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First experimental study of axial-vector meson–nucleon interactions using p–f_1 correlations with ALICE

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Chiral symmetry in QCD is expected to be partially restored at high temperature and/or baryon density, where the chiral condensate that generates most hadron masses decreases. A key manifestation of this restoration is the degeneracy in mass of chiral partners such as vector and axial-vector mesons. To identify these effects, it is essential to achieve a precise understanding of the interaction between vector mesons and nucleons, which plays a crucial role in their in-medium modifications. However, this has long been inaccessible to experiments due to the short lifetimes of these mesons.

ALICE has demonstrated that such residual strong interactions can be probed via femtoscopy through two-particle relative-momentum correlations. In this contribution, the first experimental study of strong interaction effects in the axial-vector meson sector is presented, via the p–f_1 correlation function measured in pp collisions by ALICE and enabled by the large data samples collected during LHC Run 3. Together with p–ρ results and chiral-unitary calculations, these results provide new constraints on nucleon–(axial-)vector meson interactions and their connection to chiral dynamics.

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