HK 24: Heavy Ion Collision and QCD Phases VI

Zeit: Dienstag 16:30–18:00 Raum: S1/01 A01

HK 24.1 Di 16:30 S1/01 A01

Multi-strange Hyperons and Hypernuclei reconstruction at the CBM experiment — •Iouri Vassiliev[1], Ivan Kisel[1,2,3], and Maksim Zyzak[1,2,3] for the CBM-Collaboration — [1]GSI, Darmstadt, Germany — [2]FIAS, Franfurt am Main, Germany — [3]Goethe Universitat, Franfurt am Main, Germany

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 promising signatures of this new state are the enhanced production of multi-strange particles, production of hypernuclei and dibaryons. In central Au+Au collisions at top SIS100 energies the nuclear fireball will be compressed, according to transport model calculations, to more than 8 times saturation density ρ_0. 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 especially 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. Results of feasibility studies of the multi-strange hyperons, hypernuclei and dibaryons in the CBM experiment will be presented.

HK 24.2 Di 16:45 S1/01 A01

Σ hyperons reconstruction by the missing mass method — Ivan Kisel[1,2,3], •Pavel Kisel[1,3,4], Peter Senger[3], Iouri Vassiliev[3], and Maksym Zyzak[1,2,3] 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 is a comprehensive study of the QCD phase diagram in a region of Qaurk-Gluon Plasma (QGP) and possible phase transition to the QGP phase.

One of the expected signals of QGP formation is enhanced strangeness production. Being abundant particles, Σ^+ and Σ^- carry out a large fraction of produced strange quarks. Therefore, reconstruction of Σ hyperons completes the picture of strangeness production.

Σ^+ and Σ^- have all decay modes with at least one neutral daughter. However, these particles have a lifetime sufficient to be registered by the tracking system: $c\tau = 2.4$ cm for Σ^+ and $c\tau = 4.4$ cm for Σ^-. For their identification the missing mass method is proposed to be applied. The method allow to obtain a large efficiency in the level of several percents together with a high signal to background level.

HK 24.3 Di 17:00 S1/01 A01

Λ and K^0_S Reconstruction in Au+Au Collisions at $1.23A$ GeV with HADES — •Timo Scheib for the HADES-Collaboration — Goethe-Universität, Frankfurt

We use a high statistic data sample of 7.3x10^9 recorded Au(1.23A GeV)+Au events to investigate Λ baryon and K^0_S meson production below their free nucleon-nucleon threshold. Both particles have never been observed below their NN threshold in heavy-ion collisions before. We highlight details of the analysis procedure such as event selection, particle identification and topological cuts on the decay kinematics before presenting and discussing the transverse energy spectra as well as production yields and their rapidity dependence.

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HK 24.4 Di 17:15 S1/01 A01

Nachweis von Σ^0 - Hyperonen in p + Nb Stößen* — Laura Fabbietti, Jürgen Friese und •Tobias Kunz für die HADES-Kollaboration — Physik Department, Technische Universität München

Im HADES-Experiment an der GSI Darmstadt wurde in der Reaktion p + Nb bei E = 3.5 GeV u.a. auch die Strangeness Produktion detailliert analysiert. Ein interessanter Aspekt ist dabei der Anteil an Λ^0-Hyperonen, die durch den Zerfall primär erzeugter Σ^0-Teilchen entstehen. Wir haben versucht, in den aufgezeichneten $4,2 \cdot 10^9$ Ereignissen Σ^0 Kandidaten durch den Zerfall $\Sigma^0 \to \Lambda\gamma \to p\pi^- e^+ e^-$ zu identifizieren. In dem Datensatz mit insgesamt 1,1 $\cdot 10^6$ rekonstruierten Λs wurden etwa 1000 koinzidente Elektronen-Paare nachgewiesen. In dem Vortrag wird der aktuelle Stand der Analyse von Experiment- und Simulationsdaten vorgestellt.

* Unterstützt durch das Excellence Cluster Universe

HK 24.5 Di 17:30 S1/01 A01

K* dynamics in heavy-ion collisions — •Andrej Ilner, Daniel Cabrera, and Elena Bratkovskaya — Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany

The dynamics of strange vector meson resonances (K* and anti-K*) in heavy-ion collisions is studied within the off-shell microscopic Parton-Hadron-String Dynamics (PHSD) transport approach. In-medium modification of the(anti-)K* properties in hot and dense environment is accounted for the production of resonances at hadronisation as well as at the hadronic (anti-)K + pion reactions. We investigate the influence of the in-medium effects on the final experimental observables. Since experimentally K*'s resonances are reconstructed via their decay to kaons and pion, we study the "distortion" of the true K*'s spectra by hadronic rescattering and absorption of the decay particles (K's and pions) at relativistic energies.

HK 24.6 Di 17:45 S1/01 A01

Hypertriton production in Pb–Pb collisions with ALICE at the LHC — •Lukas Kreis for the ALICE-Collaboration — Research Division and ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt — Institut für Kernphysik, Technische Universität Darmstadt

The ALICE experiment at the CERN LHC is devoted to the study of nucleus–nucleus collisions at the highest energies ever reached in the laboratory. The excellent particle identification allows to discern particles in a wide range of mass. The secondary vertices can be reconstructed within the Inner Tracking System. These capabilities enable the study of light hypernuclei in heavy-ion collisions. In this talk the ongoing investigation of hypertriton and anti-hypertriton production in Pb–Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV is presented, following the previous analysis at $\sqrt{s_{\rm NN}} = 2.76$ TeV. The decay products are identified based on their specific energy loss in the Time Projection Chamber. The ${}^3_\Lambda$H and ${}^3_{\bar\Lambda}\bar{\rm H}$ are reconstructed using the invariant mass of ^{3}He and π^- and $^3\overline{\rm He}$ and π^+, respectively.