Contribution ID: **486** Type: **Oral**

Deuterons emergence through coalescence with ALICE

Tuesday 8 April 2025 17:10 (20 minutes)

One of the unresolved issues in hadron–hadron collisions is the microscopic understanding of how light (anti)(hyper)nuclei are created. Several differential measurements of (anti)(hyper)nuclei yields, momentum distributions, and fluctuations have been carried out in pp, p–A, and A–A collisions at ultra-relativistic energies. Comparisons to models based on statistical hadronization or nucleon coalescence generally provide a good fit to the data. However, these models are grounded in different underlying scenarios, leading to a highly model dependent interpretation of the results.
In this work, new results based on femtoscopy correlations of deuteron proton and deuteron–pion pairs measured in pp and Pb–Pb collisions by ALICE at collision energies of $\sqrt{s}$ = 13 TeV and $\sqrt{s_{\rm NN}}$ = 5.02 TeV, respectively, are presented. Deuteron–proton correlations allow for studying the particle-emitting source size of deuterons compared to other hadrons. The deuteron source aligns with the proton source across all colliding systems. In pp collisions, the deuteron–pion correlation reveals the residual interaction between pions and nucleons from short lived Δ decays, followed by nucleon coalescence into deuterons. This effect is not observed in Pb–Pb collisions due to the large pion multiplicities.
These results demonstrate, in a model-independent manner, that coalescence is a viable mechanism for (anti)deuteron production in ultra-relativistic hadron–hadron collisions.

Category

Experiment

Collaboration (if applicable)

ALICE

Authors: COLLABORATION, ALICE; MAHLEIN, Maximilian (Technische Universitaet Muenchen (DE))

Presenter: MAHLEIN, Maximilian (Technische Universitaet Muenchen (DE))

Session Classification: Parallel session 23

Track Classification: Light and strange flavor physics & nuclei