HK 47: Hadron Structure and Spectroscopy II

Time: Wednesday 14:00–16:00 Location: H-ZO 30

HK 47.1 We 14:00 H-ZO 30

Infrared regularization for vector mesons and baryons — •Peter C. Bruns[1,2] and Ulf-G. Meissner[1,2,3] — [1]Helmholtz-Institut für Strahlen-und Kernphysik (Theorie), Universität Bonn, Nußallee 14-16, 53115 Bonn, Germany — [2]Bethe Center for Theoretical Physics, Universität Bonn, 53115 Bonn, Germany — [3]Institut für Kernphysik (Theorie) and Jülich Center for Hadron Physics, Forschungszentrum Jülich, 52425 Jülich, Germany

We show that the method of infrared regularization, invented in its original form by Becher and Leutwyler, can be extended to the case of explicitly included meson resonances. After a short review of the original formalism, the steps necessary for the generalization of the method will be discussed in detail. As an application, we will evaluate a contribution to the axial form factor of the nucleon employing the generalized infrared regularization scheme.

HK 47.2 We 14:15 H-ZO 30

A gauge-invariant chiral unitary framework for kaon photo- and electroproduction on the proton — Bugra Borasoy[1], •Peter C. Bruns[1,2], Ulf-G. Meissner[1,2,3], and Robin Nissler[1] — [1]Helmholtz-Institut für Strahlen-und Kernphysik (Theorie), Universität Bonn, Nußallee 14-16, 53115 Bonn, Germany — [2]Bethe Center for Theoretical Physics, Universität Bonn, 53115 Bonn, Germany — [3]Institut für Kernphysik (Theorie) and Jülich Center for Hadron Physics, Forschungszentrum Jülich, 52425 Jülich, Germany

We present a gauge-invariant approach to meson photoproduction on nucleons within a chiral unitary framework. The interaction kernel for meson-baryon scattering is derived from the chiral effective Lagrangian and iterated in a Bethe-Salpeter equation. Data on kaon photoproduction from SAPHIR, CLAS and CBELSA/TAPS are analyzed in the threshold region. The importance of gauge invariance and the precision of various approximations utilized in earlier works are discussed.

HK 47.3 We 14:30 H-ZO 30

A Linear Sigma Model with Vector Mesons and Global Chiral Invariance — •Denis Parganlija[1], Francesco Giacosa[1], and Dirk H. Rischke[1,2] — [1]Institut für Theoretische Physik, Goethe-Universität, Max von Laue-Str. 1, D-60438 Frankfurt am Main, Germany — [2]Institut für Theoretische Physik and Frankfurt Institute for Advanced Studies, Goethe-Universität, Max von Laue-Str. 1, D-60438 Frankfurt am Main, Germany

We calculate low-energy meson decay widths in a two-flavour linear sigma model with global chiral symmetry exploring two different assignments for scalar $\bar{q}$-q states: (i) as $f_0(600)$ / $a_0(980)$ and (ii) as $f_0(1370)$ / $a_0(1450)$, respectively. We compare the consequences of each of those assignments with the experimental data. Results for pion-pion scattering lengths in both assignments are also discussed.

HK 47.4 We 14:45 H-ZO 30

Mesons and glueballs: the ground states — •Gurjav Ganbold — JINR, Dubna, Russia — Inst. Phys. Tech., Ulaanbaatar

The two-quark and two-gluon bound states have been studied within a relativistic quantum-field model based on analytic confinement. The ladder Bethe-Salpeter equation is solved for the meson and glueball spectra involving a minimal set of parameters (the quark masses, the coupling constant and the confinement scale). The model provides a reasonable framework to compute data simultaneously in three sectors of low-energy particle physics, namely, the lowest glueball mass, the conventional meson spectrum (in the mass range from 140MeV up to 9.5GeV), and the pion and kaon weak decay constants. The obtained results are in reasonable agreements with the recent experimental data.

HK 47.5 We 15:00 H-ZO 30

A method to measure the $\bar{K}N$ scattering length in lattice QCD — •Michael Lage[1,2], Ulf-G. Meissner[1,2,3], and Akaki Rusetsky[1,2] — [1]Helmholtz-Institut für Strahlen- und Kernphysik (Theorie), Universität Bonn — [2]Bethe Center for Theoretical Physics, Universität Bonn — [3]Institut für Kernphysik (Theorie), Forschungszentrum Jülich

As first shown by Lüscher, finite volume simulations of the energy levels of two-particle states can give access to scattering information in the infinite volume. However, for the extraction of the $\bar{K}N$ scattering length, a generalization of this scheme is called for since there is a strong channel coupling between $\bar{K}N$ and $\Sigma\pi$, the latter channel having its threshold about 100 MeV below the opening of the $\bar{K}N$ one. In addition, the appearance of the $\Lambda(1405)$ just between these two thresholds further complicates the picture. We propose a method to determine the (complex) $\bar{K}N$ scattering length in lattice QCD, using an appropriate modification of Lüscher's formula.

Work supported in parts by DFG (TR 16).

HK 47.6 We 15:15 H-ZO 30

The strangeness of the proton measured by the G0 parity violation experiment at Jefferson Laboratory — •Jean-sebastien Real for the G0-Collaboration — LPSC, Université Joseph Fourier Grenoble 1, CNRS/IN2P3, Institut Polytechnique de Grenoble

The strangeness content of the proton is related to the sea quarks contribution to the nucleon properties, as the spin, the mass or the current. In this context, the parity violation experiments measure this contribution to the electromagnetic (EM) current of the proton, through the strange electric and magnetic form factors. The full access to these quantities requires the measurement of weak form factors of the proton. They can be accessed by measuring the asymmetry in elastic scattering of longitudinally polarized electron on hydrogen and deuterium at two different electron angles (forward and backward). The parity violation asymmetry is of the order of 10-5 and is measured at 10-6 level of accuracy. The G0 experimental setup will be described in the two configurations and the results will be presents. The forward G0 experiment provides a linear combination of the electric and magnetic strange quark contribution over a wide kinematical range. The backward G0 experiment will provide the separate electric and magnetic strange quarks contribution at two kinematics Q2 ˜ 0.63 and 0.23 (GeV/c)2.

Group Report HK 47.7 We 15:30 H-ZO 30

Results in hadronic physics with the KLOE experiment in Frascati — •Stefan E. Müller for the KLOE-Collaboration — Institut für Kernphysik Universität Mainz, J.-J.-Becher-Weg 45, 55128 Mainz

The KLOE experiment at the DAΦNE e^+e^- collider in Frascati covers a wide spectrum of physics. Concerning hadronic physics, a new precise measurement of the pion form factor in the mass range between 0.35 and 0.95 GeV^2 has been published recently, selecting events in which the e^+ or the e^- emits a hard photon in the initial state. This "radiative return" to the ρ and ω resonances allows to access the energy region below the DAΦNE energy, which is fixed to $M_\phi \simeq 1.02$ GeV. In addition, new results have been obtained in the scalar sector, like an upper limit on the branching ratio for $\phi \to K_0\overline{K}_0\gamma$, which proceeds through $f_0(980)/a_0(980)\gamma$, and a high statistics result on the $\phi \to a_0\gamma$ decay. For η/η' physics, a final result for the $\eta \to \pi^+\pi^-e^+e^-$ branching ratio has been obtained, while the KLOE measurement of the gluonium content of the η' has been updated. Also, the cross section parameters for the processes $e^+e^- \to \pi^+\pi^-\pi^0\pi^0$ and $e^+e^- \to \pi^0\pi^0\gamma$, which both proceed through the $\omega\pi^0$ intermediate state, have been measured. In the talk, these new KLOE results will be presented, and a brief overview on ongoing KLOE analyses in hadronic physics will be given.