

Measurement of the anti-nuclei nuclear inelastic cross sections with ALICE and implications for indirect Dark Matter searches

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The measurement of low-energy cosmic anti-deuterons may reveal the existence of exotic processes such as dark-matter annihilation, since the production rate of these ions through ordinary secondary processes is very low. However, the lack of experimental data at low energies, where both the anti-nuclei production and inelastic cross sections are very poorly known, prevents precise predictions of anti-nuclei fluxes near Earth.

In ultra-relativistic pp, p-Pb and Pb-Pb collisions at the CERN LHC, matter and antimatter are produced in almost equal abundances. This allows us to study the production cross sections of (anti-)nuclei with high precision as well as to measure the absorption process of produced (anti-)nuclei in the detector material.

In this talk we present the first results on the anti-deuteron and anti-³He absorption cross sections in the ALICE detector material.

The reconstructed antimatter to matter ratios are compared to the results from full-scale GEANT4 simulations of the ALICE detector. Experimental constraints on the anti-deuteron nuclear inelastic cross-section are extracted in the momentum range between 0.5 and 4.0 GeV/c and the first measurement of the nuclear inelastic cross-section of anti-³He is shown.

Finally, we discuss the implications of these results for indirect Dark Matter searches using cosmic anti-deuterons.

I read the instructions

Secondary track (number)

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