HK 38: Hadron Structure and Spectroscopy VII

Zeit: Mittwoch 16:30–18:00 Raum: HZO 80

Gruppenbericht HK 38.1 Mi 16:30 HZO 80

Strangeness in pion-nucleus collisions at 1.7 GeV/c — •Joana Wirth for the HADES-Collaboration — Physik Department, TUM, Garching, Germany — Excellence Cluster "Universe", Garching, Germany

Pion-nucleus reactions allow for detailed investigations of open and hidden strange hadron production which are directly connected to the study of hadron in-medium properties at a well defined nuclear density. Overall, 10×10^7 and 13×10^7 events have been collected with HADES in $\pi^- + C$ and $\pi^- + W$ at $p_{\pi^-} = 1.7$ GeV/c, respectively.
In this contribution, we will present results on differential, acceptance and efficiency corrected yields including the following strange hadron: $K^{\pm,0}$, Λ and ϕ. Special emphasis will be on the study of K^- absorption driven by strangeness exchange processes. A direct indication of this effect can be seen by comparing the K^-/K^+ ratios measured in collisions with heavy targets (W) and lighter ones (C). Further, the contribution of the ϕ to the K^- production will be presented. For the first time also the ϕ absorption in different nuclei in pion-induced reactions will be discussed providing complementary information to results obtained with photon and proton beams. Besides, the exclusive channel $\pi^- + p \to K^0 + \Lambda$ ($\Lambda + p \to \Lambda + p$) is investigated to shed light on the repulsive short-range Λp interaction predicted by theory. A comparative discussion of these results with respect to Au(1.23 GeV/u)+Au collisions measured with HADES will be shown as well.
∗ supported by the DFG cluster of excellence "Origin and Structure of the Universe and SFB 1258"

HK 38.2 Mi 17:00 HZO 80

A FAIR phase-0 project at MAMI — Samer Ahmed[1,2], •Luigi Capozza[1], Alaa Dbeyssi[1], Phillip Grasemann[1,2], Frank Maas[1,2,3], Oliver Noll[1,2], David Rodríguez Piñeiro[1], Sahra Wolff[1,2], Manuel Zambrana[1,2], and Iris Zimmermann[1,2] for the PANDA-Collaboration — [1]Helmholtz-Institut Mainz, Mainz, Germany — [2]Institute of Nuclear Physics, Mainz, Germany — [3]PRISMA Cluster of Excellence, Mainz, Germany

In view of the current FAIR construction schedule on the one side and the state of development of some FAIR experiment setups on the other side, the so-called "phase-0" of the FAIR project has been proposed, within which FAIR equipment shall be used for physics experiments at other facilities before the actual start of FAIR.

The PANDA electromagnetic calorimeter (EMC), which is essentially already in the construction phase, can certainly be considered for such projects.

In this talk, the use of the backward endcap of the PANDA EMC at the MAMI electron accelerator in Mainz is explored. The physics channels which have been proposed are presented and some feasibility issues are discussed.

HK 38.3 Mi 17:15 HZO 80

Femtoscopic studies of baryonic interactions with the ALICE detector — •Bernhard Hohlweger for the ALICE-Collaboration — Technische Universität München — Excellence Cluster Universe

The two body interaction of baryons with one partner containing strangeness is not well constrained, especially in the region of low momentum. Therefore data is usually obtained by conducting scattering experiments but recently a new method was proposed using femtoscopy. Here the observable is the correlation function of particle pairs, whereas in order to study the interaction of particles, the emission of the pairs needs to be constrained. In this analysis pp and pPb data recorded by the ALICE detector was used to study the proton-Λ interaction and Λ-Λ interaction. The source was constrained by simultaneously fitting the proton-proton correlation function, where the interaction of pairs is well understood. The formalism of λ-parameters was used to separate background contributions from the genuine correlation arising from the baryon-baryon interaction. The results are used to discuss the sensitivity to different potentials of the proton-Λ interaction obtained by LO and NLO calculations. Additionally a comparison of the Λ-Λ correlation to a previous measurement of the STAR collaboration is presented.

HK 38.4 Mi 17:30 HZO 80

Freed-isobar Partial-Wave Analysis of the Spin-Exotic $J^{PC} = 1^{-+}$ Wave at COMPASS — •Dmitri Rybachikov for the COMPASS-Collaboration — Physik-Department E18, Technische Universität München

COMPASS is a multi-purpose fixed-target experiment at the CERN Super Proton Synchrotron aimed at studying the structure and spectrum of hadrons. The spectrum of isovector light-meson resonances is studied in diffractive-dissociation reactions using a 190 GeV/c π^- beam. The flagship channel is the $\pi^-\pi^-\pi^+$ final state, for which COMPASS has recorded a large data sample of 46 million events. From these data, 3π resonances are extracted by performing a partial-wave analysis (PWA) using the isobar model. The model depedence of the PWA result is studied using a novel method, the freed-isobar PWA, which extracts the amplitudes of the $\pi^-\pi^+$ subsytems from the data. Using this method, we studied the spin-exotic partial wave with $J^{PC} = 1^{-+}$ quantum numbers, which decays via an isovector $\pi^-\pi^+$ subsystem with $J^{PC} = 1^{--}$. This wave is of particular interest because it has quantum numbers that are forbidden for $q\bar{q}$ systems in the non-relativistic limit. Continuous mathematical ambiguites may arise in the freed-isobar approach. We will discuss methods to resolve these ambiguities and present results of this analysis.

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 38.5 Mi 17:45 HZO 80

Simulating the phase space for the $\eta(\to \pi^+\pi^-\pi^0)\pi^-$ production at COMPASS. — •Waldemar Renz, Bernhard Ketzer, Mikhail Mikhasenko, and Mathias Wagner for the COMPASS-Collaboration — Universität Bonn, Helmholtz-Institut für Strahlen- und Kernphysik, Bonn, Germany

The COMPASS experiment at CERN studies the excitation spectrum of mesons by diffractive scattering of 190 GeV/c pions off a hydrogen target. The data are analyzed using amplitude analysis techniques to extract the contributions of individual partial waves. Monte Carlo simulations of the respective decay channels are needed in order to correct for the detector acceptance. For the $\eta\pi$ final state, a phase-space generator of the $\pi^- p \to \pi^+\pi^-\pi^-\gamma\gamma p_{\text{recoil}}$ reaction has been developed, where the reaction is split up into $2 \to 2$ and $1 \to 2$ reactions. To reduce the number of random generated variables, several assumptions are made for the squared matrix element. The generator output is then processed by TGEANT, a new, simulation framework for COMPASS, based on Geant4, to simulate particle trajectories and interactions inside detectors.

From these simulated detector outputs, one can reconstruct the final states and filter for interesting events. The selected simulated data are finally compared to experimental data in order to validate the simulations. In this talk the status of the simulations will be presented.
Supported by BMBF.