

HK 60: Focus Session III: Multiquark and Molecular States

Time: Thursday 14:00–15:30

Location: HBR 14: HS 1

Invited Talk HK 60.1 Thu 14:00 HBR 14: HS 1
Theory of multi-quark states — •CHRISTOPH HANHART — IAS-4, Forschungszentrum Jülich

In this talk the different theoretical approaches to multi-quark states in the doubly heavy quark sector will be presented and contrasted. In addition, the implications of different structure assignments - compact tetraquarks, hadronic molecules and hadroquarkonia - for experimental observables will be discussed with special emphasis on what is necessary to get a deeper understanding of the structure of the various multi-quark states found in recent years and thus into the inner workings of QCD.

Invited Talk HK 60.2 Thu 14:30 HBR 14: HS 1
Cross-Experiment Insights into Multiquarks and Molecular States — •MIKHAIL MIKHASENKO — Ruhr Univerity Bochum

This presentation delves into the forefront of hadronic physics, focusing on the intriguing realm of exotic hadrons. I will specifically address two compelling means of matter organization: the genuine Quantum Chromodynamics state, a conventional meson or a baryon, conceptualized as a single 'bag' of quarks, and the hadronic molecule arrangement, where two 'bags' are bound by residual nuclear forces. Central to discussion is the critical role of hadron-hadron rest energy, serving as the reference point for molecular binding.

Recent years have witnessed a proliferation of experimental evidence suggesting a surplus of hadronic states beyond conventional mesons and baryons. Notably, several of these states appear tantalizingly close to the hadron-hadron threshold, suggesting their molecular interpretation and blurring the lines between particle and nuclear physics.

The talk will provide a review of these experimental observations,

highlighting their significance in understanding the true nature of multi-quark states. I'll aim to shed light on the potential of these exotic states to redefine our understanding of matter organization at a fundamental level.

Invited Talk HK 60.3 Thu 15:00 HBR 14: HS 1
Molecular and bound states searches with femtoscopy — •VALENTINA MANTOVANI SARTI — TUM Department of Physics, Garching, Germany

In the last years the correlation measurements at LHC, particularly performed in small colliding systems such as proton-proton collisions, proved to be a powerful complementary experimental tool to access the strong interaction in hadronic systems with strange and charm content. The QCD dynamics driving the underlying interaction in these sectors is characterized by a rich presence of inelastic channels which, depending on the coupling strengths, can give rise to several dynamically generated states. The nature and inner composition of such states strongly depends on the interplay between the different coupled-channels and experimental constraints on their properties are typically obtained from dedicated mass invariant studies widely performed at LHC and as well at electron-positron colliders. In this talk we will discuss how femtoscopy can contribute to the search and understanding of these molecular states. We will present the recent results obtained in the meson-baryon $S=-2$ sector for the $\Xi(1620)$ and $\Xi(1690)$ states with the measurements of ΔK -correlation. Latest results on the correlation of D mesons with light hadrons will be shown. Finally, future perspectives will also be presented on how to employ femtoscopy to shed light into the composition of heavy multi-quark states with the ALICE 3 dedicated experiment.