

Measuring spin alignment of D^* mesons in pp and Pb–Pb collisions with ALICE

Heavy quarks, i.e. charm and beauty, are produced in the initial stage of the heavy-ion collisions, and can inherit a polarisation that is preserved through hadronisation and manifested in the spin state of the final hadron. This polarisation can be quantified via the spin density matrix element ρ_{00} , where deviations from 1/3 signal spin alignment. Measuring the spin alignment of vector mesons provides a unique means to investigate the transfer of quark polarisation through hadronisation and to explore the impact of the large initial angular momentum and magnetic field generated in non-central heavy-ion collisions.

In this contribution, we present the final measurements of the ρ_{00} parameter for D^* mesons in pp and Pb–Pb collisions, obtained from the data samples collected by the ALICE experiment during LHC Run 2, together with preliminary results from the larger samples collected in Run 3, which allow to extend the transverse-momentum reach. The analysis is performed separately for promptly produced D^* mesons and for those originating from B-meson decays, the latter expected to be longitudinally polarized with respect to the helicity axis, owing to helicity conservation in weak decays.

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