Hypernuclei program at the CBM experiment

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The main goal of the CBM experiment at FAIR is to study the behaviour of nuclear matter at very high baryonic density in which the transition to a deconfined and chirally restored phase is expected to happen. The promissing signatures of this new state are the enhanced production of multi-strange particles, production of hypernuclei and dibaryons. FAIR will provide heavy-ion beam energies from 2-11(14) AGeV for Q = 0.4 A (0.5 A) nuclei with the SIS100 synchrotron. In central Au+Au collisions at top SIS100 energies Fig. 1 the nuclear fireball will be compressed, according to transport model calculations, to more than 8 times saturation density ρ_0.

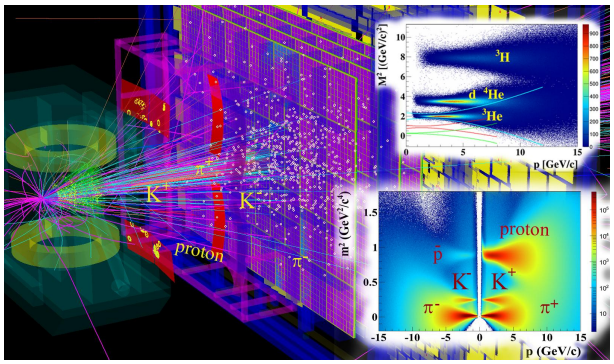

Figure 1: CBM event. Au + Au collision at 10 AGeV.

At such densities, the nucleon will start to melt and to dissolve into their constituents. The calculations predict that the dense fireball spend a relatively long time within the phase coexisting region. This is espesially well suited for generating signals of the phase transition. Theoretical models predict that single and double hypernuclei, and heavy multi-strange short-lived objects are produced via coalescence in heavy-ion collisions with the maximum yield in the region of SIS100 energies [1,2]. The discovery and investigation of new hypernuclei and of hypermatter will shed light on the hyperon-nucleon and hyperon-hyperon interactions. Results of feasibility studies of the multi-strange hyperons, hypernuclei and dibaryons in the CBM experiment will be presented.

1. A. Adronic et al., Phys. Lett. B697 (211) 203

2. H. Stoecker et al., Nucl. Phys. A827 (2009)