T 45: Eingeladene Vorträge (Invited Topical Talks) II

Time: Wednesday 14:00–16:00 Location: H-HS X

Invited Topical Talk T 45.1 Wed 14:00 H-HS X

A large Scintillating Fibre Tracker for the LHCb Upgrade — •Xiaoxue Han — Physikalisches Institut, Universität Heidelberg,Germany

The LHCb detector at the Large Hadron Collider (LHC) is undergoing a major upgrade during the long shutdown 2019/2020 in order to collect data at an instantaneous luminosity of up to 2*1033 cm-2s-1. The higher detector occupancy and higher radiation level require the replacement of the current downstream tracking stations by a Scintillating Fibre (SciFi) Tracker. The SciFi Tracker comprises plastic scintillating fibres, read out by state-of-the-art multi-channel Silicon Photomultiplier (SiPM) arrays. The detector design,studies of the radiation hardness of scintillating fibres and the SiPM arrays, the customized PACIFIC ASIC, the front-end electronics, the testbeam performance of the detector slice and the current detector assembly and commissioning status are described.

Invited Topical Talk T 45.2 Wed 14:30 H-HS X

The CMS pixel detector: ready for the future? — •Jory Sonneveld — Universität Hamburg, Hamburg, Germany

A new pixel detector has been installed in the heart of the Compact Muon Solenoid (CMS) early 2017 to meet the challenges of the high-pileup and high-luminosity environment from proton-proton collisions at the Large Hadron Collider (LHC). Despite many challenges, the pixel detector's performance was excellent. The innermost pixel layer, which has withstood radiation levels of 8e14 neq/cm2, is currently being replaced for the coming years of data taking.

For the future high luminosity LHC (HL-LHC), CMS will undergo a major upgrade to be able to fully exploit the increased luminosity and the entire tracker will be replaced. At the HL-LHC, the inner tracker will see hit rates up to 3.2 GHz/ cm2 and unprecedented levels of radiation up to 1.2 Grad and 2e16 neq/cm2. This is more than 20 times the fluence seen by the current CMS pixel detector up until today.

This presentation will discuss experience and lessons learned in operating the CMS phase 1 pixel detector, as well as new developments and test beam results from R&D for the phase 2 upgrade of the CMS pixel detector.

Invited Topical Talk T 45.3 Wed 15:00 H-HS X

Full event interpretation at Belle II — •William Sutcliffe for the Belle II-Collaboration — University of Bonn, Bonn, Germany

The Belle II experiment is an e^+e^- collider experiment in Japan, which was designed to record a large number of e^+e^- collisions producing $\Upsilon(4S) \to B\bar{B}$ decays. A wide range of precision tests of the Standard Model and searches for new physics can be performed by studying the subsequent decays of the B mesons. In many cases, these decays will involve missing energy due to weakly interacting particles such as neutrinos, which escape the detector without interacting. Given the challenging nature of reconstructing decays with missing energy an essential technique, known as tag-side reconstruction, is employed in which one B meson is reconstructed in a large number of specific decay modes. This subsequently allows the kinematics and potentially the flavour of the remaining B meson to be constrained. In this talk, first results, which quantify the performance of the Belle II hadronic tag-side reconstruction algorithm, Full Event Interpretation (FEI), are presented using 5.15 fb^{-1} of early Belle II data. Ultimately the FEI will be an integral part of the physics program of Belle II allowing the measurement of several challenging final states such as $b \to s\nu\bar{\nu}$ decays.

Invited Topical Talk T 45.4 Wed 15:30 H-HS X

The Physics Potential of CLIC — •Ulrike Schnoor for the CLICdp-Collaboration — CERN, Geneva, Switzerland

The Compact Linear Collider (CLIC) is a mature option for a future electron-positron collider operating at centre-of-mass energies of up to 3 TeV. The accelerator uses a two-beam acceleration scheme, in which normal-conducting high-gradient accelerating structures are powered via a high-current drive beam. CLIC will be built and operated in a staged approach with three centre-of-mass energy stages currently assumed to be 380 GeV, 1.5 TeV, and 3 TeV. The detector concept matches the physics performance requirements and the CLIC experimental conditions. The initial energy stage of CLIC will focus on precision measurements of Higgs-boson and top-quark properties. The subsequent energy stages enhance the reach of many searches for Beyond Standard Model physics and give access to the Higgs self-coupling with a precision of around 10 %. A selection of results from recent studies will be presented showing that CLIC has excellent sensitivity to many BSM physics scenarios, both through direct observation and precision measurements of SM processes. New particles can be discovered in a model-independent way almost up to the kinematic limit. Compared with hadron colliders, the low background conditions at CLIC provide extended discovery potential, also for non-standard signatures such as charged long-lived particles. In addition to studying new particles directly, BSM models can be probed up to scales of tens of TeV through precision measurements.