

HK 57: Hadron Structure and Spectroscopy VII

Zeit: Freitag 14:00–16:15

Raum: F 5

Gruppenbericht

HK 57.1 Fr 14:00 F 5

Measurement of electromagnetic transition form factors in two-photon collisions at BESIII — ●CHRISTOPH FLORIAN REDMER, ACHIM DENIG, BRICE GARILLON, and YUPING GUO for the BESIII-Collaboration — Institut für Kernphysik, Johannes Gutenberg-Universität Mainz

Electromagnetic transition form factors of light pseudoscalar mesons are important inputs to the calculations of the hadronic light-by-light scattering contribution to the Standard Model prediction of the anomalous magnetic moment of the muon. Data at the relevant regions of momentum transfer are scarce. The BESIII experiment at the e^+e^- collider BEPCII has collected more than 10 fb^{-1} of data at center-of-mass energies between 2.0 and 4.6 GeV/c^2 . The data sets are analyzed for two-photon collisions in events of the type $e^+e^- \rightarrow e^+e^-\mathcal{P}$, with $\mathcal{P} = \pi^0, \eta^{(\prime)}, \pi^0\pi^0$, and $\pi^+\pi^-$. The aim is to study the momentum dependence of the respective electromagnetic transition form factors in the space-like regime. In this presentation we discuss the current status and the prospects of the ongoing analyses.

Gruppenbericht

HK 57.2 Fr 14:30 F 5

Studies of Meson Decays with the Crystal Ball/TAPS setup at MAMI — ●PATRIK ADLARSON — Institut für Kernphysik, Johannes Gutenberg Universität, Mainz, Germany

Precision studies of light meson decays are used to investigate a wide range of topics related to fundamental aspects of hadron physics. Precision measurements of meson Dalitz decays give input to hadronic determinations of the light-by-light contribution to the anomalous magnetic moment of the muon. Pseudoscalar η' decays allow for studies of such diverse topics as $\pi\pi$ scattering lengths, the $\text{SU}(3)$ singlet-octet mixing angle, effective field theory and fundamental symmetries. Recently, a large statistics sample of η' (ω) mesons have been produced and collected with the Crystal Ball/TAPS setup at MAMI. An overview of the physics motivations, the experimental setup and recent results are presented.

HK 57.3 Fr 15:00 F 5

Monte Carlo Event Generation with Radiative QED processes in Deep-Inelastic Scattering. — ●NICOLAS PIERRE — for the COMPASS collaboration, Institut für Kernphysik, Mainz, Germany

In order to apply QED corrections in the extraction of 1-photon cross-sections in deep-inelastic scattering, radiation of photon have to be taken into account. In the COMPASS experiment, the production of hadrons is studied by scattering 160 GeV muons on nucleons. Radiation of photons from various ranges of kinematics, which is calculated using information from the scattered muon, thus happens. To correct for this effect, this radiation has to be taken care of in the Monte Carlo simulation used to obtain the acceptance.

The DJANGO event generator, working along with LEPTO and JETSET, is chosen as it describes well our data. The implementation into the Monte Carlo chain and the results obtained will be discussed.

HK 57.4 Fr 15:15 F 5

Analysis of 2016 COMPASS data on DVCS — ●JOHANNES GARRA — for the COMPASS Collaboration, Institut für Kernphysik, Mainz, Germany

The COMPASS Experiment is a fixed target experiment at the M2 beamline at CERN. In 2016 deeply virtual compton scattering (DVCS) was measured by scattering a polarized positive and negative charged muon beam off a liquid hydrogen target. From these measurements the charge and spin cross section difference can be determined. This difference is related to a generalized parton distribution function, which allows to study the three dimensional structure of the proton. The talk will discuss the status of the ongoing analysis with a focus on determination of the luminosity and comparison of the data taken with the

positive and negative charged muon beam.

HK 57.5 Fr 15:30 F 5

Status of the analysis of the $\eta' \rightarrow \omega\gamma$ relative branching ratio — ●ANDREAS NEISER and WOLFGANG GRADL for the A2-Collaboration — Institut für Kernphysik, Universität Mainz

The A2 collaboration at the electron accelerator MAMI in Mainz uses energy-tagged photons to produce light mesons off the nucleon. In 2014, three dedicated beamtimes for the production of η' mesons off unpolarized protons yielded a data sample of $\approx 6 \times 10^6$ η' mesons within an incident photon energy range $E_\gamma = 1.42 \dots 1.58 \text{ GeV}$.

The A2 detector system mainly consists of the 4π calorimeter Crystal Ball and the TAPS calorimeter in forward direction, which are ideally suited to detect neutral final states in the given energy range.

We present the status of the analysis for the relative branching ratio of the pseudoscalar-vector-gamma decay $\eta' \rightarrow \omega\gamma$ to the reference channel $\eta' \rightarrow 2\gamma$. We show the extraction of the value based on Monte Carlo studies and give estimates of the expected uncertainties of our measurement. The result serves as an input to effective field theories of the strong interaction, especially concerning η - η' -mixing and the consistent inclusion of vector mesons.

HK 57.6 Fr 15:45 F 5

Study of Light Mesons in Two-Photon Fusion at BESIII — ●MARVIN RICHTER for the BESIII-Collaboration — Institut für Experimentalphysik I, Ruhr-Universität Bochum

The BESIII experiment at the symmetric electron-positron collider BEPCII in Beijing has recorded large data samples at center of mass energies up to 4.6 GeV. The data recorded above the $\psi(2S)$ resonance is well suited to study the production of light meson resonances in two-photon fusion.

From these processes the two-photon width of contributing resonances can be derived, which is an important measure to understand their nature. Various final states are studied to access resonances such as $\eta(1405)$ and $\eta(1475)$, which are discussed to be an admixture of conventional $q\bar{q}$ states and a glueball. For these efforts the two-photon event generator GamGam previously utilized by the CLEO and BaBar collaborations has been migrated from Fortran77 to C++ and optimized. In this contribution preliminary results and the status of the event generator are presented.

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HK 57.7 Fr 16:00 F 5

Baryon electromagnetic transitions in pion induced reactions with HADES — ●FEDERICO SCOZZI for the HADES-Collaboration — TU Darmstadt, Germany — IPN Orsay, France

Several experiments showed an enhancement in di-lepton invariant mass spectra below the vector meson pole both in proton-nucleus and in nucleus-nucleus collisions. The main interpretation of this effect is based on the strong coupling of the ρ meson to the baryonic resonances. In summer 2014 data were taken with the High Acceptance Di-Electron Spectrometer (HADES) at GSI in pion-induced reactions with the aim to study the coupling of the ρ with the baryonic resonances in the second resonance region by means of the reactions $\pi^-p \rightarrow \pi^+\pi^-n$ and $\pi^-p \rightarrow \pi^0\pi^-p$. In addition, the role of the ρ meson in electromagnetic transitions in the time-like region is investigated in the reaction $\pi^-p \rightarrow e^+e^-n$. In this contribution results of dilepton invariant mass spectra will be presented in comparison with different models. In addition, the connection with the two-pion production channels allows to investigate the validity of the Vector Dominance Model. Finally the angular distributions of the leptons, which contain additional information on the electromagnetic properties of the different contributions, will be discussed.

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