

HK 45: Hadron Structure and Spectroscopy VIII

Zeit: Donnerstag 14:00–16:00

Raum: HZO 50

Gruppenbericht HK 45.1 Do 14:00 HZO 50
Measurement of electromagnetic transition from factors in two-photon collisions at BESIII — ACHIM DENIG, ●BRICE GARILLON, YUPING GUO, and CHRISTOPH FLORIAN REDMER for the BESIII-Collaboration — Institut für Kernphysik, Johannes Gutenberg-Universität Mainz

Electromagnetic Transition Form Factors (TFFs) of light mesons provide valuable information on the nature of the strong interaction. At large momentum transfer Q^2 , they shed light on mesons' structure. At small momentum transfer, the TFFs are important inputs to the calculation of the hadronic light-by-light scattering contribution to the Standard Model prediction of the anomalous magnetic moment of the muon $(g-2)_\mu$. The BESIII experiment at the e^+e^- collider BEPCII has collected more than 10 fb^{-1} at center-of-mass energies between 2.0 and 4.6 GeV. The data sets are analyzed for two-photon collisions in events of the type $e^+e^- \rightarrow e^+e^- \mathbf{P}$, with $\mathbf{P} = \pi^0, \eta^{(\prime)}, \pi^0\pi^0$ and $\pi^+\pi^-$. The aim is to study the momentum transfer dependence of the respective electromagnetic TFFs in the space-like region relevant for the calculation of $(g-2)_\mu$. In this talk the current status and the prospects of the ongoing analyses will be presented.

HK 45.2 Do 14:30 HZO 50

Soft-photon corrections to the Bethe-Heitler process in the $\gamma p \rightarrow l^+l^-p$ reaction — ●MATTHIAS HELLER — Johannes-Gutenberg-Universität Mainz

High-precision calculations of electromagnetic processes become more and more important for the interpretation of electron-nucleon scattering experiments. One example is the Bethe-Heitler process, the lepton pair photoproduction on a proton target, which can be used as a test of lepton universality. Violation of this universality could shed light on the proton radius puzzle, the discrepancy between the charge radii measurements from muonic spectroscopy and data with electrons. An upcoming experiment at MAMI (Mainz) aims to compare the cross-sections of muon and electron pair production. A precise knowledge of the electromagnetic radiative corrections is needed for these measurements. As a first step, the leading QED radiative corrections are presented in the soft-photon approximation.

HK 45.3 Do 14:45 HZO 50

Future Measurement of the Proton Radius at COMPASS — ●SEBASTIAN UHL for the COMPASS-Collaboration — Physik Department, Technische Universität München, Garching

The observed difference of the proton charge radius measured on the one hand in electron scattering experiments and in hydrogen spectroscopy and on the other hand in the spectroscopy of muonic hydrogen has triggered many efforts to clarify its origin. An elastic-scattering experiment using a high-energetic muon beam could provide a different view at this issue. Compared to electron scattering, such an experiment will be affected much less by radiative corrections.

We will present ideas, how such a measurement can be performed in the framework of a future COMPASS program.

HK 45.4 Do 15:00 HZO 50

Vertex reconstruction at the BGO-OD experiment* — ●PATRICK BAUER — Physikalisches Institut, Nussallee 12, D-53115 Bonn

The BGO-OD experiment at the ELSA accelerator facility in Bonn investigates the mechanisms of photoproduction of mesons from nucleons. One focus is the associated strangeness production, i.e. $\gamma p \rightarrow (KY)^+$ or $\gamma n \rightarrow (KY)^0$. In order to identify such events, the displacement of decay vertex of involved strange particles, relative to the primary vertex can be used.

Therefore a key feature of the experiment is the capability to reconstruct the decay vertices of particles decaying into multiple charged final state particles. To achieve this the experiment uses the tracks of charged child particles, measured by the newly commissioned cylindrical MWPC, to determine the decay vertices of the mother-particles. In this Talk the reconstruction procedure for the vertices and preliminary

results will be presented.

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HK 45.5 Do 15:15 HZO 50

$K^+\Lambda(1405)$ production at extreme forward angles — ●GEORG SCHELUCHIN for the BGO-OD-Collaboration — Physikalisches Institut, Nussallee 12, D-53115 Bonn

One aim of the BGO-OD experiment is the investigation of hyperon photoproduction. The setup combines a large aperture forward magnetic spectrometer and a central BGO crystal calorimeter.

Since the discovery of the $\Lambda(1405)$, it remains poorly described by conventional constituent quark models, and it is a candidate for having an "exotic" meson-baryon or "penta-quark" structure, similar to states recently reported in the hidden charm sector.

The $\Lambda(1405)$ can be produced in the reaction $\gamma p \rightarrow K^+\Lambda(1405)$. One decay mode is into $\Sigma^0\pi^0$, which is prohibited for the mass-overlapping $\Sigma(1385)$. BGO-OD is ideally suited to measure this decay with the K^+ in the forward direction. Using the newest available data at the BGO-OD experiment preliminary results will be presented.

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HK 45.6 Do 15:30 HZO 50

$K_S^0\Sigma^0$ photoproduction at the BGO-OD experiment — ●KATRIN KOHL for the BGO-OD-Collaboration — Physikalisches Institut, Nussallee 12, D-53115 Bonn

The BGO-OD experiment at the ELSA accelerator facility uses an energy tagged bremsstrahlung photon beam to investigate the internal structure of the nucleon.

The setup with a BGO calorimeter surrounding the target and an open dipole spectrometer covering the forward region is ideally suited for investigating low momentum transfer processes, in particular the investigation of strangeness photoproduction.

The photoproduction of K_S^0 is crucial to understand the role of K^* exchange mechanisms. A cusp-like structure observed in $\gamma p \rightarrow K_S^0\Sigma^+$ excitation spectra is accurately described by including dynamically generated resonances from vector meson-baryon interactions. Such interactions are predicted to give a peak like structure in the $K_S^0\Sigma^0$ excitation spectra.

I will present a preliminary study of $\gamma n \rightarrow K_S^0\Sigma^0$ from a deuterium target dataset, in preparation for high statistics data anticipated next year.

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HK 45.7 Do 15:45 HZO 50

$K^+\Lambda$ and $K^+\Sigma^0$ photoproduction at extremely forward angles with the BGO-OD experiment — ●THOMAS JUDE for the BGO-OD-Collaboration — Physikalisches Institut, Universität Bonn, Germany

The BGO-OD experiment at the ELSA accelerator facility uses an energy tagged bremsstrahlung photon beam to investigate the internal structure of the nucleon. The setup consists of a highly segmented BGO calorimeter surrounding the target, with a particle tracking magnetic spectrometer at forward angles.

BGO-OD is ideal for investigating low momentum transfer processes due to the acceptance and high momentum resolution at forward angles. In particular, this enables the investigation of strangeness photoproduction where t -channel exchange mechanisms play a dominant role. As part of an extensive strangeness photoproduction experimental programme, the differential cross section measurements for $K^+\Lambda$ and $K^+\Sigma^0$ photoproduction at centre of mass polar angles between 4° to 25° will be presented.

These first data at extremely forward angles are important for partial wave analyses, and models where accurate knowledge of t -channel mechanisms are required. The data also constrain models for hypernuclei electroproduction, where at very low Q^2 , the $K^+\Lambda$ cross section is comparable to photoproduction.

Preliminary differential cross sections, and recoiling baryon asymmetries will be shown.

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