HK 19: Hadron Structure and Spectroscopy III

Zeit: Dienstag 14:00–16:15 Raum: F 5

Gruppenbericht HK 19.1 Di 14:00 F 5

Measurement of Electromagnetic Form Factors of Nucleons at the BESIII Experiment — •Dexu Lin[1,2], Samer Ali Nasher Ahmed[1,2], Alaa Dbeyssi[1], Paul Larin[1,2], Frank Maas[1,2,3], Cristina Morales[1], Christoph Rosner[1,2], Yadi Wang[1], and Bo Zheng[1,4] for the BESIII-Collaboration — [1]Helmholtz-Institut Mainz, 55128 Mainz, Germany — [2]Institut für Kernphysik, Johannes Gutenberg Universität Mainz, 55099 Mainz, Germay — [3]PRISMA Cluster of Excellence, Johannes Gutenberg Universität Mainz, 55099 Mainz, Germay — [4]University of South China, 421001 Hengyang, China

BEPCII is a symmetric e^+e^--collider located in Beijing running at $\sqrt{s}$ energies between 2.0 and 4.6 GeV. This energy range allows the BESIII experiment to measure hadron form factors both from direct e^+e^--annihilation and from initial-state-radiation processes. Results on $e^+e^- \to p\bar{p}$ based on data at $\sqrt{s}$ energies between 2.22 to 3.67 GeV collected by BESIII in 2011 and 2012 are presented. We also report preliminary results on both tagged and untagged analyses with the initial-state-radiation process $e^+e^- \to p\bar{p}\gamma$ based on data samples at $\sqrt{s}$ energies between 3.773 to 4.60 GeV. Finally, expectations on the measurement of nucleon electromagnetic form factors from the BESIII high luminosity energy scan in 2015 are also presented.

Gruppenbericht HK 19.2 Di 14:30 F 5

The A4 experiment at MAMI — •Luigi Capozza[1,2], David Balaguer Ríos[1], Sebastian Baunack[1,3], Jürgen Diefenbach[1], Boris Gläser[1,2], Yoshio Imai[1,2], Eva-Maria Kabuss[1], Jeong-Han Lee[1], Frank Maas[1,2,3], Maria Carmen Mora Espí[1,2], Ernst Schilling[1], Dietrich von Harrach[1], and Christoph Weinrich[1] — [1]Institut für Kernphysik, Johannes Gutenberg-Universität Mainz — [2]Helmholtz-Institut Mainz — [3]PRISMA Cluster of Excellence, Johannes Gutenberg-Universität Mainz

The A4 experiment at the MAMI accelerator facility at Mainz studies the nucleon structure by measuring beam single spin asymmetries in the electron-proton scattering. Longitudinal spin measurements, i.e. parity violating (PV), for accessing the strangeness contributions to the nucleon form factors, as well transverse spin measurements, sensitive to higher order QED corrections, have been performed on both hydrogen and deuterium targets at both forward and backward angles. A review of the experimental programme with emphasis on the recently published results and the ongoing data analysis activities will be given. The status of the latest attempt of extracting the PV asymmetry from inclusive single-pion electroproduction in the invariant mass range from threshold to the maximum of the $\Delta(1232)$ resonance will be reported.

HK 19.3 Di 15:00 F 5

Beam normal spin asymmetries in the A4 experiment at backward angles — •David Balaguer Ríos for the A4-Collaboration — Institut für Kernphysik, Johannes Gutenberg-Universität Mainz, Germany

In the A4 experiment at the MAMI accelerator facility the beam normal spin asymmetries in the electron-proton elastic scattering and in the electron-deuteron quasielastic scattering have been measured at $Q^2 = 0.23$ (GeV/c)^2 and $Q^2 = 0.35$ (GeV/c)^2 at backward angles. The analysis of the data is presented and the comparison of the measurements with the theoretical calculation from B. Pasquini et al.

HK 19.4 Di 15:15 F 5

Radiative corrections on $\bar{p}p \to e^+e^-$ with the PANDA experiment at FAIR — •Manuel Zambrana[1,2], Alaa Dbeyssi[1], Frank Maas[1,2,3], Egle Tomasi-Gustafsson[4], Yuri M. Bystritskiy[5], Vladimir A. Zykunov[5], Heybat Ahmadi[1,2], Samer Ahmed[1,2], Alexander Aycock[1,2], Luigi Capozza[1], Bertold Fröhlich[1,2], Phillip Grasemann[1,2], Sebastian Haasler[1,2], David Izard[1], Dmitry Khaneft[1,2], Jörg Köhler[1,2], María Carmen Mora Espí[1], Oliver Noll[1,2], David Rodríguez Pieñeiro[1], Javier Jorge Rico[1], Sahra Wolff[1,2], and Iris Zimmermann[1,2] — [1]Helmholtz-Institut Mainz, Germany — [2]Institut für Kernphysik, Johannes Gutenberg Universität, Mainz, Germany — [3]Prisma Cluster of Excellence, Mainz, Germany — [4]CEA, IRFU, SPhN, Saclay, France — [5]Joint Institute for Nuclear Research, Dubna, Russia

Simulations studies have shown that the PANDA detector at FAIR will be capable of measuring the timelike electromagnetic form factors of the proton via the reaction $\bar{p}p \to e^+e^-$ with a precision of a few percent at low q^2, thus demanding to take into account radiative corrections. First order radiative corrections to $\bar{p}p \to e^+e^-$ have been calculated in the point-like approximation, including both virtual and real corrections, and interference effects. Suitable event generators to be used in the framework of the PANDA experiment have been developed on the basis of the calculated cross section.

HK 19.5 Di 15:30 F 5

Measurement of the Proton Formfactor by using the MAGIX Jet-Target @A1 — •Stephan Aulenbacher für die MAGIX-Kollaboration — Institut für Kernphysik, Mainz, Deutschland

Within the next decade a new experiment will be built and will start to be operated at the Institut für Kernphysik at the University of Mainz, exploiting the powerful electron beam of the new MESA accelerator. The Target of this experiment - MAGIX - will use a Jet-Target. A Prototype of this Target will be finished till Summer 2017. To test the target we will Perform a Measurement of the Proton Fomfactor via the ISR technique @A1. According to a simulation the Jet Taret should reduce the Background significantly. This Talk will be about the Measurement and the implementation of the Hardware @A1.

HK 19.6 Di 15:45 F 5

Study of chiral dynamics in $\pi^-\pi^0\pi^0$ production in Primakoff reactions at COMPASS — •Markus Krämer — Technische Universität München, Garching, Germany

COMPASS is a multipurpose fixed-target experiment at the CERN SPS, which addresses a wide variety of physic topics, in particular the structure and spectroscopy of hadrons. Diffractive dissociation of pions on nuclear targets allows for a clean access to the light-meson spectrum. * In addition, meson production is studied in pion-photon reactions via the Primakoff effect, where high-energetic pions scatter off the quasi-real photons surrounding the target nuclei. At low pion-photon center-of-mass energies, these reactions are governed by chiral dynamics and can be calculated using chiral perturbation theory. At higher energies, resonances are produced and their radiative coupling is investigated.

Using a 191 GeV/c negatively charged hadron beam (consisting mostly of pions) and a Ni target, 1.2 Million exclusive $\pi^-\pi^0\pi^0$ events have been recorded in the region of small squared four-momentum transfer, i.e. $t' < 0.026\,\mathrm{GeV}^2/c^2$. At very low $t' < 0.002\,\mathrm{GeV}^2/c^2$, the contribution from electromagnetic interactions become visible in the t' spectrum. This is used to determine the differential cross-section $\sigma(\pi^-\gamma \to \pi^-\pi^0\pi^0)$ near the three-pion threshold, where this reaction is dominated by chiral dynamics. In an alternative approach, this cross-section is determined by applying a partial-wave decomposition. Both methods and the obtained results will be presented.

HK 19.7 Di 16:00 F 5

Measurement of the cross section $e^+e^- \to \pi^+\pi^-\pi^0\pi^0$ at the BaBar Experiment — •Konrad Griessinger for the BaBar-Collaboration — Institut für Kernphysik, University of Mainz, Germany

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 to the level where evidence of this effect may be claimed or rejected, the experimental input for the theoretical prediction needs to be improved. For this purpose the most pressing issue is the precision measurement of the semi-neutral four pion cross section $\sigma(e^+e^- \to \pi^+\pi^-\pi^0\pi^0)$. This channel has recently been measured on the full BaBar data set, where its cross section as well as the contribution to the muon $g-2$ and the running of the fine structure constant $\Delta\alpha$ are evaluated.