HK 17: Heavy Ion Collision and QCD Phases IV

Zeit: Dienstag 14:00–15:45 Raum: S1/01 A01

Gruppenbericht HK 17.1 Di 14:00 S1/01 A01

Strangeness Production in Au+Au Collisions at 1.23 AGeV measured with HADES — •Heidi Schuldes for the HADES-Collaboration — Goethe-Universität Frankfurt

In Au+Au collisions at 1.23 AGeV incident energy all particles carrying open and hidden strangeness are produced below their respective free nucleon-nucleon threshold. As a consequence, the production cross sections is very sensitive to medium effects like momentum distributions, two- or multi-step collisions and modification of the in-medium spectral distribution of the produced states [1]. For the first time at such low energies, a close to complete set of open and hidden strange hadrons has been reconstructed including the following hadron yields: p, $\pi^{\pm}$, $K^{\pm}$, K^0, ϕ, Λ.
In total 7.3 Billion of the 40% most central Au(1.23 GeV per nucleon)+Au collisions have been analyzed for this investigation. The data has been recorded with HADES and a substantially improved reconstruction method has been employed to reconstruct the hadrons with high purity in a wide phase space region. In this contribution we present differential, acceptance corrected yields and a comparison to yield calculated in SHM. Special emphasis will be on the relative production yields of ϕ to K^-.
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[1] C.Hartnack et al., Phys. Rept. 510, 119 (2012).

HK 17.2 Di 14:30 S1/01 A01

In-medium kaon absorption in pion-induced reactions — •Joana Wirth[1,2], Laura Fabbietti[1,2], and Alessandro Scordo[3] for the HADES-Collaboration — [1]Physik Department, TUM, Garching, Germany — [2]Excellence Cluster "Universe", Garching, Germany — [3]LNF, INFN, Frascati, Italy

In 2014 the HADES collaboration successfully performed two experimental campaigns with secondary pion beams. Hereby, one main focus was the investigation of the production as well as the properties of K^0_S, K^+, Φ and K^- in cold nuclear matter generated in pion-nucleon reactions ($\pi^- + A$, $A = C, W$) at $p_{\pi^-} = 1.7$ GeV/c.
As already verified by the FOPI collaboration, the K^0 production in pion-induced reactions mainly takes place at the surface of the nuclei ($\sigma \sim A^b, b = 2/3$). While K^- can be absorbed in nuclear matter through strangeness exchange processes ($K^-N \rightarrow Y\pi$), no conventional absorption mechanism exists for K^0 and K^+. The question can be raised now how the K^- yield behaves? If an increase of the absorption with A would be dominant, a $b < 2/3$ should be observed. Although, a drop of the effective mass and thus a decrease of the kinematical threshold would lead to $b > 2/3$.
In this talk we are showing the recent study of the K^- absorption achieved on the basis of the comparison of K^-/K^+ ratios in both nuclear environments.
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HK 17.3 Di 14:45 S1/01 A01

Production of strange hadrons in charged jets in Pb–Pb collisions measured with ALICE at the LHC — •Alice Zimmermann for the ALICE-Collaboration — Physikalisches Institut, Universität Heidelberg

Studies of jet production characterize the properties of the hot and dense strongly interacting matter created in ultra-relativistic heavy-ion collisions. Specifically, measurements of strange hadrons in jets may clarify the role of fragmentation processes in the anomalous baryon to meson ratio at intermediate particle p_{T}, firstly observed in A-A collisions at RHIC and later confirmed in lead-lead (Pb–Pb) collisions at the LHC. Surprisingly, also measurements in proton-lead (p–Pb) collisions at the LHC showed this anomaly, although to a lesser extent.

In this contribution, we present measurements of the p_{T} spectra of $\Lambda(\overline{\Lambda})$ baryons and $\mathrm{K^0_S}$ mesons produced in association with charged jets in Pb–Pb collisions at $\sqrt{s_{\mathrm{NN}}} = 2.76$ TeV. The analysis is based on data recorded by ALICE at the LHC, exploiting its excellent particle identification capabilities. The baryon to meson ratios of strange particles associated with jets are studied in the 10 % most central events. A comparison is shown to the ratios obtained for inclusive particle production and for particles stemming from the underlying event as well as to PYTHIA proton-proton (pp) simulations. It is furthermore compared to the results obtained from charged jets in p–Pb collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV.

HK 17.4 Di 15:00 S1/01 A01

multi-strange hyperons triggering at SIS 100 — •hamda cherif for the CBM-Collaboration — Göethe Universität Frankfurt am Main

The Compressed Baryonic Matter (CBM) project at the future facility FAIR will be a dedicated heavy ion experiment operating in fixed target mode at beam energies up to 11A GeV for ions delivered by SIS 100 accelerator. The experimental challenge is to identify hadrons and to select events containing multi-strange hyperons in an environment with up to 1000 charged particles per central collision at reaction rates of up to 10 MHz. A strategy for online event selection for multi-strange hyperons (such as Ξ- , Ξ+, Ω- and Ω+) is developed based on simulated data using the identification of daughter particles in ToF detector and the decay topology in STS detector. The selection strategy developed for Au+Au collision at 10A GeV and extended to lower energies available at SIS100 will be presented.

HK 17.5 Di 15:15 S1/01 A01

Hadron production within PHSD — •Pierre Moreau — Frankfurt Institute for Advanced Studies, Universitat Frankfurt, Frankfurt am Main, Germany

We study the production of (anti-) strange and multi-strange hadrons in heavy-ion collisions from FAIR/NICA to LHC energies within the Parton-Hadron-String Dynamics (PHSD) microscopic transport approach, which contains the partonic and hadronic dynamics. By showing the channel decomposition for the strangeness production we demonstrate how with increasing energy the production in the QGP dominates the hadronic production. We observed traces from the QGP by looking at a verity of *bulk* observables like the excitation functions of particle yields, pt- and rapidity distributions, centrality dependencies of yields, etc. A striking disagreement between the PHSD results and the available data persists for bombarding energies below $\sqrt{s_{NN}} \approx$ GeV where the strangeness production is significantly underestimated as in earlier HSD studies. This finding implies that the strangeness enhancement seen experimentally at FAIR/NICA energies cannot be attributed to a deconfinement phase transition or crossover but probably involves the approximate restoration of chiral symmetry in the hadronic phase.

HK 17.6 Di 15:30 S1/01 A01

Studies of the two-baryon interaction with ALICE — •Maria Nicassio for the ALICE-Collaboration — Research Division and ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

The interaction among baryons has been the subject of intense theoretical studies for many years. Nonetheless it is still poorly known for systems that include heavy strange baryons.

Experimentally, few data from scattering experiments exist and they are not enough to constrain theory. The increasing energies of the LHC and the unprecedented sensitivity of its detectors give to this subject a new chance to be explored by studying two-baryon momentum correlations. At the high energies of the LHC indeed, baryon production is copious especially in the most central Pb–Pb collisions and correlation functions can be measured with good precision and differentially in event multiplicity also for multi-strange baryons.

Details on the measurements and the strategy to extract the parameters characteristic of the strong interaction (scattering lengths and effective radii) using Lednicky-Lyuboshitz analytical model will be discussed with particular focus on the ongoing studies of the pΞ systems, never measured before.