HK 55: Hadron Structure and Spectroscopy IX

Zeit: Freitag 14:00–15:45 Raum: HZO 50

Gruppenbericht HK 55.1 Fr 14:00 HZO 50

Measurements of Meson Transition Form Factors — •Susan Schadmand — Forschungszentrum Jülich

This talk will give an experimental overview of the electromagnetic transition form factors of light mesons. In particular, the results from WASA-at-COSY and CLAS6 are presented. At Forschungszentrum Jülich, π^0 and η mesons were produced in proton-proton reactions at the COSY accelerator where the WASA detector was used to detect all final-state particles. At Jefferson Lab, the g12 experimental run used a tagged photon beam on protons to produce mesons up to the ϕ meson where the CLAS6 detector recorded charged particles including final states with dileptons.

HK 55.2 Fr 14:30 HZO 50

Feasability Studies for a FAIR Phase-0 Project at MAMI — S. Ahmed[1,2], L. Capozza[1], A. Dbeyssi[1], P. Grasemann[1,2], F. Maas[1,2,3], O. Noll[1,2], D. Rodriguez Pineiro[1], •S. Wolff[1,2], M. Zambrana[1,2], and I. Zimmermann[1,2] — [1]Helmholtz-Institut Mainz, Mainz, Germany — [2]Institute of Nuclear Physics, Mainz, Germany — [3]PRISMA Cluster of Excellence, Mainz, Germany

Within the FAIR phase-0 project, the use of FAIR equipment at other facilities before the completion of the civil construction is envisaged. The PANDA EMC is a good candidate for FAIR phase-0, due to the advanced state of its development. In particular, the backward endcap (BWEC) of the PANDA EMC, which is developed and built at HIM in Mainz, could be ready by 2020, three years before its foreseen installation. Therefore, possible experiments at the MAMI electron beam facility making use of the BWEC are under consideration.
One candidate is the measurement of the π_0 electromagnetic transition form factor via the electroproduction on a nuclear Coulomb field. To select this channel, the momentum distribution of the π_0 needs to be measured by detecting the decay γ particles in an EMC.
Since the relevant γs are emitted at forward angles, where high particle fluxes are expected, the affordable luminosity is limited by the maximum event rate of the detector. Therefore, the total event rate at different scattering angles with various targets need to be determined. Monte Carlo simulations are ongoing and a beam test with a prototype calorimeter was scheduled for January 2018 in order to address these questions. The status of these feasibility studies will be presented.

HK 55.3 Fr 14:45 HZO 50

The ^{3}Heη final state in dp fusion at the magnetic spectrometer ANKE — •Christopher Fritzsch and Alfons Khoukaz for the ANKE-Collaboration — Westfälische Wilhelms-Universität, Münster, Germany

Total and differential cross sections of the reaction $d+p \to {}^3\mathrm{He}+\eta$ are of special interest since they differ strongly from a pure phase space behavior near threshold. The observation of the asymmetry factor α of the differential cross sections show a distinct effect of an s- and p-wave interference, caused by a rapid variation of the relative phase. These observations are an indication for an unexpected strong final state interaction between the ^{3}He nuclei and the η mesons which could lead to a quasi bound state of the ^{3}Heη system. Current investigations on high precision data of the internal fixed target experiment ANKE of the storage ring COSY enable the extraction of additional total and differential cross sections for the η production up to an excess energy of $Q = 15\,\mathrm{MeV}$. These cross sections with significantly improved accuracy will allow to study the behavior of the asymmetry factor α with high resolution. Recent results will be presented and discussed.

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HK 55.4 Fr 15:00 HZO 50

Pion Double Parton Distribution within Chiral Quark Soliton Model — •Asli Tandogan — Ruhr University Bochum

The importance of double parton scattering is being revised with the appearance and expectations in the near future of experimental results on multiple hard scattering at LHC. DPDs' contribition increases when momentum fractions x_1 and x_2 of two partons coming from the same hadron become small. In our study we consider pion double parton distribution within the chiral quark soliton model. The leading diagram of pion DPD in the model is vanishing which sugggests that quark interaction due to goldstone boson exchange is important to describe the correlations in double parton distributions. In this talk, we present our investigation of the subleading terms in large N_c limit.

HK 55.5 Fr 15:15 HZO 50

The search for symmetry violating η decays — •Cristina Collicott for the A2-Collaboration — Johannes Gutenberg University, Mainz, Germany

A continued interest in forbidden decay modes of light mesons comes from the idea that there are mechanisms which would allow a violation of the standard law of physics at a very small level. The experimental challenge for such kind of physics is mostly in the accumulated experimental statistics needed for those mesons to reach the necessary sensitivity in searching for such violations. The A2 Collaboration at the Mainz Microtron, MAMI, has collected 6.2×10^7 η mesons, produced via the $\gamma p \to \eta p$ reaction. This large statistics data set allows further improvement of the existing upper limits for branching ratio (BR) of several forbidden decays of the η meson into neutral final states.

New results for the CP violating decay mode, $\eta \to 4\pi^0$ and, for the C violating decay modes, $\eta \to 3\gamma$ and $\eta \to \pi^0\gamma$ will be presented.

HK 55.6 Fr 15:30 HZO 50

The quest for chiral symmetry restoration - experimental determination of meson-nucleus potentials and the search for meson-nucleus bound states — •Volker Metag[1], Mariana Nanova[1], and Eduard Paryev[2] — [1]II. Physikalisches Institut, Universität Giessen, Deutschland — [2]Russian Academy of Sciences, Moscow, Russia

Assuming a partial restoration of chiral symmetry in a nuclear medium, chiral model calculations predict modifications of meson properties within nuclei. An overview will be given on current experiments studying in-medium properties of mesons and the meson-nucleus interaction to extract meson-nucleus potentials [1]. The real part of the meson nucleus potential describes whether the interaction is attractive or repulsive causing a lowering or increase of the meson in-medium mass, respectively, while the imaginary part is a measure for the meson absorption in nuclei. The real part of the potential can be determined by comparing measured meson momentum distributions or excitation functions with collision model or transport model calculations. The imaginary part is extracted from transparency ratio measurements. Results on $K^+, K^0, K^-, \eta, \eta', \omega$ and ϕ mesons turn out to be largely consistent with chiral model predictions. The criteria and chances for observing meson-nucleus bound states will be discussed. The most promising candidates appear to be the K^-, η and η' meson.

[1] V. Metag, M. Nanova, E. Ya. Paryev, Prog. Part. Nucl. Phys. 97 (2017) 199