# HK 2: Hadron Structure and Spectroscopy I

Time: Monday 16:30–17:45 Location: J-HS A

**Group Report** HK 2.1 Mon 16:30 J-HS A

**Exploring the 3D nucleon structure with CLAS and CLAS12 at JLAB** — •Stefan Diehl for the CLAS-Collaboration — Justus Liebig Universität Gießen, 35390 Gießen, Germany — University of Connecticut, Storrs, CT 06269, USA

Exploring the 3-dimensional structure of the nucleon can help to understand several fundamental questions of nature, such as the origin of the nucleon spin and the charge and density distributions inside the nucleon. In QCD, the 3-dimensional structure of the nucleon is described by Wigner functions. However, experimentally momentum and coordinate space have to be accessed independently. The momentum distribution can be accessed by transverse momentum dependent distribution functions (TMDs) measured in semi-inclusive deep inelastic scattering (SIDIS) or Drell-Yan processes, while the distribution in coordinate space is described by generalized parton distributions (GPDs), which can be accessed by deeply virtual Compton scattering (DVCS) and hard exclusive meson production (DVMP). Based on the high quality data of CLAS and the recently upgraded CLAS12 detector at Jefferson Laboratory (JLAB), a detailed study of these distribution functions can be performed. The talk will present the results of recent SIDIS and DVMP studies with CLAS and CLAS12 and their impact on the understanding of the 3D nucleon structure.

HK 2.2 Mon 17:00 J-HS A

**SIDIS Kaon Beam Spin Asymmetry Measurements with CLAS12** — •Áron Kripkó[1], Stefan Diehl[1,2], and Kai-Thomas Brinkmann[1] for the CLAS-Collaboration — [1]Justus Liebig Universität Gießen, 35390 Gießen, Germany — [2]University of Connecticut, Storrs, CT 06269, USA

In 2018 the CLAS12 detector started data taking with a polarized 10.6 GeV electron beam at Jefferson Laboratory (JLab). One of the quantities which can be extracted from the data is the moment $A_{LU}^{\sin(\phi)}$ corresponding to the polarized electron beam spin asymmetry in semi-inclusive deep inelastic scattering.

$A_{LU}^{\sin(\phi)}$ is a twist-3 quantity that provides information about the quark gluon correlations. It was studied with a 10.6 GeV longitudinally polarized electron beam and an unpolarized liquid hydrogen target.

The talk will present a simultaneous analysis of two kaon channels ($K^+$ and $K^-$) over a large kinematic range with virtualities $Q^2$ ranging from 1 GeV$^2$ to 8 GeV$^2$. The measurement in a large range of z, $x_B$, $p_T$ and $Q^2$, including not yet measured kinematic regions, will allow a comparison with different reaction models.

Áron Kripkó is supported by HIC for FAIR.

HK 2.3 Mon 17:15 J-HS A

**Analysis of COMPASS data on DVCS** — •Johannes Giarra — on behalf of the COMPASS collaboration - Institut für Kernphysik, Johannes Gutenberg-Universität Mainz, Johann-Joachim-Becher-Weg 45, 55099 Mainz

In 2016 and 2017 a measurement of the Deeply Virtual Compton Scattering (DVCS) was performed at the M2 beamline of the CERN SPS using 160 GeV positive and negative charged muon beams scattering off a liquid hydrogen target. The scattered muons and the produced real photons were detected by the COMPASS spectrometer, which was supplemented by an additional electromagnetic calorimeter for the detection of large angle photons. The recoil protons were detected by the CAMERA detector, which consists of two barrels of scintillators surrounding the 2.5 m long target. The time of flight (TOF) measurement performed by the detector is used to identify the protons.
The talk will summerize the current status of the analysis of the COMPASS data taking in 2016 on the DVCS cross section.

HK 2.4 Mon 17:30 J-HS A

**New study of the two-photon exchange amplitude from polarized electron scatering** — D. Balaguer Ríos[1], S. Baunack[1,3], L. Capozza[1], J. Diefenbach[1,2], B. Gläser[1,2], •B. Gou[2], Y. Imai[1,2], E.-M. Kabuss[1], J.H. Lee[1], F. Maas[1,2,3], M. C. Mora Espí[1,2], E. Schilling[1], D. von Harrach[1], and C. Weinrich[1] for the A4-Collaboration — [1]Institut für Kernphysik, Johannes Gutenberg-Universität Mainz — [2]Helmholtz-Institut Mainz — [3]PRISMA Cluster of Excellence, Johannes Gutenberg-Universität Mainz

The study of the two-photon exchange amplitude in lepton scattering has drawn significant interest in the past two decades. This is due to the discrepancy between the Rosenbluth separation and polarization transfer data on the proton form factor ratio. In order to extract hadron structure information correctly in electron nucleon scattering, one needs to understand how two-photon exchange may affect various observables. The transverse single spin asymmetry, which arises from the interference of the one- and two-photon exchange amplitude, provides an excellent testing ground for the two-photon exchange mechanism. The A4 collaboration at the MAMI accelerator in Mainz has performed measurements of the transverse beam spin asymmetry at various beam energies between 300 MeV and 1.5 GeV. Results of a recent analysis will be presented in this talk.