HK 25: Hadron Structure and Spectroscopy II

Time: Tuesday 14:00–16:00 Location: H-ZO 30

HK 25.1 Tu 14:00 H-ZO 30

Colour transparency in hard exclusive reactions — •Murat M. Kaskulov, Kai Gallmeister, and Ulrich Mosel — Institut für Theoretische Physik, Universität Giessen, Germany

We present a microscopic approach to hadron attenuation and colour transparency in hard electromagnetic reactions off nuclei. Our results for $(e, e'\pi^+)$ off nuclei support the early onset of the pionic colour transparency observed at JLab. The model results for the colour transparency effect in semi-exclusive electroproduction of strangeness from nuclei will be presented. These results provide a base for similar effects of CBM at FAIR.
Work supported by BMBF.

HK 25.2 Tu 14:15 H-ZO 30

In-medium properties of charm at FAIR — •Laura Tolos — Theory Group, KVI, University of Groningen, Groningen, The Netherlands

We study the properties of charm mesons in hot and dense matter within a self-consistent coupled-channel approach for the experimental conditions of density and temperature expected for the CBM experiment at FAIR/GSI. The in-medium solution at finite temperature accounts for Pauli blocking effects, mean-field binding on all the baryons involved, and meson self-energies. The dynamically-generated $\Lambda_c(2593)$ and $\Sigma_c(2880)$ resonances remain close to their free-space position while acquiring a remarkable width. As a result, the D meson spectral density shows a single pronounced peak for energies close to the D meson free-space mass that broadens with increasing matter density with an extended tail particularly towards lower energies. We also discuss the implications for the $D_{s0}(2317)$, $D_0(2400)$ and the predicted $X(3700)$ resonances at FAIR energies.

HK 25.3 Tu 14:30 H-ZO 30

Dilepton Production in Elementary Nuclear Reactions — •Janus Weil and Ulrich Mosel — Institut für Theoretische Physik, Universität Giessen, Germany

We present dilepton spectra from elementary nuclear reactions, which have been calculated via a semi-classical BUU transport model. We treat photon-induced reactions, as measured by the g7 experiment at JLAB, as well as proton-induced reactions, which have been measured by the KEK-PS E325 and the HADES collaborations. Our analysis aims for an investigation of possible in-medium modifications of the light vector mesons and their influence on experimentally accessible dilepton spectra.
Work supported by DFG.

HK 25.4 Tu 14:45 H-ZO 30

In-Medium Modifications of the ω Meson* — •Mariana Nanova for the CBELSA/TAPS-Collaboration — II. Physikalisches Institut, Giessen University, Germany

The behavior of vector mesons in a dense nuclear medium is one of the most fundamental research topics in hadron physics with respect to the question of chiral symmetry restoration [1]. Evidence for medium modifications of ω-meson has been published in [2]. New results from a re-analysis of the same CBELSA-TAPS experiment on a Nb target will be presented. A more stringent event selection has been applied, requiring a proton in coincidence with the ω-meson which is detected in the $\omega \to \pi^0\gamma$ channel. Because of the high sensitivity of the extracted ω signal shape to the background subtraction a new procedure has been developed to determine the background directly from the data by selecting 4γ events and randomly omitting one of the photons. The status of the analysis will be discussed and compared to the theoretical predictions.
[1] T. Hatsuda and S. H. Lee, *Phys. Rev.* **C 46**, R34 (1992)
[2] D. Trnka et. al, *Phys. Rev. Lett.* **94**, 192303 (2005)
* Funded by DFG (SFB/TR-16)

HK 25.5 Tu 15:00 H-ZO 30

Antiproton measurements in Ar+KCl reactions at 1.76 AGeV — •Manuel Lorenz for the HADES-Collaboration — Institut für Kernphysik, Goethe-Universität, Frankfurt am Main, Germany

A major part of the research in nuclear physics is concerned with the question of the properties of nuclear matter under extreme conditions. At the heavy-ion synchrotron SIS at the GSI, Darmstadt at bombarding energies between 1-2 AGeV nuclear matter is compressed to high densities of 2-3 times ρ_0 and heated to temperatures of around 100 MeV. To keep the information of the early high density phase of the collision undistorted, particles should not undergo the strong interaction. Therefore HADES consequently reconstructs short lived resonances via their decay in e^+e^--pairs.
A different approach is to investigate particles which are produced below their NN-threshold and therefore have a very steep excitation function, which makes them sensitive to predicted medium-effects. In this contribution we present a significant signal of the most extreme subthreshold produced particle at SIS energies, the antiproton. The free NN threshold of antiprotons corresponds to a kinetic beam energy of 5.6 AGeV, i.e. the threshold for antiprotons is much higher than achievable with the Fermi motion. The production yield is a promising observable for the properties of nuclear matter under these extreme conditions.

HK 25.6 Tu 15:15 H-ZO 30

Charmonium Interaction with Nuclear Matter — •Katalin Nikolics for the PANDA-Collaboration — Stefan Meyer Institute, Vienna, Austria

Understanding the charmonium interaction with nuclear matter is important for the description of the photo- and hadro-production of charmonium and charmed hadrons on nuclear targets as well as for diagnostics of hadronic final states in heavy-ion collisions. The suppression of charmonium production in heavy ion collisions is even proposed to be a signal for the formation of Quark-Gluon-Plasma (QGP). Investigating the absorption cross section of charmonium in nuclear matter should yield valuable information on this process.

The first excited state of charmonium, J/ψ, can easily be produced in antiproton-nucleus collisions which will be studied at the PANDA experiment. J/ψ can be identified via its leptonic decay channels. Its interaction with nucleons in the nuclear environment, in particular the J/ψ-nucleon dissociation cross section can be deduced from the measurement of its production as a function of the size of the target nucleus. Simulation studies including both the physics aspects of this process and the detector response to both signal and background are required in order to evaluate the scientific potential of the planned experiments.

This talk will give a brief introduction to the physics of the J/ψ interaction with nuclei and then present first results of simulation studies for the PANDA experiment.

HK 25.7 Tu 15:30 H-ZO 30

Charmed Meson Reconstruction with the PANDA Detector* — •René Jäkel, Kai-Thomas Brinkmann, Ralf Kliemt, and Oscar Reinecke for the PANDA collaboration — Universität Bonn, HISKP, Nussallee 14-16 and TU Dresden, IKTP, Zellescher Weg 19

The PANDA detector at the future GSI-FAIR facility will be a high precision experiment to study a variety of physics aspects of QCD at low energies. Using a high precision antiproton beam with momenta up to 15 GeV/c, the study of the charmonium system, the search of exotic mesonic states and glueballs and the investigation of in-medium modification of charmed mesons will be accessible. These different aspects of the rich physics program require an excellent tracking system to detect short-lived particles, e.g. for the survey of the charmonium system above the $D\bar{D}$ threshold.

To validate the physics performance of the planned PANDA detector, two $\bar{p}p \to D\bar{D}$ channels close to the production threshold in the charmonium system have been selected as benchmarks for the performance of PANDA, in particular for the tracking of charged particles. Although the $D\bar{D}$ production cross sections are unknown, an estimate on the expected signal to background ratio will be given. The main hadronic background sources as well as the physics of these processes will be discussed. $*$ supported by BMBF and EU

HK 25.8 Tu 15:45 H-ZO 30

Analysis Tools and Vertex Reconstruction in PANDA experiment — •Dipak Mishra and Klaus Goetzen for the PANDA-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung

GmbH, Planckstr. 1, 64291 Darmstadt

The physics of strong interaction is one of the most challenging and facinating areas of current science. The PANDA experiment will address various questions related to the strong interactions by employing a multi purpose detector at High Energy Storage Ring (HESR) of the upcoming Facility for Anti proton and Ion Research (FAIR). The main physics programs of PANDA experiment are: Study of charmonium states with unprecedented precision, search for gluonic excitations such as hybrids and glueballs, study the properties of mesons in hidden and open charm in nuclear medium, hyper nuclei spectroscopy and many more physics programs.

In high energy experiments like PANDA, the precise determination of new exotic particles (resonances) are very important. These states which decay to stable particles via intermediate metastable states are usually reconstructed by following a bottom-up approach. In order to effectively separate the secondary vertices from the primary ones, all vertices have to be well reconstructed. For that purpose a set of analysis tools based on the Rho Analysis Package are being implemented comprising desirable functionality like e.g. decay tree reconstruction, kinematic and vertex fitting or PID classification. The current status of these developments will be presented.