HK 11: Hadron Structure and Spectroscopy II

Time: Monday 16:45–18:15 Location: HBR 62: EG 19

HK 11.1 Mon 16:45 HBR 62: EG 19

Photoproduction of $\mathbf{K^+(\Sigma(1385) \to \Lambda\pi^0)}$ at very forward K^+ angles at the BGOOD experiment — •Mrunmoy Jena for the BGOOD-Collaboration — Physikalisches Institut, Universität Bonn

The differential cross section for photoproduction of $K^+\Sigma^0$ previously carried out at the BGOOD showed a peak like structure followed by a significant decrease in strength around $W = 1900$ MeV (at very forward angles) potentially indicating the formation of a bound $K^+\Sigma(1385)$ molecular state. If this is the case, there appears to be an equivalence between this proposed state in the strange quark sector and the $P_c(4380)$ state in the charm sector identified at the LHCb. In light of these results, a precision measurement near threshold at forward K^+ angles for $\gamma p \to K^+\Sigma(1385)$ is essential to shed light on the reaction mechanism.

This work reports for the first time, the differential cross section for the $\gamma p \to K^+\Sigma(1385)$ for the dominant decay channel $\Sigma(1385) \to \Lambda\pi^0$ at very forward angles ($\cos\theta^K_{CM} > 0.9$). The missing mass (from the $K^+\pi^0\pi^0$ and the $K^+\pi^0$ system) technique was used for event reconstruction and to remove $K^+\Lambda(1405)$ background events.

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HK 11.2 Mon 17:00 HBR 62: EG 19

Analysis of the reaction $pp \to ppKK$ with HADES — •Valentin Kladov[1,2], Johan Messchendorp[2], and James Ritman[1,2,3] — [1]Ruhr-Universität Bochum — [2]GSI Helmholtzzentrum fur Schwerionenforschung GmbH — [3]Forschungszentrum Jülich

In this study we present an exclusive analysis of the $pp \to ppKK$ reaction with data collected by the HADES detector during February 2022. In the course of this analysis, we developed a neural network-based particle identification procedure (PID), which compensates for the differences between simulation and experiment via domain adversarial technique, mixing experimental and simulation datasets during training. With this PID we detect and identify all final state particles, which allows an efficient suppression of background by means of kinematic refit with a 4C constraint, corresponding to the conservation of 4 Momentum in the process. We observed clear signals from $\phi(1020) \to KK$ and $\Lambda(1520) \to pK$ with their parameters consistent with PDG data within one standard deviation. This talk will present the event selection procedures which will be the basis for a subsequent partial wave analysis, with the goal to determine the contribution of various baryonic resonances in the initial step of the reaction. Additionally, the analysis will be extended to the $ppKK\pi^0$ final state.

HK 11.3 Mon 17:15 HBR 62: EG 19

Investigation of $\mathrm{K^+(\Lambda(1405) \to \Sigma^+\pi^-)}$ photoproduction at the BGOOD experiment — •Linus Plagens for the BGOOD-Collaboration — Physikalisches Institut, Universität Bonn

Since its discovery in the 1960's, the $\Lambda(1405)$ resonance has been intensively studied and today is considered as the archetype of a dynamically generated resonance. It is imperative to conduct precise measurements on its invariant mass distribution, commonly referred to as the *line shape*, as well as its differential cross section. The BGOOD experiment at the Electron Stretcher Accelerator (ELSA) at the University of Bonn is well-suited for this task. The unique combination of a central detector with a forward spectrometer allows the investigation of very forward-going kaons through meson photoproduction. In this talk, results obtained for the differential cross section for $\Lambda(1405) \to \Sigma^+\pi^-$ in the reaction $\gamma p \to K^+\Lambda(1405)$ will be presented.

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HK 11.4 Mon 17:30 HBR 62: EG 19

New data for the photoproduction of $\Lambda(1520)$ at the BGOOD experiment — •Emil Rosanowski for the BGOOD-Collaboration — Physikalisches Institut, Universität Bonn

The BGOOD experiment at the ELSA facility at the University of Bonn is used to study photoproduction in the *uds* sector. The unique design of a central electromagnetic calorimeter complemented by a forward spectrometer for charged particles enable the study of K^+Y systems, where the recoiling hyperon (Y) is at low momentum transfer.

Studies of the reaction $\gamma p \to K^+\Lambda(1520)$ where the K^+ is at forward angles were made. Preliminary differential cross section measurements will be presented.

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HK 11.5 Mon 17:45 HBR 62: EG 19

Dilepton production in proton-proton reaction at 4.5 GeV with the HADES spectrometer — •Rayane Abou Yassine for the HADES-Collaboration — TU Darmstadt — GSI Helmholtzzentrum für Schwerionenforschung GmbH — Laboratoire de Physique des 2 infinis Irène Joliot- Curie, Université Paris-Saclay, France

The investigation of dilepton production in hadron collisions is an important tool to study the electromagnetic decays of resonances. It provides a reference spectra for the hot and dense matter effects (heavy-ion collisions A+A). In February 2022, the HADES collaboration measured p+p collisions at 4.5 GeV beam kinetic energy. In this contribution we present results for the multi-differential analysis of signal spectra as well as the vector meson production cross section.

HK 11.6 Mon 18:00 HBR 62: EG 19

A simulation of the reaction $\bar{\mathrm{p}}\mathrm{p} \to \pi^0\pi^0\eta \to 6\gamma$ with the $\bar{\mathrm{P}}$ANDA detector — •Jean Franç Noël for the PANDA-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Universität Bonn, Nussallee 14-16, 53115 Bonn

An important frontier in high energy physics is the study of the formation of hadrons, which is described by quantum chromodynamics. The $\bar{\mathrm{P}}$ANDA-experiment is an upcoming experiment, which will be located at the Facility for Antiproton and Ion Research (FAIR) in Darmstadt. $\bar{\mathrm{P}}$ANDA aims to shed new light on this topic by investigating deep inelastic scattering in antiproton-proton collisions, up to a center-of-mass energy of 5.5 GeV.

This talk will be focused on a simulation of the reconstruction of the decay $\bar{\mathrm{p}}\mathrm{p} \to \pi^0\pi^0\eta$, $\pi^0 \to \gamma\gamma$, $\eta \to \gamma\gamma$ with the $\bar{\mathrm{P}}$ANDA detector. Predictions for the underlying resonance structure are included into the simulation by usage of a so-called Partial Wave Analysis (PWA)-filter. These predictions are based on the Bonn-Gatchina PWA model.

In this presentation, I will show preliminary results for background simulations and the reconstruction of the corresponding Dalitz plot.

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