



Contribution ID: 128

Type: Poster

Search for the Chiral Magnetic Wave in Pb-Pb collisions with the ALICE detector

Wednesday 6 April 2022 18:14 (4 minutes)

The interplay of the chiral anomaly and the strong magnetic field ($\sim 10^{15}$ T) created in the off-central heavy-ion collisions could give rise to a collective excitation in the quark-gluon plasma called the Chiral Magnetic Wave (CMW), which can be experimentally sought by the charge asymmetry (A_{ch}) dependence of elliptic flow v_2 of positively and negatively charged hadrons. However, non-CMW mechanisms such as local charge conservation (LCC) intertwined with collective flow can also lead to a similar dependence of v_2 on A_{ch} . The measurement with triangular flow (v_3) thus serves as a reference as it is not expected to be affected by the CMW.

In this talk, we present new ALICE measurements of v_2 and v_3 of inclusive and identified hadrons as functions of A_{ch} in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ and 5.02 TeV. The slope parameters of $\Delta v_2 - A_{ch}$ and $\Delta v_3 - A_{ch}$ correlations, where the Δv_n are the differences between v_n of positive and negative particles, are normalized and then compared with results from other experiments and models. In addition, the Event Shape Engineering (ESE) technique is adopted for the first time to quantitatively distinguish the CMW signal and the LCC background. The upper limit of the CMW signal contribution is further extracted. Our measurements reveal that the background effect is dominant in the search for the CMW in heavy-ion collisions.

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Session Classification: Poster Session 1 T02

Track Classification: Chirality, vorticity and spin polarization