Symposium Colorful and Colorless QCD (SYCC)

veranstaltet vom Fachverband Physik der Hadronen und Kerne (HK)

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Übersicht der Hauptvorträge und Fachsitzungen

(Hörsaal Audimax)

Hauptvorträge

SYCC 1.2	Mi	9:05– 9:50	Audimax	**Understanding the structure of the proton through large-scale simulations** — •Constantia Alexandrou
SYCC 1.3	Mi	9:50–10:35	Audimax	**The quest for light exotic hadrons** — •Bernhard Ketzer
SYCC 2.1	Mi	11:00–11:45	Audimax	**Exotic hadrons with heavy quarks** — •Tomasz Skwarnicki
SYCC 2.2	Mi	11:45–12:30	Audimax	**Towards a new paradigm in hadron spectroscopy** — •Ulf-G. Meissner

Fachsitzungen

SYCC 1.1–1.3	Mi	9:00–10:35	Audimax	**Colorful and Colorless QCD I**
SYCC 2.1–2.2	Mi	11:00–12:30	Audimax	**Colorful and Colorless QCD II**

SYCC 1: Colorful and Colorless QCD I

Zeit: Mittwoch 9:00–10:35 Raum: Audimax

SYCC 1.1 Mi 9:00 Audimax

Introductory remarks — •Evgeny Epelbaum[1] and Stephan Paul[2] — [1]Ruhr-Universität Bochum — [2]TU München

Hauptvortrag SYCC 1.2 Mi 9:05 Audimax

Understanding the structure of the proton through large-scale simulations — •Constantia Alexandrou — Departmet of Physics, University of Cyprus, PO Box 20537, 1678 Nicosia, Cyprus — Computation-based Science and Technology Research Center, The Cyprus Institute, 20 K. Kavafi Str., 2121 Nicosia, Cyprus

Understanding of the fundamental properties of the proton is a major milestone of Nuclear Physics. We overview recent progress in lattice QCD simulations and explain how fundamental properties of hadrons can be investigated within this formalism. In particular, we focus on the determination of the distribution of spin and momentum among the constituents of the proton, resolving a three-decade old puzzle.

Hauptvortrag SYCC 1.3 Mi 9:50 Audimax

The quest for light exotic hadrons — •Bernhard Ketzer — Universität Bonn, Helmholtz-Institut für Strahlen- und Kernphysik, Bonn, Germany

In recent years, the spectroscopy of hadrons containing heavy quarks has brought forward a plethora of new and unexpected resonance-like signals. Many of these so-called X,Y,Z states are candidates for states beyond the quark-antiquark or three-quark configurations of mesons and baryons, respectively, which have been sought after since the introduction of the quark model. Similar studies in the light-quark sector are more challenging due to the wide and overlapping nature of known resonances. Recent high-quality data samples, collected e.g. by the COMPASS experiment at CERN or at e^+e^- machines, open the possibility to search for exotics also at masses below $2.5\,\mathrm{GeV}/c^2$. In particular, access to hadrons with explicit gluonic degrees of freedom is expected to be easier in this mass region. Recently, lattice QCD started to make predictions on the multiplet structure of such exotic hadrons, which may be used as a guideline in the experimental searches.

Excited states are produced in t- or s-channel reactions or in the decays of heavy hadrons into multi-particle final states subjected to partial-wave analyses. In addition to studying the properties of established mesons with unprecedented accuracy, the large existing data samples allow us to detect possibly exotic states. The talk will give an overview on ongoing experimental studies of light exotic states involving novel analysis techniques and discuss possible interpretations.

SYCC 2: Colorful and Colorless QCD II

Zeit: Mittwoch 11:00–12:30 Raum: Audimax

Hauptvortrag SYCC 2.1 Mi 11:00 Audimax

Exotic hadrons with heavy quarks — •Tomasz Skwarnicki — Department of Physics, Syracuse University, Syracuse, NY 13244, USA

A plethora of heavy hadronic structures with unusual properties have been discovered in the past fifteen years. A large number of experiments have contributed to these developments. The present status and future prospects of exotic heavy flavor spectroscopy will be reviewed.

Hauptvortrag SYCC 2.2 Mi 11:45 Audimax

Towards a new paradigm in hadron spectroscopy — •Ulf-G. Meissner — Univ. Bonn / FZ Jülich

Understanding the hadron spectrum is one of the premier challenges in particle physics. For a long time, the quark model has served as an ordering scheme and brought systematics into the hadron zoo. However, many new hadrons that were observed since 2003 do not conform with quark model expectations. Here, we demonstrate that if the lightest scalar, the $D_{s0}^*(2317)$, and axial-vector, the $D_{s1}(2460)$, states are assumed to owe their existence to the nonperturbative dynamics of Goldstone-Boson scattering off D and D^* mesons, various puzzles in the spectrum of the charm mesons find a natural resolution. Most importantly the ordering of the lightest strange and non-strange scalars becomes natural. Furthermore it is demonstrated that the well constrained amplitudes for Goldstone-Boson scattering off charm mesons are fully consistent with recent high quality data on the $B^- \to D^+\pi^-\pi^-$ final states provided by the LHCb experiment at CERN. This implies that the lowest quark-model positive-parity charm mesons, together with their bottom cousins, do not form the ground-state multiplet. In a broader view, the hadron spectrum must be viewed as more than a collection of quark model states.