

HK 39: Hadron Structure and Spectroscopy IV

Time: Wednesday 15:45–17:15

Location: SCH/A316

Group Report HK 39.1 Wed 15:45 SCH/A316
The BGOOD experiment at ELSA - exotic structures in the light quark sector? — ●THOMAS JUDE for the BGOOD-Collaboration — Physikalisches Institut, Universität Bonn

The discoveries of the pentaquark states and XYZ mesons in the charmed quark sector initiated a new epoch in hadron physics, where the existence of exotic multi-quark states beyond the conventional three and two quark systems has been unambiguously realised. Similar structure may be evidenced in the light, uds sector, where access to a low momentum exchange and forward meson production region is crucial to study such phenomena. The BGOOD photoproduction experiment is uniquely designed to explore this kinematic region; it is comprised of a central calorimeter complemented by a magnetic spectrometer in forward directions.

Highlighted results include the indication of a peak-like structure in the $\gamma n \rightarrow K^0 \Sigma^0$ cross section consistent with a meson-baryon interaction model which predicted the charmed P_C states. The same $K^* \Sigma$ molecular nature of this proposed $N^*(2030)$ is also supported in our measurement of $\gamma p \rightarrow K^+ \Lambda(1405) \rightarrow K^+ \pi^0 \Sigma^0$, where it is predicted to drive a triangle singularity mechanism. In the non-strange sector, coherent meson photoproduction off the deuteron enables access to proposed dibaryon states, including the recently discovered $d^*(2380)$. Results will be presented which support recent experimental claims of higher mass isoscalar and isovector dibaryons.

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HK 39.2 Wed 16:15 SCH/A316
Acceptance studies with pseudo data of the diffractive reaction $\pi^- + p \rightarrow a_2(1320)(\rightarrow \eta\pi) + p$ at COMPASS — ●DAVID SPÜLBECK, HENRI PEKELER, and BERNHARD KETZER for the COMPASS-Collaboration — Universität Bonn, Helmholtz-Institut für Strahlen- und Kernphysik, Bonn, Germany

The COMPASS collaboration has recorded large data samples of diffractively produced final states with a 190 GeV hadron beam. First analyses of the final states $\eta^{(\prime)}\pi^-$ showed that these are golden channels to investigate the spin-exotic hybrid candidate $\pi_1(1600)$ experimentally.

For a successful partial-wave decomposition of the data using an extended likelihood fit, acceptance effects have to be corrected for. The presence of both charged and neutral particles in these final states makes a very good understanding of the full apparatus mandatory for a reliable acceptance correction. Wrong or missing acceptance corrections would lead to artifacts in the partial-wave decomposition and hence to possibly wrong conclusions.

In our ongoing analyses of the $\eta^{(\prime)}\pi^-$ final states, we use GEANT4-based Monte Carlo software to simulate the acceptance of our apparatus. To test its performance independently from any fit, we compare the kinematic distributions of real data and pseudo data for the almost isolated resonance $a_2^-(1320)$ decaying into $\eta(\rightarrow \pi^- \pi^+ \pi^0(\gamma\gamma))\pi^-$ that have been accepted by our detector simulation.

Supported by BMBF.

HK 39.3 Wed 16:30 SCH/A316
Search for exotic states in η_c decays at BESIII — ●ANJA BRÜGGEMANN¹, SALLEH AHMED¹, NILS HÜSKEN², NIKOLAI IN DER WIESCHE¹, HANNAH NEUWIRTH¹, ANN-CHRISTIN SCHLUSE¹, ANNA THEIMANN¹, FREDERIK WEIDNER¹, and ALFONS KHOUKAZ¹ for the BESIII-Collaboration — ¹Westfälische Wilhelms-Universität Münster,

Germany — ²Johannes Gutenberg-Universität Mainz, Germany

The BESIII detector at the e^+e^- collider BEPCII in Beijing, China, provides the world's largest data sample of the charmonium J/ψ with more than 10 billion events taken from 2009 to 2019.

Resulting from the radiative J/ψ decay into $\gamma\eta_c$ we analyse the reactions $\eta_c \rightarrow \eta' hh$, where the hh system represents the K^+K^- , $K_S K_S$, $\pi^+\pi^-$, $\pi^0\pi^0$, $\eta\eta$ and $2\pi^+2\pi^-$ systems. Since the majority of these η_c decay modes are still unlisted in the particle data group database we determine the corresponding branching ratios. Furthermore, since these mesonic η_c decays constitute a gluon-rich environment they offer the opportunity to investigate possible exotic content in hh intermediate states, that lie in the mass region below 2 GeV/c², where the lightest glueball is predicted.

Incorporating all analysed η_c decay modes our study is based on a combined partial wave analysis approach, which gives access to the partial decay widths of contributing resonances decaying into the hh subsystems. These widths are directly comparable to theory predictions, that assume glueball admixtures carried by certain isoscalar scalar resonances. The current status of the analysis will be presented.

This work is funded by DFG - 269952272, 271236083 and 443159800.

HK 39.4 Wed 16:45 SCH/A316
Study of $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\pi^+\pi^-$ at BESIII — ●SEBASTIAN COEN — Ruhr-Universität Bochum, Institut für Experimentalphysik I, 44801 Bochum

The BESIII experiment at the symmetric electron-positron collider BEPCII in Beijing has recorded large data samples at center of mass energies between 2.0 GeV and 4.9 GeV. This offers good opportunities for the spectroscopy of both charm and light hadrons. In the accessible mass range recent lattice QCD calculations predict a rich spectrum of glueball states.

In the reaction $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\pi^+\pi^-$ at center of mass energies between 4.0 GeV and 4.9 GeV the production and decay of light mesons as well as the vector glueball, predicted at a mass of about 3.8 GeV/c² can be studied. Preliminary results and future prospects of the study will be presented.

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HK 39.5 Wed 17:00 SCH/A316
 $K_S^0 \Sigma^0$ photoproduction at the BGOOD experiment — ●ADRIAN SONNENSCHNEIN and KATRIN KOHL for the BGOOD-Collaboration — Physikalisches Institut, Nussallee 12, D-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 at BGOOD from threshold to a beam energy of 2600 MeV. In this talk results will be presented using updated analysis techniques and improved statistical precision.

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