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Anomalous kaon correlations in Pb–Pb collisions at the LHC with ALICE

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Two-particle correlation functions provide critical information about the medium created in heavy-ion collisions. Recent ALICE measurements have demonstrated large dynamical correlations between produced neutral and charged kaons in Pb–Pb collisions at $\sqrt{s_{\rm NN}} = 2.76$ TeV. These integrated correlations cannot be described by conventional heavy-ion models, such as EPOS and AMPT. On the other hand, the ALICE measurements can only be described by invoking the presence of strange-quark condensates. Two candidates for such a condensate are the Disoriented Chiral Condensate (DCC) and Disoriented Isospin Condensate (DIC). They both arise from chiral symmetry restoration in the QGP, which breaks during the phase transition to form a condensate that coherently emits hadrons.

To investigate these anomalous kaon correlations further, we will present a differential analysis of two-particle angular correlation functions of charged and neutral kaons as a function of $\Delta\varphi$ and $\Delta\eta$ in Pb–Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV. Such an analysis is expected to shed light on the origin of the observed large dynamical fluctuations experimentally, as these have contributions from single-particle fluctuations and two-particle correlations. In particular, the results from this differential study will help disentangle the contributions from resonances and possible contributions from condensates.

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