T 125: Calorimeter / Detector Systems V

Time: Thursday 15:50–17:20 Location: WIL/C133

T 125.1 Thu 15:50 WIL/C133

Developement of a SplitCAL Prototype — •Matei Climescu and Rainer Wanke — Johannes Gutenberg Universität Mainz

The SplitCAL is a mixed electromagnetic calorimeter designed to provide both energy reconstruction through layers of scintillating stripes read out by wavelength shifting fibres and shower direc tion information through high-precision layers. This can be used for fixed target experiments which require high geometrical precision (such as SHiP@ECN3 or SHADOWS@ECN3). The development needs to account for low rates but a large dynamic range. The status of the detector prototype as well as the readout electronics will be presented.

T 125.2 Thu 16:05 WIL/C133

A pointing Calorimeter for the SHADOWS Experiment — •Sebastian Ritter for the SHADOWS-Collaboration — Universität Mainz

The SHADOWS experiment is a proposed off-axis beam dump experiment on the 400 GeV/c proton beam from the CERN SPS aiming to measure the decay of Hidden Sector particles. To reconstruct particles that only decay into photons, the photon energies, and directions need to be measured. In this talk, a highly granular plastic scintillator-based electromagnetic calorimeter is presented, which aims to provide the necessary energy and pointing resolution to achieve this task in SHADOWS.

T 125.3 Thu 16:20 WIL/C133

Multi-layer tile modules test system using cosmic ray for the CMS HGCAL upgrade — •Jia-Hao Li — Deutsches Elektronen-Synchrotron DESY, Notkestr. 85, 22607 Hamburg, Germany

The CMS experiment plans to upgrade its calorimeter endcap for the high luminosity phase of the LHC with the High Granularity Calorimeter (HGCAL). The hadronic calorimeter (CE-H) part of the HGCAL in the lower radiation dose region is composed of scintillator-base tile modules using the SiPM-on-tile technology for particle detection. The tile module is equipped with HGCROC ASIC for data readout. The fast command and slow control signals from the counting room are also received by the HGCROC. To test and calibrate the tile modules, a cosmic ray measuring test with multi-layer tile modules parallel to each other is set up for quality control and a better understanding of the property and capability of the tile module. The presentation will discuss the idea and current status of the cosmic test setup at DESY.

T 125.4 Thu 16:35 WIL/C133

Testbeam Measurements with a Liquid Scintillator Detector Prototype for the SHiP Surrounding Background Tagger — •Annika Hollnagel for the SHiP-SBT-Collaboration — JGU Mainz

By introducing a segmented geometry, Liquid Scintillator [LS] detectors are able to offer a combination of large geometrical coverage and good spatial resolution. This approach can be employed to create a new generation of high-resolution particle detectors or to improve the performance of large-volume detectors commonly used in neutrino and low-background experiments.

As a frontrunner proposal of the CERN Physics Beyond Colliders initiative, SHiP aims to exploit the full potential of a future SPS Beam-Dump Facility and combine the Search for Hidden Particles [SHiP] with tau neutrino physics. The Hidden Sector detector of SHiP will consist of a large evacuated volume followed by magnetic spectrometer and Particle Identification system. To enable studying the decays of Feebly-Interacting Particles, the reduction of beam-induced background heavily relies on the Surrounding Background Tagger [SBT] enveloping the 50m-long decay vessel. Current baseline for the SBT is a segmented LS detector that is instrumented with Wavelength-shifting Optical Modules [WOM] and read out via SiPMs.

Supported by laboratory measurements and simulations, several testbeam measurements have already been conducted at CERN and DESY, proving the principle and allowing to improve detector design and performance. This talk will give an overview of the latest 2022 test exposure of a full-size detector cell to the DESY II electron beams.

T 125.5 Thu 16:50 WIL/C133

Development of the experiment control system for the Timepix4 telescope — Johannes Albrecht[1], Elena Dall'Occo[1], and •David Rolf[1,2] — [1]TU Dortmund University, Dortmund, Germany — [2]CERN, Geneve, Switzerland

Future high-energy physics experiments will require a very precise timing measurement, on top of a good spatial resolution. A precise timing will allow to not only reconstruct tracks in space, but also to separate them in time; this in turn allows for densely packed, almost simultaneous collisions to be reconstructed with high precision.

The Timepix4 telescope is designed to be a first demonstrator of track reconstruction in four dimensions, as well as a system to probe and characterise next generation devices in terms of space and time capabilities. The final version of the telescope aims to have a pointing resolution below 2 μm in space and around 30 ps in time. To achieve this, the telescope is built up from eight silicon sensors of 100 μm and 300 μm thickness, bump bonded to the newest generation of Timepix4 ASICs.

This talk will give a brief overview of the Timepix4 telescopes design, and then focus on its experiment control system. The control system is used to remotely operate the motion stages and power supplies of the telescope, and to monitor the environmental conditions. The focus of the talk will be on the development of the controlling software implemented in WinCCOA and its communication to the hardware.

T 125.6 Thu 17:05 WIL/C133

Upgrading the Cosmic Ray Facility for Tests Regarding the Phase-II Upgrade of the ATLAS Muon Spectrometer — •Florian Egli[1], Otmar Biebel[1], Henk Boterenbrood[2], Valerio D'Amico[1], Stefanie Götz[1], Ralf Hertenberger[1], Christoph Jagfeld[1], Eshita Kumar[1], Katrin Penski[1], Maximilian Rinnagel[1], Nick Schneider[1], Chrysostomos Valderanis[1], and Fabian Vogel[1] — [1]LMU München — [2]Nikhef, Amsterdam

The Phase-II Upgrade of the ATLAS Muon Spectrometer for the High Luminosity LHC (HL-LHC) includes the installation of a new and more efficient trigger and readout system for the Monitored Drift Tube (MDT) chambers. It is crucial that the Phase-II Upgrade can be tested on an MDT chamber outside of ATLAS, to detect errors and verify possible solutions, independent of the upgrade operations at CERN. The Cosmic Ray Facility in Garching could provide an ideal testsite, as it consists of two fully functional MDT chambers. However, its readout electronics and infrastracture are not compatible with the Phase-II Upgrade. As a first step, the infrastructure and electronics in the Cosmic Ray Facility are upgraded to the Phase-I standard of the ATLAS Muon Spectrometer. This includes the setup of a FELIX based readout system, which is compatible with both the Phase-I and the Phase-II electronics. Furthermore, new scintillators are installed on the top and on the bottom of the setup, in parallel to the MDTs, to allow preliminary tests of a path-based trigger. In this talk the current status of the project and first results are presented.