

HK 17: Hadronenstruktur und -spektroskopie

Zeit: Montag 16:45–19:00

Raum: HSZ-204

HK 17.1 Mo 16:45 HSZ-204

The $\omega \rightarrow \pi^0\gamma^*$ and $\phi \rightarrow \pi^0\gamma^*$ transition form factors in dispersion theory — ●SEBASTIAN PHILIPP SCHNEIDER — Helmholtz-Institut für Strahlen- und Kernphysik, Universität Bonn, Nussallee 14-16, 53115 Bonn

We present a dispersion-theoretical approach to the $\omega \rightarrow \pi^0\gamma^*$ and $\phi \rightarrow \pi^0\gamma^*$ electromagnetic transition form factors. The study relies solely on a previous dispersive analysis of the corresponding three-pion decays and the precisely known pion vector form factor. Our numerical results are compared to recent measurements of the $\omega \rightarrow \pi^0\mu^+\mu^-$ decay spectrum by the NA60 collaboration. We strongly encourage experimental investigation of the Okubo–Zweig–Iizuka-forbidden $\phi \rightarrow \pi^0\ell^+\ell^-$ decays in order to understand the strong deviations from vector-meson dominance found in these transition form factors.

HK 17.2 Mo 17:00 HSZ-204

Investigating in-medium properties of the ω meson via the $\omega \rightarrow \pi^0\gamma$ decay — ●JANUS WEIL^{1,2}, ULRICH MOSEL¹, and VOLKER METAG³ — ¹Institut für Theoretische Physik, Justus-Liebig-Universität Giessen, Heinrich-Buff-Ring 16, D-35392 Giessen, Germany — ²Present address: Frankfurt Institute for Advanced Studies (FIAS), Ruth-Moufang-Str. 1, D-60438 Frankfurt — ³II. Physikalisches Institut, Justus-Liebig-Universität Giessen, Heinrich-Buff-Ring 16, D-35392 Giessen, Germany

We investigate the feasibility of studying in-medium properties of the ω meson in photoproduction experiments via the decay $\omega \rightarrow \pi^0\gamma$. We use the GiBUU transport model to compare different methods of obtaining in-medium information, such as the invariant mass spectrum, transparency ratio, excitation function and momentum spectrum. We show that the final-state interaction of the pion poses a major obstacle for the interpretation of the invariant mass spectrum. We also demonstrate that the other three observables are fairly independent of final-state interactions and thus can give access to the ω in-medium properties.

Work supported by HIC-for-FAIR, HGS-HIRE and DFG under TR16.

HK 17.3 Mo 17:15 HSZ-204

π^0 and η production in proton-induced reactions measured with HADES* — ●MALGORZATA GUMBERIDZE for the HADES-Collaboration — Technische Universität Darmstadt — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt

The HADES experiment at GSI studies dielectron radiation as well as strangeness production in various proton, deuteron and heavy-ion induced reactions. In this contribution we will present results from a 4-lepton analysis of 3.5 GeV p+p and p+⁹³Nb collisions providing information on π^0 and η production. To do so, we exploit the ability of HADES to also detect e^+e^- pairs from external conversion of real photons, thus allowing for a full reconstruction of the decays $\pi^0, \eta \rightarrow \gamma\gamma \rightarrow e^+e^-e^+e^-$. Differential production cross sections will be shown and discussed. We will further demonstrate how these results provide constraints for transport models (e.g. UrQMD, IQMD, HSD, GiBUU) used to interpret the dielectron yields measured by HADES. Note that the method can be applied to heavy-ion reactions as well.

*Work supported by BMBF (06FY9100I and 06FY7114), HIC for FAIR, EMMI, GSI, and HGS-HIRE.

HK 17.4 Mo 17:30 HSZ-204

J/ψ measurements in pp collisions with the ALICE apparatus at the LHC — ●JAN WAGNER for the ALICE-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

The study of quarkonium production with the ALICE detector is pursued in pp and heavy-ion collisions at the Large Hadron Collider (LHC). J/ψ , a $c\bar{c}$ vector meson, is a probe of deconfinement expected to be reached in heavy-ion collisions. The measurements in pp collisions provide data to test (perturbative) QCD models of quarkonium production and serve as a reference for measurements in nucleus-nucleus collisions. Results of the J/ψ production cross section in pp collisions at $\sqrt{s} = 7$ TeV will be presented. Measurements of J/ψ polarization at central rapidity and forward rapidities will be discussed.

HK 17.5 Mo 17:45 HSZ-204

Produktion von Λ -Hyperonen und ϕ -Mesonen in Reaktionen von p (@3.5 GeV)+Nb. — ●CHRISTIAN WENDISCH für die HADES-Kollaboration — Helmholtz-Zentrum Dresden-Rossendorf

Neben Schwerionenkollisionen bieten elementare Nukleon-Nukleon sowie Nukleon-Kern-Reaktionen eine wesentliche Grundlage zum Verständnis des Verhaltens der Kernmaterie. Besonders Strangeness enthaltene Teilchen sind sensitive Sonden zur Untersuchung der Wechselwirkung und von Produktionsmechanismen von Hadronen im Kernmedium. Dazu stellen wir eine detaillierte Analyse von Λ -Hyperonen und ϕ -Mesonen vor, die mit dem High Acceptance Di-Electron Spectrometer (HADES) rekonstruiert wurden. Aus ca. 4×10^9 aufgezeichneten Reaktionen von p($E_{kin} = 3,5$ GeV) mit Niob-Kernen werden Phasenraumverteilungen dieser Hadronen extrahiert und mit verschiedenen Transportmodell-Rechnungen verglichen, um die Produktionsmechanismen der Strangeness tragenden Teilchen zu identifizieren. Diese Arbeit wurde unterstützt durch BMBF.

HK 17.6 Mo 18:00 HSZ-204

Production and interaction of neutral kaons in proton-proton and proton-nucleus reactions at 3.5 GeV beam energy — ●KIRILL LAPIDUS and JIA-CHU BERGER-CHEN for the HADES-Collaboration — Excellence Cluster 'Universe', Boltzmannstr. 2, 85748, Garching, Germany

Results on the inclusive K^0 -meson production in proton-proton and proton-niobium collisions will be presented. The high-statistics ($\sim 10^4$ kaons) data were measured by the HADES experiment (GSI Helmholtzzentrum), employing a proton beam with a kinetic energy of 3.5 GeV. Differential cross sections, reconstructed in $p + p$ collisions, are compared with predictions of a resonance model for kaon production. The GiBUU transport code, which includes the resonance model, is used for the interpretation of the data, obtained in $p + ^{93}\text{Nb}$ reactions. On the basis of GiBUU simulations, the sensitivity of the measurements to the in-medium kaon-nucleon scattering and the repulsive kaon-nucleus potential will be discussed.

Supported by BMBF and the Excellence Cluster "Universe".

HK 17.7 Mo 18:15 HSZ-204

Low-mass dielectron measurement for pp collisions with ALICE — ●MARKUS K. KÖHLER for the ALICE-Collaboration — Research Division and ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung, Planckstraße 1, 64291 Darmstadt, Germany

Dileptons are an important probe for the medium, which can be created in heavy-ion collisions at high energies. Thereby, proton-proton collisions provide a reference measurement for a medium free environment.

We report on the latest results of dielectron measurements in proton-proton collisions at $\sqrt{s} = 7$ TeV with the ALICE detector system. Contributions from known hadronic sources will be compared to the data. We demonstrate that the hadronic cocktail is consistent with our data.

HK 17.8 Mo 18:30 HSZ-204

Wilson-Koeffizienten von Vier-Quark-Kondensaten zur Beschreibung von Medium-Modifikationen von qQ -Mesonen — ●THOMAS BUCHHEIM^{1,2} und BURKHARD KÄMPFER^{1,2} — ¹Helmholtz-Zentrum Dresden-Rossendorf — ²Technische Universität Dresden

Zur Evaluierung mediumabhängiger spektraler Eigenschaften von qQ -Mesonen wird die Methode der QCD-Summenregeln bei nicht-verschwindenden Baryonendichten und/oder Temperaturen angewendet. Die IR-divergenzfreie Operatorproduktentwicklung (OPE) für qQ -Mesonen im Medium bis zur Massendimension 5 wird dabei durch Vier-Quark-Kondensate bis zur Massendimension 6 erweitert. Ein vollständiger Katalog von Vier-Quark-Kondensaten im qq - und qQ -Sektor wird angegeben. Die Berechnung der zugehörigen Wilson-Koeffizienten aus Diagrammen auf Baumgraphenniveau wird für die Ströme $\bar{q}\Gamma Q$ mit den Dirac-Strukturen $\Gamma = 1, i\gamma_5, \gamma_\mu$ und $\gamma_5\gamma_\mu$ vorgenommen. Auftretende Kondensate, welche neben Feldoperatoren leichter Quarks (q) auch Feldoperatoren schwerer Quarks (Q) enthalten, werden in Potenzen der inversen schweren Quark-Masse entwickelt. Die Zunahme der kompletten Vier-Quark-Kondensatbeiträge zur OPE im Medium

geht über bisherige Auswertungen von D-Meson-Summenregeln hinaus. Da von der Mediumabhängigkeit der Vier-Quark-Kondensate ein großer Einfluss auf die Eigenschaften von Mesonen erwartet wird, ist mit Blick auf die geplanten Experimente bei FAIR, wo diese Mediumabhängigkeiten experimentell zugänglich sein werden, die Bestimmung der Vier-Quark-Kondensatbeiträge von großem Interesse.

Gefördert durch BMBF.

HK 17.9 Mo 18:45 HSZ-204

Charmonium production in \bar{p} -nucleus reactions at low energies — ●ALEXEI LARIONOV^{1,2}, MARKUS BLEICHER^{1,3}, ALBRECHT GILLITZER⁴, and MARK STRIKMAN⁵ — ¹Frankfurt Institute for Advanced Studies (FIAS), Ruth-Moufang-Straße 1, D-60438 Frankfurt — ²National Research Center "Kurchatov Institute", 123182 Moscow, Russia — ³Institut für Theoretische Physik, Goethe-Universität Frankfurt, Max-von-Laue-Straße 1, D-60438 Frankfurt — ⁴Institut für Kernphysik, Forschungszentrum Jülich, D-52425 Jülich — ⁵Pennsylvania

State University, University Park, PA 16802, USA

The $J/\Psi(1S)$, $\Psi'(2S)$ and $\chi_{c1}(1P)$ production near threshold in antiproton-nucleus reactions is calculated within a Glauber model. The model takes into account the antiproton (pre)absorption, proton Fermi motion, and charmonium formation length. The realistic proton and neutron density profiles are included in our calculations. We confirm earlier prediction that the charmonium production in $\bar{p}A$ collisions at $p_{\text{lab}} = 3 - 10$ GeV/c is not influenced by formation length effects and is very well suited to determine the genuine charmonium-nucleon dissociation cross sections. However, we demonstrate that the detailed structure of the proton and neutron density profiles have to be taken into account, if one wants to extract information on the $J/\Psi N$ dissociation cross section from J/Ψ transparency ratios. The possibility to test the polarization-dependent $\chi_{c1}N$ cross sections is discussed. These studies are relevant for the upcoming PANDA experiment at FAIR. Supported by the Hessian LOEWE initiative through the Helmholtz International Center for FAIR (HIC for FAIR)