HK 55: Hadron Structure and Spectroscopy IX

Zeit: Donnerstag 16:30–18:15 Raum: S1/01 A5

Gruppenbericht HK 55.1 Do 16:30 S1/01 A5

Chiral extrapolation of baryon masses — Matthias F.M. Lutz and •Yonggoo Heo — Gesellschaft für Schwerionenforschung GmbH, PlanckStr.1, 64291 Darmstadt, Germany

We study the quark-mass dependence of baryon masses from the three-flavour chiral Lagrangian formulated for the $J = 1/2^+$ and $J^P = 3/2^+$ ground states. The available lattice data are used to determine the low-energy parameters relevant for the baryon masses at chiral order 4, where large-N_c sum rules are imposed as to reduce the number of independent low-energy operators. We scrutinize the convergence properties of the three-flavour chiral extrapolation.

HK 55.2 Do 17:00 S1/01 A5

First measurements of $\gamma p \to K^+\Lambda$ at extreme forward angles at the BGO-OD experiment* — •Thomas Zimmermann for the BGO-OD-Collaboration — Physikalisches Institut, Universität Bonn

The BGO-OD experiment, located at the electron accelerator ELSA at the University of Bonn, is designed to study nucleon excitations with emphasis on understanding the reaction dynamics. One reaction of major interest is $\gamma p \to K^+\Lambda$. The BGO-OD experiment is ideal to investigate the dominant t-channel mechanisms in this reaction channel at forward angles due to the high resolution and acceptance of the forward spectrometer. The new data currently being analyzed covers extremely forward angles with high resolution. This will constrain solutions from data driven models and analysis, such as PWA and isobar models.

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HK 55.3 Do 17:15 S1/01 A5

Analysis of the reaction $\gamma p \to K^0\Sigma^+$ by the identification of the charged $K*$ decay channel at the BGO-OD experiment using kinematic fitting. — •Björn-Eric Reitz for the BGO-OD-Collaboration — Physikalisches Institut Bonn

The BGO-OD experiment at the ELSA facility in Bonn is built to investigate nucleon excitations via meson photoproduction. A program of measurements of reactions of associated strangeness in the final state has begun, one of which is $\gamma p \to K^0\Sigma^+$.

This talk shows the preliminary results of the analysis for the charged decay channel $K^0\Sigma^+ \to \pi^-\pi^+\pi^0 p$. Due to the small production cross section kinematic fitting has been used to discriminate the wanted channel against backround. Supported by DFG (SFB/TR-16).

HK 55.4 Do 17:30 S1/01 A5

Hyperon Interaction in Free Space and Nuclear Matter — •Madhumita Dhar[1] and Horst Lenske[1,2] — [1]Justus-Liebig University Giessen — [2]GSI, Darmstadt

A new approach to the SU(3) flavour symmetric meson-exchange model is introduced to describe free space baryon-baryon interaction. The Bethe-Salpeter equations are solved in a 3-D reduction scheme. The coupling of the various channels of total strangeness S and conserved total charge Q is studied in detail. Special attention is paid to the physical thresholds. The derived vacuum interaction has then been used to derive nuclear medium effect by employing the Pauli projector operator in 3-D reduced Bethe-Salpeter equation.The in-medium properties of the interaction are clearly seen in the variation of the in-medium low-energy parameters as a function of density.

This work is supported by HIC for FAIR and HGS-HIRe.

HK 55.5 Do 17:45 S1/01 A5

Scattering of hadrons within an extended linear sigma model — •Khaled Teilab[1,2], Francesco Giacosa[1,3], and Dirk H. Rischke[1] — [1]Goethe-Universität, Frankfurt am Main — [2]Cairo Universität, Giza, Ägypten — [3]Jan Kochanowski Universität, Kielce, Polen

In the low-energy regime, hadrons (instead of quarks and gluons) are the relevant degrees of freedom. Their masses and interactions can be well described by effective approaches to QCD. The extended linear sigma model is an effective model based on chiral and dilatation symmetries (together with their explicit as well as spontaneous breaking). It includes (axial-) vector mesons in addition to (pseudo-) scalar ones, which turns out to be very successful in describing the mass spectrum and decay widths of mesons up to 1.7 GeV.

Moreover, including two baryon doublets in the so-called mirror assignment allows for introducing a chirally invariant mass term for baryons as well as the interaction with a low-mass four-quark field, related to the resonance $f_0(500)$. Thus, the mass of the nucleon arises not solely from the chiral condensate, but also from the four-quark condensate.

The model has been used to describe elastic and inelastic baryon-baryon interactions and can be used to study meson-baryon and photon-baryon interactions as well. A comparison of the theoretical results with experimental data will be shown.

HK 55.6 Do 18:00 S1/01 A5

Study of the Lambda-proton interaction with the femtoscopy technique in p+Nb reactions at 3.5 GeV with HADES — •Oliver Arnold for the HADES-Collaboration — Physik Department, Technische Universität München, Garching, Germany — Excellence Cluster "Universe", Garching, Germany

Two-particle correlation functions at low relative momenta are sensitive to the size of the emission zone. By knowing the particle interaction precisely it is possible to make a detailed study of the particle's source. But turning the picture around is also possible: By knowing the source size it is possible to study final state interactions of particle pairs where the interaction strength is not well established.

We use the technique of two-particle correlations in a femtoscopy measurement of proton-proton and proton-Lambda pairs, which were produced in p+Nb collisions and detected with the HADES setup, where the proton had a kinetic beam energy of 3.5 GeV. By using proton pairs we were able to extract the region of homogeneity of the p+Nb system. This information together with UrQMD transport simulations allowed us to concentrate solely on the investigation of the proton-Lambda interaction. We tested different sets of scattering parameters predicted by theoretical calculations on the experimental data and the sensitivity of the method. This work is supported by HIC for FAIR and HGS-HIRe.