

HK 5: Hadronenstruktur und -spektroskopie II

Zeit: Montag 16:30–19:00

Raum: HG IV

HK 5.1 Mo 16:30 HG IV

Diffractive dissociation of exclusive $K^-\pi^+\pi^-$ events in the high energetic hadron beam of the COMPASS-experiment —

•PROMETEUSZ JASINSKI — Institut für Kernphysik, Universität Mainz, Johann-Joachim-Becherweg 45, 55099 Mainz

In order to study the production of exotic mesons the COMPASS experiment at CERN took data with a 190 GeV/c hadron beam hitting a liquid hydrogen target in the years 2008 and 2009. The negative hadron beam contains mainly pions and a small fraction of about 2.5% of kaons. Using CEDAR pid detectors in the beam line we are identifying the small kaon component. One of the channels of interest are diffractively produced resonances decaying into $K^-\pi^+\pi^-$ final states. I will deliver insight to ongoing analysis of this channel that is of major interest for not well explored K resonances such as $K_2(1820)$ and $K(1460)$.

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HK 5.2 Mo 16:45 HG IV

Untersuchung der $\Sigma^+K_s^0$ Photoproduktion am Proton mit dem CBELSA/TAPS-Experiment* — •RALF EWALD für die CBELSA/TAPS-Kollaboration — Physikalisches Institut, Universität Bonn

Obwohl Quarkmodelle das bekannte Baryonspektrum im Allgemeinen gut beschreiben, überschätzen sie alle signifikant die Zahl der angeregten Zustände. Dies wird gemeinhin als das Problem der fehlenden Resonanzen bezeichnet. Eine mögliche Erklärung für dieses Problem könnte sein, dass viele Resonanzen nur eine geringe Kopplung an den πN -Kanal haben. Aus diesem Grund wird an ELSA die assoziierte Strangeness-Produktion untersucht, im speziellen die $\Sigma^+K_s^0$ Photoproduktion. Bislang gibt es für diesen Kanal nur Daten von der SAPHIR-, der CLAS- und der CBELSA/TAPS-Kollaboration für den totalen und differentiellen Wirkungsquerschnitt und die Rückstoßpolarisation. Mit den kombinierten Photonspektrometern Crystal Barrel und TAPS und einem linear polarisierten Photonenstrahl wurden erstmals auch Daten zur Photonasymmetrie Σ aufgenommen. Der Aufbau ist ideal für neutrale Zerfallskanäle geeignet und daher, um den Reaktionskanal $\gamma p \rightarrow \Sigma^+K_s^0 \rightarrow p3\pi^0 \rightarrow p6\gamma$ zu vermessen. In meinem Vortrag werde ich die Ergebnisse meiner Analyse vorstellen.

*Gefördert durch die DFG(SFB/TR16).

HK 5.3 Mo 17:00 HG IV

 $\bar{p}p \rightarrow pK\Lambda$ Reaktionen am verbesserten COSY-TOF Experiment — •MATTHIAS RÖDER, JAMES RITMAN und PETER WINTZ für die COSY-TOF-Kollaboration — Forschungszentrum Jülich

Im Jahr 2009 wurde die erste Strahlzeit zur $\bar{p}p \rightarrow pK\Lambda$ Reaktion mit dem erweiterten COSY-TOF Spektrometer durchgeführt. Die 4π Akzeptanz des Spektrometers erlaubt die vollständige Messung des Dalitz-Diagramms der Reaktion und damit die Bestimmung der einzelnen N^* Resonanzbeiträge. Das neue System erlaubt ausserdem erstmalig die genaue Messung der spin-aufgelösten pA Streulänge.

Das neue Silicon Quirl Telescope nahe am Target und der neue Straw Tube Tracker (STT) verbessern Effizienz und Ortsauflösung der Spurrekonstruktion wesentlich. Besonders wichtig für die Rekonstruktion des Λ Zerfalls ist der STT. Dieses System aus 2704 Straws, gruppiert zu 26 Lagen, ist optimiert für den Betrieb im COSY-TOF Vakuum und gleichzeitig geringste Massenbelegung von $X/X_0 \approx 1\%$ Strahlungslänge.

In diesem Vortrag wird der Aufbau, insbesondere der STT, beschrieben und erste Ergebnisse der Strahlzeit werden präsentiert.

HK 5.4 Mo 17:15 HG IV

Study of the $pp \rightarrow K^+n\Sigma^+$ reaction near threshold — •YURY

VALDAU for the ANKE-Collaboration — Forschungszentrum Jülich, Leo-Brandt-Straße, 52428 Jülich, Germany — Petersburg Nuclear Physics Institute of RAS, High Energy Physics Division, Meson Physics of a Condensed Matter Laboratory, 188300 Gatchina, Leningrad district, Russia

Three different hyperon channels, Λ , Σ^0 and Σ^+ , contribute to K^+ production in pp interactions close-to-threshold. While a lot of data exist for the Λ and Σ^0 total production cross sections, there are only a few measurements of the third hyperon channel $pp \rightarrow K^+n\Sigma^+$.

At ANKE-COSY the energy dependence of the Σ^+ production total

cross section was studied at four different proton beam energies between reaction threshold and 2.1 GeV. Our analysis of the Σ^+ channel is based on a simultaneous measurement of three experimental observable: K^+ inclusive spectra, K^+p missing mass spectra and individual particle momentum spectra from $K^+\pi^+$ correlation events. Below the $pp \rightarrow K^+n\Lambda\pi^+$ reaction threshold (~ 2.02 GeV) the only source of $K^+\pi^+$ correlations is Σ^+ production. Thus, identification of $K^+\pi^+$ coincidences allows us to identify the Σ^+ reaction channel unambiguously below ~ 2.0 GeV, and to estimate the total cross section. The extracted Σ^+ production total cross sections should allow to describe K^+ inclusive and K^+p correlation spectra using known Λ and Σ^0 total cross sections as well.

The status of analysis and experimental results will be presented.

Supported by the COSY-FFE program.

HK 5.5 Mo 17:30 HG IV

Reconstruction of the $\Lambda(1405)$ -Resonance with the HADES-Spectrometer — •JOHANNES SIEBENSON, LAURA FABBIIETTI, ELIANE EPPLE, and ALEXANDER SCHMAH — TU Muenchen

The $\Lambda(1405)$ -resonance is known for several years, but its inner structure is still a topic of investigation. A coupled channel approach can be used to describe this resonance as a kind of molecular state, oscillating between a $\bar{K}N$ - and a $\Sigma\pi$ -bound state. From the experimental point of view, the line shape of the $\Lambda(1405)$ can be reconstructed from its decay into the $(\Sigma\pi)^0$ decay channels. This line shape is expected to be sensitive to the production mechanism. Therefore it is interesting to study the production of this resonance exploiting different beams. We have reconstructed the $\Lambda(1405)$ signal in pp -reactions at 3.5 GeV with the HADES spectrometer at GSI, where 1.2 billion triggered events were collected. We have achieved to disentangle the three different decay channels ($\Lambda(1405) \rightarrow \Sigma^0\pi^0$, $\Sigma^-\pi^+$ and $\Sigma^+\pi^-$) and the resulting line shapes can be compared.

All the steps of the complex reconstruction analysis will be shown and the results will be compared to the predictions of theoretical models. This work has been supported by the Excellence Cluster 'Universe' and the Helmholtz Gesellschaft.

HK 5.6 Mo 17:45 HG IV

Analyse der Reaktion $pp \rightarrow \Lambda pK^+$ bei $T_p = 2.26$ GeV * — •KATHARINA EHRHARDT für die COSY-TOF-Kollaboration — Physikalisches Institut der Universität Tübingen

Die Reaktion $pp \rightarrow \Lambda pK^+$ ist bei einer Einschussenergie von $T_p = 2.26$ GeV (Einschussimpuls $p_p = 3.06$ GeV/c) am Fluzeitspektrometer TOF an COSY vermessen worden. In den Zwei-Teilchen-invarianten Massen überdecken die Daten die kinematischen Bereiche der Zerfälle der N^* -Resonanzen $N^* \rightarrow \Lambda K^+$ einschließlich der $P_{11}(1710)$ -Resonanz.

Methoden der Datenrekonstruktion und vorläufige Ergebnisse werden diskutiert.

* gefördert durch BMBF, COSY-FFE(FZ Jülich) und DFG (Europäisches Graduiertenkolleg)

HK 5.7 Mo 18:00 HG IV

Systematic study of the reactions $pp \rightarrow pK^+\Lambda$ and $pp \rightarrow pK^+\Sigma^0$ at moderate excess energies — •MARTIN SCHULTE-WISSERMANN¹, HARTWIG FREIESLEBEN¹, WOLFGANG ULLRICH¹, and KAI-THOMAS BRINKMANN² for the COSY-TOF-Collaboration — ¹Institut für Kern- und Teilchenphysik, Technische Universität Dresden — ²HISKP, Universität Bonn

The time-of-flight spectrometer COSY-TOF installed at COSY, Forschungszentrum Jülich, stands out for its large geometric acceptance. With this detector the dynamics of a great variety of reaction channels can be studied, as both total and differential cross sections are accessible. In this talk, we present results of the simultaneously measured reactions $pp \rightarrow pK^+\Lambda$ and $pp \rightarrow pK^+\Sigma^0$ at excess energies of 204, 239, and 284 MeV (Λ) and 127, 162, and 207 MeV (Σ^0). It is concluded from the total cross sections that the high energy limit of the Λ to Σ^0 cross section ratio is already reached at an excess energy of only 200 MeV. From the differential distributions observed in the overall CMS, the Jackson, and helicity frames, a significant contribution of nucleon resonances to the Λ -production mechanism is deduced. The differential distributions for the Σ^0 -channel, measured for the first time, indicate a significant contribution of kaon exchange to the pro-

duction mechanism. The data clearly show the strangeness production mechanisms to be distinctively different for these two hyperon channels. The data provide a benchmark of high quality for theoretical models already available or yet to come. (Supported by BMBF and FZ Jülich)

HK 5.8 Mo 18:15 HG IV

Search for the ppK^- Kaonic Bound State in pp-Reactions at 3.1 GeV with FOPI — ●MARTIN BERGER for the FOPI-Collaboration — Technische Universität München

In a dedicated experiment in August 2009 at the FOPI spectrometer at GSI/Darmstadt we measured proton induced reactions on a LH_2 target for the search of the ppK^- kaonic bound state to extend the results of recent experiments [1]. The ppK^- state will be investigated via missing and invariant mass technique in the reaction: $p+p \rightarrow ppK^- + K^+$. Where the ppK^- further decays into a Λ and a proton. To enhance the signal of this decay a trigger system for the online identification of Λ -hyperons was developed (SiAVio). It is based on double sided silicon strip detectors and provides an additional hit point which improves the vertex reconstruction in forward direction. This is necessary for the reconstruction of Λ -Hyperons, since they are mostly emitted under small polar angles. Newly installed RPC time-of-flight detectors allow to identify Kaons up to momenta of 1 GeV/c. During the experiment in August 2009, 80 millions LVL2 events were collected. Preliminary results of the analysis and simulations as well as the performance of the trigger system will be shown.

[1]M. Maggiora, Proceedings of the 'Hypernuclear and Strange Particle Physics' conference, Tokai, 2009.

HK 5.9 Mo 18:30 HG IV

Study of charged kaonic final states at the COMPASS ex-

periment — ●MATTHIAS SCHOTT for the COMPASS-Collaboration — CERN, Geneva, Switzerland

The COMPASS experiment at CERN took data with a 190 GeV/c negative hadron beam impinging on a fixed proton target in 2008. These data provide an opportunity to search for light mesons with exotic quantum numbers and glueballs. The available statistics of the 2008 data allows an strongly improved study of centrally produced resonances compared to previous experiments. In this talk we will give a first glance on the ongoing analyses with charged kaonic final states produced by incoming pions or kaons.

HK 5.10 Mo 18:45 HG IV

Hyperon production in the reactions $pn(p) \rightarrow K^0\Lambda p(p)$ and $pp \rightarrow K^+\Lambda p$ — ●MARTIN KRAPP, WOLFGANG EYRICH, FLORIAN HAUENSTEIN, LUKAS KOBER, CECILIA PIZZOLOTTO, WOLFGANG SCHROEDER, and ANDREAS TEUFEL for the COSY-TOF-Collaboration — Universität Erlangen-Nürnberg

The near threshold production of hyperons by using a liquid hydrogen target is one of the main topics studied at the time-of-flight spectrometer COSY-TOF. Up to now the reactions $pp \rightarrow K^+\Lambda p$, $K^0\Sigma^+p$ and $K^+\Sigma^0p$ have been investigated in detail and led to an essential information gain about the reaction mechanism. In order to achieve more complete information about hyperon production near threshold in nucleon-nucleon reactions, the investigation has been extended to pn reactions by using a liquid deuterium target. The current status of the analysis of the reaction channel $pn(p) \rightarrow K^0\Lambda p(p)$ will be presented, as well as reconstruction techniques, preliminary results and Monte Carlo simulation including Fermi motion. Moreover high statistics data of the reaction $pp \rightarrow K^+\Lambda p$ are discussed. In this context especially the influence of N^* -resonances on Dalitz-plots is investigated.

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