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New results on light (anti-)(hyper-)nuclei production and hypertriton lifetime in Pb-Pb collisions at the LHC

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New results on the production of light nuclei, including deuterons, tritons, ^{3}He, ^{4}He and the corresponding anti-nuclei, in Pb-Pb collisions at $\sqrt{s_{\rm NN}}$ = 2.76 TeV and $\sqrt{s_{\rm NN}}$ = 5.02 TeV will be presented and compared with theoretical predictions to provide insight into their production mechanisms in heavy-ion collisions. Those results will be complemented by the production measurement of nuclei containing one strange baryon, namely the (anti-)hypertriton, exploiting both the invariant mass method and a machine learning approach to enhance the significance of the measurement with respect to the published results.

We also present the latest measurement of the hypertriton lifetime aiming at shedding light on the hypertriton lifetime puzzle. During the end of LHC Run 2, the ALICE experiment recorded Pb-Pb collisions at $\sqrt{s_{\rm NN}}$ = 5.02 TeV that complement the already available Pb-Pb datasets. Indeed, most calculations on the hypertriton lifetime give similar values, which are close to the lifetime of free Λ decays. On the experimental side, all results from other heavy-ion experiments show a significantly shorter lifetime in comparison with that of the free Λ decay.

Furthermore, new results on the measurement of the elliptic and the triangular flow of deuteron and ^{3}He produced in Pb-Pb collisions at $\sqrt{s_{\rm NN}}$ = 5.02 TeV will be presented and they will be compared to the lower energy results and to the expectations from coalescence and hydrodynamic models. The measurement of the elliptic and triangular flow of light nuclei provides a powerful tool to give insight into their production mechanism and freeze-out properties at a late stage of the collision evolution.

Finally, the large variety of measurements performed with the ALICE apparatus at different energies allows us to constrain the models of the production mechanisms of light-flavour baryon clusters, in particular those based on the coalescence and statistical hadronisation approaches.

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