

## HK 17: Hadronenstruktur und -spektroskopie V

Time: Tuesday 14:00–16:00

Location: C-2

**Group Report**

HK 17.1 Tue 14:00 C-2

**Das OLYMPUS-Experiment am DESY** — ●ALEXANDER WINNEBECK für die OLYMPUS-Kollaboration — M.I.T., Cambridge, USA

Das Ziel des OLYMPUS-Experiments am DORIS-Ring in Hamburg ist die präzise Messung des Verhältnisses der Wirkungsquerschnitte der elastischen  $e^+p/e^-p$ -Streuung, und damit eine direkte Bestimmung des Beitrags des Zwei-Photon-Austauschs zur Lepton-Nukleon-Streuung. In den aktuellen Messungen des Verhältnisses zwischen elektrischem und magnetischem Formfaktor des Protons zeigt sich eine starke Diskrepanz zwischen den am JLab mittels Polarisationstransfer und durch Rosenbluth-Separation ermittelten Werten. Diese Diskrepanz kann durch Multiphotonaustausch erklärt werden, der in der klassischen Einphoton-Näherung zur Berechnung des elastischen Lepton-Proton-Streuwirkungsquerschnitts nicht berücksichtigt wird. Da ein Großteil des jetzigen Verständnisses der Protonstruktur auf der Analyse von Leptonstreuendaten in der Einphoton-Näherung basiert ist es von großer Bedeutung den Multiphotonbeitrag zu überprüfen. In diesem Vortrag werden das OLYMPUS-Experiment und der aktuelle Status vorgestellt.

HK 17.2 Tue 14:30 C-2

**Symmetric Moeller/Bhabha Luminosity Monitor** — ●ROBERTO PEREZ BENITO for the OLYMPUS-Collaboration — Helmholtz-Institut Mainz, Johannes Gutenberg-Universität Johann-Joachim-Becher-Weg 45, 55128 Mainz, Germany

Recent determinations of the proton electric to magnetic elastic form factor ratio from polarization transfer measurements at Jefferson Lab indicate a discrepancy with the elastic form factor ratio obtained using the Rosenbluth separation technique in unpolarized cross section measurements. This discrepancy has been explained as the effect of two-photon exchange in the calculation of the elastic electron-proton scattering cross section.

The OLYMPUS experiment at DESY has been proposed to measure the ratio of positron-proton and electron-proton elastic scattering cross sections to quantify the effect of two-photon exchange to a percent level. In order to control the systematic uncertainties to the percent level the Symmetric Moeller/Bhabha Luminosity Monitor was proposed. The design and aspected performance will be presented.

HK 17.3 Tue 14:45 C-2

**Spin Observables in Compton Scattering with the CB@MAMI Detector System.** — ●EVANGELINE JOY DOWNIE for the A2-Collaboration — Institut für Kernphysik, Universität Mainz, Mainz, Germany

The study of spin observables in Compton scattering allows access to the vector polarisabilities of the nucleon. These observables, which describe the dynamic response of the nucleon to a changing electromagnetic field, are often predicted by theory, but have never before been independently accessed by experiment due to the technical difficulty involved.

With the advent of the new Mainz Frozen Spin Target, affording average target polarisations of above 70% with relaxation time in excess of 1000 hours, in combination with the Mainz 4 pi detector system and the high quality polarised photon beam resulting from the combination of the Glasgow Tagged Photon Spectrometer and the MAMI C 1.557 GeV electron beam, these technical challenges can be overcome.

We will give an introduction to the measurement of Spin Polarizabilities through Compton Scattering and a brief overview of the detector setup, comprising of the Crystal Ball (672 element NaI spectrometer), TAPS (384 element BaF2 spectrometer), two Multi Wire Proportional Chambers for charged particle tracking and the Particle Identification Detector (a 24 strip plastic barrel detector) for charged particle identification. The current status of the experiment and recent results will be discussed and an future outlook will be presented.

HK 17.4 Tue 15:00 C-2

**Measurement of the photon asymmetry in neutral pion production from the proton near threshold** — ●DUNCAN MIDDLETON for the A2-Collaboration — Institut für Kernphysik, Universität

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The study of neutral pion production off the proton close to threshold is a good tool for testing chiral perturbation theory. For this a precise determination of the  $S$ -wave and all three  $P$ -wave amplitudes which describe the process is necessary. This separation can be achieved using linearly polarised photons in addition to determining the total and differential cross sections for the reaction. Here we report on a measurement of  $\vec{\gamma}p \rightarrow \pi^0 p$  reaction in the threshold region.

The measurement was performed in the A2 hall of the Mainzer Mikrotron MAMI. An 855 MeV electron beam impinged upon a 100  $\mu\text{m}$  diamond radiator to produce a beam of linearly polarised photons in the range  $100 \leq E_\gamma \leq 200$  MeV which were incident on a liquid hydrogen target. The recoil electrons from the Bremsstrahlung process were detected in the Glasgow tagger of the A2 hall and the  $\pi^0$  decay photons in the Crystal Ball and TAPS detector systems.

Cross sections and beam asymmetries for the reaction  $\vec{\gamma}p \rightarrow \pi^0 p$  will be shown. The data are compared to predictions of the MAID and SAID partial wave analyses and calculations based on chiral perturbation theory.

HK 17.5 Tue 15:15 C-2

**Zwei-Photon-Austausch und Normalspin-Asymmetrien im A4-Experiment** — ●DAVID BALAGUER RIOS für die A4-Kollaboration — Institut für Kernphysik

Die A4-Kollaboration hat am MAMI-Beschleuniger die Normalspin-Asymmetrie im Wirkungsquerschnitt der elastischen und quasielastischen ep-Streuung bzw. ed-Streuung bei Rückwärtswinkeln gemessen, um den Einfluss von Zwei-Photonen-Diagrammen bei diesen Prozessen zu untersuchen. In diesem Vortrag werden Ergebnisse für verschiedene kinematische Bedingungen vorgestellt.

HK 17.6 Tue 15:30 C-2

**Messung von Polarisationsobservablen in der  $\omega$  Photoproduktion** — ●HOLGER EBERHARDT für die CBELSA/TAPS-Kollaboration — Physikalisches Institut der Universität Bonn

Zur Untersuchung von spezifischen Nukleon-Resonanzzuständen in der Photoproduktion von Mesonen ist die Messung von Polarisationsobservablen unabdingbar. Aus diesem Grund werden zur Zeit Doppelpolarisationsexperimente mit polarisiertem Target und polarisierten Photonen am Bonner Elektronen-Beschleuniger ELSA durchgeführt. Das Crystal-Barrel/TAPS Experiment ist für die Messung neutraler Endzustände optimiert. Dieser Vortrag befasst sich mit dem Status meiner Analyse der Reaktion  $\vec{\gamma}p \rightarrow p\omega \rightarrow p3\gamma$  unter Verwendung linear bzw. zirkular polarisierter Photonen, sowie einem longitudinal polarisierten Target. Die untersuchten Observablen  $\Sigma$ ,  $\Sigma_\pi$ ,  $G$ ,  $G_\pi$  und  $E$  tragen zur Aufklärung des Produktionsmechanismus des  $\omega$ -Mesons bei.

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HK 17.7 Tue 15:45 C-2

 **$\omega$  Photoproduction off Protons and Neutrons with CBELSA-TAPS\*** — ●FRIDA DIETZ for the CBELSA/TAPS-Collaboration — II. Physikalisches Institut, Heinrich-Buff-Ring 16, 35392 Giessen, Germany

$\omega$  photoproduction off  $\text{LH}_2$  and  $\text{LD}_2$  targets has been studied with the tagged photon beam of the ELSA accelerator in Bonn. The  $\omega$  meson was identified via the  $\omega \rightarrow \pi^0 \gamma$  decay mode, using the combined setup of the Crystal Barrel/TAPS setup, which allowed photon detection over almost the full solid angle. The aim of this study is to determine the  $\omega$  photoproduction cross section on the neutron, which has not been measured so far but is of particular importance with respect to model calculations of the  $\omega$ -nucleus interaction. The quasi-free exclusive production channels of the  $\omega$  off the proton and neutron were studied and compared. In addition, the inclusive cross section for omega produced off  $\text{LD}_2$  has been determined using an event-by-event efficiency correction which is independent of any reaction kinematics. Preliminary results on both the total and differential cross sections will be presented.

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