HK 14: Hadron Structure and Spectroscopy IV

Time: Tuesday 17:00–18:30 Location: J-HS M

Group Report HK 14.1 Tue 17:00 J-HS M

Σ^0 production in p(3.5 GeV)p collisions at HADES — •Waleed Esmail and James Ritman for the HADES-Collaboration — Jülich Forschungszentrum, GmbH, IKP1, 52428 Jülich

Studying hyperon production at beam energies of a few GeV is important for many open questions in the field of hadron physics. While there are several experimental results for Λ hyperons in $p+p$ reactions, measurements of Σ^0 production are scarce. This study is a first step to gain access to the hyperon electromagnetic transition form factors with the upgraded HADES detector system. As a first step, existing HADES data taken in 2007 with a proton beam of kinetic energy 3.5 GeV incident on liquid hydrogen target were used to study the production of Σ^0 baryons via the exclusive reaction $pp \to pK^+\Sigma^0$. Σ^0s were identified via the decay $\Sigma^0 \to \Lambda\gamma$ with subsequent decays $\Lambda \to p\pi^-$. Since HADES was not equipped with an electromagnetic calorimeter at that time, photons are identified as a missing mass particle, while other charged particles are identified by their energy loss and time of flight. This talk will present a brief overview of the first results about the electromagnetic decay of the Σ^0.

HK 14.2 Tue 17:30 J-HS M

$K^0_S\Sigma^0$ photoproduction at the BGO-OD experiment — •Katrin Kohl for the BGO-OD-Collaboration — Physikalisches Institut, Nussallee 12, D-53115 Bonn

The BGO-OD experiment at the ELSA accelerator facility uses an energy tagged bremsstrahlung photon beam to investigate the exitation structure of the nucleon in meson photoproduction.

The associated photoproduction of K^0_S and hyperons is essential to understand the role of K^* exchange mechanisms. A cusp-like structure observed in the $\gamma p \to K^0_S\Sigma^+$ reaction at the K^* threshold is described by models including dynamically generated resonances from vector meson-baryon interactions. Such interactions are predicted to give a peak like structure in $K^0_S\Sigma^0$ photoproduction off the neutron.

This talk presents a preliminary analysis of the reaction $\gamma n \to K^0_S\Sigma^0$. First results seem to support the predicted peak like structure.

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HK 14.3 Tue 17:45 J-HS M

K^+ Σ^- Photoproduction at the BGO-OD Experiment — •Johannes Gross — Physikalisches Institut Universität Bonn

The BGO-OD experiment at the ELSA accelerator facility uses an energy-tagged bremsstrahlung photon beam to investigate the excitation spectra of the nucleon. The setup consists of a highly segmented BGO calorimeter surrounding the target, with a particle tracking magnetic spectrometer at forward angles.

This unique combination is ideal for investigating low momentum transfer processes due to the acceptance and high momentum resolution at forward angles. The K^+ detection in the forward spectrometer is complemented by a technique to identify K^+ mesons in the central calorimeter via the time delayed weak decay, vastly increasing the angular acceptance for final states of open and hidden strangeness.

Preliminary, high statistics cross section and beam asymmetry measurements for the reaction $\gamma n \to K^+\Sigma^-$ will be presented.

HK 14.4 Tue 18:00 J-HS M

Strange-Meson Spectroscopy at COMPASS — •Stefan Wallner — Physik-Department E18, Technische Universität München

COMPASS is a multi-purpose fixed-target experiment at CERN aimed at studying the structure and spectrum of hadrons. The two-stage spectrometer has a large acceptance over a wide kinematic range. Thus, it can be used to investigate a wide range of reactions. Diffractive production of mesons is studied with a negative hadron beam with a momentum of 190 GeV/c. So far, COMPASS has studied mainly isovector resonances of the a_J and π_J families with high precision, using the dominating π^- component of the beam.

Using the smaller K^- component of the beam allows us to investigate also the spectrum of strange mesons in various final states. The flagship channel is the $K^-\pi^-\pi^+$ final state, which in principle gives access to nearly all kaon states, i.e. K_J and K^*_J families. COMPASS has acquired the so far worlds largest data set of about 720 000 exclusive events for this channel. In order to disentangle the produced mesons by their spin-parity quantum numbers, we employ the method of partial-wave analysis. The size of our dataset enables us to perform the analysis in four bins of the squared four-momentum transfer t'. Thus, the t' dependence of the various signals in the data can be studied.

This work was supported by the BMBF, the DFG Cluster of Excellence *Origin and Structure of the Universe* (Exc 153), and the Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München.

HK 14.5 Tue 18:15 J-HS M

In-beam tests results for the PANDA STT — •Gabriela Perez-Andrade, Peter Wintz, and James Ritman for the PANDA-Collaboration — Institut für Kernphysik, Forschungszentrum Jülich, Germany

At the PANDA experiment, fundamental hadron physics questions will be addressed through $\bar{p}p$ annihilations in a $\bar{p}$ momentum range from 1.5 to 15 GeV/c. The Straw Tube Tracker (STT), in the solenoidal magnetic field of the PANDA target spectrometer, has the tasks of charged particle tracking, momentum reconstruction, and particle identification (PID) based on the energy loss measurement (dE/dx) in the straw gas. The STT will provide PID information for $p/K/\pi$ separation in the low momentum region up to ∼0.8 GeV/c. For a full 3D track reconstruction, the STT consists of axial and stereo straw layers. The technique of self-supporting, close-packed straw layer modules yields a minimal material budget of 1.2% (X/X_0). In-beam measurements with a STT test system have been conducted at COSY (Forschungszentrum Jülich), using proton and deuteron beams in a momentum range of ∼ 0.6 - 2.5 GeV/c. Preliminary results show a 2D track resolution of ∼120 μm ($\sigma_{r\phi}$), which corresponds to 2.5 mm (σ_z) for the stereo layers in the beam direction. Furthermore, a PID method based on time-over-threshold measurement was tested, showing that proton and deuteron separation from minimum ionising particles of 4σ at 0.8 GeV/c is obtained, rising to about 12σ for 0.6 GeV/c deuterons. In this talk, the calibration, tracking and PID methods together with the preliminary test results will be discussed.