HK 20: Heavy-Ion Collisions and QCD Phases IV

Zeit: Dienstag 14:00–15:15 Raum: HS 12

HK 20.1 Di 14:00 HS 12

Flow performance studies with CBM — •Viktor Klochkov[1,2] and Ilya Selyuzhenkov[1,3] for the CBM-Collaboration — [1]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany — [2]Göthe Universität Frankfurt, Frankfurt am Main, Germany — [3]National Research Nuclear University (Moscow Engineering Physics Institute), Moscow, Russia

The Compressed Baryonic Matter experiment (CBM) at FAIR aims to study the area of the QCD phase diagram at high net baryon densities and moderate temperatures using collisions of heavy ions at center-of-mass energies of a few GeV per nucleon. Anisotropic transverse flow is among the key observables to study the properties of matter created in such collisions.

The CBM performance for anisotropic flow measurements is studied with Monte-Carlo simulations using gold ions at SIS-100 energies with lab momentum up to $12A$ GeV/c employing different heavy-ion event generators. Various combinations of CBM detector subsystems are used to investigate the possible systematic biases in flow measurement and to study the effects of detector azimuthal non-uniformity. The resulting performance of CBM for flow measurements is demonstrated for different harmonics of identified charged hadron anisotropic flow as a function of rapidity and transverse momentum in different centrality classes.

HK 20.2 Di 14:15 HS 12

Λ Polarization in Au+Au collisions at $\sqrt{s}_{NN} = 2.4\,$GeV measured with HADES — •Frederic Kornas for the HADES-Collaboration — TU Darmstadt, Darmstadt, Germany

Through its self-analyzing decay the Λ hyperon allows to measure the spin orientation by measuring the outgoing proton momentum. A possible spin polarization with respect to the reaction plane could probe a global polarization of the fireball. This would be a hint for vortical effects at the very early stages of the collision.

Previous measurements by the STAR collabiration show an increasing polarization to $P_\Lambda \approx 2\,\%$ for a center-of-mass energy of $\sqrt{s}_{NN} = 7.7\,$GeV. In this contribution the status of the Lambda polarization in Au+Au collisions at $\sqrt{s}_{NN} = 2.4\,$GeV measured with HADES will be reported.

HK 20.3 Di 14:30 HS 12

Reconstruction of hypernuclei in CBM — •Maksym Zyzak[1], Iouri Vassiliev[1], and Ivan Kisel[1,2,3] for the CBM-Collaboration — [1]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany — [2]Göthe-Universität Frankfurt, Frankfurt am Main, Germany — [3]Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany

The main goal of the CBM experiment is to study highly compressed baryonic matter produced in the collisions of heavy ions. According to modern theories a complex structure of the QCD matter is predicted in the energy region of the SIS100 accelerator. To successfully fulfil its wide and challenging physics program CBM will study all relevant observables. One of them are hypernuclei, which are believed to be sensitive probes of the newly created matter. They will allow investigation of the equation of state of the highly compressed baryonic matter, hyperon-nucleon and hyperon-hyperon interactions.

The maximum yields of hypernuclei are predicted to be at CBM energies. Thus, with its unprecedented interaction rate of 10^7 Hz CBM will be able to perform high-precision measurement of hypernuclei containing one Λ particle like $^3_\Lambda$H, $^4_\Lambda$H, $^4_\Lambda$He, $^5_\Lambda$He, etc. and even double-Λ hypernuclei like $^4_{\Lambda\Lambda}$H or $^6_{\Lambda\Lambda}$He. Results of the feasibility studies on the reconstruction of hypernuclei in the CBM experiment are presented and discussed.

HK 20.4 Di 14:45 HS 12

Production of (anti-)^{3}He and (anti-)^{3}H in p–Pb collisions at $\sqrt{s_{\mathbf{NN}}} = 5.02$ TeV measured with ALICE — •Sebastian Hornung for the ALICE-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany — Heidelberg University, Germany

The production mechanism of multi-baryon states in ultra-relativistic ion collisions is one of the open puzzles in high-energy physics. On the one hand, thermal-statistical hadronization models can describe the particle yields over a wide range of energies in AA collisions. On the other hand, the nuclei yields can also be explained by the coalescence of protons and neutrons which are close by in phase space. Studies of the light (anti-)nuclei production as a function of the charged-particle multiplicity per event provide an important insight into the system-size dependence of hadronization. Previous measurements in pp and Pb–Pb collisions by ALICE show a more coalescence-like behaviour for low multiplicities and a thermal behaviour at larger multiplicities.

The spectra of (anti-)^{3}H and (anti-)^{3}He measured in p–Pb collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV are presented. The latter were measured for different charged-particle multiplicities. Thanks to removal of the contamination from nuclei produced via spallation, the spectra could be evaluated down to a transverse momentum $p_{\mathrm{T}} = 1.5$ GeV/c for both the anti-nuclei and the nuclei. These results contribute to the current picture by providing information about intermediate multiplicities. In addition, an upper limit on the production of anti-^{4}He is provided.

HK 20.5 Di 15:00 HS 12

Strange particle reconstruction in the CBM experiment at FAIR — Ivan Kisel[1,2,3], •Pavel Kisel[1,3,4], Peter Senger[3], Iouri Vassiliev[3], and Maksym Zyzak[3] for the CBM-Collaboration — [1]Goethe-Universität Frankfurt — [2]Frankfurt Institute for Advanced Studies — [3]GSI Helmholtzzentrum für Schwerionenforschung GmbH — [4]Joint Institute for Nuclear Research

The main goal of the CBM experiment at FAIR is to study the behavior of nuclear matter at very high baryonic density in which the transition to a deconfined and chirally restored phase is expected to happen.

One of the promising signatures of this new states are the enhanced production of multi-strange particles. The CBM detector is designed to measure such rare diagnostic probes with unprecedented precision and statistics.

Most of these particles have all decay modes with neutral daughter, which cannot be registered directly. The results of two independent approaches, conventional and missing mass methods, for reconstruction of these key CBM observables are presented.