HK 19: Hadron Structure and Spectroscopy 4

Time: Monday 17:00–19:00 Location: T/SR25

Group Report HK 19.1 Mon 17:00 T/SR25

Precision Hadron Spectroscopy at COMPASS — •Alexander Austregesilo — Physik-Department E18, Techische Universität München

COMPASS is a fixed-target experiment at the CERN SPS, investigating the structure and the dynamics of hadrons. The experimental setup features a modern spectrometer with acceptance over a wide kinematic range and precise momentum resolution for charged-track reconstruction. Furthermore, particle identification and calorimetry make it an ideal tool to access a broad range of final states. In 2008 and 2009, a world leading data set was recorded with 190 GeV/c hadron beams impinging on a liquid hydrogen target.

Precision studies of the light-quark meson spectrum are pursued by the means of partial-wave analysis. As additional input, the dependence of the partial waves on the squared four-momentum transfer t is used to differentiate between resonant and non-resonant contributions. Furthermore, a novel method to extract information about the $\pi^+\pi^-$ subsystem in multi-pion final states was developed. We will present selected results on exotic mesons and glueball candidates formed in diffractive dissociation and central production reactions.

Supported by BMBF, MLL and the Cluster of Excellence Exc153 'Origin and Structure of the Universe'

Group Report HK 19.2 Mon 17:30 T/SR25

Circularly polarized photons at the BGO-OD experiment* — •Thomas Zimmermann for the BGO-OD-Collaboration — Physikalisches Institut, Universität Bonn

The BGO-OD experiment, presently starting data taking at the electron accelerator ELSA at the University of Bonn, is intended for the systematic investigation of the photo-production of mesons and the structure and dynamics of nucleon excitations. To disentangle the different contributions to the measured observables, linearly and circularly polarized photons are used.

This talk describes the production of circularly polarized photons at the BGO-OD experiment and how the degree of polarization is determined using a Møller polarimeter. First results using circular polarization will be presented.

* Supported by the DFG (SFB/TR-16)

HK 19.3 Mon 18:00 T/SR25

Measuring two-hadron azimuthal asymmetries on a longitudinally polarized proton target — •Stefan Sirtl, Horst Fischer, Matthias Gorzellik, Philipp Jörg, Kay Königsmann, Steffen Landgraf, Christopher Regali, Katharina Schmidt, Tobias Szameitat, and Johannes ter Wolbeek — for the COMPASS collaboration, Physikalisches Institut, Albert-Ludwigs-Universität Freiburg

In recent years, measuring azimuthal asymmetries on polarized targets emerged as a powerful tool to investigate the nucleon spin structure, one of the main goals of the COMPASS physics program. COMPASS is a fixed target experiment, located at the SPS/CERN and is characterized by a two-stage spectrometer with large acceptance and excellent particle identification. By scattering a tertiary longitudinally polarized μ^+ beam on a transversely or longitudinally polarized ammonia target, it suits the experimental requirements for asymmetry measurements. Two-hadron azimuthal asymmetries were already studied at COMPASS using transversely polarized protons. In this talk we present first measurements of two-hadron azimuthal asymmetries scattering a 160 GeV/c, respectively 200 GeV/c, μ^+ beam off longitudinally polarized protons. Supported by BMBF, DFG and EU FP7 (Grant Agreement 283286).

HK 19.4 Mon 18:15 T/SR25

Modifications of the $D_{33}(1700)$ resonance in the nuclear medium — •Vahe Sokhoyan for the A2-Collaboration — Institut für Kernphysik, Universität Mainz

Despite the progress in particle and nuclear physics, the origin of the mass being a fundamental property of matter is not fully understood. The modification of the mass and lifetime of hadrons in the nuclear medium is an important aspect which concerns the origin of the mass directly. At the MAMI accelerator facility in Mainz the modifications of the $D_{33}(1700)$ resonance will be studied in the reaction $\gamma p \to p\pi^0\eta$ close to the production threshold where the dominance of this resonance is established. The new approach to study in-medium modifications of baryon resonances by the determination of polarization observables in addition to unpolarized cross-sections will be discussed in this talk. The measurements will be performed with circularly polarized photons and a set of different targets (^{12}C, ^{40}Ca, ^{93}Nb and ^{208}Pb) using the Crystal Ball/TAPS 4π spectrometer setup.
This work is supported by the Carl-Zeiss-Stiftung.

HK 19.5 Mon 18:30 T/SR25

Spectroscopy of final states with neutral particles in COMPASS — •Sebastian Uhl[1] and COMPASS Collaboration[2] — [1]Technische Universität München — [2]CERN

In order to study the spectrum of light hadrons, the COMPASS experiment at CERN has collected a huge data set with a negative pion beam impinging on a liquid hydrogen target. Resonances are diffractively produced at squared four-momentum transfers to the target between 0.1 and 1 (GeV/c)^2. The two-stage magnetic spectrometer with two electromagnetic calorimeters allows to study in particular channels with neutral particles in the final states. We will report on recent results.

This work was supported by the BMBF, the DFG Cluster of Excellence 'Origin and Structure of the Universe' (Exc 153), and the Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München.

HK 19.6 Mon 18:45 T/SR25

On the nature of the $a_1(1420)$ — •Mikhail Mikhasenko, Bernhard Ketzer, and Andrey Sarantsev — Universität Bonn, Helmholtz-Institut für Strahlen- und Kernphysik, Bonn, Germany

The resonance-like signal with axial-vector quantum numbers in the $f_0(980)\pi$ system, recently observed by the COMPASS and VES experiments at a mass of 1420 MeV, is discussed. We interpret it as a "pseudo resonance" due to a logarithmic singularity arising in the reaction $a_1^-(1260) \to K^{\star-}K^0 + K^{\star 0}K^- \to f_0(980)\pi^-$. The triangle diagram corresponding to this process is calculated. The structure of the imaginary part of the amplitude is investigated by employing the Cutkosky cutting rules. The result exhibits a peak in the intensity of the $a_1(1260) \to f_0\pi$ P-wave with a sharp phase motion with respect to the dominant $\rho\pi$ S-wave decay, in good agreement with data. The branching ratio for the decay of $a_1(1260) \to f_0(980)\pi$ is estimated and compared to the $a_1(1260) \to \rho\pi$ decay.