

Construction and beam-tests of silicon-tungsten prototype modules for the CMS High Granularity Calorimeter for HL-LHC

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As part of its HL-LHC upgrade program, CMS is developing a High Granularity Calorimeter (HGCAL) to replace the existing endcap calorimeters. The HGCAL will be realised as a sampling calorimeter, including an electromagnetic compartment comprising 28 layers of silicon pad detectors with pad areas of 0.5 - 1.0 cm² interspersed with absorbers.

Prototype modules, based on 6-inch hexagonal silicon pad sensors with 128 channels, have been constructed and include many of the features required for this challenging detector.

In 2016, beam tests of sampling configurations made from these modules have been conducted both at FNAL and at CERN using the Skiroc2 front-end chip (designed for the CALICE experiment for ILC).

This year, the setup is extended with CALICE's AHCAL prototype and it is further tested in dedicated beam tests at CERN. There, the new Skiroc2-CMS front-end chip is used for the first time.

We present final results from our studies in 2016, including noise performance, calibration with MIPs, energy and position resolution as well as precision timing-measurements.

Furthermore, the extended setup in 2017 is discussed and first results from laboratory and beam tests with electrons and pions are shown.

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Session Classification: test beam results & analysis