

HK 58: Hadron Structure and Spectroscopy VIII

Time: Wednesday 17:30–19:00

Location: HBR 62: EG 19

Group Report HK 58.1 Wed 17:30 HBR 62: EG 19
Exploring the 3D structure of baryon resonances with transition Generalized Parton Distributions — ●STEFAN DIEHL for the CLAS-Collaboration — Justus Liebig Universität Gießen and University of Connecticut

The nucleon consists of three quarks bound by the strong interaction, which is the strongest force in nature. If a lepton is scattered on this object, energy is transferred and can lead to an excited system, known as a baryon resonance. Under certain kinematic conditions, a meson or a photon can be emitted during this process and provide us with information on the 3D distribution of the quarks within the resonance, which is encoded in so-called transition Generalized Parton Distributions (GPDs). The knowledge of these objects can help us to better understand the excitation process itself and to study the mechanical properties of resonances and the connection between the angular momentum of resonances and the distribution and motion of the partons. Based on the high-intensity, 10.6 GeV electron beam at JLAB and the CLAS12 detector, it was possible to study the $ep \rightarrow e\Delta^{++}\pi^-$ with a large mass of the virtual photon Q^2 and with the pion produced under very forward angles, providing a first measurement sensitive to transition GPDs. The talk will present the results from this study as well as the first results from ongoing measurements of the $N \rightarrow N^*$ deeply virtual Compton scattering (DVCS) process ($ep \rightarrow e\Delta^+\gamma$) with CLAS12.

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HK 58.2 Wed 18:00 HBR 62: EG 19
Double-Tagged Investigation of $\gamma^*\gamma^* \rightarrow \eta'$ at BESIII — ●MAURICE ANDERSON, ACHIM DENIG, CHRISTOPH FLORIAN REDMER, and MAX LELLMANN for the BESIII-Collaboration — JGU Mainz

In this presentation, the production of pseudoscalar η' mesons via two virtual spacelike photons is studied ($\gamma^*\gamma^* \rightarrow \eta'$). Double-tagged measurements are conducted at the BESIII experiment in Beijing, China, in which both virtual photons possess nonzero momentum transfers Q_1^2 and Q_2^2 . The Monte Carlo generator Ekhara 3.0 is used to simulate the expected Q_1^2, Q_2^2 distribution of the signal events. By measuring the double differential cross section at BESIII, the transition form factor (TFF) can be determined for $Q_1^2, Q_2^2 < 2 \text{ GeV}^2$. The TFF of pseudoscalar mesons serves as essential input for calculating the hadronic light-by-light (HLbL) contribution to the theoretical Standard Model prediction of the anomalous magnetic moment of the muon $a_\mu = (g_\mu - 2)/2$.

HK 58.3 Wed 18:15 HBR 62: EG 19
Exploring s quark TMD-s with charged kaon SIDIS with CLAS12 — ●ÁRON KRIPKÓ¹, STEFAN DIEHL^{1,2}, and KAI-THOMAS BRINKMANN¹ for the CLAS-Collaboration — ¹Justus Liebig Universität Gießen, 35390 Gießen, Germany — ²University of Connecticut, Storrs, CT 06269, USA

A multidimensional study of the structure function ratio $F_{LU}^{\sin(\phi)}/F_{UU}$ has been performed for K^\pm , based on the measurement of beam-spin asymmetries. It uses the high statistics data recorded with the CLAS12 spectrometer at Jefferson Laboratory. The 10.6 GeV longitudinally polarized electron beam interacted with an unpolarized liquid hydrogen

target during the experiment. $F_{LU}^{\sin(\phi)}$ is a twist-3 quantity that provides information about the quark-gluon-correlations in the proton. The talk will present a simultaneous analysis of two kaon channels (K^+ and K^-) using machine learning improved particle identification, over a large kinematic range with virtualities Q^2 ranging from 1 GeV^2 to 8 GeV^2 . The precise multidimensional measurement was performed in a large range of z , x_B , p_T and Q^2 for the first time in the valence quark region. Based on the precise multidimensional data, a comparison with different TMD based reaction models will be presented for the different kinematic regions.

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HK 58.4 Wed 18:30 HBR 62: EG 19
Measurement of the two photon production of the $f_1(1285)$ in e^+e^- scattering at BESIII — ●JAN MUSKALLA, ACHIM DENIG, and CHRISTOPH FLORIAN REDMER for the BESIII-Collaboration — Johannes-Gutenberg Universität Mainz, Institut für Kernphysik

The anomalous magnetic moment of the muon a_μ is one of the most precisely measured observables of the Standard Model (SM). Nonetheless, a discrepancy of 5.1σ is observed between SM prediction and experiment. The uncertainties of the SM prediction are currently dominated by hadronic contributions. In particular, axial vector contributions to the hadronic light-by-light (HLbL) scattering need higher precision transition form factor (TFF) measurements as experimental input to theory predictions. The BESIII experiment at the Beijing Electron Positron Collider (BEPCII) is collecting data in the τ -charm energy region and offers large datasets perfectly suited for the study of two-photon interactions. With a data set of up to 40 fb^{-1} in the energy range $\sqrt{s} = (3.77 - 4.6) \text{ GeV}$, the reaction $e^+e^- \rightarrow e^+e^- f_1(1285)$ is investigated in a single tag configuration to evaluate the momentum dependence of the TFF. This talk will present the current status of the analysis.

HK 58.5 Wed 18:45 HBR 62: EG 19
 $K_S^0 \Sigma^0$ photoproduction at the BGOOD experiment — ●ADRIAN SONNENSCHNEIN for the BGOOD-Collaboration — Physikalisches Institut der Universität Bonn, Nußallee 12, 53115 Bonn

The BGOOD experiment at the ELSA accelerator facility uses an energy tagged bremsstrahlung photon beam to investigate hadronic excitations in meson photoproduction. The associated photoproduction of K_S^0 and hyperons is of particular interest. A cusp-like structure observed in the $\gamma p \rightarrow K_S^0 \Sigma^+$ reaction at the K^* threshold is described by models including multi-quark resonances through dynamically generated vector meson-baryon interactions. This is the same model which predicted the P_C pentaquark states observed at LHCb through $D^*-\Sigma_c$ interactions. In analogy, in the s-quark sector a peak like structure in $K_S^0 \Sigma^0$ photoproduction off the neutron is predicted, associated with a $K^*-\Sigma$ type configuration.

The reaction $\gamma n \rightarrow K_S^0 \Sigma^0$ has been measured from threshold to a beam energy of 2600 MeV. Within the available statistics the results appear consistent with the predicted peak like structure. This talk presents updated analysis techniques and improved statistical precision.

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