HK 65: Hadronenstruktur und -spektroskopie XI

Zeit: Freitag 14:00–16:00 Raum: HG IV

Gruppenbericht HK 65.1 Fr 14:00 HG IV

Erste Resultate von BES III — •Marc Pelizäus — Ruhr-Universität Bochum, 44780 Bochum — für die BES III-Kollaboration

Das BES III-Experiment am Elektron-Positron-Speicherring BEPCII in Peking hat 2008 seinen Betrieb erfolgreich aufgenommen. Der Speicherring wird bei einer Schwerpunktsenergie zwischen 2 und 4,6 GeV/c^2 betrieben und hat eine Design-Luminosität von $10^{33}\mathrm{cm}^{-2}\mathrm{s}^{-1}$. Zusammen mit der guten Instrumentierung des BES III-Detektors bieten sich hervorragende experimentelle Bedingungen für die Spektroskopie leichter Hadronen, das Studium von Charmonium- und Open-Charm-Systemen sowie Hochstatistikmessungen im Bereich der τ-Physik.

Während der ersten beiden Datennahmeperioden im Frühjahr 2009 wurden zwei umfangreiche Datensätze aufgezeichnet, die mehr als 100 Mio. J/ψ und mehr als 200 Mio. $\psi(2S)$-Ereignissen entsprechen. Eine höhere Datenmenge ist bei diesen Resonanzen von keinem anderen Experiment aufgenommen worden.

Es werden aktuelle Ereignisse u.a. zur Hadronen-Spektroskopie und zu Charmonium-Zerfällen vorgestellt.

HK 65.2 Fr 14:30 HG IV

Eine Methode zur präzisen Bestimmung von Masse und Breite des $D^*_{s0}(2317)$ mit dem PANDA Detektor — •Marius C. Mertens, James Ritman und Tobias Stockmanns — Forschungszentrum Jülich

Das 2003 an BaBar entdeckte $D^*_{s0}(2317)$ Meson verfügt über eine ungewöhnlich geringe Breite sowie eine Masse knapp unterhalb der DK Schwelle. Verschiedene theoretische Modelle versuchen, die Natur seiner Eigenschaften zu erklären. Eine genaue Kenntnis der Breite gilt als gutes Kriterium zur Beurteilung dieser Modelle. Bisher ist die Masse des $D^*_{s0}(2317)$ mit einer Genauigkeit von 0,6MeV bekannt, für die Breite existiert lediglich eine obere Schranke von 3,8MeV (PDG). Eine geeignete Methode zur Bestimmung der Breite von Teilchen, die signifikant schmaler sind als die experimentelle Auflösung, ist die Messung des Wirkungsquerschnitts in Abhängigkeit von der Schwerpunktsenergie. Hierzu wird die Produktionsrate der $D^*_{s0}(2317)$ Mesonen für verschiedene Schwerpunktsenergien im Bereich der Schwelle gemessen, um aus der so ermittelten Anregungsfunktion Masse und Breite zu bestimmen. Die Erzeugung von $D_s^{\pm}D^*_{s0}(2317)^{\mp}$ Paaren in Antiproton-Proton Kollisionen bei präzise einstellbaren Schwerpunktsenergien und hoher Luminosität machen den PANDA Detektor zur einem hervorragend geeigneten Instrument für diese Messung. Im Rahmen des Vortrags werden die nötige Vorgehensweise zur Durchführung dieser Messung am PANDA Detektor sowie aktuelle Studien zur damit potentiell erzielbaren Genauigkeit (ca. 0,1MeV Breitenauflösung, präzise genug zur Bestätigung/Widerlegung vieler theoretischer Vorhersagen) vorgestellt.

HK 65.3 Fr 14:45 HG IV

Measurement of Hyperon Decays of Charmonia with the BES3 Detector* — •Björn Spruck, Ingo Heller, Jens Sören Lange, Yutie Liang, Wolfgang Kühn, and Qiang Wang — II. Physikalisches Institut, Universität Gießen

Since 2009, the upgraded BES3 detector located at IHEP/Beijing has taken over 200M J/Ψ and over 100M $\Psi(2S)$ events in symmetric e^+e^- collisions at the resonance energies. This data is so far the largest amount of electron collider data on charmonia and gives the opportunity to study know decays more precisely and discover new decay channels. This talk will be focused on baryon/anti-baryon decays involving hyperons (Λ, Σ, Ξ and their excited states). For some of these decays a large SU(3) flavour symmetry breaking has been observed by other experiments before. The design of the BES3 detector allows for exclusive reconstruction of these decays into charged and neutral channels. Possible implications for measurements at the PANDA experiment will be discussed and preliminary results on inclusive and exclusive reconstructions will be presented.

* This work was supported by WTZ-CHN(06-20).

HK 65.4 Fr 15:00 HG IV

Simulation of X(3872) Decays Using The PandaRoot Framework* — •Martin Galuska, Thomas Gessler, Wolfgang Kühn, Stephanie Künze, Jens Sören Lange, Yutie Liang, David Münchow, Björn Spruck, Matthias Ullrich, and Marcel Werner for the PANDA-Collaboration — II. Physikalisches Institut, Universität Gießen

The charmonium-like state $X(3872)$ was discovered by Belle (PRL 91(2003)262001) and is recently being discussed as a possible D^0 D^{*0} S-wave bound molecular state. In this talk, MC simulations for the investigation of the $X(3872)$ on the decay channels $X(3872)\rightarrow$ J/Ψ π^+ π^- and $X(3872)\rightarrow$ J/Ψ γ will be presented using the `PandaRoot` framework. As the $X(3872)$ has a tentative quantum number assignment as J^P=1$^+$, direct formation in e^+ e^- collisions e.g. at BESIII is not possible, but in p $\bar{p}$ collisions at Panda. In the framework of the MC simulations in particular, a.) variation of angular distributions under different quantum number assignment and b.) effect of initial and final state radiation will be discussed.

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HK 65.5 Fr 15:15 HG IV

Study of decays of Ψ(3770) and Ψ(2S) into $p\bar{p}$ related channels — •Yutie Liang, Martin Galuska, Ingo Heller, Wolfgang Kühn, Jens Sören Lange, Qiang Wang, and Björn Spruck — II. Physikalisches Institut, Universität Gießen

The physics goals of PANDA include a detailed investigation of the spectrum of charmonium. For this physics program, charmonium production cross sections in $p\bar{p}$ annihilation, which remain poorly measured, are obviously crucial, both to evaluate luminosity requirements and to design detector. With the data of BESIII, we plan to study the decay of $\Psi(3770)$ to $p\bar{p}$, which will be very useful to estimate the cross section of $p\bar{p}$ to $\Psi(3770)$ in the PANDA experiment using detailed balance. The cross section of $p\bar{p}$ to $\Psi(3770)$ could then be used to provide the lowest limit for the cross section of $p\bar{p}$ to open charm which is important for the open charm physics in PANDA. We also plan to study decays of $\Psi(3770)$ and Ψ(2S) to $p\bar{p}\pi^0(\eta)$. According to theory studies, knowledge of the decay of charmonium into $p\bar{p}$ related channels can be used to estimate the numerical scale of the charmonium production cross section with certain theory models. The study of these channels will be helpful for the estimate of associated charmonium production in the PANDA experiment.

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HK 65.6 Fr 15:30 HG IV

Vertex and kinematic fitting for Panda — •Vishwajeet Jha and James Ritman for the PANDA-Collaboration — IKP, Forschungszentrum, Jülich, Germany

The efficient reconstruction of the primary and secondary vertices is crucial for many topics in the PANDA physics program. The vertex position of a set of tracks can be determined by varying the track parameters such that the total error is minimized under the condition that the tracks pass through a common vertex point. In addition, the kinematic information of various particles in a particular decay chain can be used as constraints, leading to an improvement in the momentum and mass resolution of the reconstructed particles.

The algorithms based on kinematic constraints for the vertex fitting have been implemented in the Pandaroot software package. The method includes the constraints by the Lagarange multipliers and it uses an iterative χ^2 minimization procedure for vertex fitting. The performance of the vertex fitter has been tested by reconstructing the short lived decay particles $D_s^{\pm}$ mesons ($c\tau$ = 147μm) and Λ baryons ($c\tau$ = 7.89cm), using simulated events from the reactions $p\bar{p}$ $\rightarrow$ $D_s^{\pm}D^*_s(2317)^{\mp}$ and $p\bar{p}$ $\rightarrow$ $\Lambda\bar{\Lambda}$, respectively. These decay particles have been reconstructed from the tracks of their daughter particles. In addition to the vertex fit, the possibility to include other kinematic constraints such as mass constraint, total momentum constraint, total energy constraint, four momentum constraints etc. are being developed and tested.

HK 65.7 Fr 15:45 HG IV

Towards Polarised Antiprotons — •Christian Weidemann for the PAX-Collaboration — Institut für Kernphysik (IKP), FZ-Jülich — JCHP, FZ-Jülich

The spin-filtering experiments at COSY and AD-CERN within the framework of the **P**olarised **A**ntiproton E**X**periments (PAX) want to

achieve a polarisation build-up of an initially unpolarized stored proton (antiproton) beam by multiple passage through an internal polarised gas target. For a quantitative understanding of the polarisation buildup and commissioning of the experimental setup spin-filtering will first be done with protons at COSY, before repeating the measurement with antiprotons at the AD.
A first major step towards this goal has been achieved at COSY with the installation of the required mini-β section in summer 2009, which will be comissioned in early 2010. The target chamber together with the atomic beam source (ABS), the Breit-Rabi-Polarimeter, and the detection system, which is based on silicon microstrip detectors, will be installed and commissioned in summer 2010.
The talk outlines the status and the anticipated plan of PAX at COSY and AD.