HK 18: Hadron Structure and Spectroscopy 3

Time: Monday 17:00–18:45 Location: T/SR19

Group Report HK 18.1 Mon 17:00 T/SR19

Status of the GPD program @ COMPASS II — •Matthias Gorzellik, Horst Fischer, Philipp Jörg, Kay Königsmann, Steffen Landgraf, Christopher Regali, Katharina Schmidt, Stefan Sirtl, Tobias Szameitat, and Johannes ter Wolbeek — for the COMPASS collaboration, Physikalisches Institut, Albert-Ludwigs-Universität Freiburg

The COMPASS-II experiment is a fixed target experiment situated at CERN. A tertiary myon beam from the SPS scattered of protons from a liquid hydrogen target is used to measure Deeply Virtual Compton Scattering (DVCS) and Hard Exclusive Meson Production (HEMP).

Both processes open a unique window to constrain Generalized Parton Distributions, which are related to the total angular momentum of quarks, antiquarks and gluons in the nucleon. An upgrade of the previous experiment was started in 2012. The major parts of the upgrade for the measurement of exclusive reactions are the recoil proton detector (CAMERA) and an additional Electromagnetic Calorimeter.

The close to final setup allows for a measurement of exclusive reactions with very low cross sections in a wide kinematic range. A pilot run, covering five weeks of data taking, was performed at the end of 2012. In this talk we will present first results from the analysis.

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HK 18.2 Mon 17:30 T/SR19

Eperimental access to Transition Distribution Amplitudes with the PANDA experiment at FAIR — •Manuel Zambrana[1,2], María Carmen Mora Espí[2], Frank Maas[1,2,3], Heybat Ahmadi[2], Samer Ahmed[1,2], Luigi Capozza[2], Alaa Dbeyssi[2], Malte Deiseroth[1,2], Bertold Fröhlich[1,2], Dmitry Khaneft[1,2], Dexu Lin[1,2], Cristina Morales[2], Oliver Noll[1,2], David Rodríguez Piñeiro[2], Roserio Valente[1,2], and Iris Zimmermann[1,2] — [1]Institut für Kernphysik, Johannes Gutenberg Universität, Mainz, Germany — [2]Helmholtz-Institut Mainz, Germany — [3]Prisma Cluster of Excellence, Mainz, Germany

We address the feasibility of accessing proton to pion Transition Distribution Amplitudes with the future PANDA detector at the FAIR facility. Assuming a factorized cross section, feasibility studies of measuring $\bar{p}p \to e^+e^-\pi^0$ with PANDA have been performed at the center of mass energy squared $s = 5$ GeV^2 and $s = 10$ GeV^2, in the kinematic region of four-momentum transfer $3.0 < q^2 < 4.3$ GeV^2 and $5 < q^2 < 9$ GeV^2, respectively, with a neutral pion scattered in the forward or backward cone $|\cos\theta_{\pi^0}| > 0.5$ in the $\bar{p}p$ center of mass frame. These include detailed simulations on signal reconstruction efficiency, rejection of the most severe background channel, i.e. $\bar{p}p \to \pi^+\pi^-\pi^0$, and the feasibility of the measurement using a sample of 2 fb^{-1} of integrated luminosity. The "measured" cross sections with the simulations are used to test QCD factorization at the leading order by measuring scaling laws and fitting angular distributions.

HK 18.3 Mon 17:45 T/SR19

Odd moments of nucleon charge and magnetization distribution in ChPT — •Nadiia Krupina and Vladimir Pascalutsa — Institut für Kernphysik, JGU Mainz

We consider the predictions of Chiral Perturbation Theory (ChPT) for the third Zemach moment and Zemach radius and confront them with empirical values. We look at implications of these results for the Lamb shift and hyperfine structure of (muonic) hydrogen.

HK 18.4 Mon 18:00 T/SR19

Measuring the proton form factor at very low Q^2 — •Adrian Weber — Institut für Kernphysik, Johannes Gutenberg Universität Mainz

The proton is a fundamental constituent of matter. Yet the determination of its radius via interaction with electrons and muons seems to yield different radii leading to the so called proton radius puzzle.

To bring new insight into the observed discrepancy a novel electron scattering experiment at MAMI (Mainz Microtron) was performed aiming to determine the electric form factor of the proton at Q^2 as low as $1-3\cdot10^{-4}(GeV/c)^2$, by using a method based on initial state radiation. The goal of the experiment is to obtain the electric form factor with an accuracy of 1% and extract a new value for the proton charge radius. In this presentation a brief overview of the experiment will be presented together with the underlying theory. Then the present status of the analysis and preliminary results will be discussed.

HK 18.5 Mon 18:15 T/SR19

Measurement of the $e^+e^- \to \bar{p}p$ cross section at BESIII using the untagged-initial state radiation technique — •Christoph Rosner[1], Samer Ali Nasher Ahmed[1], Alaa Dbeyssi[1], Paul Larin[1], Dexu Lin[1], Frank Maas[1,2,3], and Cristina Morales[1] — [1]Helmholtz-Institut Mainz, 55128 Mainz, Germany — [2]Institute of Nuclear Physics, Mainz, Germany — [3]PRISMA Cluster of Excellence, Mainz, Germany

Electromagnetic form factors are fundamental quantities which describe the structure and the internal dynamics of hadrons. In the timelike region, proton form factors are experimentally accessible through the $e^+ + e^- \leftrightarrow \bar{p} + p$ channels. Initial state radiation (ISR) is an effective tool to measure hadronic cross section at high luminosity e^+e^- storage rings, such as the Beijing Electron-Positron Collider II (BEPC-II). This contribution reports on the $e^+ + e^- \to \bar{p} + p + \gamma$ analysis for proton form factor measurements at the Beijing Spectrometer III (BESIII/BEPC-II). The case of untagged ISR photon is presented. Monte Carlo simulations for signal and background processes at center of mass energies 4.23, 4.26 and 4.36 GeV, are described.

HK 18.6 Mon 18:30 T/SR19

Search for polarization effects in the antiproton production process — •Dieter Grzonka — Forschungszentrum Jülich GmbH, 52425 Jülich, Germany

for the P349 collaboration

Polarized antiproton beams would allow more detailed studied in various topics of low and high energy antiproton physics experiments. There are a number of proposals how polarized antiprotons could be produced but mostly the expected intensity or polarization is very low or feasibility studies would require an enormous effort. A rather simple method for the preparation of a polarized antiproton beam would be the production process itself if it creates some polarization. In order to investigate polarization effects in the antiproton production process the angular distribution of elastically scattered antiprotons is measured which are produced in the interaction of the 24 GeV/c PS proton beam at CERN with a solid target. The measurement is done in the CNI region at small forward scattering angles for which the analyzing power is rather well known by reconstructing the tracks of primary and scattered antiprotons. The experimental setup will be presented and preliminary results will be shown.