

HK 9: Elektromagnetische und Hadronische Sonden

Zeit: Montag 16:30–19:00

Raum: 1C

HK 9.1 Mo 16:30 1C

Dileptonen-Produktion in γ A- und pA-Reaktionen — ●JANUS WEIL und ULRICH MOSEL — Institut für Theoretische Physik, Universität Gießen

Wir präsentieren Dileptonen-Spektren am Kern, die mit einem semiklassischen BUU-Modell gewonnen wurden. Dabei beschäftigen wir uns zum einen mit photoninduzierten Reaktionen, wie sie im g7 Experiment am JLAB gemessen wurden, zum anderen mit protoninduzierten Reaktionen bei 12 GeV, die von der KEK-PS E325 Kollaboration durchgeführt wurden. Unsere Analyse zielt vor allem auf die Untersuchung möglicher Mediummodifikationen der leichten Vektormesonen und der Frage ob diese in den experimentellen Daten erkennbar sind.

HK 9.2 Mo 16:45 1C

Investigation of Diffractive Pion Dissociation at COMPASS — ●QUIRIN WEITZEL¹, ALEXANDER AUSTREGESILO¹, SUH-URK CHUNG^{1,2}, ANNA-MARIA DINKELBACH¹, JAN FRIEDRICH¹, SERGEI GERASSIMOV¹, STEFANIE GRABMÜLLER¹, FLORIAN HAAS¹, CHRISTIAN HÖPPNER¹, BERNHARD KETZER¹, IGOR KONOROV¹, MARKUS KRÄMER¹, ROLAND KUHN¹, ALEXANDER MANN¹, THIEMO NAGEL¹, SEBASTIAN NEUBERT¹, STEPHAN PAUL¹, and DMITRI RYABCHIKOV³ for the COMPASS-Collaboration — ¹Technische Universität München, Physik-Department E18, 85748 Garching, Germany — ²Brookhaven National Laboratory, Upton, NY 11973, USA — ³Institute for High Energy Physics, 142284 Protvino, Russia

COMPASS is a fixed-target experiment at the CERN SPS, which investigates the structure and spectroscopy of hadrons. In 2004, a first run with a 190 GeV/c π^- beam took place, using nuclear targets. Diffractive reactions in COMPASS provide clean access to meson resonances with masses below 2.5 GeV/c², where candidates for spin-exotic states (e.g. 1^{--}) have been reported in the past. Within a few days of data taking, a competitive number of events on lead with $\pi^- \pi^- \pi^+$ final states were recorded. In this talk we will report on the results of a first partial wave analysis of this data set.

This work is supported by the German Bundesministerium für Bildung und Forschung (06MT244), the Cluster of Excellence for Fundamental Physics (EXC153) and the Maier-Leibnitz-Labor der LMU und TU München.

HK 9.3 Mo 17:00 1C

HADES results for the pp reaction at 2.2 GeV — ●INGO FRÖHLICH — Institut für Kernphysik, 60438 Frankfurt am Main

HADES has measured meson and di-lepton production in pp collisions at 2.2 GeV kinetic beam energy. For the inclusive reaction $pp \rightarrow Xe^+e^-$, the lepton pair spectra have been corrected for efficiency and trigger bias. Invariant mass spectra will be presented and compared to PLUTO and HSD [1] vacuum calculations, as well as to the C+C data at 2AGeV [2].

For the exclusive measurements, the reactions $pp \rightarrow pp\pi^0$, $pp \rightarrow pn\pi^+$ as well as $pp \rightarrow pp\eta$ have been identified by detecting 2 charged tracks in the final state. The first 2 reactions are dominated by Δ production and the latter one by an intermediate $N^*(1535)$ resonance. A precise knowledge of angular distributions of all resonances - production as well as the decay - is very important for the interpretation of the di-lepton spectra mentioned above. Preliminary results for these reactions will be presented.

This work has been supported by BMBF and GSI

[1] E.L.Bratkovskaya and W.Cassing, Phys. Reports 308 (1999) 65

[2] G. Agakichiev et al., Phys. Rev. Lett 98 (2007) 052302

HK 9.4 Mo 17:15 1C

Eta-photoproduction on the nucleon in the resonance energy region — ●VITALY SHKLYAR¹, HORST LENSKE^{1,2} und ULRICH MOSEL¹ — ¹Institut für Theoretische Physik, Universität Gießen — ²GSI, Darmstadt

Pion- and photon induced reactions are analyzed within the coupled-channel effective Lagrangian Giessen model for the baryon resonance analysis. Last results for the eta-meson productions both in pion and photon induced reactions are presented.

Work supported by DFG and FZ Jülich.

HK 9.5 Mo 17:30 1C

$\eta \rightarrow 3\pi^0$ decay with WASA-at-COSY. — ●PETER VLASOV and CHRISTIAN PAULY for the WASA-at-COSY-Collaboration — Institute für Kernphysik, Forschungszentrum Jülich, 52425 Jülich

During the first production run of the WASA-at-COSY experiment the $\eta \rightarrow 3\pi^0$ decay has been measured at $Q = 55$ MeV. The goal of this experiment is a high statistics measurement of the $3\pi^0$ Dalitz plot density distribution which allows precise test of ChPT calculations in non-perturbative regime of QCD.

The η mesons were produced in the interaction of the COSY proton beam with frozen hydrogen pellets delivered by the WASA Pellet Target. The components of the detection system can be subdivided into two parts: the Central Detector - mainly suited for detection of the η meson decay products and the Forward Detector which is used for tagging of the η decays by reconstruction of the protons scattered in the forward direction.

The events selected by the missing mass technique under restrictive conditions were analyzed. The π^0 and η mesons mass hypothesis were used to constrain the kinematic variables.

We report on the status of the analysis of the $\eta \rightarrow 3\pi^0$ decay measured in proton-proton interactions from the first production run of the WASA-at-COSY experiment.

Supported in part by BMBF and FZ-Jülich.

HK 9.6 Mo 17:45 1C

ω Photoproduction off Protons and Neutrons with CBELSA-TAPS* — ●FRIDA HJELM for the CBELSA/TAPS-Collaboration — II Physikalisches Institut, Heinrich-Buff-Ring 16, 35392 Giessen

ω photoproduction off LH₂ and LD₂ targets has been studied with the tagged photon beam of the ELSA accelerator in Bonn. The combined setup of the Crystal Barrel and TAPS detecting systems, which formed a 4 π electromagnetic calorimeter, was used for detecting the ω meson via the $\omega \rightarrow \pi^0 \gamma$ decay mode. The aim of this study is to determine the ω photoproduction cross section on the neutron, which has not been measured so far, and to compare it to the cross section on the free proton and on the bound proton in LD₂. The photoproduction cross section on the neutron is of particular importance with respect to model calculations of the ω -nucleus interaction. Preliminary results on both total and differential cross sections will be presented.

* founded by DFG (SFB/TR-16)

HK 9.7 Mo 18:00 1C

Measurement of the in-medium K^0 inclusive cross section in π^- -induced reactions at 1.15 GeV/c with FOPI — ●MOHAMED LOTFI BENABDERRAHMANE for the FOPI-Collaboration — Physikalisches Institut, Universität Heidelberg, Heidelberg, Germany

Studies of the in-medium properties of hadrons are nowadays one of the significant topics of nuclear and hadron physics. Experimentally, there are two ways of investigating the medium modifications of hadron properties, either employing nucleus-nucleus collisions or using elementary reactions like π^- -nucleus where hadrons are produced under well controlled conditions.

The FOPI collaboration has carried out an experiment where five targets (C, Al, Cu, Sn and Pb) were irradiated with a pion beam of 1.15 GeV/c momentum. The secondary pion beam was provided by the SIS-18 accelerator at GSI.

Inclusive K^0 -production cross sections are evaluated and compared to the vacuum expectation and modern transport theories. In addition, we present our observation of a significant difference in the phase space population for the K^0 's produced in the Pb and the C targets which is interpreted as a hint for the presence of a repulsive KN potential in medium.

HK 9.8 Mo 18:15 1C

Measurement of the Reaction $dd \rightarrow \alpha K^+ K^-$ with Anke/Cosy — ●XIAOHUA YUAN for the ANKE-Collaboration — Institut für kernphysik, FZ Jülich, D-52425 Jülich, Deutschland

Precise knowledge of the $a_0(980)$ and $f_0(980)$ coupling constants to kaons would allow one to determine the $K\bar{K}$ content of the a_0/f_0 . However, the values for $g_{a_0 K\bar{K}}$ and $g_{f_0 K\bar{K}}$ are still poorly known.

The isospin-violating (IV) a_0/f_0 mixing amplitude is in leading order proportional to the product of $g_{a_0 K\bar{K}}$ and $g_{f_0 K\bar{K}}$. Since the a_0 and the f_0 are rather narrow overlapping resonances, a_0 - f_0 mixing

should give the dominant contribution to the IV effect via the reaction chain $dd \rightarrow \alpha f_0(I=0) \rightarrow \alpha a_0^0(I=1) \rightarrow \alpha(\pi^0\eta)$. Any observation of $\pi^0\eta$ production in the $dd \rightarrow \alpha X$ reaction would thus be a direct indication of IV.

An experiment on the reaction $dd \rightarrow \alpha(\pi^0\eta)$ is under preparation for WASA-at-COSY. As a first step, a measurement of the $dd \rightarrow \alpha f_0 \rightarrow \alpha K^+ K^-$ cross section has been performed with ANKE in spring 2006. About 10 $dd \rightarrow \alpha K^+ K^-$ events have been deduced from a preliminary analysis. The present status of the analysis will be presented.

This work is supported by DAAD.

HK 9.9 Mo 18:30 1C

Exclusive Reconstruction in pp Reactions at 3.5 GeV with HADES — ●STEFANO SPATARO for the HADES-Collaboration — II. Physikalisches Institut, Gießen, Germany

The HADES Spectrometer has studied pp collisions at 3.5 GeV, aiming at establishing reference spectrum for planned studies of vector mesons in p+A reactions, as well as investigating production mechanisms of vector mesons and the role of baryonic resonances in pp collisions. This contribution will report on the exclusive reconstruction of several hadron channels, presenting analysis techniques and first results obtained from this experiment. Exclusive analyses of meson decay channels will be presented, such as $\eta \rightarrow \pi^+\pi^-\pi^0$, $\eta \rightarrow e^+e^-\gamma$, $\omega \rightarrow \pi^+\pi^-\pi^0$ and $\omega/\rho \rightarrow e^+e^-$, as well as strange baryon decays (i.e.

$\Lambda \rightarrow p\pi^-$). This work was supported by BMBF 06 GI 179.

HK 9.10 Mo 18:45 1C

Study of the forward 1S_0 diproton production in the $pp \rightarrow pp\pi^0$ reaction at ANKE — ●SERGEY DYMOV for the ANKE-Collaboration — Laboratory of Nuclear Problems, Joint Institute for Nuclear Research, 141980 Dubna, Russia — Institut für Kernphysik, Forschungszentrum Jülich, 52425 Jülich, Germany

Single pion production in nucleon-nucleon collisions, $NN \rightarrow NN\pi$, is one of the principal tools used in the investigation of NN dynamics at intermediate energies. Because of large momentum transfers involved, even close to threshold, such a meson production is sensitive to the short-distance part of the NN-interaction. The ratio of $pp \rightarrow (pp)_s(0^\circ)\pi^0$ to $pp \rightarrow d(0^\circ)\pi^+$ cross sections can provide information on the relative strength of spin-sinlet to spin-triplet production. Prior to our study of the $pp \rightarrow (pp)_s(0^\circ)\pi^0$ reaction at ANKE, the only published data in the 1S_0 conditions were limited to energies $T_p < 0.425$ GeV. The $pp \rightarrow (pp)_s\pi^0$ differential cross section has been measured with the ANKE spectrometer at COSY-Jülich for seven proton beam energies T_p between 0.5 and 2.0 GeV. The obtained energy dependence of the cross section and of the singlet/triplet ratio will be presented. In a subsequent experiment in October 2007 the cross section has been measured at additional five beam energies in the range $T_p = 0.35 - 2.4$ GeV. Preliminary results of the analysis of the new data will be shown.