HK 67: Hadron Structure and Spectroscopy VIII

Time: Thursday 15:45–17:00 Location: SCH/A316

Group Report HK 67.1 Thu 15:45 SCH/A316

Recent and ongoing studies from the A2 Collaboration at MAMI — •Edoardo Mornacchi for the A2-Collaboration — Johannes Gutenberg-Universität, Mainz, Germany

The A2 Collaboration at the Mainz Microtron (MAMI) performs photoproduction experiments to investigate the internal structure of nucleons and mesons, gaining a better understanding of non-perturbative QCD.

It uses a circularly or linearly polarized Bremsstrahlung photon beam with energies up to 1.6 GeV, together with a variety of unpolarized and polarized targets. The resulting particles are then detected using the large acceptance Crystal Ball-TAPS detector system, which is perfectly suited for the detection of multi-photon final states.

An overview of the ongoing studies as well as recent results from the A2 Collaboration will be given, along with an outlook on current and future measurements.

HK 67.2 Thu 16:15 SCH/A316

Studies of Coherent Photoproduction off the Deuteron at the BGOOD Experiment — •Antonio Joao Clara Figueiredo for the BGOOD-Collaboration — Physikalisches Institut der Universität Bonn

The BGOOD photo production experiment [1] at the ELSA facility [2] is uniquely designed to explore kinematics where a charged particle is identified in the forward spectrometer and a recoiling hadronic system is reconstructed in the central calorimeter at low momentum transfer. Typically used to study strangeness photoproduction at low t, the setup also enables studies of coherent reactions off the deuteron where the deuteron takes the majority of the beam momentum.

Following a BGOOD publication on the $\pi^0\pi^0 d$ [3] photoproduction supporting the three isoscalar dibaryon candidates reported by the ELPH collaboration [4], the presented work uses an improved method of momentum reconstruction in the forward spectrometer and uses a kinematic fit to improve invariant mass resolutions. Preliminary results are presented of the analysis of the $pi^0\pi^0 d$ and $\pi^0\eta d$ final states.

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[1] S. Alex et al., Eur. Phys. J. A 57 (2021) 80. [2] W. Hiller, Eur. Phys. J. A 28 (2006) 139. [3] T.C. Jude et al., Phys. Lett. B (2022) 137277. [4] T. Ishikawa et al., Phys. Lett. B 789 (2019) 413.

HK 67.3 Thu 16:30 SCH/A316

Evidence for a phi-N bound state — •Emma Chizzali for the ALICE Germany-Collaboration — Technical University of Munich, Munich, Germany

The possible existence of phi-mesic nuclei is widely discussed in the literature, however, experimental evidence so far is missing. The main ingredient for the study of such systems is the phi-N strong interaction, which is characterised by the two spin states S=1/2 and S=3/2 and can be accessed experimentally via momentum correlations. In this talk, a re-analysis of the p-phi correlation function, measured by the ALICE Collaboration in high-multiplicity pp collisions at sqrt(s)=13 TeV, is presented. The S=3/2 channel is constrained using the recently published lattice QCD potential. This makes it possible to study the unknown interaction in the S=1/2, which is modelled by an advanced phenomenological potential. The results of this study show evidence of a bound state in the S=1/2 channel, with sizeable binding energy, which is characterised by a potential strong enough that it results in negative scattering length.

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HK 67.4 Thu 16:45 SCH/A316

Separation of protons and neutrons with the CBELSA/TAPS experiment — •Nadia Reinartz for the CBELSA/TAPS-Collaboration — HISKP, Uni Bonn

The ELSA accelerator can provide a polarised electron beam that together with the polarised target of the CBELSA/TAPS experiment makes it possible to determine single or double polarisation observables for various final states. The Crystal Barrel (CB) calorimeter in combination with the MiniTAPS calorimeter in forward direction, allows measurements in a full 4π coverage. In the past it was difficult to efficiently measure reactions with a neutron in the final state.

In the last years the CBELSA/TAPS experiment in Bonn has been improved in order to significantly boost the efficiency for detecting neutrons in the main calorimeter. The data taken after the upgrade was used to determine methods for identifying protons and neutrons with beam energies between 600 MeV and 3200 MeV. In this talk an overview about those results is presented.