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Search for the Chiral Magnetic Wave in Heavy-ion Collisions

The interplay of the chiral anomaly and the strong magnetic field ($\sim 10^{15}$ T) created in heavy-ion collisions could give rise to a collective excitation in the quark-gluon plasma called the Chiral Magnetic Wave (CMW). This effect can be experimentally sought by the charge asymmetry (A_{ch}) dependence of elliptic flow v_2 . However, non-CMW mechanisms such as local charge conservation (LCC) coupled with collective flow can also lead to a similar dependence of v_2 on A_{ch} . The triangular flow (v_3) measurement serves as a reference as it is not expected to be affected by the CMW. The v_2 and v_3 of charged hadrons as a function of A_{ch} measured in Pb-Pb collisions at $\sqrt{s_{\text{NN}}} = 2.76$ and 5.02 TeV are presented. In addition, the event-shape engineering (ESE) technique is adopted for the first time to quantitatively disentangle the CMW signal and the LCC background. The results indicate that the background effects dominate the CMW measurements.

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