

HK 53: Hadronenstruktur und -spektroskopie

Zeit: Freitag 11:00–12:45

Raum: HZ 3

Gruppenbericht

HK 53.1 Fr 11:00 HZ 3

Study of $\bar{p}\bar{N} \rightarrow \{pp\}_s\pi$ reactions in the near-threshold region at ANKE-COSY — ●SERGEY DYMOV for the ANKE-Collaboration — FZ-Juelich, Wilhelm-Johnen-Straße 52428 Jülich

For description of pion reactions within the χ PT framework it is important to establish that the same short-range $NN \rightarrow NN\pi$ vertex contributes to both p -wave pion production, where both initial and final NN pairs are in S waves, and to other low energy phenomena.

The COSY-ANKE collaboration has embarked on an ambitious program of performing a complete set of measurements of the $NN \rightarrow \{pp\}_s\pi$ reactions so that a full amplitude analysis can be carried out. By selecting events with excitation energy in the proton-proton system $E_{pp} < 3$ MeV, the resulting diproton $\{pp\}_s$ is overwhelmingly in the 1S_0 state. As parts of this program, measurements at $T_p = 353$ MeV of the cross sections $d\sigma/d\Omega$ and proton analyzing powers A_y^p in the $\bar{p}p \rightarrow \{pp\}_s\pi^0$ and the quasi-free $\bar{p}n \rightarrow \{pp\}_s\pi^-$ reactions were done at ANKE, as well as of the transverse spin correlations $A_{x,x}$ and $A_{y,y}$ in the $\bar{n}\bar{p} \rightarrow \{pp\}_s\pi^-$ reaction.

The partial wave analysis results in three distinct solutions that can all describe reasonably well the measured values. However, the predictions for $A_{x,z}$ are radically different. Hence even a low statistics measurement of this parameter would be sufficient to resolve the ambiguities. For a proton beam this can be achieved through the use of a Siberian snake. It is planned that such an experiment will be carried out at ANKE using the polarized deuterium target.

HK 53.2 Fr 11:30 HZ 3

Hyperon Interactions in Nuclear Matter — ●MADHUMITA DHAR and HORST LENSKE — Institut für Theoretische Physik, Universität Gießen

Baryon-baryon interactions within the $SU(3)$ -octet are investigated in free space and nuclear matter. A meson exchange model is used for determining the interaction. The Bethe-Salpeter equations are solved in a $3-D$ reduction scheme. In-medium effects have been incorporated by including a two particle Pauli projection operator in the scattering equation. The coupling of the various channels of total strangeness $S = -1, -2$ and conserved total charge is studied in detail. Calculations and the corresponding results are compared for using the isospin and the particle basis. Matrix elements are compared in detail, in particular discussing mixing effects of different hyperon channels. Special attention is paid to the physical thresholds. The density dependence of interaction is clearly seen in the variation of the in-medium low-energy parameters. The approach is compared to descriptions derived from chiral-EFT and other meson-exchange models e.g. the Nijmegen and the Juelich model.

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HK 53.3 Fr 11:45 HZ 3

Λ_c^+ production in antiproton-proton annihilation within an effective Lagrangian model — ●RADHEY SHYAM¹ und HORST LENSKE² — ¹Institut für Theoretische Physik, Justus-Liebig-Universität Giessen, Heinrich-Buff-Ring 16, D-35392 Giessen and Saha Institute of Nuclear Physics, Kolkata, India — ²Institut für Theoretische Physik, Justus-Liebig-Universität Giessen, Heinrich-Buff-Ring 16, D-35392 Giessen

Using effective hadronic Lagrangians with physical hadron masses and coupling constants determined from $SU(4)$ flavor symmetry, we study the production cross sections of charmed baryon Λ_c^+ in the $\bar{p}p \rightarrow \bar{\Lambda}_c\Lambda_c^+$ reaction. The production mechanism is described by the t -channel meson exchange diagrams involving the exchange of D^0 and D^* mesons. At the $ND^0\Lambda_c$ and $ND^*\Lambda_c$ vertices several types of form factors have been used and sensitivity of the production cross sections to their form and the cut-off parameters appearing therein have been investigated. With a monopole form factor and a cut-off parameter of 2.5 GeV, our cross sections are of the same order of magnitude as those obtained in Ref. [1].

This work has been supported by DFG Le439/8-2 and HIC for FAIR.

[1] J. Haidenbauer and G. Krein, Phys. Lett. B **687**, 314 (2010).

HK 53.4 Fr 12:00 HZ 3

Light meson production in nucleon-nucleon reactions — ●KHALED TEILAB, SUSANNA GALLAS, FRANCESCO GIACOSA, and DIRK H. RISCHKE — Goethe-Universität, Frankfurt

We study the production of mesons in nucleon-nucleon reactions at center-of-mass momenta of a few GeV using an $N_f = 2$ linear sigma model, extended by including the $N_f = 2$ multiplets of (pseudo-) scalar and (axial-) vector mesons and a doublet of the nucleon together with its chiral partner (the $N^*(1535)$ or $N^*(1650)$ resonance).

Cross sections for the production of π^- , η^- , ρ^- and ω^- -mesons will be presented. The results are compared to experimental data.

HK 53.5 Fr 12:15 HZ 3

Investigation of the quasi-free reaction $p + d \rightarrow d + \eta + p_{sp}$ close to threshold at ANKE — ●DANIEL SCHROEER, CHRISTOPHER FRITZSCH, ALFONS KHOUKAZ, MALTE MIELKE, MICHAEL PAPENBROCK, and ALEXANDER TAESCHNER for the ANKE-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität, 48149 Münster, Germany

Recent precision measurements on the interaction of η mesons with He nuclei have shown evidence for an unexpectedly strong final state interaction which could possibly lead to the formation of η -mesic nuclei. To further investigate this behaviour for different nuclei a measurement on the reaction $p + d \rightarrow d + \eta + p_{sp}$ has been performed at the ANKE experiment located at the COSY accelerator of the Forschungszentrum Jülich. Here the deuteron serves as an effective neutron target while the remaining proton acts in good approximation as a spectator particle. The chosen beam momenta ($p_1 = 2.09$ GeV/c and $p_2 = 2.25$ GeV/c) in combination with the Fermi motion of the nucleons inside of the deuteron allow to measure cross sections in an excess energy range from 0 MeV up to 100 MeV. Based on these information the $d\eta$ scattering length $a_{d\eta}$ will be measured which will shed new light on the interaction between η meson and nucleons. In addition the data obtained at higher excess energies will allow for further information about the role of nucleonic resonances on the η meson production. Recent results will be presented and discussed.

Supported by the COSY-FFE program.

HK 53.6 Fr 12:30 HZ 3

Coulombanregung von ^{26}Na mit MINIBALL an REX-ISOLDE — ●BURKHARD SIEBECK¹, PETER REITER¹, MICHAEL SEIDLITZ¹, RICHARD ALTENKIRCH¹, CHRISTOPHER BAUER², HILDE DE WITTE³, HERBERT HESS¹, THORSTEN KRÖLL², JANNE PAKARINEN⁴, FABIAN RADECK¹, MARCUS SCHECK², DAVID SCHNEIDERS¹, CHRISTOPHE SOTTY^{4,5}, DIDIER VOULOT⁴, NIGEL WARR¹ und FREDRIK WENANDER⁴ — ¹IKP, Universität zu Köln — ²IKP, TU Darmstadt — ³IKS, K.U. Leuven — ⁴CERN, Genf — ⁵CSNSM, Orsay

Die empirische Zweikörperwechselwirkung USD wurde durch zusätzliche experimentelle Daten verbessert. Die daraus resultierenden Wechselwirkungen USDA/USDB beschreiben ^{26}Na in Hinblick auf Anregungsenergien und Spinzuweisungen in besserer Übereinstimmung mit experimentellen Ergebnissen. Dies motivierte die Bestimmung von Übergangswahrscheinlichkeiten zwischen angeregten Zuständen als sensitive Probe der zugrunde liegenden Schalenstruktur. Hierzu wurde ein Coulombanregungsexperiment mit einem radioaktiven ^{26}Na -Strahl bei einer Energie von 2,82 MeV/u an einem ^{104}Pd -Target mit dem MINIBALL-Spektrometer am REX-ISOLDE Beschleuniger durchgeführt. Mit Hilfe von GOSIA2-Berechnungen wurden Übergangswahrscheinlichkeiten der ersten angeregten Zustände in ^{26}Na aus den experimentellen Daten bestimmt. Der Vergleich mit theoretischen Werten zeigt auch bei den neuen Wechselwirkungen USDA/B eine bessere Übereinstimmung.

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