T 40: Methods in Particle Physics II (Misc.)

Time: Tuesday 16:15–18:00 Location: VG 4.101

T 40.1 Tue 16:15 VG 4.101

ATLAS Forward Proton (AFP) detector operation challenges and ToF Run-3 performance — •Viktoriia Lysenko and Andre Sopczak — Czech Technical University in Prague

Operational and data quality challenges for the ATLAS Forward Proton (AFP) detector in 2024 are presented together with performance studies of the Time-of-Flight (ToF) detector during LHC Run-3 datataking.

T 40.2 Tue 16:30 VG 4.101

Luminosity measurements using the ATLAS Forward Proton (AFP) detector — Jan Broulim, Petr Fiedler, •Daniil Khmelnytskyi, and Andre Sopczak — Czech Technical University in Prague

The latest results of luminosity measurements using the AFP detector are presented.

T 40.3 Tue 16:45 VG 4.101

Characterization of Losses in LHCb — Johannes Albrecht[1], Federico Alessio[2], Elena Dall'Occo[2], and •David Rolf[1] — [1]TU Dortmund University, Dortmund, Germany — [2]CERN, Geneva, Switzerland

The LHCb experiment is one of the four large particle detectors at the LHC. One important aspect of the experiment is to perform very precise measurements of rare b and c quark decays.

A very clean signal is required during nominal collisions. Operating the LHC comes with different sources of background particles induced from machine operation (MIB). These particles can collide with the collimators shielding the experiment causing secondary showers onto the detector.

In this talk the sources of such losses are explained. The losses are characterized by performing dedicated loss runs. The potential effect on the detector and the physics impact is studied.

T 40.4 Tue 17:00 VG 4.101

Study of the intrinsic detection asymmetry at Belle II for a generic search for matter-antimatter asymmetries — •Beatrice Locatelli, Thomas Lück, Nikolai Krug, and Thomas Kuhr — Ludwig-Maximilians-Universität München Germany

To explain the abundance of matter over antimatter observed in the universe, the CP symmetry must be broken. The Standard Model accounts for some CP violation, but that is not sufficient to explain the magnitude of the observed baryon asymmetry. Therefore, it is crucial to search for new manifestation of CP violation that might have been overlooked so far.

The main source of background in the measurement of CP asymmetries is the intrinsic detector asymmetry. For this reason, it is essential to have a precise knowledge of the asymmetry in particle detection, which can be done by studying the different reconstruction efficiencies between particles and antiparticles. The final goal is to formulate a model-independent analysis strategy that can be applied to detect asymmetries in B-decays at Belle II.

T 40.5 Tue 17:15 VG 4.101

Background Studies for the ILD Detector Concept at the FCC-ee — •Victor Schwan[1], Jenny List[2], and Daniel Jeans[3] — [1]DESY, Universität Hamburg — [2]DESY — [3]KEK, Japan

The ILD detector concept has originally been developed for the International Linear Collider (ILC). Detailed simulations gauged against the performance of prototype components have shown that ILD in its ILC incarnation is ideally suited to pursue the physics program of a linear Higgs factory as well as of a higher energy e^+e^- collider. Recently, the ILD collaboration has started to investigate how the detector concept would need to be modified in order to operate successfully in the experimental environment of a circular Higgs factory like for instance FCCee. In particular, the interaction region, or machine-detector interface (MDI), requires substantial changes to make room for accelerator elements and to withstand backgrounds. This contribution presents the assessment of the occupancy caused by machine backgrounds in the modified detector design, especially in the tracking subdetector systems.

T 40.6 Tue 17:30 VG 4.101

Optimization of module orientation for the DUNE TMS detector — •Asa Nehm for the DUNE-Collaboration — Johannes-Gutenberg University Mainz

The Deep Underground Neutrino Experiment (DUNE), currently under construction, will use a high-intensity neutrino beam from Fermilab and observe the neutrinos in the near detector based at Fermilab and the far detector complex located at SURF. The DUNE near detector complex will host a suite of detectors that are currently in development. The experiment will make precision measurements of the neutrino oscillation parameters including the CP violation phase and the mass ordering. It is also sensitive to neutrinos from galactic supernovas.

One of the near detectors is The Muon Spectrometer (TMS) that is tasked with determining the charge and measuring the momentum by range of the muons resulting from neutrino interactions exiting the preceding near detector. TMS will consist of alternating layers of plastic scintillators, in the form of bars, and steel. The scintillator bars will be read out by WLS fibers and SiPMs and detect the scintillation light created by through-going charged particles.

The original design featured a stereo orientation plan with the bars being tilted by $\pm 3^\circ$ alternatingly by layer. This introduces a large uncertainty in the dimension along the bars and can lead to problems in determining the momentum. In this talk different orientation plans including also orthogonal modules that could solve these problems will be discussed.

T 40.7 Tue 17:45 VG 4.101

Polarized Positron Production for HALHF concept — •Malte Trautwein, Manuel Formela, and Gudrid Moortgat-Pick — University of Hamburg

The HALHF concept represents an energy-efficient and cost-effective alternative to Higgs production using plasma-accelerated electrons and SRF accelerated positrons. The energy asymmetry of electrons (500 GeV) and positrons (31.3 GeV) reduces the overall effort of the acceleration process. An optimised positron source is required for eventful collision processes and for providing polarized beams to optimze the physics potential. Therefore, CAIN simulations are used to generate photon distributions originating from a helical undulator setup. The photon spectra are influenced by parameters such as the undulator strength parameter K, the spatial period of undulator λ_u or the drive beam energy E. The aim is to optimize a set of suitable parameters to generate a matching (polarized) positron spectrum and simultaneously maximise positron yield.