HK 11: Hadron Structure and Spectroscopy II

Zeit: Dienstag 11:00–12:30 Raum: F 5

HK 11.1 Di 11:00 F 5

Analysis of the reaction $\gamma p \to K^0\Sigma^+$ in the decay channel $(\pi^0\pi^0)\,(\pi^+ n)$ at the BGO-OD experiment — •Stefan Alef for the BGO-OD-Collaboration — Physikalisches Institut Universität Bonn

The BGO-OD experiment at the ELSA facility in Bonn investigates nucleon excitations via meson photoproduction. One research objective is associated strangeness production, which includes the reaction channel $\gamma p \to K^0\Sigma^+$.

Results of the analysis of the mixed charged/neutral decay channel $K^0\Sigma^+ \to (\pi^0\pi^0)\,(\pi^+ n)$ will be presented. Kinematic and template fitting are used to discriminate the reaction against background.
Supported by DFG (SFB/TR-16).

HK 11.2 Di 11:15 F 5

Hyperon Photoproduction with the BGO-OD Experiment* — •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 non-strange and strange hyperon photoproduction. The setup combines a large aperture forward magnetic spectrometer and a central BGO crystal calorimeter covering the polar angles up to 12° and 25° to 155°, respectively. The acceptance gap in between is covered by a segmented plastic scintillator.

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 $\gamma p \to K^+\Lambda(1405)$. One decay mode is into $\Sigma^0\pi^0$, which is prohibited for the mass-overlapping $\Sigma(1385)$. A similar reaction to reconstruct is $\gamma p \to K^+\Sigma^0$, which yields one less pion in the final state. BGO-OD is ideally suited to measure both reactions and preliminary results will be presented.

*Supported by DFG (SFB/TR-16).

HK 11.3 Di 11:30 F 5

$K^+\Lambda$ 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

The BGO-OD experiment at the ELSA accelerator facility uses an energy tagged bremstrahlung 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.

Forward K^+ identification, fitting techniques to separate signal from background, and preliminary results will be shown.

HK 11.4 Di 11:45 F 5

Analysis of the reaction $\gamma p \to K^0\Sigma^+$ by the identification of the charged $K*$ decay channel at the BGO-OD experiment* — •Björn-Eric Reitz for the BGO-OD-Collaboration — Physikalisches Institut Universität Bonn

The BGO-OD experiment at the ELSA facility in Bonn investigates nucleon excitations via meson photoproduction. A program of measurements of associated strangeness final states has begun, one of which is $\gamma p \to K^0\Sigma^+$.

This talk shows preliminary results of the analysis for the charged decay channel $K^0\Sigma^+ \to (\pi^-\pi^+)\,(\pi^0 p)$ obtained from new data.
*Supported by DFG (SFB/TR-16).

HK 11.5 Di 12:00 F 5

Cascading nucleon resonance decays * — •Mariana Nanova for the CBELSA/TAPS-Collaboration — II. Physikalisches Institut, Justus-Liebig-Universität Gießen

A key step towards understanding non-perturbative QCD is baryon spectroscopy, the investigation of the spectrum and properties of baryon resonances [1]. We studied the two-meson photoproduction with the CB/TAPS detector system at the ELSA accelerator in Bonn in the reactions $\gamma p \to p\pi^0\pi^0$ and $\gamma p \to p\pi^0\eta$. High statistics have been obtained in irradiating a liquid hydrogen target with photon beams in the incident energy range from 0.5 to 3.0 GeV. A kinematic fit has been used in the reconstruction and identification of the exit channels. Dalitz plots show a clear evidence for the $\Delta(1232)$, and further baryon resonances populated in the decay of higher lying nucleon resonances [2,3,4]. Preliminary results on $\Delta(1232)\pi^0$ and $\Delta(1232)\eta$ excitation functions will be presented.

[1] E. Klempt and J.-M. Richard, *Rev. Mod. Phys.* **82** (2010) 1095
[2] E. Gutz et al., *Eur. Phys. J. A* **50** (2014) 74
[3] V. Sokhoyan et al., *Eur. Phys. J. A* **51** (2015) 95
[4] A. Thiel et al., *Phys. Rev. Lett.* **114** (2015) 091803
*Supported by DFG through SFB/TR16.

HK 11.6 Di 12:15 F 5

Cascading decays of nucleon and delta resonances with the CLAS detector at JLAB — •Stefan Diehl, Kai-Thomas Brinkmann, Eric Gutz, and Mariana Nanova for the CLAS-Collaboration — II. Physikalisches Institut, Justus-Liebig-Universität Gießen

A rich variety of nucleon and delta resonances with cascading decays into hadrons (i.e. $\Delta^{**} \to \Delta^{++}\pi^- \to p\pi^+\pi^-$) are predicted by different relativistic quark models and lattice QCD calculations in the mass range above 2 GeV. The CEBAF Large Acceptance Spectrometer (CLAS) at Jefferson National Laoboratory (JLAB), Newport News, Virginia, provides an excellent opportunity to discover such resonances. In this contribution, the search for cascading nucleon and delta resonances in the reaction $\gamma p \to \Delta^{**}$ and $\gamma p \to N^{**}$ with photon energies between 3.0 GeV and 3.8 GeV based on a resonance scan and on the angular distributions of the pions, will be presented. The analysis is based on an isolation of isobars (e.g. $\Delta\ \pi$) in the dataset via Dalitz plots. The obtained subsets are then analysed with respect to cascading decays of high-mass excited states. Due to the high statistics provided by the g11 dataset of CLAS, resonance scans could be performed with a high accuracy. In addition, the status of the search at lower energies, which enables a cross check to earlier analyses, will be presented. As an outlook the focus will be set on the search for hadrons containing strange quarks, which show cascading decays with, for example, Kaons in the final state. *S. D. is supported by JLU Gießen through a JUST'us scholarship grant.