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Search for the Chiral Magnetic Wave using the ALICE detector in Pb–Pb collisions at √sNN = 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 in the presence of a non-zero electric and axial charge density, can lead to vector and axial currents in the produced system $textendash$ the phenomena 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), which could cause a finite quadrapole moment of the collision system. As a result, elliptic flow, v_2, becomes charge dependent and the normalized difference of v_2 of positive and negative charges, $\Delta v_{2_{\rm Norm}}$, may exhibit a positive slope as a function of the asymmetry ($A_{\rm ch}$) in the number of positively and negatively charged particles in an event. However, interpretations of the experimental results get complicated by possible background contributions, like Local Charge Conservation (LCC). A similar measurement with v_3 can probe the effect of LCC, because v_3 is not expected to be affected by the CMW.

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

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