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Accessing strong interaction in three-hadron systems with ALICE

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The ALICE Collaboration presents a new experimental approach to explore the interactions in three-hadron systems by analyzing femtoscopic correlation functions of deuteron-hadron pairs produced in high-multiplicity pp collisions at $\sqrt{s} = 13$ TeV and in Pb-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV at the LHC. The measured p-d correlation function can only be explained if the three nucleons are considered as explicit degrees of freedom in the calculations, demonstrating the sensitivity of the correlation function to the full three-nucleon dynamics. Additionally, the measurement of K^+dK+d and K^-dK-d correlations in Pb-Pb collisions at different centralities has made it possible to extract for the first time the scattering lengths and the source radii of such pairs, which have been awaited for more than 40 years. Future plans for the study of three-body dynamics at the LHC will be discussed. In particular, the precise measurement of three-hadron correlations, such as p-p-p and p-p- Λ , requires the large data sample that will be collected during the Run 3. The p-p and p- Λ pair correlations are currently under study as they provide the benchmark for measuring the p-p-p and p-p- Λ triplets in pp collisions at $\sqrt{s} = 13.6$ TeV.

Category

Experiment

Collaboration (if applicable)

ALICE

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