

Master Seminar physics654 (4 cp)

Exotic Multi-Quark States

winter term 23/24

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with tutors

Contents & Generalities

Over the last decade a revolution has occurred in hadron physics: States have been unambiguously experimentally identified with a quark structure beyond that of the common quark models: Mesons, usually thought to consist of a quark-antiquark combination, which have a minimum 4-quark structure (2 quarks and 2 anti-quarks), and baryons, normally built from 3 quarks, which must consist of 5 quarks. Such states have e.g. been determined at Belle and LHCb in the charm quark sector. Similar states seem to exist with strange quarks and have been investigated at Jefferson Lab in USA and ELSA at the University of Bonn. To date it remains open as to whether these tetra- or pentaquark systems are subject to colour binding through gluon exchange or, in contrast, molecular-type structures are formed where two ordinary mesons or a meson and a baryon as colour neutral objects bind together through pion exchange.

In this seminar key papers of experimental findings and theoretical interpretation shall be discussed. The idea is that students (if needed in groups of 2) try to look at a paper in the respective context and present it to the full audience in a 30 – 40 minute talk. Support will be provided by experienced tutors. 4 cp will be awarded for successful presentation and active participation.

Schedule

To set the stage, in the first seminar (**Wednesday, 11 October, 13th, Conference Room 2, PI**, 1st floor above the ELSA floor) the lecturers will introduce the research context and the papers to be looked at. Based on this, possible talks will be discussed. Assigning talks to interested students shall be started and finalised within two weeks. The talks shall not begin before end of November to provide sufficient preparation time.

Format

Student seminars with round table discussions.