coupling gives rise to a collective excitation in the quark-gluon plasma (QGP) called the Chiral Magnetic Wave (CMW), causing a charge-dependent elliptic flow, v_2. As a result, the normalized difference of v_2 of positive and negative charges, ($\Delta v_{2_{\mathrm{Norm}}}$), may exhibit a positive slope as a function of the asymmetry (A_{ch}) in the number of positively and negatively charged particles in an event. However, non-CMW mechanisms like Local Charge Conservation (LCC) can also lead to a similar dependence of $v_{2_{\mathrm{Norm}}}$ on A_{ch}. A similar measurement with v_3 can probe the effect of LCC as we expect it not to be affected by the CMW.

In this talk, we present ALICE measurement of v_2, $\Delta v_{2_{\mathrm{Norm}}}$, v_3 and $\Delta v_{3_{\mathrm{Norm}}}$ of charged hadrons in $0.2 < p_{\mathrm{T}} < 1.0$˜GeV/$c$ and pions in $0.2 < p_{\mathrm{T}} < 0.5$˜GeV/$c$ as a function of A_{ch} in Pb–Pb collisions at $\sqrt{s_{\mathrm{NN}}} =$ 5.02 TeV. The slope parameters corresponding to $v_{2_{\mathrm{Norm}}}$ and $v_{3_{\mathrm{Norm}}}$ versus A_{ch} are measured as a function of collision centrality to search for the CMW phenomena at LHC energies. We will also compare the ALICE results with those from the CMS experiment and lower collision energy STAR experiment and also with different model predictions.

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