FAKULTÄT für PHYSIK
LUDWIG-MAXIMILIANS-UNIVERSITÄT
MÜNCHEN/GARCHING

PHYSIK-DEPARTMENT
TECHNISCHE UNIVERSITÄT MÜNCHEN
MÜNCHEN/GARCHING

MLL-KOLLOQUIUM

Donnerstag, 19.05.2016, 16^{15} Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1
Treffen zum gemeinsamen Kaffee 16 Uhr

Dr. Boris Grube

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Meson Spectroscopy at the COMPASS Experiment

COMPASS is a multi-purpose fixed-target experiment at the CERN Super Proton Synchrotron aimed at studying the structure and dynamics of hadrons using high-intensity muon and hadron beams with energies ranging from 160 to 190 GeV. One main goal is the precise measurement of the spectra of mesons composed of up, down, and strange quarks. The focus lies in particular on the search for "exotic" mesons that may be interpreted as multi-quark states, meson-meson molecules, excited gluonic field configurations (hybrids), or even purely gluonic bound states (glueballs).
The two-stage spectrometer used by the experiment has a large acceptance and covers a wide kinematic range for charged as well as neutral final-state particles so that a wide range of reactions can be measured. At COMPASS, light mesons are studied mainly in diffractive dissociation reactions of a 190 GeV pion beam on various targets.
The talk will focus on results from the analysis of the $\pi^-\pi^+\pi^-$ final state, for which COMPASS has recorded the currently world's largest data sample. Based on these data, the properties of known iso-vector resonances can be measured with high precision. In addition, the analysis method is also sensitive to small signals from potential new states. In fact, COMPASS recently found a possible new axial-vector resonance, the $a_1(1420)$, with rather unusual properties. The signal is confirmed by the analysis of the $\pi^-\pi^0\pi^0$ final state. To study it in more detail, a novel analysis technique has been developed, which is able to extract the amplitude of the $\pi^+\pi^-$ subsystem as a function of 3π mass from the data. This information will help to better understand the dynamics of the 3π system.

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