HK 65: Hadronenstruktur und -spektroskopie

Zeit: Donnerstag 14:00–16:00 Raum: HSZ-304

Gruppenbericht HK 65.1 Do 14:00 HSZ-304

Hadron Electromagnetic Form Factors in the Timelike Region — •Cristina Morales, Frank E. Maas, Paul Larin, Dexu Lin, Manuel Zambrana, Roberto Perez, Luigi Capozza, Mari Carmen Mora, Dmitry Khaneft, Iris Zimmermann, Bertalan Feher, David Rodriguez, Jorge Ceballos, Roserio Valente, Oliver Noll, and Felix Welzel — Helmholtz-Institut Mainz, SB1, Johann-Joachim-Becher-Weg 36, 55128 Mainz

The electromagnetic form factors of hadrons in the timelike region are re-viewed. We present the current status of the field and we emphasize the relevant role of initial state radiation processes studied in high luminosity storage rings, such as the B-factory PEP-II and the tau-charm factory BEPCII, i.e. from BaBar and BES-III experiments, respectively. We also present expectations from BES-III R-scan measurements around the hadron production threshold and above.

HK 65.2 Do 14:30 HSZ-304

Four pion hadronic cross sections at BABAR — •Konrad Griessinger for the BaBar-Collaboration — Institut für Kernphysik, Mainz

One of the most significant deviations from the Standard Model (SM) in laboratory experiments can be observed when comparing the SM prediction and the direct measurement of $g-2$ of the muon. In order to increase the current significance (3.6σ) to the level where evidence of this effect may be claimed or rejected, we need to improve upon the experimental input for the theoretical prediction. For this purpose the most pressing issue is the precision measurement of the four pion cross sections $\sigma(e^+e^- \to \pi^+\pi^-\pi^+\pi^-)$ and $\sigma(e^+e^- \to \pi^+\pi^-\pi^0\pi^0)$. The fully charged mode has recently been published by BABAR with unprecedented precision, and the semi-neutral mode is in preparation.

HK 65.3 Do 14:45 HSZ-304

Search for ω-mesic states* — •Stefan Friedrich for the CBELSA/TAPS-Collaboration — II. Physikalisches Institut, Gießen

Experiments searching for the existence of ω-mesic states, using the tagged photon beam at the ELSA accelerator in Bonn, are presented. The combined setup of the Crystal Barrel and MiniTAPS detector systems, which form a 4π electromagnetic calorimeter, was used for detecting the possible ω-mesic states via the $\omega \to \pi^\circ + \gamma$ decay mode. The recoiling proton of the $\gamma+p \to \omega+p$ reaction was identified with an aerogel Cherenkov detector and the forward angle spectrometer MiniTAPS. Two experiments on a carbon target have been performed as well as a reference measurement on LH_2. A comparison of the experimental results with theoretical predictions indicates a weakly attractive or even repulsive ω-nucleus potential.
*Funded by DFG (SFB/TR16)

HK 65.4 Do 15:00 HSZ-304

Partialwellenanalyse der Reaktion $\overline{p}p \to \omega\pi^0$ — •Julian Pychy, Helmut Koch, Bertram Kopf und Ulrich Wiedner — Ruhr-Universität Bochum

Um wichtige Erkenntnisse für das zukünftige $\overline{\text{P}}$anda-Experiment zu gewinnen, wurde mit Daten des Crystal Barrel (LEAR)-Experimentes eine Partialwellenanalyse (PWA) der Reaktion $\overline{p}p \to \omega\pi^0$ durchgeführt. Die beiden dominanten Zerfälle des ω-Mesons in $\pi^0\gamma$ und $\pi^+\pi^-\pi^0$ wurden separat für verschiedene $\overline{p}$-Impulse zwischen 600 MeV/c und 1940 MeV/c untersucht. Durch ein elaboriertes Verfahren zur Unterdrückung des Untergrundes konnte eine exzellente Datenqualität erzielt werden. Mit der PWA wurden der maximal beitragende Bahndrehimpuls des $\overline{p}p$-Systems und insbesondere die Elemente der Spin-Dichtematrix des ω bestimmt, welche wichtige Informationen über die Ausrichtung (Alignment) und den Produktionsprozess dieses Mesons enthalten. Ergänzend wurden die Elemente der Spin-Dichtematrix mittels der herkömmlichen Methode über die Zerfallswinkelverteilungen ermittelt. Die jeweiligen Resultate stehen in sehr gutem Einklang miteinander und zeigen ein signifikantes, vom Produktionswinkel abhängiges Alignment des ω.

Gefördert durch das BMBF.

HK 65.5 Do 15:15 HSZ-304

Search for antiproton-^{15}N Bound State in PANDA — •Dexu Lin[1,2], Alexei Larionov[3,4], Yue Ma[5], Igor Mishustin[3,4], and Frank Maas[1,2,6] — [1]Helmholtz Institut Mainz, 55128 Mainz, Germany — [2]Johannes Gutenberg Universität Mainz, Institut für Kernphysik, 55099 Mainz, Germany — [3]Frankfurt Institute for Advanced Studies (FIAS), D-60438 Frankfurt am Main, Germany — [4]National Research Center "Kurchatov Institute", 123182 Moscow, Russia — [5]RIKEN, Saitama 351-0198, Japan — [6]GSI Helmholtzzentrum fuer Schwerionenforschung, GmbH, 64291 Darmstadt, Germany

In order to study the antiproton-nucleus potential (antimatter-mater potential), and prepare a possible experiment for the PANDA spectrometer at FAIR facility, we carried out a calculation with the Gießen-Boltzman-Uehling-Uhlenbeck(GiBUU) model.

The calculation was performed for an antiproton beam energy 1.5 GeV and an ^{16}O target. The interesting events, which provide information about the antiproton-^{15}N potential, are required to have one knocked-out proton in forward direction and two or more pions from the antiproton annihilation at rest. Preliminary results of these studies will be presented

HK 65.6 Do 15:30 HSZ-304

The $\bar{p}p \to l^+l^-$ ($l = e, \mu$ or τ) and $\bar{p}p \to \pi^+\pi^-$ cross section — •Manuel Zambrana — Institut fuer Kernphysik, Johannes Gutenberg Universitaet Mainz, Germany

We describe the differential cross section for the processes $\bar{p}p \to l^+l^-$, with $l = e, \mu$ or τ, and $\bar{p}p \to \pi^+\pi^-$, when both the proton target and the antiproton beam are unpolarized. For lepton production, the cross section is a leading order calculation with a massive lepton in the final state. For pion production, the parametrization of the cross section in the low energy regime is based on a Legendre polynomial fit to data from the (antiproton beam) CERN 28 GeV proton synchroton, whereas in the high energy regime the recent predictions by J. van de Wiele and S. Ong based on a Regge Theory approach were used. A public C++ code to perform integration of both the lepton and pion cross section in a user-defined kinematic region is also described. This code is a useful tool for simulation studies with PANDA at FAIR.

HK 65.7 Do 15:45 HSZ-304

Central Diffraction in Proton-Proton Collisions at $\sqrt{s} = 7$ TeV with the ALICE Experiment — •Felix Reidt — Physikalisches Institut, Universität Heidelberg

The ALICE Experiment consists of a central barrel covering the pseudorapidity range $-0.9 < \eta < 0.9$ accompanied by additional detectors in the region $-3.7 < \eta < -0.9$ and $0.9 < \eta < 5.1$. Using this detector configuration, central diffractive events can be identified by their topology. This topology, characterized by rapidity gaps, is defined by hadronic activity in the central barrel and missing activity in the additional detectors. This talk will summarize first results from the analysis of double-gap events.