T 47: Eingeladene Vorträge II

Zeit: Mittwoch 14:00–16:00 Raum: Z6 - HS 0.002

Eingeladener Vortrag T 47.1 Mi 14:00 Z6 - HS 0.002

Wissen ist Macht – die Matrixelement-Methode für Suchen mit Top-Quarks — •Olaf Nackenhorst — TU Dortmund, Lehrstuhl für Experimentelle Physik IV

Top-Quarks werden am LHC im Zusammenhang mit vielen interessanten Physikprozessen produziert. Die Endzustände und Signaturen im Detektor sind häufig komplex und können nicht immer einfach vom Untergrund getrennt werden. Eine Möglichkeit die Trennkraft zwischen Signal und Untergrund zu erhöhen, ist es mit Hilfe der Matrixelement-Methode Informationen zu verwenden, die der theoretische Beschreibung des harten Streuprozesses zu Grunde liegen.

Die Suche nach dem Higgs-Boson, produziert in Assoziation mit einem Top-Quarkpaar und bei der das Higgs-Boson in ein Bottom-Quarkpaar zerfällt, war die erste Suche am ATLAS-Experiment, die die Matrixelement-Methode verwendet hat. Kürzlich wurde die Matrixelement-Methode zum ersten Mal auch bei einer Suche nach Phänomenen jenseits des Standardmodells verwendet. In dieser Analyse wurde nach der Produktion von exotischen vektorartigen Quarkpaaren gesucht, die vollständig in hadronische Endzustände zerfallen. Beide Suchen werden mit Fokus auf die Verwendung der Matrixelement-Methode vorgestellt und diskutiert.

Eingeladener Vortrag T 47.2 Mi 14:24 Z6 - HS 0.002

IAXO & MADMAX - Axion Searches with Helio- & Haloscopes — •Christoph Krieger — Physikalisches Institut, Universität Bonn, Nußallee 12, 53115 Bonn — Institut für Experimentalphysik, Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg

Axions feature a small mass and only weak couplings which provide a suitable candidate for Dark Matter. The detection of axions relies mostly on the conversion of axions to photons inside a strong electromagnetic field via the inverse Primakoff effect.

Axion helioscopes look for axions produced in the solar core which reach earth and can be detected by strong magnets pointed towards the sun converting them back into X-ray photons. The International Axion Observatory (IAXO) is a next generation helioscope currently under consideration.

The Magnetized Disc and Mirror Axion Experiment (MADMAX) is a proposed dielectric haloscope, supposed to be built at DESY in Hamburg. Here the conversion of axions into microwave photons happens at the surfaces of dielectric discs in a magnetic field. Dielectric haloscopes enable the detection of axions in a previously inaccessible mass range.

Prospects and first milestones for both experiments, IAXO and MADMAX, will be presented. For IAXO this especially includes the development of low background X-ray detectors while for MADMAX first results concerning the production of large area dielectric discs will be shown.

Eingeladener Vortrag T 47.3 Mi 14:48 Z6 - HS 0.002

The CMS Phase-II Tracker Upgrade — •Thomas Eichhorn — Deutsches Elektronen-Synchrotron DESY

From 2023 onward the Large Hadron Collider (LHC) at CERN will be upgraded to a new, so-called High-Luminosity LHC (HL-LHC). With this upgrade, the instantaneous luminosity will be increased to up to $7.5 \times 10^{34}\,\mathrm{cm^2 s^{-1}}$. After 10 years of operation, the CMS experiment will have accumulated an integrated luminosity of over $3000\,\mathrm{fb^{-1}}$. These unprecedented luminosities have enormous consequences for the LHC and its experiments, such as CMS, and here especially for the innermost detector component, the tracking detector. To address the anticipated vast increase in particle density and the unprecedented radiation damage, a complete redesign of the CMS Tracker is needed. This talk will explain the forseen upgrade of the CMS Tracker, its components and some of the technological choices. Ongoing R&D efforts will also be highlighted.

Eingeladener Vortrag T 47.4 Mi 15:12 Z6 - HS 0.002

The Higgs Physics at LHC: Status quo — •Tatjana Lenz — Bonn University

The more than five years ago discovered Higgs boson is the last missing piece of the Standard Modell of Elementary Particle Physics. Its properties are very Standard-Model-like and have been tested already at high precision. This presentation addresses new results on the Higgs boson based on the data set collected by ATLAS and CMS experiments during Run-2 started in 2015 at 13 TeV centre-of-mass energy. An overview of the recent measurements of Higgs boson properties as well as searches involving Higgs boson will be shown.

Eingeladener Vortrag T 47.5 Mi 15:36 Z6 - HS 0.002

Proton-lead and lead-lead collisions with LHCb — •Michael Winn — Laboratoire de l'accélérateur linéaire, Orsay, France

The LHCb experiment allows to study heavy-ion interactions in the forward region with a fully instrumented spectrometer, a unique opportunity at the LHC. In proton-lead collisions, both forward and backward rapidities are covered thanks to beam direction reversal. Recent results include measurements of cross sections, nuclear modification factors and forward-backward ratios for heavy quarkonia states, open heavy-flavour hadrons including baryons and dihadron correlations. These quantities are sensitive probes for nuclear effects in proton-nucleus collisions. Strong nuclear modifications are observed in particular at low Bjorken-x and constitute an important basis for the understanding of nucleus-nucleus collisions. In 2015, LHCb participated successfully for the first time in the lead-lead data-taking. The status of analyses in this collision system will be shown. Finally, an outlook for future opportunities with LHCb in heavy-ion collisions will be given.