HK 45: Poster – Hadronenstruktur und -spektroskopie

Zeit: Donnerstag 14:00–16:00 Raum: P Foyer

HK 45.1 Do 14:00 P Foyer

Dalitz Decay of the ω Meson with WASA-at-COSY — •Farha Anjum Khan for the WASA-at-COSY-Collaboration — IKP and JCHP, Forschungszentrum Juelich

Two sets of experiments have been performed with the WASA detector at COSY using two reaction mechanisms. The intention is to compare the quality of the data between the pd→^{3}He ω (at 1.45 GeV and 1.5 GeV beam energy) and pp→pp ω (at 2.063 GeV beam energy) reactions, in the sense of a feasibility and background study for $\omega \to \pi^0 e^+ e^-$ decays. The aim is to measure the transition form factor of the ω meson which does not agree with standard Vector Meson Dominance. The first analysis is performed using the pd reaction for the $\omega \to \pi^0\gamma$ decay. ^{3}He has been detected in the forward part of the detector using the ΔE-E method and the decay particles i.e. e^+,e^-,γ have been identified in the central part of the detector. The ω is fully reconstructed with the missing mass of ^{3}He and invariant mass of decay products. The number of expected ω Dalitz decays is being estimated using the number of ω in the $\pi^0\gamma$ channel for two energies in the pd reaction. The experiment conditions for the high statistics beam time will be decided based on the analysis of both reactions.

HK 45.2 Do 14:00 P Foyer

Das P2-Experiment: Messung der schwachen Ladung des Protons — •Dominik Becker für die A4-Kollaboration — Institut für Kernphysik, Mainz

Das sich in der Planungsphase befindliche P2-Experiment in Mainz ist auf eine hochpräzise Bestimmung der schwachen Ladung des Protons bei niedrigem Impulsübertrag ausgelegt. Hiezu ist eine sehr genaue Messung der paritätsverletzenden Asymmetrie der elastischen Elektron-Proton-Streuung notwendig. Wir geben einen kurzen Überblick über die theoretischen Aspekte und präsentieren eine mögliche Detektorkonfiguration. Des Weiteren werden Resultate von Monte-Carlo-Simulationen bezüglich der erreichbaren Unsicherheiten bei der Bestimmung der schwachen Ladung des Protons vorgestellt.

HK 45.3 Do 14:00 P Foyer

Feasibility studies of proton FF measurements in $\bar{p}p$-collisions at PANDA — •Iris Zimmermann for the PANDA-Collaboration — Helmholtz-Institut Mainz

The investigation of the time-like electromagnetic form factors is one important goal of the PANDA-Experiment at the Facility of Antiproton and Ion Research (FAIR) at GSI. The data taking with high statistics at PANDA will allow the independent extraction of the time-like form factors from the study of the angular distribution of $\bar{p}p$-collisions into a pair of charged leptons. The muonic channel contains the same physical information on the form factors as the electronic channel, but the difficult separation from the strong hadronic background makes that channel a big challenge. On the other hand the measurement of the muonic channel is a good opportunity to cross-check the results of the electronic channel. Therefore detailed simulation studies for both the muonic channel and the hadronic background (mostly pion production) are needed. First studies have been carried out to get a better understanding of the kinematical aspects of the muonic channel. The detailed simulation of those processes will be done using the software package PANDA Root taking the geometry and properties of the PANDA-Detector into account. Therefore an event generator for muons is under development.

HK 45.4 Do 14:00 P Foyer

Detector development for in-trap decay studies in a Penning trap* — •Peter Müller, Jasmin Moazzami-Fallah, Peter Thirolf, and Christine Weber — LMU München

The precision of decay spectroscopy experiments is limited due to scattering in the source material. However, well-localized ions in a Penning trap, can be considered as an ideal, carrier-free source. In order to investigate α decays, the ring electrode is replaced by a detector array, also providing the trapping potential. This "Detector-Trap" is developed at MLLTRAP to be implemented in the future MATS facility at FAIR. It consists of a cubic array of 4 single-sided silicon strip detectors, which measure energy and polar angle of the α particles, released in the trap centre. Each sensor contains 30 strips with 1mm pitch, totally covering a solid angle of 67%. UHV and cryogenic conditions inside the trap require customized solutions for all individual components of the detector trap. The Si sensors are glued on ceramic circuit boards; glue and ceramics being selected due to their thermal properties (matched to silicon) and their low outgassing rate. The Capton insulated multiwire signal cables are connected to the circuit boards via customized PEEK (a low outgassing polymer) connectors and flexible spring contacts. The cubic detector array is mounted via grooves in the adjacent trap electrodes.

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HK 45.5 Do 14:00 P Foyer

Commissioning experiment of the polarized internal gas target with deuterium at ANKE/COSY — •Boxing Gou for the ANKE-Collaboration — Institut für Kernphysik, Forschungszentrum Jülich,D-52425 Jülich, Germany — Institute of Modern Physics, Chinese Academy of Sciences, 509 Nanchang Road, Lanzhou, 730000, P.R.China

In order to conduct the production experiments with polarized deuterium target and (un)polarized proton beam at ANKE/COSY, a commissioning experiment of the polarized internal target with deuterium is imperative. The commissioning experiment includes the measurements of both the vector (Qy) and tensor (Qyy) polarization of the deuterium gas target through the nuclear reactions with large and well known analyzing powers, which can be detected in ANKE. The dependence of the polarizations along the storage cell will also be determined. The poster presents the physics case for the experiments with deuterium polarized internal target and the apparatus needed for the commissioning experiment, as well as the procedure of extraction for spin observables.

Supported by CSC program.

HK 45.6 Do 14:00 P Foyer

Total and Differential Cross Sections of the Reaction pd $\to$ ^{3}He + η at 49 an 60 MeV Excess Energy* — •Florian Bergmann, Annika Passfeld, Kay Demmich, Paul Goslawski, Christina Husmann, Alfons Khoukaz, and Alexander Täschner for the WASA-at-COSY-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster

The p + d $\to$ ^{3}He + η reaction has been used recently for various precision experiments, e.g. for the investigation of the η-nucleus final state interaction, the search for possible η-mesic nuclei as well as for the η-mass determination with highest accuracy. A remarkable feature of this reaction is the unexpected shape of the excitation function which is strongly influenced by the η-^{3}He final state interaction. While close to threshold ($Q \leq 11$ MeV) a rich data sample has been provided a short time ago, only limited information are available at higher excess energies. Therefore, new measurements at $Q = 49$ and 60 MeV with high statistics have been performed at the WASA-at-COSY experiment. Final results on total and differential cross sections will be presented and discussed.

*Supported by COSY-FFE grants

HK 45.7 Do 14:00 P Foyer

Future experiments with Pion Beams* — Johannes Siebenson and •Rafal Lalik for the HADES-Collaboration — TU München, Boltzmannstr. 2, 85748 Garching, Germany

New experiments exploiting secondary pion beams with incoming momenta varying from 0.8 to 1.7 GeV/c are planned for the HADES spectrometer at GSI, SIS18. This will provide a unique possibility to study a variety of physics observable exploiting both hadronic and leptonic probes.

For this a new beam detector, based on large area silicons, for the measurement of the incoming pion momentum is under construction. The detector readout system is based on the n-XYTER ASIC (DETNI, GSI Darmstadt) and Exploder (GSI Darmstatd) boards. The status of the project will be described in this contribution.

Additionally full scale simulations with a pion beam momentum of 1.75 GeV have been analyzed with focus on the production of the $\Lambda(1405)$ hyperon. At the moment this resonance is of large interest, as its formation is highly influenced by the $\bar{K}N$ dynamics. The rather low cross section of the reaction $\pi + p \to \Lambda(1405) + K^0$ and the decay into $\Sigma\pi$ pairs make the reconstruction of this particle a challenging task.

We present our results on the Λ(1405) analysis and estimations of the expected yields for the upcoming beam time.

*) supported by BMBF and Excellence Cluster "Universe"

HK 45.8 Do 14:00 P Foyer

A Kinematic Refit for the analysis of the reaction $pp \to pK^+\Lambda$ at 3.1 GeV with FOPI* — •Dominik Pleiner for the FOPI-Collaboration — Excellence Cluster Universe, TU München, Boltzmannstr. 8, D-85748 Garching

In order to study the existence of the ppK^- kaonic bound state, the FOPI experiment at GSI took data with a 3.1 GeV/c proton beam hitting a LH_2 target in August 2009. The reaction of interest is $pp \to pK^+\Lambda$, where the Λ further decays into a proton and a π^-. In order to improve the momentum and mass resolution of the reconstructed Λ, a kinematic refit was developed. The refit imposes the knowledge of several physical processes on the track-fitting by introducing certain constraints on the reconstructed tracks of the final reaction $pp \to pK^+p\pi^-$. In addition to several non-vertex constraints (e.g. energy/momentum conservation, invariant mass), also vertex constraints are applied.
The improvement of the momentum resolution of the refitted particles is quantified via elastic pp reactions, exploiting the ability to precisely predict the theoretical momentum of the protons by measuring their polar angles.
The poster will present the basic functioning as well as tests and preliminary results of the kinematic refit.

* supported by BMBF and Excellence Cluster "Universe"

HK 45.9 Do 14:00 P Foyer

Statistic decay of slightly excited hyperfragments — •Alicia Sanchez Lorente for the A1-Collaboration — HIM, Mainz, Deutschland — Institut fuer Kernphysik, Mainz, Deutschland

Combining the unique features of the hypernuclear electro-production mechanism and the high precision in magnetic spectroscopy, the proposed E-08-012 experiment at Jefferson Lab, Virginia, and the scheduled hypernuclear experiment at MAMI, Germany, focus on the high-resolution spectroscopy of weak two-body decay pions from hypernuclei. These experiments will provide insight on a wide range of light hypernuclei via the production of hyperfragments from ^{6,7}Li, ^{9}Be and ^{12}C targets. In the present work we explore the production of Λ-hypernuclei following the micro-canonical break-up of an excited hypernucleus which is created by the electro/photo-production reaction. This method has already been successfully used for the PANDA experiment to determine to what extent excited states of a produced doubleΛ-Hypernucleus can be produced. Accordingly the model is used to predict the pionic decay spectra and relative fragmentation yields for the planned hypernuclear experiment at MAMI.

HK 45.10 Do 14:00 P Foyer

The OLYMPUS Experiment at DESY — •Lauren Ice for the OLYMPUS-Collaboration — Arizona State University, Tempe, AZ, USA

The OLYMPUS experiment underway at the DESY laboratory in Hamburg will determine the two-photon contribution to electron-proton elastic scattering by measuring the cross section ratio between electron and positron elastic scattering from the proton. The experiment utilizes the storage ring DORIS at DESY with an internal gas target and a large acceptance magnetic spectrometer. An overview of the physics motivation for the experiment plus a description of the detector system will be presented. The first data run was completed in February, 2012 and preliminary results on the experimental operation and performance will also be discussed.