HK 33: Hadron Structure and Spectroscopy VII

Time: Wednesday 16:30–18:30 Location: J-HS A

Group Report HK 33.1 Wed 16:30 J-HS A

ALICE: A new Laboratory to Investigate and Constrain Exotic hadron-hadron interactions — •Dimitar Mihaylov for the ALICE-Collaboration — Technische Universität München, James-Franck-Straße, 85748, Garching, Germany

The study of baryon-hyperon interactions is essential for understanding the Equation of State of dense objects like neutron stars. Recent results from lattice calculations, based on fundamental QCD principles, provide theoretical predictions for an attractive interaction between p−Ξ^- and p−Ω^-, and a hint that the latter could form a bound state. At the moment all experimental attempts to study these predictions were inconclusive.

Pioneering studies by the ALICE collaboration demonstrated the potential of employing femtoscopy to investigate and constrain baryon-baryon interactions with unprecedented precision, thus providing a unique opportunity to study exotic baryon-hyperon pairs. In this contribution we present the latest ALICE results on p−Λ, p−Σ^0, p−Ξ^- and p−Ω^- interactions, based on the analysis of high-multiplicity pp collisions at $\sqrt{s}$ =13 TeV. To achieve the required precision, a novel procedure to model the emission source of all baryons, based on the explicit correction for the effect of short lived resonances, was developed. The p−Λ correlation provides new constraints to theoretical models, in particular related to the effects of the coupling to N−Σ. In the multi-strangeness sector, the p−Ξ^- and p−Ω^- interactions are confirmed to be attractive. The possible existence of a bound state in the p−Ω^- system will be discussed in detail.

HK 33.2 Wed 17:00 J-HS A

Search for $c\bar{c}s\bar{s}$ exotic states in B decays at Belle — •Ashish Thampi[1], Elisabetta Prencipe[1], Soeren Lange[2], and James Ritman[1] — [1]IKP-1, Forschungszentrum Juelich — [2]Physikalisches Institut II, JLU Giessen

The $B \to J/\psi\phi K$ transition most likely proceeds as a three body decay. Investigating this decay is important in the search for possible $c\bar{c}s\bar{s}$ exotic states in the $J/\psi\phi$ invariant mass system. Indeed LHCb has confirmed enhancements at 4140, 4274, 4500 and 4700 MeV/c^2 by studying the charged B meson decays. In order to provide a better understanding of the process and understanding the nature of these enhancements, we have analyzed the $J/\psi\phi$ invariant mass system produced in both, charged and neutral B meson decays, $B^{\pm} \to J/\psi\phi K^{\pm}$ and $B^0 \to J/\psi\phi K^0$. This analysis uses 711 fb^{-1} integrated luminosity data collected at the energy in the center of mass of $\Upsilon(4S)$ resonance by the Belle detector during the years 1999-2010. MC studies for evaluating the branching ratio and the study of the $J/\psi\phi$ invariant mass system are shown.

HK 33.3 Wed 17:15 J-HS A

Search for the Y(2175) in Photo-production at GlueX — •Abdennacer Hamdi[1,2], Klaus Götzen[1], Frank Nerling[1,2], and Klaus Peters[1,2] — [1]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany — [2]Institut für Kernphysik, Goethe-Universität, Frankfurt am Main, Germany

Understanding the Hadron spectrum is one of the primary goals of non-perturbative QCD. Many predictions have been experimentally confirmed, but others remain under experimental investigation. Of particular interest is how gluonic excitations give rise to states with constituent glue. One class of such states are hybrid mesons that are predicted by theoretical models and Lattice QCD calculations. Searching for and understanding the nature of these states is a primary physics goal of the GlueX experiment at the CEBAF accelerator at Jefferson Lab in the US. We will present the status to search for a hybrid meson candidate, the $Y(2175)$, in $\phi(1020)\pi^+\pi^+$ and $\phi(1020)f_0(980)$ channels in photo-production at the GlueX experiment.

HK 33.4 Wed 17:30 J-HS A

Heavy-Light Tetraquarks in a Bethe-Salpeter Approach — •Nico Santowsky and Christian S. Fischer — JLU Gießen, Germany

We investigate heavy-light tetraquarks with quark content $(c\bar{c}q\bar{q})/(cc\bar{q}\bar{q})$ with a fixed heavy quark mass $m_{c=\text{charm}}$ and a variable light quark mass m_q using the Dyson-Schwinger/Bethe-Salpeter framework (DSE/BSE). We explicitly treat internal 'cluster' structures *mesonic* $(c\bar{q} - \bar{c}q)$, *hadro-charmonium* $(c\bar{c} - q\bar{q})$ and *diquarkonic* $(cq - \bar{c}\bar{q})$, with meson and diquark states, determined by their DSE/BSEs. We investigate possible candidates for the states $X(3872)$, $Z(3900)$ and $(cc\bar{u}\bar{u})_{0^+/1^+}$. For the $X(3872)$ and the $Z(3900)$ we find that these are essentially dominated by the mesonic $D\bar{D}^*$ component indicating the possibility of a molecular structure. The scalar $(cc\bar{u}\bar{u})$ shows two states, where the ground state seems to be dominated by the mesonic $\eta_c\pi$ component, whereas the excited one has diquarkonic contributions.

HK 33.5 Wed 17:45 J-HS A

Inclusive charmonium mesons production above 4 GeV — •Simon Nakhoul[1,2], Klaus Götzen[1], Ralf Kliemt[1], Frank Nerling[1,2], and Klaus Peters[1,2] — [1]GSI Helmholtzzentrum für Schwerionenforschung — [2]Goethe-Universität Frankfurt

Since 2003, the XYZ charmonium-like states have become a hot topic in the hadron spectroscopy field. The Beijing Spectrometer III (BESIII) at the Beijing Electron-Positron Collider II (BEPC II) is one of the leading experiments in the XYZ-related physics. It has brought us numerous breakthrough discoveries, e.g., the first observation of the $Z_c(3900)$. In order to understand the nature of these intriguing states and their decay patterns, an inclusive analysis is performed using the recoil mass technique approach for different particles $(\pi^+\pi^-, K^+K^-, \pi^0\pi^0...)$ at center of mass energies above 4 GeV. The aim of this analysis is to search for new unobserved $Y(4260)$ decay channels and to provide accurate inclusive cross section measurements for $e^+e^- \to X_{\bar{c}c} + \pi^+\pi^-(X_{\bar{c}c} = J/\psi, h_c, \psi(2S))$ then compare them to the corresponding exclusive BESIII measurements.

HK 33.6 Wed 18:00 J-HS A

Inclusive analysis of the Y(4260) with baryonic recoil at the BESIII/BEPCII experiment — •Mathilde Himmelreich[1], Klaus Götzen[3], Ralf Kliemt[2,3], Frank Nerling[1,3], Simon Nakhoul[1,3], and Klaus Peters[1,3] — [1]Goethe Universität Frankfurt — [2]Helmholtzinstitut Mainz — [3]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt

The BESIII experiment is operating since 2008 and is well suited for charmonium spectroscopy.Besides the conventional charmonium states, many unexpected charmonium-like states with exotic properties, the so-called XYZ states, have been discovered. The nature of these states is still unclear, they are not in agreement with the theoretical expectations. The vector charmonium-like state Y(4260) has been discussed to be a hybrid or a tetraquark state. Precise cross section measurements of the hidden-charm final states of the Y(4260) in the BESIII data resolve meanwhile two resonance structures, the Y(4220) and the Y(4390). Additional studies of open-strange final states such as $\Lambda\overline{\Lambda}$ and $\Sigma\overline{\Sigma}$ will help to clarify the nature of these two vector states.

HK 33.7 Wed 18:15 J-HS A

Glueballs from Dyson-Schwinger equations — •Markus Huber[1], Christian Fischer[1], and Helios Sanchis-Alepuz[2] — [1]Institut für Theoretische Physik, Justus-Liebig–Universität Giessen, 35392 Giessen, Germany — [2]Institute of Physics, University of Graz, NAWI Graz, Universitätsplatz 5, 8010 Graz, Austria

We report on the calculation of the ground states and the first excited states of the scalar glueball sector in pure QCD in the framework of Dyson-Schwinger/Bethe-Salpeter equations. Our setup takes into account recent advances in the calculation of Yang-Mills correlation functions.