“Measurements of the anti-helium-3 inelastic cross section by ALICE and their implications on the indirect dark matter searches”.

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In the last decade, the ALICE Collaboration has measured the production of light (anti)nuclei very precisely in small and large collision systems. The most recent development in this field concerns the measurements of the momentum-dependent inelastic cross sections of antideuterons and antihelium-3 nuclei employing the ALICE detector material as a target. The antihelium-3 inelastic cross sections have been obtained by applying the antimatter-to-matter ratio and TOF-to-TPC matching methods in pp and Pb-Pb collisions, respectively. These, for the first time, measured inelastic cross sections have been implemented in the GALPROP propagation model to estimate the losses in the antihelium-3 cosmic ray fluxes due to inelastic interactions with the interstellar medium. Indeed, some dark matter candidates, such as the Weakly Interacting Massive Particles (WIMPs), are expected to annihilate in our galaxy and produce, among other particles, light antinuclei, which can be observed as cosmic rays. However, the same antinuclei can also be produced in ordinary cosmic ray collisions with the interstellar gas. Thus, precise modelling of signal and background cosmic ray fluxes, including the inelastic losses in the interstellar medium, is required to draw conclusions from future measurements expected by the AMS and GAPS experiments. The results of this interdisciplinary study by ALICE allowed the determination of the transparency of our galaxy to the propagation of the antihelium-3 from dark matter annihilation and ordinary cosmic ray collisions, and to demonstrate that antihelium-3 nuclei are a promising probe for indirect dark matter searches.