

HK 61: Hadronenstruktur und -spektroskopie

Zeit: Donnerstag 14:00–16:15

Raum: HSZ-105

Gruppenbericht

HK 61.1 Do 14:00 HSZ-105

Baryon spectroscopy at BESIII — ●YUTIE LIANG, JIFENG HU, WOLFGANG KÜHN, JENS SÖREN LANGE, BJÖRN SPRUCK, MATTHIAS ULLRICH, MARCEL WERNER, and HUA YE — II. Physikalisches Institut, Giessen University, 35392, Germany

Although three-quark models of baryons are quite successful in interpreting low-lying excited baryon resonances, our present knowledge on baryon spectroscopy is still in its infancy. Many very fundamental issues in baryon spectroscopy are still not well understood. On the experimental side, our present knowledge of baryon spectroscopy has come almost entirely from the traditional πN and γN experiments, in which many broad resonances with various possible quantum numbers overlap each other and make it difficult to disentangle. An alternative method to investigate baryon states employs decays of charmonium states such as J/ψ and $\psi(3686)$, in which the natural isospin filter makes the analysis less complicate. In July 2008 the BESIII experiment in Beijing recorded the first hadronic e^+e^- collision at the BEPCII storage ring. Since then, the BESIII detector has taken over 100 million $\Psi(2S)$ and over 1 billion J/ψ events, as well as a data sample corresponding to an integrated luminosity of 2.9 fb^{-1} at the $\psi(3770)$ resonance. This is so far the largest amount of electron collider data on charmonia and provide the opportunity for high precise measurements. In this talk, a selection of recent results relevant to baryon spectroscopy are shown.

HK 61.2 Do 14:30 HSZ-105

Measurement of the $e^+e^- \rightarrow \pi^+\pi^-$ Cross Section Using Initial State Radiation at BES-III — ●BENEDIKT KLOSS — Institut für Kernphysik Mainz

The magnetic moment of the muon is one of the most precisely measured quantities in modern particle physics. The theoretical prediction and the experimental measurement differ by more than 3 standard deviations. The hadronic cross section of $e^+e^- \rightarrow \pi^+\pi^-$ is an important impact for the theoretical prediction of the hadronic contribution to the magnetic moment of the muon.

The experimental measurement of this cross section was performed by the KLOE and the BABAR experiment with high precision. These experiments dominate the world average but they differ below 1 GeV by more than 2 standard deviations. Another comparable experiment is therefore needed.

This measurement can be done at the BES-III experiment in Beijing, China. Using the technique of initial state radiation we are planning to measure this hadronic cross section below 3.0 GeV with a comparable precision to BABAR and KLOE. This talk will give an overview of the current status of this analysis.

HK 61.3 Do 14:45 HSZ-105

Measurement of the hadronic cross section e^+e^- to $\pi^+\pi^-\pi^0$ at BES-III — ●MARTIN RIPKA — Kernphysik Uni Mainz

Experimental and theoretical values of the muon anomalous magnetic moment presently show a deviation of more than 3 standard deviations. While the electromagnetic and the weak contributions to its theoretical value are well under control, the QCD contributions have to be obtained from data. Experimental measurements of hadronic cross sections can indeed be used to determine the QCD loop contributions using the optical theorem. This talk is about the contribution of the $2\pi^+\pi^-\pi^0$ ISR channel using ISR data from the BESIII experiment in Beijing/China. Preliminary results of the simulated cross section will be shown.

HK 61.4 Do 15:00 HSZ-105

Measurement of $e^+e^- \rightarrow \pi^+\pi^-\pi^0$ cross section via initial state radiation — ACHIM DENIG¹, ●YAQIAN WANG¹, CHANGZHENG YUAN², and XUEYAO ZHANG³ — ¹Institute of Nuclear Physics, Mainz, Germany — ²Institute of High Energy Physics, Beijing, China — ³Shandong University, Jinan, China

Based on the 2.9 pb^{-1} data with $\sqrt{s} = 3.773 \text{ GeV}$ collected by the BESIII detector in Beijing, cross section of $e^+e^- \rightarrow \pi^+\pi^-\pi^0$ is measured with the ISR method. Depending on the angular distribution of the ISR photon, both the tagged and untagged method are performed to select the signal events.

HK 61.5 Do 15:15 HSZ-105

Study of the transition form factors in the $\gamma\gamma^*$ interaction processes e^+e^-h ($h = \pi^0/\eta$) at BES III — ●ELISABETTA PRENCIPE and ACHIM DENIG — Institute for Nuclear Physics, Johannes Gutenberg-Universität Mainz

The experiment BES III, located at BEPC2 in Beijing (China) is a symmetric e^+e^- collider well suited for spectroscopy studies. It offers also a unique opportunity to perform precision measurements of the transition form factors as function of the transfer momentum Q^2 at low energy. This is important to our better understanding of the Standard Model prediction of the muon anomaly a_μ , in particular of the light-by-light hadronic contribution, as the study of the form factor at medium and low Q^2 range represents a test of the Standard Model at low energy frontiers. The study of the channels $e^+e^-\pi^0/\eta$ via $\gamma\gamma^*$ interactions (in the space-like Q^2 region), where both π^0 and η in this analysis decay to 2-photons, plays an important role in this context. First results with the BES III dataset collected at the energy in the center of mass of $\psi''(3770)$ will be shown here, corresponding to an integrated luminosity of 2.9 fb^{-1} , in the range of $Q^2 \in [0.3;10.0] \text{ GeV}^2$. This analysis allows to test with high precision the distribution of the function $F(Q^2)\cdot Q^2$ in the range of $Q^2 \in [0.3;1.5] \text{ GeV}^2$; to improve the previous measurements performed by CLEO in the range of $Q^2 \in [1.5;3.0] \text{ GeV}^2$; to cross check the BaBar and Belle data in the range of $Q^2 \in [4.0;10.0] \text{ GeV}^2$.

HK 61.6 Do 15:30 HSZ-105

Messung der polarisierten Strukturfunktion $\sigma_{LT'}$ in der Kaon-Elektroproduktion an MAMI — ●PATRICK ACHENBACH für die A1-Kollaboration — Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz

Am Mainzer Mikrotron MAMI werden durch elektromagnetische Anregung neue Einblicke in die Niederenergiestruktur des Protons gewonnen. Die Elektroproduktion von Kaonen am angeregten Proton weist bei Energien von 1–2 GeV eine Vielzahl überlappender hadronischer Resonanzen auf.

Erste Messungen der polarisierten Strukturfunktion $\sigma_{LT'}$ für die Reaktion $p(\vec{e}, e'K^+)\Lambda$ bei kleinem Viererimpulsübertrag werden gezeigt, die mit spin-polarisiertem Elektronenstrahl an der Spektrometranlage durchgeführt worden sind.

$\sigma_{LT'}$ ist ein imaginärer Teil der longitudinal-transversalen Beiträge im Wirkungsquerschnitt. Modelle, die auf effektiven Lagrangedichten basieren, zeigen Abhängigkeiten von Interferenzen zwischen Nukleon-Resonanzen im s -Kanal sowie Interferenzen zwischen resonanten und nicht-resonanten Prozessen.

Die an MAMI gemessene Strukturfunktion hat das gegenteilige Vorzeichen der mit CLAS am Jefferson Lab gemessenen Werte bei höherem Viererimpulsübertrag.

HK 61.7 Do 15:45 HSZ-105

Beam asymmetry Σ in π^0 photoproduction off protons bound in carbon nuclei — ●INKE JÜRGENSEN for the CBELSA/TAPS-Collaboration — HISKP University of Bonn

In order to study the dynamics of the inner components of the nucleon, its excitation spectrum is investigated through meson-photoproduction. Due to the strong overlap of the nucleon's excited states, it is insufficient to determine the cross section only. To identify all resonance contributions unambiguously, single and double polarization observables have to be measured. At the Crystal Barrel experiment at ELSA in Bonn, this is achieved utilizing linearly or circularly polarized photons and longitudinally or transversely polarized nucleons. Polarized protons are realized in a butanol target, which consists of hydrogen, oxygen and carbon. A pure carbon target was used to perform a background measurement. The results for the beam asymmetry Σ in π^0 photoproduction, obtained with a carbon target and a linearly polarized photon beam, will be presented. Furthermore, the influence of carbon background on the measured polarization observables will be discussed. Supported by the Deutsche Forschungsgemeinschaft (SFB/TR 16)

HK 61.8 Do 16:00 HSZ-105

Spin alignment and OZI violation in exclusive ω and ϕ production with pp collisions at COMPASS — ●JOHANNES BERNHARD

— for the COMPASS collaboration

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The COMPASS collaboration investigates the exclusive production of ω and ϕ mesons with a 190 GeV proton beam on a liquid hydrogen target with the aim to explore the interplay of several production mechanisms. For this, cross section ratios and their dependence on x_F of the leading proton p_{fast} and the mass of the $p_{fast}V$ system are de-

termined. We find a significant violation of the OZI rule which can be partly explained by the role of intermediate baryon resonances contributing to ω production. Additionally, the spin alignment of the vector mesons is measured within a set of reference frames which are sensitive to different production types. Again, dependencies of the alignment on x_F and the $p_{fast}V$ mass are found which differ significantly for ω and ϕ .

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