HK 59: Hadronenstruktur und -spektroskopie

Zeit: Freitag 14:00–16:00 Raum: HZ 1+2

Gruppenbericht HK 59.1 Fr 14:00 HZ 1+2

Online software trigger at PANDA/FAIR — •Donghee Kang[1], Achim Denig[2], Klaus Götzen[3], Ralf Kliemt[1], Frank Nerling[1], and Klaus Peters[3] for the PANDA-Collaboration — [1]Helmholtz-Institut Mainz, Germany — [2]Institut für Kernphysik, Universität Mainz, Germany — [3]GSI Helmholtzzentrum für Schwerionenforschung GmbH

The PANDA experiment at FAIR will employ a novel trigger-less readout system. Since a conventional hardware trigger concept is not suitable for PANDA, a high level online event filter will be applied to perform fast event selection based on physics properties of the reconstructed events. A trigger-less data stream implies an event selection with track reconstruction and pattern recognition to be performed online, and thus analysing data under real time conditions at event rates of up to 40 MHz.The projected data rate reduction of about three orders of magnitude requires an effective background rejection, while retaining interesting signal events. Real time event selection in the environment of hadronic reactions is rather challenging and relies on sophisticated algorithms for the software trigger. The implementation and the performance of physics trigger algorithms presently studied with realistic Monte Carlo simulations will be discussed. The impact of parameters such as momentum or mass resolution, PID probability, vertex reconstruction and a multivariate analysis using the TMVA package for event filtering is presented.

HK 59.2 Fr 14:30 HZ 1+2

Perspectives on Open Charm Physics with PANDA — •Elisabetta Prencipe and James Ritman for the PANDA-Collaboration — FZJ Juelich, Leo Brandt Strasse - 52428 Juelich

The experiment PANDA at FAIR (Facility for Antiproton and Ion Research) in Darmstadt (Germany) will investigate fundamental questions of hadron and nuclear physics in interactions of antiprotons with nucleons and nuclei. Gluonic excitations and the physics of hadrons with strange and charm quarks will be accessible with unprecedented accuracy, thereby allowing high precision tests of the strong interaction. In particular, the D{sJ}(2317)+ and D{sJ}(2460)+ are still of high interest 10 years after their discovery, because they can not be simply understood in term of potential models. In fact, the low statistics and lack of precision of the past experiments did not allow to clarify their nature. Recently LHCb at CERN have made progresses in this respect, but still not at the level of precision required in order to clarify the puzzle of the cs-bar spectrum. PANDA will be able to achieve a factor 20 higher mass resolution than attained at the B-factories, which is expected to be decisive on these and second-order open questions. The technique to evaluate the width from the excitation function of the cross section of the D{sJ} mesons will be presented, and full simulations performed with PandaRoot will be shown.

HK 59.3 Fr 14:45 HZ 1+2

Strange and charm meson masses from twisted mass lattice QCD — •Martin Kalinowski and Marc Wagner — Goethe University Frankfurt am Main

We present results of a twisted mass lattice QCD computation of the strange and charm meson spectrum with $2 + 1 + 1$ dynamical quark flavors. Particular focus is put on excited D and D_s mesons and on a connection to the "$1/2, 3/2$ limit" for the $D^{**}_{(s)}$.

HK 59.4 Fr 15:00 HZ 1+2

The resonances f0(1370), f0(1500) and f0(1710) in the extended Linera Sigma Model — •Stanislaus Janowski, Francesco Giacosa, and Dirk H. Rischke — Goethe-University, Frankfurt am Main, Germany

In order to study the vacuum properties of the scalar-isoscalar states f0(1370), f0(1500) and f0(1710) we use the extended Linear Sigma Model (eLSM) with globel chiral symmetry and dilatation invariance. Our effective Lagrangian contains (pseudo)scalar and (axial)vector quark-antiquark states and a scalar glueball. We investigate mixing, masses, and decays. We find that a scenario in which f0(1710) is predominantely a scalar glueball is in agreement with the vacuum's phenomenology.

HK 59.5 Fr 15:15 HZ 1+2

$a_0(980)$ as a dynamically generated resonance in the extended linear sigma model — •Thomas Wolkanowski-Gans and Francesco Giacosa — Goethe-Universität Frankfurt am Main

We study basic properties of scalar hadronic resonances within the so-called extended linear sigma model (eLSM), which is an effective model of QCD based on chiral symmetry and dilatation invariance. In particular, we focus on the mass and decay width of the isovector state $a_0(1450)$ and perform a numerical study of the propagator pole(s) on the unphysical Riemann sheets. Here, the $a_0(1450)$ is understood as a seed state explicitly included in the eLSM – this is in fact not true for the corresponding resonance below 1 GeV, the $a_0(980)$, which is sometimes interpreted as a kaonic (i.e., dynamically generated) bound state. In our work we want to clarify if the yet not included $a_0(980)$ can be found as a propagator pole generated by hadronic loop contributions. From such an investigation one could learn more about the general dependence of the eLSM – and effective field models in general – on strongly coupled hadronic intermediate states, possibly giving new insight into the low-energy regime, scalar resonances and both its theoretical description and physical interpretation.

HK 59.6 Fr 15:30 HZ 1+2

Analyse der Reaktion $\bar{p}p \to \pi^+\pi^-\pi^0\pi^0$ bei Crystal Barrel im Fluge — •Arber Mustafa — Institut für Experimentalphysik I, Ruhr-Universität Bochum

Am PANDA-Experiment, welches an der künftigen Beschleunigeranlage FAIR aufgebaut wird, werden $\bar{p}p$-Annihilationen bis zu einer Schwerpunktsenergie von etwa 5,5 GeV untersucht. Eines der Hauptziele des Experiments ist die Spektroskopie von Hadronen, insbesondere von Charmonium-Zuständen. Die Identifizierung zu einer Reaktion beitragender Resonanzen erfordert dabei meist eine Partialwellenanalyse der Reaktion. Um im Hinblick auf das PANDA-Experiment die $\bar{p}p$-Annihilationen näher zu untersuchen, wird die Reaktion $\bar{p}p \to \pi^+\pi^-\pi^0\pi^0$ im Fluge bei Strahlenimpulsen von 900 MeV/c und 1940 MeV/c rekonstruiert. Die analysierten Daten wurden durch das Crystal Barrel-Experiment am Antiprotonspeicherring LEAR am CERN in den Jahren zwischen 1989 und 1996 aufgezeichnet. In diesem Beitrag werden die Selektion der Reaktion und vorläufige Resultate vorgestellt.

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HK 59.7 Fr 15:45 HZ 1+2

ComPWA: Ein allgemeines Partialwellenanalyse Framework — Florian Feldbauer[1,2], Miriam Fritsch[1,2], Klaus Götzen[1,3], Prometeusz Jasinski[1,2], Anastasia Karavdina[2], •Mathias Michel[1], Frank Nerling[1] und Klaus Peters[1,3] — [1]HI Mainz — [2]Universität Mainz — [3]GSI Darmstadt

Viele neue Experimente verschreiben sich der Suche nach neuen konventionellen sowie exotischen hadronischen Zuständen wie z.B. Hybriden oder Gluebällen. Zur Identifizierung möglicher Kandidaten und zur eindeutigen Einordnung bereits bekannter Zustände wird in einem Großteil der Analysen eine Partialwellenanalyse (PWA) benötigt. Zu diesem Zweck wird das neue, flexible und effiziente PWA-Framework ComPWA entwickelt. Es ist modular gestaltet, was es erlaubt, problemlos weitere Modelle und Formalismen hinzuzufügen, wie auch gleichzeitig mehrere Datensätze (auch verschiedener Experimente) anzupassen. Außerdem werden verschiedene Minimierungs- und Bewertungsroutinen zur Verfügung gestellt. Um Einschränkungen bisheriger PWA-Programme zu vermeiden, werden neue, allgemeine Methoden der Optimierung implementiert. Ziel ist es, die Software mit Daten laufender Experimente wie z.B. BaBar oder BESIII zu entwickeln und zu testen. In diesem Vortrag werden der Status der Entwicklung sowie erste Testergebnisse vorgestellt.