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Probing the Ξ^- interaction with nucleons in two- and three-body systems with ALICE

The interaction among nucleons and double-strange Ξ^- baryons is an important ingredient for the equation of state of neutron stars.
In classical experimental methods, information on the strangeness S=-2 sector is accessed by measuring the binding energy of a Ξ^- hyperon to a nucleus in so called hypernuclei. However, it is difficult to obtain large statistics with such experiments and the interpretation is model dependent, because of the involvement of many-body forces in the system.
The ALICE Collaboration has demonstrated that the femtoscopy method excels in accessing multi-strange interacting systems with high precision. Using the dataset from high-multiplicity pp collisions collected during the Run 2 data-taking period of the LHC, the measured p–Ξ^- and p–Ω^- correlation functions were used to test Lattice QCD calculations. Since the start of Run 3 in 2022 the ALICE Collaboration has been collecting new data with significant gain in the number of available candidates for two-body analyses. These data also allow for the first time to perform three-body femtoscopic measurements in the strangeness S=-2 sector.
This contribution presents preliminary results on the p–Ξ^- and p–p–Ξ^- correlations in pp collisions obtained with the data collected in the first three years of Run 3. The comparison with Lattice QCD calculations will be shown and discussed for both two- and three-body systems.

Category

Experiment

Collaboration (if applicable)

ALICE Collaboration

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