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## Study of the three-body dynamics at short range via deuteron-hadron correlations by ALICE

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We present a new experimental method to study three-body nuclear systems by measuring correlations in the momentum space of deuteron-hadron pairs produced in proton-proton collisions at the LHC. The study of three- and many-body dynamics has been a long-standing goal in nuclear physics, particularly for understanding the structure of light nuclei and describing neutron-rich and dense nuclear matter.

The ALICE Collaboration has performed measurements of the  $K^+$ -d and p-d correlations analyzing high-multiplicity proton-proton collisions at  $\sqrt{s} = 13$  TeV. The correlation functions are compared with effective two-body calculations anchored to results from  $K^+$ -d and p-d scattering experiments that provide an excellent description of the measured  $K^+$ -d correlation but fail to describe the p-d system. This discrepancy can only be resolved by performing a full three-body calculation that accounts for the underlying three-nucleon dynamics. The analysis demonstrates that nucleons are the explicit degrees of freedom also in the correlations among light nuclei produced at short distances in hadronic collisions and opens the possibility of investigating the effect of genuine many-body nuclear interactions at the LHC in the future.

### Category

Experiment

### Collaboration (if applicable)

ALICE Collaboration

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