

HK 1: Hadronenstruktur und -spektroskopie

Zeit: Montag 14:00–16:00

Raum: HZ 1+2

Gruppenbericht

HK 1.1 Mo 14:00 HZ 1+2

Photoproduction of π^0 -Mesons off Neutrons in the Nucleon Resonance Region — •DIETERLE MANUEL for the A2-Collaboration — Department of Physics, University of Basel, Klingelbergstrasse 82, 4056 Basel, Switzerland

Severe differences between the experimentally observed excitation spectrum of the nucleon and the theoretically predicted results require detailed investigation. Meson photoproduction offers the nice possibility to measure the electromagnetic properties of the nucleon and thereby provides stringent tests to the nucleon models.

π^0 photoproduction is in particular interesting as neutral pions couple only weakly to photons so that non-resonant background contributions become negligible. Although pion photoproduction off the free proton is well known the isospin decomposition also requires measurements on the free neutron. However, this can only be investigated with quasi-free neutrons bound in light nuclei, i.e. the deuteron.

We will present final results of the first measurement of precise angular distributions for π^0 photoproduction off neutrons bound in the deuteron. Effects from nuclear Fermi motion have been removed by a complete kinematic reconstruction of the final state. An attempt to remove the final state interactions reveals first conclusions about the reaction on the free neutron and will put stringent tests on future nucleon models.

Gruppenbericht

HK 1.2 Mo 14:30 HZ 1+2

The BGO-OD experiment: data analysis in preparation for physics proposals — •THOMAS JUDE for the BGO-OD-Collaboration — Physikalisches Institut, University of Bonn, Bonn, Germany

The BGO-OD experiment at the ELSA accelerator facility, Bonn, consists of the highly segmented BGO calorimeter with a particle tracking magnetic spectrometer at forward angles. This allows the investigation of final states of mixed charge with nearly 4π acceptance, with very high precision at forward angles for charged particles.

An extensive physics programme using an energy tagged bremsstrahlung photon beam is planned using this unique setup. This includes measurements of associated strangeness, vector meson and pseudoscalar meson photoproduction.

The commissioning phase of the experiment is almost complete. This talk focuses on analysis of the commissioning data, which includes particle track reconstruction in the forward spectrometer and momentum reconstruction with the BGO calorimeter. Comparisons are made with simulated data, and analysis results relevant to the physics proposals are presented.

Supported by DFG (SFB/TR-16).

HK 1.3 Mo 15:00 HZ 1+2

Impulsrekonstruktion im Vorwärtsspektrometer des BGO-OD-Experiments — •PAUL-FIETE HARTMANN für die BGO-OD-Kollaboration — Universität Bonn

Das neue BGO-OD-Experiment am ELSA-Beschleuniger der Universität Bonn dient der systematischen Untersuchung der Photoproduktion von Mesonen. Es besteht aus einem hochsegmentierten BGO-Ball als Zentraldetektor in Kombination mit einem offenen Magnetspektrometer in Vorwärtsrichtung. Für die geplanten Messungen ist hier eine hohe Impulsauflösung von entscheidender Bedeutung.

Vorgestellt werden Weiterentwicklungen des Rekonstruktionsalgorithmus mit dem Ziel einer verbesserten Impuls- und Vertexbestimmung sowie Teilchenidentifikation: Für die Driftkammern wurde ausgehend von einer Rekonstruktion, welche lediglich die Position der Signaldrähte (Abstand 1,7 cm) berücksichtigt, zusätzlich die gemessenen Driftzeiten in die Analyse einbezogen. Des Weiteren werden die

Effekte des Streufelds des Dipolmagneten für die Spurbestimmung berücksichtigt.

Gefördert durch die DFG (SFB/TR-16).

HK 1.4 Mo 15:15 HZ 1+2

F Observable in Double π^0 -Photoproduction — •STEFANIE GARNI for the A2-Collaboration — Department of Physics, University of Basel, CH-4056 Basel, Switzerland

The measurement of single and double polarization observables gives information about the different resonance contributions in the cross section and hence leads to a better understanding of the nucleon and its excited states. The double π^0 -photoproduction is one of the most interesting reaction for the measurement of these observables. It allows to search for excited nucleon states which decay preferentially via cascades involving intermediate excited states. Furthermore, the background from non-resonant terms is small since the photon does not couple directly to neutral pions.

Double π^0 -photoproduction off a transversally polarized H-Butanol target has been measured using circularly polarized bremsstrahlung photons produced by MAMI-C with incident energies up to 1.5 GeV. The double π^0 reaction was identified using a combined setup of the Crystal Ball calorimeter and a TAPS forward wall which results in an almost 4π acceptance. Preliminary results on the single polarization observable T and double polarization observable F will be presented.

HK 1.5 Mo 15:30 HZ 1+2

Measurement of the double polarization observable E in η' -photoproduction — •FARAH NOREEN AFZAL for the CBELSA/TAPS-Collaboration — HISKP, Uni Bonn

The goal of the CBELSA/TAPS experiment located at the electron stretcher accelerator ELSA lies in the better understanding of the dynamics of the nucleon constituents by investigating the nucleon excitation spectrum through photoproduction of mesons off the nucleon. The study of η' -photoproduction gives information of the high mass region ($m_{N^*} > 1892$ MeV) of the nucleon excitation spectrum which is poorly understood. In order to determine all contributing resonances in the underlying process, the measurement of well chosen single and double polarization observables apart from the unpolarized cross section is needed. For this purpose, a linearly or circularly polarized photon beam and longitudinally or transversely polarized target are used at the CBELSA/TAPS experiment. The setup provides with the Crystal Barrel and the MiniTAPS calorimeters a nearly full 4π angular coverage and has therefore a high detection efficiency for neutral final states. In this talk, preliminary results of the double polarization observable E in the photoproduction reaction $\gamma p \rightarrow \eta' p$ are presented. Supported by the Deutsche Forschungsgemeinschaft (SFB/TR16).

HK 1.6 Mo 15:45 HZ 1+2

Analysis of $\pi N \rightarrow 2\pi N$ reactions within the Giessen coupled-channel model — •VITALY SHKLYAR, HORST LENSKE und ULRICH MOSEL — Institut für Theoretische Physik, Justus-Liebig-Universität Giessen, Heinrich-Buff-Ring 16, D-35392 Giessen

An unitary coupled-channel Lagrangian model is developed for simultaneous analysis of pion- and photon-induced reactions in the resonance energy region. The πN , ρN , $\pi\Delta$, σN , ηN , ωN , $K\Lambda$, $K\Sigma$ final states are treated on the same basis. The three-body unitarity is approximately maintained up to interference between different isobar channels in Bethe-Salpeter equation. Results of the analysis of the $\pi^- p \rightarrow \pi^0 \pi^0 n$ reaction in the first resonance energy region are presented and discussed.

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