HK 34 Elektromagnetische und Hadronische Sonden

Zeit: Mittwoch 16:30–18:30   Raum: F

Gruppenbericht   HK 34.1 Mi 16:30 F

Radiative corrections to $(e, e'p)$ experiments — Going beyond peaking and soft photon approximation — •FLORIAN WEISSBACH, KAI HENCKEN, DANIELA ROHE, INGO SICK, and DIRK TRAUTMANN — Universität Basel, Departement für Physik und Astronomie, CH - 4056 Basel, Switzerland

Exclusive electron scattering experiments are subject to QED radiative corrections [J. Schwinger, Phys. Rev. **75**, 898 (1949)], like *e.g.* bremsstrahlung. These corrections can be calculated exactly in pure QED and to a good accuracy including hadronic loops. But most $(e, e'p)$ data analysis procedures consider these radiative corrections only approximatively, using both the peaking approximation and the soft photon approximation [R. Ent *et al.*, Phys. Rev. C **64**, 054610 (2001)]. Both approximations have their limitations [F. Weissbach *et al.*, nucl-th/0411033]. We show that the peaking approximation can be removed from data analysis completely. And we introduce a method to remove the soft photon approximation partially for multi-photon bremsstrahlung. Removal of the peaking approximation improves the discretion of the angular photon distribution considerably. And removal of the soft photon approximation could have an impact on Rosenbluth data analyses [P. Guichon, M. Vanderhaeghen, Phys. Rev. Lett. **91**, 142303 (2003)].

Gruppenbericht   HK 34.2 Mi 17:00 F

Inclusive π^0 and jet production and double longitudinal spin asymmetries in polarized p+p collisions at RHIC — •FRANK SIMON for the STAR collaboration — Massachusetts Institute of Technology, Cambridge, MA, USA

The spin physics program of RHIC makes collisions of polarized protons at an energy of $\sqrt{s_{NN}} = 200$ GeV available. Due to its large acceptance tracking detectors and electromagnetic calorimeters, the STAR experiment has the unique capability of measuring inclusive π^0 and inclusive jet production in these reactions. One of the main objectives of these measurements is the determination of the polarized gluon distribution via the double longitudinal spin asymmetries.

We present first measurements of the longitudinal spin asymmetry for inclusive jet and π^0 production. The results are compared to expectation from NLO QCD calculations and place constraints on the possible gluon polarization in the nucleon. A preliminary cross section measurement for inclusive π^0 and jet production in unpolarized p+p collisions will be presented, compared to NLO QCD calculations.

HK 34.3 Mi 17:30 F

Elektromagnetische Prozesse in der Pion-Kernstreuung im COMPASS Experiment — •ANNA-MARIA DINKELBACH, JAN FRIEDRICH, ROLAND KUHN, STEPHAN PAUL, LARS SCHMITT, BORIS GRUBE, SERGEI GERASSIMOV, BERNHARD KETZER, MATTHIAS BECKER, QUIRIN WEITZEL, IGOR KONOROV, SEBASTIAN NEUBERT, PHILIPP TUNKA, STEFANIE GRABMÜLLER, THIEMO NAGEL und FLORIAN HAAS — TU-München Physik-Department E18

Das COMPASS Experiment (CERN NA58) hat in einer dreiwöchigen Pilotstrahlzeit Ende 2004 mit einem negativ geladenem 190 GeV Hadronstrahl weiche Reaktionen untersucht. Bei der Streuung von Pionen im Coulombfeld von Bleikernen werden die Primakoff-Reaktionen beobachtet. Im Falle der Produktion eines reellen Photons, welches Comptonstreuung in inverser Kinematik entspricht, hat man hier Zugang zu den elektromagnetischen Polarisierbarkeiten der Strahlteilchen. Desweitern untersuchen wir die diffraktive Produktion von 3 geladenen Pionen $(\pi^- A \to \pi^- \pi^+ \pi^- A)$ und der Bestimmung von Momenten in der Winkelverteilung. Wir präsentieren den Messaufbau sowie den Status der laufenden Analysen. *Diese Arbeit wird unterstützt vom BMBF und dem Maier-Leibnitz-Labor, Garching.

HK 34.4 Mi 17:45 F

Precision measurement of the proton charge radius with elastic electron scattering* — •I. PYSMENETSKA, P. VON NEUMANN-COSEL, S. RATHI, A. RICHTER, G. SCHRIEDER, and A. SHEVCHENKO — Institut für Kernphysik, Technische Universität Darmstadt

A precise measurement of the proton charge radius is an old, but still open problem. Interest is renewed by extremely precise Lamb Shift measurements [1] requiring higher-order QED corrections for their interpretation depending on the proton charge radius. Existing measurements show a considerable scattering of results. A new precision experiment using elastic electron scattering is now in preparation at the S-DALINAC, where backscattered protons instead of the electrons will be measured. This new method has many advantages. For example, one can measure range of momentum transfers with a single setup, thereby avoiding problems with the relative normalization. Recent test measurements demonstrate the feasibility of such a kind of experiment, but at the same time show several problems to be solved first. Preliminary results and conclusions are discussed.

[1] S.G.Karshenboim, arXiv:hep-ph/9712347

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HK 34.5 Mi 18:00 F

Production of heavy quarks in hadron-hadron collisions — •JOHANN RIEDL, MARCO STRATMANN, and ANDREAS SCHÄFER — Universität Regensburg, 93040 Regensburg

The production of heavy quarks in polarised proton-proton collisions at BNL-RHIC is one of the processes which can give information about the currently largely unconstrained gluon polarisation Δg in the nucleon. For this purpose the calculation of the relevant cross sections in next-to-leading order of QCD perturbation theory is presented. The difference of the differential cross sections for the production of heavy quarks and antiquarks, the so-called charge asymmetry, is directly sensitive to next-to-leading order corrections. Phenomenological studies for BNL-RHIC, LHC and TeVatron are given.

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HK 34.6 Mi 18:15 F

BLM Renormalization Scale-Fixing for Complex Scattering Amplitudes — •FELIPE J. LLANES-ESTRADA[1] and STANLEY J. BRODSKY[2] — [1]Depto. Fisica Teorica I, Universidad Complutense de Madrid, 28040 Madrid, Spain — [2]Theory Group, Stanford Linear Accelerator Center, 94025 Menlo Park, CA, USA

We show how to fix the BLM renormalization scale for hard-scattering exclusive processes such as deeply virtual meson electroproduction by applying the BLM prescription to the imaginary part of the scattering amplitude, and employing a fixed-t dispersion relation to obtain the real part. In this way we resolve the ambiguity in BLM renormalization scale-setting for complex amplitudes. For this purpose we compute the H Generalized Parton Distribution in the perturbative quark-diquark model for the parton-proton scattering amplitude.