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New results on light nuclei, hyperons and hypernuclei at HADES

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Heavy-ion collisions at collision energies of a few GeV, explored by e.g. HADES or the STAR fixed-target program, study the properties of matter under extreme conditions like expected in merging neutron stars. At these energies, the lightest hadrons containing strangeness are produced close to their free nucleon nucleon threshold energy. Furthermore, due to the substantial stopping of the colliding nucleons in the collision zone, the fireball is dominated by (net-)baryons.

In this contribution we present preliminary results on the production and emission of light nuclei (d, t, ^3He), Λ hyperons as well as ${}^3_\Lambda H$ and ${}^4_\Lambda H$ hypernuclei. The weakly decaying particles are reconstructed via their two-body decay channels, $\Lambda \rightarrow p + \pi^-$, ${}^3_\Lambda H \rightarrow {}^3He + \pi^-$ and ${}^4_\Lambda H \rightarrow {}^4He + \pi^-$, which are identified based on their weak decay topologies with the help of an artificial neural network (ANN). All particles are analyzed multi-differentially as a function of transverse momentum, rapidity and centrality. This constitutes the first successful measurement of hypernuclei at mid-rapidity in heavy-ion collisions at $\sqrt{s_{NN}} = 2.55$ GeV and we contribute to the word data of hypernuclei lifetimes by performing a lifetime measurement of the ${}^3_\Lambda H$ and ${}^4_\Lambda H$. Finally, we discuss our results with respect to hypernuclei measurements by other heavy-ion experiments e.g. STAR, HypHI and ALICE as well as prospects for upcoming measurements with e.g. CBM.

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