T 90: Calorimeters II

Time: Friday 9:00–10:15 Location: KH 00.015

T 90.1 Fri 9:00 KH 00.015

Integrated Cooling Solutions for a Highly Granular Scintillator-Based Hadronic Calorimeter — •Andre Klotzbücher[1], Lucia Masetti[1], Reinhold Degele[1], Steffen Schönfelder[2], and Konrad Briggl[3] — [1]Institut für Physik, Johannes-Gutenberg Universität Mainz — [2]Prisma+ Detektorlabor, Johannes-Gutenberg Universität Mainz — [3]Kirchhoff-Institut für Physik, Universität Heidelberg

This talk discusses the adaptation of the analogue hadronic calorimeter (AHCAL), originally developed by the CALICE collaboration for the International Linear Collider (ILC), to meet the demanding requirements of future circular colliders. The AHCAL is based on the SiPM-on-tile technology, where the HCAL Base Units (HBUs) combine scintillator tiles read out by silicon photomultipliers (SiPMs) with embedded front-end electronics. For the linear collider environment, no integrated cooling system was necessary, as power consumption was effectively managed through power pulsing. However, this approach is no longer feasible due to the significantly higher interaction rate in circular colliders, requiring the electronics to remain continuously powered. This must be achieved with a small temperature gradient to ensure uniform SiPM gain and with minimal additional material to preserve the detector's physics performance. To address this challenge, an integrated cooling system is being developed. In this context, a dedicated dummy PCB was designed to allow systematic tests of different cooling strategies. Initial tests with a copper plate thermally coupled to the PCB and the resulting PCB temperatures will be presented.

T 90.2 Fri 9:15 KH 00.015

Wrapping 160.000 scintillators in 300 days. HGCAL upgrade challenges — •Jorge Ortiz — Deutsches Elektronen-Synchrotron (DESY), Notkestr. 85, 22607 Hamburg, Germany — Universität Hamburg, Mittelweg 177, 20148 Hamburg, Germany

The High Granularity Calorimeter (HGCAL) will replace the current endcap calorimeters of the CMS detector to meet the challenging conditions of the High-Luminosity LHC, including unprecedented radiation levels and pile-up. The hadronic section of the HGCAL requires approximately 280,000 plastic scintillator tiles in 35 different sizes, which are produced in the US. At DESY, around 160,000 of these tiles will be wrapped in reflective foil and subjected to quality control. Given the scale of the task, automation is essential.

In this talk, I will present the system developed at DESY to automate the wrapping, detailing the technical challenges and the current performance of the setup based on the first production batch of more than 10.000 tiles.

T 90.3 Fri 9:30 KH 00.015

Quality Control of the Tilemodules for the High Granularity Calorimeter upgrade of the CMS experiment — •Anurag Sritharan — Deutsches Elektronen-Synchrotron (DESY), Notkestraße 85, 22607 Hamburg, Germany

The CMS experiment will upgrade its detectors to cope with higher luminosities and collision rates during the High-Luminosity era of the LHC. One key upgrade of the CMS is the High Granularity Calorimeter (HGCAL), which will completely replace the current end-cap calorimeter. The hadronic calorimeter is split into two sections using different technologies, depending on the expected amount of radiation damage at the end of life. Where the expected fluence is below $5\times10^{13} n_{eq}/cm^2$, the SiPM-on-Tile technology was chosen. It consists of small scintillator tiles read out by silicon photo-multipliers on a PCB, named "Tilemodule". A Tilemodule will house 1 or 2 readout chips (called HGCROCs), and each can read out 72 channels. To test and qualify the Tilemodules and the functionality of the readout chips, a robust and modular software framework for quality control has been developed. Additionally, in September 2025, 15 Tilemodules were tuned through the software framework, assembled into a stainless steel absorber stack, and tested at CERN SPS. The test setups, results, and a first look into the analysis of the calorimetric stack will be presented.

T 90.4 Fri 9:45 KH 00.015

Upcoming Upgrades of the ATLAS Liquid Argon Purity System for the High-Luminosity Upgrade — •Christopher Engel, Maximilian Linkert, and Stefan Tapprogge — Institut für Physik, Johannes Gutenberg-Universität, Mainz

The ATLAS Liquid Argon Purity system monitors the possible impurities of the Liquid Argon within the calorimeter system ensuring excellent data taking quality. In preparation of the upcoming Long Shutdown of the LHC for the High Luminosity Upgrade, the Purity system has to undergo some changes and upgrades. This includes a complete redesign of the power distribution board due to the incoming voltage changing from a positive and negative voltage to a single higher positive voltage. The monitoring modules need to have negative voltage resulting in an on-board solution creating the voltage locally. The current design, test setup and production status of the power distribution board is presented.

T 90.5 Fri 10:00 KH 00.015

Optimisation of the SHiP calorimeter system — •Matei Climescu[1], Volker Büscher[2], Claudia Delogu[3], Sebastian Ritter[2], and Rainer Wanke[2] — [1]Ghent University — [2]University of Mainz — [3]INFN Genova

The SHiP/NA67 experiment is an approved beam-dump experiment which will be located in the CERN North Area and is scheduled to start taking data starting 2032. It will operate at very high intensities and requires no background. To this effect, its calorimeter system consists of a SplitCal electromagnetic section and a hadronic section which are optimised for particle identification and high-resolution vertexing of neutral final states from Feebly-Interacting-Particle decays. The optimisation of the calorimeter system is presented.