HK 47: Hadron Structure and Spectroscopy 10

Time: Wednesday 14:30–16:30 Location: T/SR25

HK 47.1 Wed 14:30 T/SR25

Extraction of Quark Fragmentation Functions in Leading Order at COMPASS — •Nicolas du Fresne von Hohenesche — For the COMPASS collaboration— Institut für Kernphysik, Johannes Gutenberg-Universität Mainz, Johann-Joachim-Becher-Weg 45, 55099 Mainz

Quark fragmentation functions (FF) $D_q^h(z, Q^2)$ describe final-state hadronisation of quarks q into hadrons h. The FFs can be extracted from hadron multiplicities produced in semi-inclusive deep inelastic scattering using a χ^2 fit. The COMPASS collaboration has recently measured charged hadron multiplicities for identified pions and kaons using a 160 GeV/c muon beam impinging on an iso-scalar target. The data cover a large kinematical range and provide an important input for global QCD analyses of world data at NLO, aiming at the determination of FFs in particular in the strange quark sector. The newest results from COMPASS on pion multiplicities and LO fragmentation functions will be presented.

Supported by BMBF

HK 47.2 Wed 14:45 T/SR25

Narrow Delta-resonance contribution to lepton-proton scattering — •Volodymyr Shubnyi[1,2] and Marc Vanderhaeghen[1] — [1]JGU Mainz, Germany — [2]KNU Kiev, Ukraine

The measured value of the proton charge radius from the Lamb shift of energy levels in muonic hydrogen is in strong contradiction, by 7-8 standard deviations, with the value obtained from electronic hydrogen spectroscopy and the value extracted from the unpolarized electron-proton scattering data. The dominant unaccounted higher order contribution in scattering experiments corresponds to two photon exchange (TPE) diagram. The delta-resonance contribution to TPE correction was studied in narrow width approximation.

HK 47.3 Wed 15:00 T/SR25

Nucleon axial form factors from two-flavour Lattice QCD — •jiayu hua[1], parikshit m. junnarkar[2], stefano capitani[2], dalibor djukanovic[2], georg m. von hippel[1], benjamin jäger[3], harvey b. meyer[1,2], thomas d. rae[2], and hartmut wittig[1,2] — [1]PRISMA Cluster of Excellence and Institut für Kernphysik, Johannes Gutenberg-Universität Mainz, Mainz, Germany — [2]Helmholtz-Institut Mainz, Mainz, Germany — [3]Department of Physics, College of Science, Swansea University, Swansea, UK

We present preliminary lattice QCD results on the axial form factor $G_{\mathrm{A}}(Q_2)$ and the induced pseudoscalar form factor $G_{\mathrm{P}}(Q_2)$ of the nucleon. A systematic analysis of the excited-state contributions in correlation functions is performed on two-flavour ensembles with O(a) improved Wilson fermions. We observe that the form factors suffer from non-trivial excited-state contributions at the source-sink separations available to us. We use both the matrix elements of the axial current and the pseudoscalar density to extract the form factors.

HK 47.4 Wed 15:15 T/SR25

Geant 4 Monte Carlo simulation for the COMPASS-II experiment at CERN — •Christopher Regali, Fischer Horst, Matthias Gorzellik, Philipp Jörg, Kay Königsmann, Steffen Landgraf, Katharina Schmidt, Stefan Sirtl, Tobias Szameitat, and Johannes ter Wolbeek — for the COMPASS collaboration, Physikalisches Institut, Albert-Ludwigs-Universität Freiburg

The COMPASS-II experiment at CERN/SPS is a multi purpose experiment for nucleon structure studies and hadron spectroscopy. It offers the unique possibility to measure exclusive processes like Hard Exclusive Meson Production and Deeply Virtual Compton Scattering with different beams over a wide kinematic range. Such processes will provide access to Generalized Parton Distributions (GPDs), which, as a theoretical framework, are particularly interesting, because they can give a dynamical insight into the nucleon. For future measurements a very precise understanding of the spectrometer acceptance is needed, as the measurement aims towards asymmetries in total cross sections. In order to accomplish this, a new Geant4 based simulation software was developed. This talk will give an overview of the project. Supported by BMBF, DFG and EU FP7 (Grant Agreement 283286).

HK 47.5 Wed 15:30 T/SR25

Messung des differentiellen und totalen Wirkungsquerschnitts der η' Photoproduktion an MAMI — •Patrik Ott für die A2-Kollaboration — Institut für Kernphysik, Universität Mainz, Mainz, Germany

Am Crystal-Ball (CB) Experiment am Elektronenstrahl-Beschleuniger MAMI in Mainz werden Nukleonen und weitere Hadronen mittels eines reellen Photonenstrahls untersucht. Mit der Beschleunigerstufe MAMI-C, steht ein intensiver polarisierter Strahl mit einer Energie von bis zu 1,604 GeV zur Verfügung. Durch Bremsstrahlung wird mit Hilfe eines neu entwickelten Magnet-Spektrometers ein hochenergetischer energiemarkierter Photonenstrahl erzeugt. Erste Experimente wurden 2012 durchgeführt. Ein hermetisches Detektorsystem, bestehend aus dem CB/TAPS-Kalorimeter und weiteren Detektoren, welche eine Teilchenidentifikation und Spurrekonstruktion erlauben, weist Vielkörper-Endzustände exklusiv nach.

In meinem Vortrag werde ich Messungen des totalen und differentiellen Wirkungsquerschnitts der Photoproduktion $\gamma p \to \eta' p$ präsentieren. Diese beruhen auf der Analyse des neutralen Zerfallskanals $\eta' \to \eta\pi^0\pi^0 \to 6\gamma$.

HK 47.6 Wed 15:45 T/SR25

In-medium properties of the ω-meson* — •Stefan Friedrich for the CBELSA/TAPS-Collaboration — II. Physikalisches Institut, Justus-Liebig-Universität Gießen

The attenuation of ω-mesons in cold nuclear matter has been studied in photonuclear reactions on proton, ^{12}C and ^{93}Nb nuclei, using the tagged photon beam at the ELSA accelerator in Bonn. The combined setup of the Crystal Barrel and MiniTAPS detector systems, which form a 4π electromagnetic calorimeter, was used for detecting the ω-mesons via the $\omega \to \pi^\circ + \gamma$ decay mode.
Results on the in-medium width of the ω-meson, derived from the transparency ratio measurements, will be presented and compared to experimental data [1] and recent theoretical predictions [2,3]. The inelastic ωN cross section is deduced as a function of momentum as well. In particular, the momentum-dependence for slow ω-mesons will be discussed.
[1] Kotulla et al., *Phys. Rev. Lett.* **100** (2008), 192302
[2] Cabrera and Rapp, *Phys. Lett. B* **729** (2014), 67
[3] Ramos et al., *Eur. Phys. Jour. A* **49** (2013), 148
*Funded by DFG (SFB/TR16)

HK 47.7 Wed 16:00 T/SR25

Determination of the strange vector form factors and the anapole moment of the nucleon from measurements of the A4 Collaboration — •David Balaguer Ríos, Kurt Aulenbacher, Sebastian Baunack, Dominik Becker, Luigi Capozza, Jürgen Diefenbach, Boris Gläser, Dietrich von Harrach, Yoshio Imai, Eva-Maria Kabuss, Rainer Kothe, Jeonghan Lee, Frank Maas, Harald Merkel, María Carmen Mora Espí, Ernst Schilling, and Christoph Weinrich for the A4-Collaboration — Institut für Kernphysik, Mainz, Germany

At the MAMI accelerator facility the A4 collaboration has measured the parity violating asymmetry in the quasielastic scattering of longitudinally polarized electrons on the deuteron at backward angles at $Q^2 = 0.23$ (GeV)^2. The aim is to extract simultaneously the strange vector form factors G_E^s, G_M^s and the dominant isovector axial vector form factor of the nucleon $G_A^{e,(T=1)}$. Moreover this set of measurements permits the constrain of electroweak radiative corrections contributing to the effective axial vector current of the nucleon as seen by the photon (the nucleon anapole moment). In this talk the latest measurement of the asymmetry is presented and discussed in terms of strangeness and axial form factors of the nucleon.

HK 47.8 Wed 16:15 T/SR25

Extending the alpha/beta rule for accurate calculation of meson masses to baryons — •Karl Otto Greulich — Fritz Lipmann Instute, Beutenbergstr.11,D07745 Jena

The alpha/beta rule: m (particle) = alpha power to -n x beta power to m x 27,2 eV/c2 has recently been reported to predict, for n=3 and m=0, a mass of 70,02 MeV/c2 (K.O.Greulich, DPG Spring meeting 2014, Frankfurt, HK 18.5). Thereby alpha is the fine structure con-

stant (= 1/137,036), beta is the proton vs. electron mass ratio (= 1836,12); m and n are integers. The predicted mass is a sort of building block for most mesons and allows accurate calculation of their masses. Here it is reported that the masses of a number of baryons also fit into this scheme.