

HK 24: Hadron Structure and Spectroscopy III

Time: Tuesday 15:45–17:15

Location: HBR 62: EG 19

Group Report HK 24.1 Tue 15:45 HBR 62: EG 19

Exploring exotic hadrons with functional equations — ●MARKUS Q. HUBER¹, GERNOT EICHMANN², CHRISTIAN S. FISCHER^{1,3}, STEPHAN HAGEL¹, JOSHUA HOFFER¹, and FRANZISKA MÜNSTER¹ — ¹Institut für Theoretische Physik, Justus-Liebig-Universität Giessen, 35392 Giessen, Germany — ²Institute of Physics, University of Graz, NAWI Graz, Universitätsplatz 5, 8010 Graz, Austria — ³Helmholtz Forschungsakademie Hessen für FAIR (HFHF), GSI Helmholtzzentrum für Schwerionenforschung, Campus Gießen, 35392 Gießen, Germany

The spectrum of quantum chromodynamics consists of different types of hadrons. The group of exotic hadrons contains those which cannot be described by the conventional quark model. In this talk we describe the functional framework of Dyson-Schwinger and bound state equations and its application to such states. We give an overview of different approximations and explain when to apply them to obtain qualitative or even quantitative results. This is exemplified with recent highlights like the spectrum of charm and bottom tetraquarks or a first-principles calculation of the glueball spectrum in Yang-Mills theory. We also discuss prospects to access the hybrid sector of QCD.

HK 24.2 Tue 16:15 HBR 62: EG 19

Search for exotic states in the η_c decay to $\eta'K^+K^-$ at BESIII — ●ANJA BRÜGGEMANN¹, SALLEH AHMED¹, NILS HÜSKEN², NIKOLAI IN DER WIESCHE¹, FREDERIK WEIDNER¹, and ALFONS KHOUKAZ¹ for the BESIII-Collaboration — ¹Universität Münster, Germany — ²Johannes Gutenberg-Universität Mainz, Germany

The BESIII detector at the e^+e^- collider BEPCII in Beijing, China, provides the world's largest data sample of the charmonium J/ψ with more than 10 billion events collected from 2009 to 2019.

Starting from the radiative J/ψ decay into $\gamma\eta_c$, we analyse the reaction $\eta_c \rightarrow \eta'K^+K^-$ to determine the corresponding branching ratio as well as the mass and width of the ground-state charmonium η_c based on a signal yield much higher than achieved in former analyses. Moreover, this mesonic η_c decay provides the opportunity to investigate possible exotic content in K^+K^- intermediate states, that lie in the mass region below 2 GeV/ c^2 , where the lightest glueball is predicted.

Our study is based on a partial wave analysis approach that gives access to the properties of the η_c charmonium and to the partial decay widths of contributing resonances decaying into the K^+K^- subsystem. These widths are directly comparable to theoretical predictions, which assume glueball admixtures carried by certain considered resonances.

The current status of the analysis is presented.

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HK 24.3 Tue 16:30 HBR 62: EG 19

Partial wave analysis of the radiative decay $J/\psi \rightarrow \gamma K^+K^-$ at BESIII — ●FABIAN HÖLZKEN for the BESIII-Collaboration — Ruhr-Universität Bochum

Radiative J/ψ decays are an ideal source to identify exotic states with gluonic degrees of freedom such as glueballs or hybrids. The K^+K^- system of $J/\psi \rightarrow \gamma K^+K^-$ only allows for J^{PC} quantum numbers like 0^{++} or 2^{++} and as such, it provides an excellent environment for the search of the lightest scalar and tensor glueballs.

The BESIII experiment, located at the BEPCII collider in Beijing, has collected a total of 10^{10} J/ψ events and thereby offers sufficient statistics for this analysis.

In this talk preliminary results of a mass independent and mass dependent partial wave analysis of the K^+K^- system produced in radiative J/ψ decays will be shown.

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HK 24.4 Tue 16:45 HBR 62: EG 19

Partial-wave analysis of $\tau^- \rightarrow \pi^- \pi^- \pi^+ \nu_\tau$ at Belle — ●ANDREI RABUSOV, DANIEL GREENWALD, and STEPHAN PAUL — Technical University of Munich

We present results of a partial-wave analysis of $\tau^- \rightarrow \pi^- \pi^- \pi^+ \nu_\tau$ in data from the Belle experiment at the KEK e^+e^- collider. We demonstrate the presence of the $a_1(1420)$ and $a_1(1640)$ resonances. We observe the $1^-[\omega(782)\pi]_P$ wave using the G -parity violating decay of $\omega(782) \rightarrow \pi^+\pi^-$. We also present validation of our findings using a model-independent approach. Our results can improve modeling in simulation studies necessary for measuring the τ electric and magnetic dipole moments and Michel parameters.

HK 24.5 Tue 17:00 HBR 62: EG 19

Partial-Wave Analysis of the $K_S^0 K^-$ Final State at COMPASS* — ●JULIEN BECKERS for the COMPASS-Collaboration — Technical University of Munich

The COMPASS experiment is a multi-purpose two-stage spectrometer at the CERN SPS. One of its main goals is to probe the strong interaction at low energies by studying the excitation spectrum of light mesons. This is done by decomposing the data into partial-wave amplitudes with well-defined quantum numbers and searching for resonances in these amplitudes. One of the many final states produced at COMPASS is $K_S^0 K^-$, which is complementary to COMPASS's flagship $\pi^- \pi^- \pi^+$ final state in that the same states appear as intermediate resonances. However, in $K_S^0 K^-$, only selected resonances, the a_J states with even J , can appear at COMPASS' high beam energies. This allows a very selective study of these states. Additionally, the final state, consisting of two strange mesons, enables us to probe the intrinsic $s\bar{s}$ content of the isovector states. Using the so-far largest dataset of $K_S^0 K^-$ events, we are able to search for new resonances and measure states with high precision. We will present the partial-wave analysis of the $K_S^0 K^-$ final state, which shows several clear resonance signals.

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