HK 37: Hadronenstruktur und -spektroskopie

Zeit: Donnerstag 14:00–15:45 Raum: HZ 1+2

HK 37.1 Do 14:00 HZ 1+2

Hard exclusive meson production to constrain GPDs — •Johannes ter Wolbeek, Horst Fischer, Matthias Gorzellik, Arne Gross, Philipp Jörg, Kay Königsmann, Pasquale Malm, Christopher Regali, Katharina Schmidt, Stefan Sirtl, and Tobias Szameitat — for the COMPASS collaboration, Physikalisches Institut, Albert-Ludwigs-Universität Freiburg

The concept of Generalized Parton Distributions (GPDs) combines the two-dimensional spatial information, given by form factors, with the longitudinal momentum information from the PDFs. Thus, GPDs provide a three-dimensional 'tomography' of the nucleon. Furthermore, according to Ji's sum rule, the GPDs H and E enable access to the total angular momenta of quarks, antiquarks and gluons. While H can be approached using electroproduction cross section, hard exclusive meson production off a transversely polarized target can help to constrain the GPD E.
At the COMPASS experiment at CERN, two periods of data taking were performed in 2007 and 2010, using a longitudinally polarized 160 GeV/c muon beam and a transversely polarized NH_3 target. This talk will introduce the data analysis of the process $\mu + p \to \mu' + p' + V$ and recent results will be presented. Supported by BMBF, DFG and EU FP7 (Grant Agreement 283286).

HK 37.2 Do 14:15 HZ 1+2

COMPASS results on the transverse spin asymmetry in identified dihadron production in SIDIS — •Christopher Braun — Univ. Erlangen

The parton distribution function $h_1^q(x)$ of a transversely polarized quark q inside a transversely polarized nucleon, is chiral-odd and therefore not accessible in inclusive deep-inelastic scattering. It can only be observed in semi-inclusive deep-inelastic scattering (SIDIS) in combination with another chiral-odd function like the dihadron interference fragmentation function (IFF) $H_{1,q}^{\sphericalangle}$. The 160 GeV/$c$ polarized muon beam of CERNs M2 beamline allows COMPASS to investigate transverse spin effects using polarized solid state targets.
In this contribution an overview of COMPASS results for the azimuthal asymmetry in identified dihadron production is given. Taking advantage of the very precise particle identification of the apparatus using the RICH detector an identification of the hadrons which form the pairs in terms of pions and kaons was performed. Recently, the full set of this asymmetry from the COMPASS data on the deuteron and the proton target is available. The latter has been taken in the years 2007 and 2010, while the deuteron date dates back to the years 2003 and 2004. Data sets from same targets have been combined and analyzed using homogeneous cuts and methods. This allows for a detailed comparison of the obtained results to each other, to the corresponding results of the HERMES experiment and to model predictions. Furthermore an extraction of the so-called "Transversity" distribution $h_1(x)$ for u and d quarks was carried out. – Supported by German BMBF

HK 37.3 Do 14:30 HZ 1+2

Results on the longitudinal double spin asymmetry A_1^p and g_1^p from the 2011 COMPASS data — •Malte Wilfert — for the COMPASS collaboration — Institut für Kernphysik, Johannes Gutenberg-Universität Mainz, Johann-Joachim-Becher-Weg 45, 55099 Mainz

The COMPASS experiment at the M2 beamline of the CERN SPS has taken data with a polarised muon beam scattering of a polarised NH_3 target in 2011. The beam energy has been increased to 200 GeV compared to 160 GeV in 2007. With the increased beam energy it is possible to reach higher values of Q^2 and lower values of x_{Bj}, compared to our first measurement in 2007. We will present our results on the longitudinal double spin asymmetry A_1^p and the spin-dependent structure function g_1^p from the 2011 data taking. This results will be used in a NLO QCD fit to the worlds data to obtain the polarised parton distributions and also to update our results on the validation of the Bjorken sum rule, connecting the integral of the non-singulet structure function with the ratio of the weak coupling constants.

Supported by BMBF under the contract 05P12UMCC1 and GRK Symmetry Breaking (DFG/GRK 1581)

HK 37.4 Do 14:45 HZ 1+2

Lambda-Polarisation in der Reaktion p (3.5 GeV) + Nb. — •Christian Wendisch für die HADES-Kollaboration — Helmholtz-Zentrum Dresden-Rossendorf

Die bereits 1976 erstmals beobachtete starke Polarisation von Hyperonen aus Kernreaktionen mit unpolarisierten Projektilen stellt ein bislang nur unzureichend erforschtes Phönomen dar. Entgegen den Erwartungen übt der Spin einen bedeutenden Einfluss bei der Teilchen-Erzeugung in inklusiven Prozessen, unabhängig von der kinetischen Energie der Reaktion, aus. Die Messung der Hyperon-Polarisation liefert somit Informationen über die Spin-Abhängigkeit der Quark-Verteilungen im Nukleon sowie der Fragmentationsprozesse und erlaubt den Test von Modellen zur Baryon-Struktur. Insbesondere in der Reaktion unpolarisierter Nukleonen stellen Λ-Hyperonen ein ideales Instrument zur Untersuchung der Polarisations-Effekte dar, weil sie über ihren schwachen Zerfall als natürliches Polarimeter wirken.

Aufgrund der großen Raumwinkelabdeckung und der hohen Nachweiseffizienz für Hadronen ermöglicht das High Acceptance Di-Electron Spectrometer (HADES) Λ-Hyperonen in einem weiten Phasenraumbereich zu rekonstruieren und somit deren Polarisation in der Reaktion p (3.5 GeV) + Nb in Abhängigkeit von Transversalimpuls und Rapidität zu bestimmen. Unsere Analyse zeigt eine signifikant negative Polarisation, welche im Mittel -11 % beträgt und mit steigendem Transversalimpuls zunimmt. Diese Arbeit wurde unterstützt durch das BMBF.

HK 37.5 Do 15:00 HZ 1+2

Measurement of Identified Jet Fragmentation Functions in Proton-Proton Collisions with ALICE at the LHC — •Benjamin A. Hess for the ALICE-Collaboration — Physikalisches Institut, Universität Tübingen, Germany

The ALICE experiment has excellent tracking and particle identification capabilities for tracks with transverse momenta ranging from 150 MeV/c up to several 10 GeV/c. This renders the measurement of identified jet fragmentation functions possible.

Partons from hard interactions at large momentum transfers fragment into jets. The non-perturbative aspect of the fragmentation process is encoded in so-called fragmentation functions that need to be determined from experiment. Comparing the measured functions with theoretical models can help to better understand the fragmentation process.

The anti-kT algorithm is used to reconstruct charged jets. Charged particles in these jets are then identified via their specific energy loss dE/dx in the ALICE TPC. First results for identified fragmentation functions in proton-proton collisions at $\sqrt{s} = 7$ TeV will be presented and compared to MC models.

HK 37.6 Do 15:15 HZ 1+2

Feasibility Study of a Transversely Polarized Target in Panda — •Bertold Fröhlich — Helmholtz Institut Mainz

PANDA (Antiproton Annihilation at Darmstadt) is a key project at the Facility for Antiproton and Ion Research (FAIR), currently under construction at the GSI Darmstadt. PANDA is a state of the art detector for antiproton-proton fixed target experiments. A transversely polarized target in PANDA would allow the determination of the proton electromagnetic form factors in the time-like region with unprecedented accuracy and the first-time extraction of their imaginary part, opening a new window for investigating the nucleon structure.

As a first step for achieving a transverse target polarization, the target region has to be shielded against the 2 T longitudinal magnetic flux from the solenoid of the PANDA spectrometer. We present numerical simulations and experimental results on intense magnetic flux shielding using a high temperature superconducting hollow cylinder.

HK 37.7 Do 15:30 HZ 1+2

Accessing Transition Distribution Amplitudes with the PANDA experiment at FAIR — •Manuel Zambrana, Maria del Carmen Mora, and Frank Maas — Institut für Kernphysik, Johannes Gutenberg Universität, Mainz, Germany

The possibility of accessing the proton to pion Transition Distribution Amplitudes with the future PANDA detector at the FAIR facility is investigated. At high center of mass energy and four-momentum transfer, the amplitude of signal channel $\bar{p}p \to e^+e^-\pi^0$ admits a QCD factor-

ized description in terms of Distribution Amplitudes and Transition Distribution Amplitudes in the forward and backward regions. Feasibility studies of measuring $\bar{p}p \to e^+e^-\pi^0$ with the PANDA detector have been performed at the center of mass energy squared $s = 5$ GeV^2 and $s = 10$ GeV^2, in the kinematic region of four-momentum transfer $3.8 < q^2 < 4.2$ GeV^2 and $7 < q^2 < 8$ GeV^2, respectively. These include detailed simulations on signal reconstruction efficiency as well as on rejection of the most severe background channel, i.e. $\bar{p}p \to \pi^+\pi^-\pi^0$. Simulations show that the particle identification capabilities of the PANDA detector will allow to achieve a background rejection factor larger than 10^8 while keeping the signal reconstruction efficiency at the level of 40%, and that a clean lepton signal can be reconstructed with a data sample corresponding to 2 fb^{-1} of integrated luminosity. The future measurement of the signal channel cross section with PANDA will provide a test of QCD factorization and opens the possibility of accessing the proton to pion Transition Distribution Amplitudes.