

HK 8: Hadron Structure and Spectroscopy II

Zeit: Montag 16:30–18:30

Raum: HZO 50

Gruppenbericht

HK 8.1 Mo 16:30 HZO 50

Spin Density Matrix Elements in Exclusive Omega Meson Production at COMPASS — HORST FISCHER, MATTHIAS GORZELLIK, and PHILIPP JÖRG — Albert-Ludwigs-Universität Freiburg, on behalf of the COMPASS collaboration

A major part of the COMPASS-II program is dedicated to the investigation of generalized parton distributions (GPDs) and transverse momentum dependent parton distributions (TMDs), which aim for the most complete description of the partonic structure of the nucleon.

GPDs are experimentally accessible via lepton-induced exclusive reactions, in particular the Deeply Virtual Compton Scattering (DVCS) and Deeply Virtual Meson Production (DVMP). At COMPASS, those processes are investigated using a high intensity muon beam with a momentum of 160 GeV/c impinging on a 2.5 m-long liquid hydrogen target. To ensure the exclusivity and precision of the measurement, wide angle electromagnetic calorimetry together with a two-stage magnetic spectrometer is used.

Exploiting the flavour filtering character of DVMP measurements, the COMPASS experiment is able to access different combinations of quark and gluon GPDs by studying the exclusive production of various mesons. We report on the extraction of spin density matrix elements in exclusive ω production.

*Supported by BMBF and the DFG Research Training Group Programme 2044.

HK 8.2 Mo 17:00 HZO 50

Nucleon resonance spectroscopy via meson-pair decay* — MARIANA NANOVA for the CBELSA/TAPS-Collaboration — II. Physikalisches Institut, Justus-Liebig-Universität Gießen

Photoproduction of mesons provides important information about the excitation spectrum of the nucleon that is still not sufficiently understood despite various long-lasting experimental and theoretical efforts [1]. Reactions with multiple-meson final states are important, in particular $\pi^0\eta$ since the η acts as an isospin filter and provides information on the nature of the intermediate resonances. We studied the two-meson photoproduction with the CB/TAPS detector system at the ELSA accelerator in Bonn in the reaction $\gamma p \rightarrow p\pi^0\eta$. High statistics have been obtained in irradiating a liquid hydrogen target with photon beams in the incident energy range from 0.9 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 various baryon resonances populated in the decay of higher lying nucleon resonances. Preliminary results on studying a narrow resonance-like structure, claimed by other experiments, will be presented.

[1] E. Klempt and J.-M. Richard, *Rev. Mod. Phys.* **82** (2010) 1095

*Supported by DFG through SFB/TR16.

HK 8.3 Mo 17:15 HZO 50

Analysis of the reaction $\gamma p \rightarrow K^0\Sigma^+$ in the $K^0 \rightarrow (\pi^0\pi^0)$ decay channel 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 $\gamma p \rightarrow K^0\Sigma^+$.

The K^0 is reconstructed via its neutral decay. Kinematic fitting and template fits are used to discriminate signal against background. Supported by DFG (PN 50165297).

HK 8.4 Mo 17:30 HZO 50

The η' -nucleus potential at low meson momenta* — MARIANA NANOVA and VOLKER METAG for the CBELSA/TAPS-Collaboration — II. Physikalisches Institut, Justus-Liebig-Universität Gießen

The production of η' -mesons in coincidence with forward-going protons has been studied in photon induced reactions on ^{12}C and on a LH_2 target for incoming photon energies of 1.3-2.6 GeV at the electron

accelerator ELSA. Under these kinematic constraints the η' mesons are produced with relatively low kinetic energy (≈ 150 MeV) since the coincident protons take over most of the momentum of the incident photon beam. For the C-target this allows the determination of the real part of the η' -carbon potential at low meson momenta by comparing with collision model calculations of the η' kinetic energy distribution and excitation function. The present measurement extends earlier determinations of the η' -nucleus potential at higher average momenta towards the production threshold. A comparison of the data with calculations by E. Paryev [1] indicates that also at low momenta deep η' -nucleus potentials of ≥ 100 MeV can be excluded. The LH_2 data, taken as a reference to check the data analysis and the model calculations, provide differential and integral cross sections in good agreement with previous results for η' and η photoproduction off the free proton.

[1] E. Ya. Paryev, *J. Phys. G* **43** (2016) 015106

*Supported by DFG through SFB/TR16.

HK 8.5 Mo 17:45 HZO 50

Analysis of the reaction $\gamma p \rightarrow K^0\Sigma^+$ by the identification of the charged K^0 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 $\gamma p \rightarrow K^0\Sigma^+$.

This talk shows preliminary results of the analysis for the charged decay channel $K^0\Sigma^+ \rightarrow (\pi^-\pi^+)(\pi^0p)$ obtained from new data.

*Supported by DFG (PN 50165297).

HK 8.6 Mo 18:00 HZO 50

Low-energy limit of the O(4) quark-meson model from the functional renormalization group approach — JÜRGEN ESER¹, FLORIAN DIVOTGEY¹, MARIO MITTER², and DIRK RISCHKE¹ — ¹Institut für Theoretische Physik, Johann Wolfgang Goethe-Universität, Max-von-Laue-Str. 1, 60438 Frankfurt am Main — ²Department of Physics, Brookhaven National Laboratory, Upton, NY 11973

We compute the low-energy limit of the O(4)-symmetric quark-meson model as an effective field theory for Quantum Chromodynamics within the Functional Renormalization Group (FRG) approach. In particular, we analyze the renormalization group flow of momentum-dependent pion self-interactions beyond the local potential approximation. The numerical results for these couplings obtained from the FRG are confronted with a recent tree-level study. Additionally, their effect on the wave-function renormalization and the curvature masses is investigated.

HK 8.7 Mo 18:15 HZO 50

$\eta \rightarrow \pi^0 e^+ e^-$ – Search for C-violation with WASA-at-COSY* — KAY DEMMICH, FLORIAN BERGMANN, NILS HÜSKEN, and ALFONS KHOUKAZ for the WASA-at-COSY-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, Germany

By the means of the experimental setup WASA-at-COSY a huge $pp \rightarrow pp\eta$ data set of $\approx 5 \times 10^8$ η -mesons has been collected, aiming for analyses of rare and forbidden η -decays. This data set allows for studies on C-parity violating reactions like the electromagnetic decay $\eta \rightarrow \pi^0 e^+ e^-$ via a virtual photon, which is forbidden within the standard model. The branching ratio can be determined with a significantly higher sensitivity than the current upper limit of 4×10^{-5} as quoted by the PDG. Since C-parity conserving higher order processes are highly suppressed, this decay poses a perfect probe to test the conservation laws of the standard model.

Preliminary results of the analysis will be presented and discussed.

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