HK 56: Hadron Structure and Spectroscopy VII

Time: Thursday 17:30–18:45 Location: HS 3 Physik

Group Report HK 56.1 Thu 17:30 HS 3 Physik

Evidence of pentaquark-like states in strangeness photoproduction at the BGOOD experiment — •Antonio Joao Clara Figueiredo for the BGOOD-Collaboration — Physikalisches Institut, Universität Bonn

Exotic multi-quark states have been confirmed in the heavy quark sectors and equivalent structures may be evidenced in the light, *uds* sector as well.

The BGOOD experiment at the ELSA facility is ideal for the study of strangeness photoproduction in the region of low momentum exchange to the hyperon. BGOOD is comprised of a central calorimeter for neutral meson momentum reconstruction and complemented by a magnetic spectrometer in forward directions for charged particle identification.

Our published results in the strangeness sector suggest a dominant role of meson-baryon dynamics which has an equivalence to the P_C states in the charmed sector. This includes structure in $K^0\Sigma^0$ and $K^+(\Lambda(1405) \rightarrow \pi^0\Sigma^0)$ photoproduction at the K^*Y threshold. Additionally, the differential cross section for $K^+\Sigma^0$ photoproduction at forward angles shows a peak-like structure at the $K^+\Sigma(1385)$ threshold, potentially indicating the formation of a bound molecular state. This is further supported by a peak in $K^+\Sigma(1385)$ exactly at threshold, which is consistent with model calculations of on-shell production of the constituents of molecular states.

Supported by DFG projects 388979758/405882627 and the European Union's Horizon 2020 programme, grant 824093.

HK 56.2 Thu 18:00 HS 3 Physik

Novel constraints for the multi-strange meson-baryon interaction using correlation measurements with ALICE — •Valentina Mantovani Sarti for the ALICE Germany-Collaboration — TUM Department of Physics, Garching, Germany

We present unprecedented correlation measurements involving Λ, Ξ, kaons and pions measured by ALICE in pp collisions at 13 TeV.

Several measurements are presented for the first time, constituting new experimental constraints on the strangeness S=-1,-2 meson-baryon interactions and the nature of exotic states.

The strong interactions involving mesons and baryons with strangeness content delivers a rather broad spectrum of interesting states, arising from the rich interplay between the elastic and inelastic QCD dynamics. The Λ(1405) in the S=-1 sector is an example of such molecular state, but in order to build a solid description of its inner structure more data are needed particularly below the antiKN energy threshold.

Much less experimental data are currently available on another potential molecular state, the Ξ(1620), predicted and observed in the S=-2 meson-baryon sector.

The correlation data we present here constitute new constraints on these sectors and delivers a better understanding on such states. Funded by the Deutsche Forschungsgemeinschaft (DFG) through the grant MA 8660/1 * 1.

HK 56.3 Thu 18:15 HS 3 Physik

Studying the strong nuclear force in the strangeness $S = -1$ sector via $\Lambda\pi$ femtoscopy — •Daniel Battistini for the ALICE Germany-Collaboration — Technical University of Munich, Munich, Germany

Due to its non-perturbative nature at low energies, a deep understanding of the strong force still represents a challenge for the physics community. From the theoretical side, the study of low-energy QCD is typically conducted employing effective field theories (EFT) which are based on low-energy constraints to be anchored to the experimental measurements. Understanding the strangeness $S = -1$ meson-baryon systems is particularly relevant because they are characterised by a rich coupled-channel structure and feature the emergence of dynamically generated states. At present, EFT calculations have been well constrained by experimental data for energies above the K-N threshold. At lower energies, there are tensions among models due to the limited amount of measurements. The study of $\Lambda\pi^+$ and $\Lambda\pi^-$ interactions is so relevant because it allows accessing the K-N subthreshold energies, leading to new experimental inputs to EFTs. In this contribution, the $\Lambda\pi$ strong interaction is measured using the femtoscopy technique applied to high-multiplicity proton-proton collisions at $\sqrt{s} = 13$ TeV recorded by the ALICE collaboration. Funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy – EXC-2094 – 390783311.

HK 56.4 Thu 18:30 HS 3 Physik

Hyperon-production in proton-proton collisions at $\sqrt{s} = 3.5$ GeV with HADES — •Snehankit Pattnaik[1,2], Johan Messchendorp[1], and James Ritman[1,2,3] for the HADES-Collaboration — [1]GSI Helmholtzzentrum für Schwerionenforschung GmbH — [2]Ruhr-Universität Bochum — [3]Institut für Kernphysik (IKP) - Forschungszentrum Jülich

This work presents a preliminary analysis of the $\Lambda + K^0_S + p + \pi^+$ final state in proton-proton scattering using data collected at $\sqrt{s} = 3.46$ GeV with HADES at GSI in Darmstadt, Germany. Proton-induced hyperon production studies offer valuable insights into baryon spectroscopy, in particular to understand the coupling strengths of intermediate baryons to hyperon final states and to search for new baryon resonances. Hyperon production provides information about the role of N^* resonances in strangeness production in NN interactions and in elementary reactions as a reference for understanding many-body systems.

In this talk we will present some of the data-driven analysis procedures, including the use of a kinematic fitter to efficiently select the signal for this exclusive state. Additionally, we discuss the results from an analysis that explores the role of intermediate baryons such as Δ^{++}, $\Sigma^*(1385)$ and mesonic excitations, K^* (892). Preliminary results include total and differential cross sections and hints of N^* resonances at this energy, building on earlier studies in related channels.