HK 62: Accelerators and Instrumentation I

Time: Wednesday 16:30–19:00 Location: H-ZO 80

Group Report HK 62.1 We 16:30 H-ZO 80

Installation and commissioning of the KAOS spectrometer at MAMI — •PATRICK ACHENBACH for the A1-Collaboration — Institut für Kernphysik, Joh. Gutenberg-Universität, Mainz

At the Institut für Kernphysik in Mainz, Germany, the microtron MAMI has been upgraded to 1.5 GeV electron beam energy and can now be used to study strange hadronic systems. In recent years the compact magnetic spectrometer KAOS was installed in the existing spectrometer facility operated by the A1 collaboration. KAOS is especially suitable for the detection of kaons. Since September 2008 measurements of kaon production on hydrogen have been successfully performed. The identification of Λ and Σ^0 hyperons in the missing mass has demonstrated the capability of the extended facility to perform strangeness electro-production spectroscopy. Kaons in the angular range of 21-43° and momentum range of 400-600 MeV/c were detected with a survival probability of around 10% and identified by their time-of-flight. In 2009, the KAOS spectrometer will cover simultaneously electron scattering angles close to 0° and kaon scattering angles around 5° up to 15° in order to extract dynamical information from the K^+ angular distribution.

Group Report HK 62.2 We 17:00 H-ZO 80

Performance of the CBELSA/TAPS Experiment — •CHRISTOPH WENDEL for the CBELSA/TAPS-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Universität Bonn

To perform double polarisation experiments at the electron accelerator ELSA in Bonn (aiming at a good understanding of the hadron spectrum), the experimental setup of the Crystal-Barrel-Experiment was subject to several modifications.
They include the relocation to a different experimental hall, a longitudinal polarised target, a new photon tagging system, the refurbishment of the 30° forward angle of the Crystal-Barrels CsI(Tl) calorimeter, a modular gas/aerogel Cerenkov detector and modifications to the TAPS BaF_2 calorimeter wall.
The talk will cover these modifications and extensions of the setup and discuss the performance of the experiment.
Supported by the DFG (SFB/TR 16)

HK 62.3 We 17:30 H-ZO 80

A Sampling ADC readout for the Crystal Barrel calorimeter at ELSA — •STEFFEN SCHAEPE for the CBELSA/TAPS-Collaboration — Helmholtz - Institut für Strahlen- und Kernphysik, Nußallee 14-16, 53115 Bonn, Germany

The CBELSA/TAPS experiment is a photoproduction experiment specialized for hadron spectroscopy investigating reactions with multi photon final states. Its central component is the Crystal Barrel calorimeter with a nearly 4π coverage. With its 1320 CsI(Tl) crystals it offers excellent detection capabilities and good energy resolution. Due to the scintillating characteristics of CsI(Tl) and electronic hardware designed for best energy resolution it does not offer any timing or fast triggering capabilities for most of the 4π solid angle yet.

In an upgrade scheduled for the near future it is planned to add these features to the experiment. Therefore sensors and/or readout of the crystals are to be exchanged. It is studied how the use of fast sampling ADCs with feature extraction could improve the readout in terms of timing and pulse shape analysis without degrading the current performance in energy resolution, either with existing signal processing electronics or with new hardware.
This work is supported by DFG (SFB/TR16).

HK 62.4 We 17:45 H-ZO 80

Status of the endpoint tagger at the CB experiment — •LEYLA AKASOY for the A2-Collaboration — Institut für Kernphysik, Mainz

The A2 Collaboration at the Mainz Microtron makes experiments with real photons using the Glasgow-Mainz tagged photon facility. The usable energies of tagged photons are restricted to up to 1.4 MeV at 1.508 MeV electron beam energy. Since some yet only scarcely investigated resonances lie very closely above this upper energy limit it is planned to increase it by building a second tagging facility for high energy photons.

Status and outlook for this project shall be discussed in this talk.

HK 62.5 We 18:00 H-ZO 80

Drift Chamber Tests for the B1-Spektrometer at ELSA* — •DANIEL HAMMANN for the CBELSA/TAPS-Collaboration — Physikalisches Institut, Bonn

At the Bonn electron accelerator ELSA photoproduction of mesons is studied at energies up to $E_\gamma = 3.5$ GeV. Presently, a new experimental setup is beeing installed. To detect mixed charged final states, the BGO-Ball of the former GRAAL-Experiment is combined with an open magnetic spectrometer in forward direction. The spectrometer utilizes scintillating fibers for tracking in front of the magnet and large drift chambers behind the magnet. A prototype drift chamber has been tested for efficiency and position resolution. Testing of the full size chambers has started. Test results shall be presented.

* supported by DFG SFB/TR16.

HK 62.6 We 18:15 H-ZO 80

Polarimetry in Meson Photoproduction Reactions at MAMI — •MARK SIKORA, DAN WATTS, and DEREK GLAZIER — University of Edinburgh, Edinburgh, UK

Accurately establishing the spectrum and properties of the excited states of the nucleon has proven to be elusive. Many states have poorly established properties and many resonances predicted by theoretical models of nucleon structure do not reveal themselves in the current experimental data. This could be because the data is not sensitive to these resonances or because the states do not exist.

Most attempts to address this situation utilise meson photoproduction from the nucleon. Such reactions can be described by 4 complex helicity amplitudes which include all the information on the process, including the excitation spectrum. Consequently, there are 16 experimental observables, of which 8 must be determined to fully constrain the amplitudes. This has led to major programmes of measurements exploiting polarised photon beams and polarised targets at the major electromagnetic beam facilities such as ELSA, JLAB and MAMI. However, the goal of a complete measurement cannot be achieved without measurements including recoil nucleon polarisation. With this aim the Edinburgh group has developed a novel design for a large aceptance recoil nucleon polarimeter for use in meson photoproduction reactions with the Glasgow/Mainz polarised photon beam and the Crystal Ball at MAMI. Preliminary measurements of double-polarisation observables in neutral pion photoproduction will be presented and compared with the various current partial wave analyses of the reaction.

HK 62.7 We 18:30 H-ZO 80

Detector system for spin-filtering experiments — •CHRISTIAN WEIDEMANN — Institut für Kernphysik (IKP) and Jülich Center for Hadron Physics (JCHP), Forschungszentrum Jülich

The spin-filtering experiments at COSY and AD-CERN within the framework of the **P**olarized **A**ntiproton E**X**periments (PAX) want to clarify the polarization build-up of an initially unpolarized stored proton (antiproton) beam by multiple passage through a polarized gas target.

One necessity is the determination of the polarizations of beam and target. While the target polarization could be determined with a Breit-Rabi Polarimeter, a system for beam polarization measurements based on the silicon recoil detectors of the HERMES-Experiment is under development. 8 modules from HERMES together with 8 already ordered PAX TTT silicon microstrip detectors from Micron Technology will form the PAX detector system for spin-filtering experiments. One module (Demetrius) consisting of 2 double-sided detectors with an active area of 97,3 mm × 97,3 mm and 128+128 strips has been equipped with new UHV-compatible readout electronics. Further preparations for detector tests including a specially designed coolable support and a test bench were finished.

The status of the detector system for spin-filtering experiments and the results of first detector tests will be presented.

HK 62.8 We 18:45 H-ZO 80

Eine neue externe Strahlführung für Detektortests an ELSA — •STEFAN PATZELT — Elektronen-Stretcher-Anlage ELSA, Physikalisches Institut, Universität Bonn

An der Elektronenbeschleuniger-Anlage ELSA wird zurzeit neben der bereits bestehenden externen Strahlführung für Mittelenergieexperi-

mente eine weitere für Detektortests entwickelt und aufgebaut.

Primäres Ziel dieser neuen Strahlführung ist es, die Strahlparameter wie Strahlstrom und -breite über einen großen Bereich variieren zu können. Die im Speicherring mit einer maximalen Energie von 3,5 GeV umlaufenden Elektronen werden mittels Arbeitspunktverschiebung auf eine drittelzahlige Resonanz langsam extrahiert, sodass dem Testplatz ein externer Strahlstrom von 1 - 100 pA zur Verfügung gestellt werden kann. Mit Fertigstellung des Einzelpulsbetriebs kann der Strahlstrom nochmals signifikant verringert werden. Wesentlicher Vorteil ist die variable Dimensionierung der Strahlbreite, die von 1,5 mm bis zu 20 mm beliebig verändert werden kann. Aufgrund des hohen Tastverhältnisses von über 95% wird dem Testplatz während nahezu der gesamten Testzeit ein Strahl mit gleichbleibenden Eigenschaften bereitgestellt.

Der Vortrag gibt einen Überblick über die Simulation der Parameter der Strahlführung mit MAD-X und greift die wesentlichen Punkte wie Konzeption, Strahldiagnose und Strahlenschutz in Rahmen der räumlichen Gegebenheiten der Anlage auf.