

HK 16: Hadronenstruktur und -spektroskopie III

Zeit: Dienstag 14:00–16:00

Raum: HG III

Gruppenbericht

HK 16.1 Di 14:00 HG III

Lattice QCD studies of nucleon structure — ●PHILIPP HÄGLER
— Institut für Theoretische Physik T39, TU München, Garching, Germany

Generalized as well as intrinsic transverse momentum dependent parton distributions (GPDs and TMDs) are the essential, non-perturbative ingredients in the description and interpretation of, e.g., semi-inclusive deep inelastic and deeply virtual Compton scattering experiments at HERA, COMPASS and JLab. They provide a wealth of information about the internal quark and gluon structure of hadrons, giving for example direct access to the nucleon spin sum rule, the spatial distribution of partons in the transverse plane, and remarkable correlations between intrinsic transverse momentum and spin degrees of freedom. In this talk, I will give an overview of corresponding results from dynamical lattice QCD calculations, thereby illustrating the substantial progress that has been made in the recent years in lattice studies of hadron structure.

Gruppenbericht

HK 16.2 Di 14:30 HG III

New results of transverse target spin asymmetries on a proton target at COMPASS — ●ANDREAS RICHTER for the COMPASS-Collaboration — Physikalisches Institut, Universität Erlangen-Nürnberg, 91058 Erlangen, Germany

COMPASS is a fixed target experiment at the CERN M2 external beamline using a 160GeV/c polarized μ^+ beam. After the data taking in 2002-04 with a transversely polarized deuterium target, in 2007 COMPASS has taken data with a transversely polarized proton (NH_3) target. For having a full description of the spin structure of the nucleon at quark level at leading twist it is necessary to know all three quark distribution functions, namely the unpolarized distribution function $q(x)$, the helicity distribution function $\Delta q(x)$ and the transverse spin distribution function $\Delta_T q(x)$, the so-called “Transversity”. One possibility to extract the transverse spin distribution function is the measurement of the Collins effect in semi-inclusive DIS on a transversely polarized target, describing the fragmentation of transversely polarized quarks into spinless hadrons. Furthermore the Sivers effect was studied at COMPASS, which measures the correlation of the transverse momentum of an unpolarized quark in a transversely polarized nucleon and the transverse polarization of the nucleon. New results on those asymmetries will be presented and will be compared to COMPASS deuteron data. The work is supported by the BMBF.

HK 16.3 Di 15:00 HG III

The Transverse Single Spin Asymmetry A_N in Inclusive Hadron Production $lp^1 \rightarrow hX$ at HERMES — ●FLORIAN SANFTL for the HERMES-Collaboration — Institut für theoretische Physik, Universität Regensburg, Universitätsstrasse 31, D-93053 Regensburg, Germany

The azimuthal single-spin asymmetry (SSA) A_N in inclusive hadron production of charged pions and kaons on a transversely polarised hydrogen target at the HERMES experiment at DESY is presented. Due to the inclusive character of the analysis the final asymmetries are evaluated dependent on the transverse hadron momentum $P_{h\perp}$ and x_F . For positively charged hadrons asymmetries with a maximum value of $A_N \sim 6\%$ were found. The asymmetries for negatively charged hadrons are consistent with zero. The evaluation of the $P_{h\perp}$ -dependence of the

asymmetries allows to give an estimate for higher-twist contributions to the mechanisms causing sizeable asymmetries A_N . The two main mechanisms giving rise to a non-zero SSA A_N are the Sivers- and the Collins-effect.

This work has been supported by the German Bundesministerium für Bildung und Forschung (BMBF) and the Japanese Society for the Promotion of Science (JSPS).

HK 16.4 Di 15:15 HG III

A Summary of the recent Results on Deeply Virtual Compton Scattering at the HERMES Experiment — ●DIETMAR ZEILER for the HERMES-Collaboration — University of Erlangen-Nürnberg

The exclusive lepton production of real photons offers an elegant access to the total angular momenta of partons inside the nucleon. At the HERMES experiment Deeply Virtual Compton Scattering off various gaseous targets in either unpolarized, or longitudinally as well as transversely polarized states with longitudinally polarized electron and positron beams has been analyzed. In this presentation the broad variety of measured asymmetry amplitudes extracted from an hydrogen and a deuterium target will be discussed. In summary, the obtained leading-twist asymmetry amplitudes show sizeable magnitudes, while the suppressed contributions are mostly compatible with zero.

This project is funded by the BMBF, project no 06 ER 9065.

HK 16.5 Di 15:30 HG III

Spin structure of the nucleon: model calculations and QCD evolution of lattice results — ●MICHAEL ALTENBUCHINGER, PHILIPP HÄGLER, and WOLFRAM WEISE — Physik-Department, TU München

The question of how the spin of the nucleon is distributed among its quark and gluon constituents is still a subject of intense investigations. Recent work by Thomas and Myhrer addressed this question in terms of a relativistic, chirally symmetric model. In the comparison of such model calculations with experiment or lattice QCD, the treatment of scale evolution and the fixing of the model scale are essential. In this talk we present a study based on a refined model and next-to-leading order QCD evolution of lattice results from the LHP collaboration. We compare this approach with the Thomas-Myhrer scenario for resolving the proton spin puzzle.

Work supported in part by BMBF, the DFG Emmy-Noether-Program and the Cluster of Excellence “Origin and Structure of the Universe”.

HK 16.6 Di 15:45 HG III

Hadronische Unterdrückung und Transversalimpuls-Verbreiterung bei CLAS und HERMES — ●KAI GALLMEISTER and ULRICH MOSEL — Institut für Theoretische Physik, Universität Giessen

Wir untersuchen die hadronische Unterdrückung in semiinklusive Teilchenspektren von CLAS und HERMES im Rahmen des semiklassischen Transportmodells GiBUU. Durch Vergleich verschiedener Hadronisierungsszenarien werden Rückschlüsse auf den zeitlichen Verlauf der Hadronisierung gewonnen. Ebenfalls betrachtet werden die Transversalimpulsspektren der Teilchen und mögliche Aspekte für deren Aufweitung diskutiert.

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