HK 29: Hauptvorträge II

Zeit: Mittwoch 11:00–13:00 Raum: HZ 1+2

Hauptvortrag HK 29.1 Mi 11:00 HZ 1+2

Physics of Heavy Quarks in Nuclear Collisions at the LHC — •Raphaelle Bailhache for the ALICE-Collaboration — Goethe-Universitaet, Frankfurt, Germany

After three years of successful operation with lead and proton beams at the Large Hadron Collider (LHC), many exciting results could be obtained from the measured data. The characterization of the Quark-Gluon Plasma (QGP), the deconfined state of strongly-interacting matter produced in high-energy collisions of heavy ions, is the main purpose of the ALICE experiment. In this presentation, emphasis will be put on the measurement of heavy quarks, including both hadrons with open heavy flavours and quarkonia. These probes play a key role for the study of thermalization and deconfinement in heavy-ion collisions, and the determination of the QGP properties. The measurements discussed in this talk include heavy-quark energy loss as well as quarkonia suppression and regeneration in the medium. Qualitatively new features are observed in Pb-Pb collisions at the LHC as compared to previous measurements at lower collision energies. The production of heavy quarks is also affected by the presence of cold nuclear matter in the initial state. The study of p-Pb collisions is instrumental to quantify these effects, and supports the conjecture of significant final-state effects in Pb-Pb. Finally, we conclude with a brief look into the future, where an increase of the LHC collision rate and energy will open new opportunities for heavy-quark physics with ALICE.

Hauptvortrag HK 29.2 Mi 11:40 HZ 1+2

Electric Dipole Moment Measurements at Storage Rings — •Jörg Pretz for the JEDI-Collaboration — Physikalisches Institut 3B, RWTH Aachen University — IKP2, Forschungszentrum Jülich

Electric Dipole Moments (EDMs) of elementary particles are considered as one of the most powerful tools to discover CP violation beyond the Standard Model and to find an explanation for the dominance of matter over anti-matter in our universe.

Up to now experiments concentrated on neutral systems (neutron, atoms, molecules). Storage rings offer the possibility to measure EDMs of charged particles by observing the influence of the EDM on the spin motion. The Cooler Synchrotron COSY at the Forschungszentrum Jülich provides polarized protons and deuterons up to a momentum of 3.7 GeV/c and is thus an ideal starting point for such an experimental programme. Plans for measurements of charged hadron EDMs and results of first test measurements will be presented.

Hauptvortrag HK 29.3 Mi 12:20 HZ 1+2

Faster and further, masses and more: Latest developments and results from ISOLTRAP — •Robert Wolf — Institut für Physik, Universität Greifswald, Felix-Hausdorff-Str. 6, 17489 Greifswald — Max-Planck-Institut für Kernphysik, Saupfercheckweg 1, 69117 Heidelberg

Precision mass measurements of radioactive nuclides give direct insight to one of the most fundamental properties of atomic nuclei, their binding energy. Investigating this property as a function of proton and neutron numbers is crucial for advancing theory in describing and predicting the structure of nuclei. Furthermore, knowledge of masses far from stability is necessary for the understanding of nucleosynthesis in supernovae and neutron stars. Laboratory experiments are often extremely challenging due to the short half-lives and low production rates of the nuclides of interest. At the same time, longer-lived or stable contaminations are produced by orders of magnitude more, demanding a high selectivity and resolving power of the mass spectrometer. ISOLTRAP at ISOLDE/CERN has already investigated over 500 isotopes on an uncertainty level down to $\delta m/m = 1 \times 10^{-8}$ by use of Penning-trap techniques. To extend the range of accessible nuclides even further, the setup has been upgraded with a multi-reflection time-of-flight mass analyzer. This device can be operated as a mass purifier or a mass spectrometer, which allowed mass measurements for nuclear astrophysics applications and tests of valence-shell calculations based on 3N forces. The talk will give an overview of these recent developments and further applications of the new MR-ToF device.