HK 66: Invited Talks V

Time: Friday 14:30–16:00 Location: H-HS X

Invited Talk HK 66.1 Fri 14:30 H-HS X

Baryon Spectroscopy with the CBELSA/TAPS experiment at ELSA — •Annika Thiel for the CBELSA/TAPS-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Universität Bonn

The dynamics of the quarks and gluons inside the nucleon are a long-standing question in hadron physics. To shed more light on this topic, the excitation spectrum of the nucleons needs to be measured and compared to theoretical models like constituent quark models or lattice QCD calculations. Until now, most of the predicted resonances - especially at high masses - have not been found by experiments, which are the well-known "missing resonances". The missing resonances problem is a recent research project by several different experiments. One of them is the CBELSA/TAPS experiment, which is located at the ELSA accelerator in Bonn. This experiment features a detector system with nearly full 4π angular coverage and a high detection efficiency for photons, which makes it the ideal tool for the measurement of final states comprising neutral mesons. One of its features is the use of linearly or circularly polarized photon beams impinging on a longitudinally or transversely polarized butanol target. This allows for the measurement of single or double polarization observables, which are of major importance in the identification of weak resonance contributions.

In this talk, an overview of the recent status in baryon spectroscopy at the CBELSA/TAPS experiment will be given, which includes the measurement of different polarization observables and a review of their impact on the excitation spectra of the nucleons. Supported by the DFG (SFB/TR16).

Invited Talk HK 66.2 Fri 15:00 H-HS X

The BGOOD experiment at ELSA - exotic structures in the light quark sector? — •Thomas Jude for the BGO-OD-Collaboration — Physikalisches Institut, Universität Bonn

The recent discoveries of the pentaquark, P_C, states and XYZ mesons in the charmed quark sector began a new epoch in hadron physics, where multi-quark states beyond three and two quark systems have been realised. Such states could manifest as single colour bound objects, or evolve from meson-baryon and meson-meson interactions, creating molecular like systems and re-scattering effects near production thresholds. Intriguingly, similar effects may be evidenced in the light, *uds* sector in meson photoproduction. Access to a low momentum exchange and forward meson production region is crucial. BGOOD is uniquely designed to explore this kinematic region; a central calorimeter is complemented by a magnetic spectrometer in forward directions.

First results indicate a peak-like structure in the $\gamma n \to K^0\Sigma^0$ cross section at $W \sim 2\,\text{GeV}$ consistent with the meson-baryon interaction model which predicted the charmed P_C states. Unexpectedly, a drop in the $\gamma p \to K^+\Sigma^0$ cross section at forward angles at $W \sim 1.9\,\text{GeV}$ is also observed, consistent with threshold effects from meson-baryon interactions. BGOOD's forward acceptance also enables identification of coherent photoproduction from deuterons. This is currently being exploited to study the dibaryon, $d^*(2380)$, which may have an important impact upon the equation of state for neutron stars.

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Invited Talk HK 66.3 Fri 15:30 H-HS X

Double parton scattering and double parton distributions — •Peter Plössl — DESY Hamburg

Double parton scattering (DPS) describes the situation when two individual hard scattering reactions occur in a single hadron-hadron collision. In some regions of phase space DPS may give sizeable contributions to the production of multi-particle final states and thus be an important background to single parton scattering (SPS) in channels suitable for the search for physics beyond the standard model. Furthermore DPS is also an interesting phenomena in its own right, as it gives insight into the correlations of partons inside of hadrons.

A theoretical description of DPS processes from first principles can be achieved by deriving factorisation theorems akin to the ones known from SPS, with a central building block being the double parton distributions (DPDs). However, these DPDs are presently basically unknown as experimental data is still lacking.

As a consequence one has to rely on physically motivated models for DPDs to be able to calculate DPS contributions to a given process. One important constraint for such models is given by number and momentum sum rules for DPDs in close analogy to the well known PDF sum rules. Another constraint can be obtained by observing that in the limit of small distances between the two partons DPDs can in fact be matched onto a regular PDFs with a perturbative matching kernels.