T 87: Eingeladene Vorträge III

Zeit: Donnerstag 13:45–16:15 Raum: VMP4 Audimax 1

Eingeladener Vortrag T 87.1 Do 13:45 VMP4 Audimax 1
Reconstruction of tau lepton decays and applications in the ATLAS experiment — •Peter Wagner — Rheinische Friedrich-Wilhelms-Universität Bonn, Germany

Final states with hadronically decaying tau leptons play an important part in the physics programme of the ATLAS experiment. Examples are measurements of Standard Model processes, evidence of the Higgs-boson Yukawa couplings to tau leptons, and searches for new physics phenomena, such as Supersymmetry. These analyses depended on robust tau reconstruction and excellent particle identification algorithms that provided suppression of backgrounds from jets, electrons and muons.

I will present a new "particle flow" method of reconstructing the individual charged and neutral hadrons in tau decays with the ATLAS detector which leads to a significant improvement in the tau energy and directional resolution. It further gives access to the individual charged and neutral hadron four-momenta and offers a high purity decay mode selection. These features will play a particularly important role in analyses that exploit tau spin information, such as a measurement of the CP mixture of the Higgs boson in $H \to \tau\tau$ decays.

Eingeladener Vortrag T 87.2 Do 14:15 VMP4 Audimax 1
Auf der Suche nach neuer Physik mit geboosteten Bosonen bei CMS — •Andreas Hinzmann — University of Zurich, Zurich, Switzerland

Viele Erweiterungen des Standard Modells (SM) sagen neue Teilchen mit Massen von mehreren TeV vorher, die in W-, Z- und Higgs-Bosonen zerfallen. Bei den ersten Suchen nach solchen Teilchen im Run 1 des LHC gab es kleine Hinweise auf die Existenz einer Resonanz bei 2 TeV, weshalb ihre Suche am Anfang des Run 2 des LHC (2015) von höchster Priorität ist. Da hochenergetische W-, Z- und Higgs-Bosonen, die hauptsächlich in Quark-Antiquark-Paare zerfallen, massive Teilchenjets im Detektor bilden, für deren Identifikation komplexe Rekonstruktionstechniken basierend auf Jetsubstruktur erforderlich sind, birgt diese Suche große experimentelle Herausforderungen. In diesem Vortrag werden diese Techniken anhand der Run-1-Analysen erklärt und die neusten Ergebnisse von Run 2 präsentiert.

Eingeladener Vortrag T 87.3 Do 14:45 VMP4 Audimax 1
Hunting for new, weakly coupled particles with high intensities — •Babette Döbrich — CERN, 1211 Geneva 23, Switzerland

A number of smaller and diverse experiments complements the high-energy explorations for new physics at the LHC. Many of these experiments are searching for new physics hiding at comparably low mass but very weak coupling.

Examples of such particles are axion-like particles and dark gauge bosons, which could also explain Dark Matter. The technology to directly search for such particles are often high-intensity and precision set-ups.

In my talk I will give a brief overview of the motivation and search for axion-like particles and then focus on the possibility to find them in a proton-dump experiment at CERN.

Eingeladener Vortrag T 87.4 Do 15:15 VMP4 Audimax 1
Probing low mass dark matter with the CRESST direct search — •Federica Petricca for the CRESST-Collaboration — Max-Planck-Institut für Physik, Föhringer Ring 6, D-80805 München

In this era of precision cosmology we know that dark matter constitutes about 85% of the matter in the Universe, although its nature is still unknown. Direct dark matter searches apply a great variety of different detector technologies, all aiming to observe dark matter particles via their elastic scattering off nuclei in their detectors. Cryogenic experiments currently provide the best sensitivity for light dark matter particles, with the CRESST-II experiment advancing to the sub-GeV/c^2 dark matter particle mass regime.

The CRESST target consists of scintillating $CaWO_4$ crystals operated as cryogenic calorimeters at millikelvin temperatures. The low energy thresholds of these detectors, combined with the presence of light nuclei in the target material, allow to probe the low-mass region of the parameter space for spin-independent dark matter-nucleon scattering with high sensitivity.

In this contribution we present results of the latest measurement campaign. With 52kg live days and a threshold for nuclear recoils of 307eV we obtain an unprecedented sensitivity for light dark matter, extending the reach of direct dark matter searches to the sub-GeV/c^2 region. Currently, CRESST-III is on its way, featuring detectors consequently optimized for the measurement of very small energy deposits to further explore the low-mass region. We will report on the status of the experiment and give an outlook on the anticipated sensitivity.

Eingeladener Vortrag T 87.5 Do 15:45 VMP4 Audimax 1
The Top Quark and the Higgs Boson: Vital Actors at LHC — •Johannes Hauk — Deutsches Elektronen-Synchrotron

The two heaviest elementary particles known so far, the top quark and the Higgs boson, were discovered relatively late, long time after their prediction by the Standard Model (SM). This is due to the high masses which could not be predicted directly, but this makes them especially interesting for validating the SM or revealing signs of new physics. The high collision energy of protons at LHC leads to plenty of top quarks, mainly via pair production ($t\bar{t}$), and also numerous Higgs bosons.

Many properties of the top quark are meanwhile studied with high precision, and also the Higgs boson is undergoing scrutiny – so far everything in agreement with the SM. One important test is to measure the interplay between these two particles. The only possibility to measure directly the coupling is the Higgs production in association with top quarks, and especially $t\bar{t}$. This requires a good understanding of the overwhelming background processes, namely $t\bar{t}$ production in association with other particles. In this talk, measurements from the CMS experiment will be discussed concerning both, understanding the background processes as well as targeting the detection of associated $t\bar{t}$ and Higgs boson production.