HK 46: Hadron Structure and Spectroscopy VI

Zeit: Donnerstag 16:45–19:00 Raum: F 5

Gruppenbericht HK 46.1 Do 16:45 F 5

The t-dependence of the pure DVCS cross-section at COMPASS — Horst Fischer, Simon Gerstner, Matthias Gorzellik, Pirmin Hofmeier, •Philipp Jörg, Christopher Regali, and Tobias Szameitat — Albert-Ludwigs-Universität Freiburg

A major part of the COMPASS-II program will be dedicated to the investigation of **G**eneralized **P**arton **D**istributions (GPDs), which aim for the most complete description of the partonic structure of the nucleon. GPDs are experimentally accessible via lepton-induced exclusive reactions, in particular the **D**eeply **V**irtual **C**ompton **S**cattering (DVCS) and **D**eeply **V**irtual **M**eson **P**roduction (DVMP). At COMPASS, those processes are investigated using a high intensity muon beam with a momentum of 160 GeV/c and a 2.5 m-long liquid hydrogen target. In order to optimize the selection of exclusive reactions at those energies, the target is surrounded by a new barrel-shaped time-of-flight system to detect the recoiling particles.

COMPASS-II covers the up to now unexplored x_{Bj} domain ranging from 0.01 to 0.15. From the sum of cross-sections measured with positive and negative beam polarities, the pure DVCS cross-section and its t-dependence can be extracted. Pilot measurements for the COMPASS II program allow for an extraction of the t-dependence in a single x_{Bj} bin, thus providing first information on the nucleon transverse size in an up to now uncharted x_{Bj} regime.

* Supported by BMBF and the DFG Research Training Group Programme 2044.

Gruppenbericht HK 46.2 Do 17:15 F 5

Measurement of the exclusive π^0 muoproduction cross section at COMPASS — Horst Fischer, Simon Gerstner, •Matthias Gorzellik, Pirmin Hofmeier, Philipp Jörg, Christopher Regali, and Tobias Szameitat — Albert-Ludwigs-Universität Freiburg

At COMPASS Deeply Virutal Compton Scattering and **D**eeply **V**irtual **M**eson **P**roduction (DVMP) processes are studied in order to probe the partonic structure of the nucleon by constraining **G**eneralized **P**arton **D**istribution (GPD) models. Extending beyond semi-inclusive deep inelastic scattering, the measurement of lepton-induced exclusive reactions enables the study of GPDs, which ultimately reveal the three dimensional picture of the nucleon and the decomposition of its total angular momentum.

The COMPASS experiment at CERN uses a high intensity tertiary muon beam with a momentum of 160 GeV/c impinging on a 2.5 m-long unpolarized liquid hydrogen target. To ensure the exclusivity and precision of the measurement, the wide angle electromagnetic calorimetry together with the two-stage magnetic spectrometer is complemented with a new barrel-shaped time-of-flight system surrounding the target. Exploiting the flavour filtering character of DVMP measurements, the COMPASS experiment is able to access different combinations of quark and gluon GPDs by determining the cross sections for various mesons. We report on the first extraction of the exclusive π^0 cross section in the intermediate x_{Bj} domain ranging from 0.01 to 0.15.

*Supported by BMBF and the DFG Research Training Group Programme 2044.

HK 46.3 Do 17:45 F 5

Meson-baryon scattering to one-loop order in heavy baryon chiral perturbation theory — •Bolin Huang[1,2] and Norbert Kaiser[1] — [1]Physik Department, Technische Universität München, D-85747 Garching, Germany — [2]Department of Physics, Yunnan University, Kunming 650091, China

We calculate the T matrices of pseudoscalar meson octet-baryon scattering to one-loop order in SU(3) heavy baryon chiral perturbation theory (HBχPT). The low-energy constants (LECs) and their combinations are then determined by fitting the phase shifts of πN and KN scattering and the corresponding data. By using these LECs, we predict the other channels and obtain reasonable results. The issues like convergence are discussed in detail.

HK 46.4 Do 18:00 F 5

Proton Time-Like Electromagnetic Form Factor Measurement with the Scan Method at BESIII — •Yadi Wang[1], Samer Ali Nasher Ahmed[1], Alaa Dbeyssi[1], Paul Larin[1], Dexu Lin[1], Frank Maas[1,2,3], Cristina Morales[1], Christoph Rosner[1], and Bo Zheng[1,4] for the BESIII-Collaboration — [1]Helmholtz-Institut Mainz, 55128 Mainz, Germany — [2]Institute of Nuclear Physics, Mainz, Germany — [3]PRISMA Cluster of Excellence, Mainz, Germany — [4]University of South China, 421001 Hengyang China

Electromagnetic form factors (FF) provide valuable insight to the internal structure and dynamics of the proton. While they are well known in the space-like region through electron scattering experiments, the time-like region, typically accessed by annihilation experiments, is known with much less precision. Specifically the separation of the electric and magnetic FF has only been possible with low accuracy due to the low luminosity of previous data.

This contribution reports on the analysis based on 651 pb^{-1} scan data taken at 22 energy points between 2.0 and 3.08 GeV with the Beijing Spectrometer III (BESIII) at the Beijing Electron Positron Collider II (BEPCII). The efforts to extract both the cross section of $p\bar{p}$ as well as the individual electric and magnetic FF are presented.

HK 46.5 Do 18:15 F 5

High precision studies on angular asymmetries of the differential cross sections in the $d + p \rightarrow {}^3\mathrm{He} + \eta$ reaction — •Christopher Fritzsch, Alfons Khoukaz, and Daniel Schröer for the ANKE-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster, Deutschland

Investigations on the total and differential cross sections of the reaction $d + p \rightarrow {}^3\mathrm{He} + \eta$ are of special interest since they differ strongly from a pure phase space behavior near threshold. Furthermore, analyses of the asymmetry factor α of the differential cross sections show a distinct effect of s- and p-wave interference, which can be explained by a rapid variation of the relative phase. These effects are an indication for an unexpected strong final state interaction (FSI) between η mesons and ^{3}He nuclei which could lead to a quasi bound state of the ^{3}Heη-system. Current investigations on high precision data at the internal fixed target experiment ANKE of the storage ring COSY enable the extraction of additional total and differential cross sections for the η production up to an excess energy of $Q = 15\,\mathrm{MeV}$. These cross sections will significantly improve the accuracy, which will allow to study the behavior of the asymmetry factor α with high resolution. Recent results will be presented and discussed.

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HK 46.6 Do 18:30 F 5

Upper limit of the η-decay $\eta \rightarrow \pi^0 + e^+ + e^-$ with WASA-at-COSY* — •Florian Bergmann, Kay Demmich, Nils Hüsken, and Alfons Khoukaz for the WASA-at-COSY-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, Germany

Investigations on symmetries and symmetry breaking allow for a better understanding of the physics within the standard model. The study of rare meson decays is an elegant way to search for violation of conservation laws, and hence symmetry breaking effects. An extensive physics program on η-meson decays has been performed as part of the WASA-at-COSY experiment. Due to the high statistics of the measurements new limits on e.g., the C, P and T symmetry breaking or combinations thereof can be determined.

This contribution will present recent results of the analysis of the C-violating η-decay $\eta \rightarrow \pi^0 + e^+ + e^-$ using the high statistics $p+d \rightarrow {}^3He+\eta$ data obtained with WASA-at-COSY. In a further contribution by the WASA-at-COSY collaboration insights on the analysis based on the $p + p \rightarrow p + p + \eta$ data, also obtained with WASA-at-COSY, will be given.

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HK 46.7 Do 18:45 F 5

Measuring the branching fraction of $\omega \rightarrow \eta\gamma$ with the Crystal Ball Experiment at MAMI — •Oliver Steffen and Wolfgang Gradl for the A2-Collaboration — Institut für Kernphysik, Johannes Gutenberg-Universität Mainz

The Crystal Ball Collaboration uses energy tagged bremstrahlung pho-

tons produced from the MAMI electron beam to study photo-induced reactions on nucleons and nuclei. The Crystal Ball/TAPS 4π calorimeter setup is optimized for the detection of neutral final states. Charged particles are identified and measured by the inner detector system.

A large data set of photoproduced η' and ω mesons has been obtained during recent data taking periods with the End Point Tagger ($E_\gamma = 1.4$ to $1.6\,\mathrm{GeV}$) and the liquid hydrogen target.

With this dataset we want to measure the branching fraction of the $\omega \to \eta\gamma$ decay. This is useful for understanding the pseudo vector-gamma interaction within effective field theories. In this talk we will give an overview of the ongoing analysis.