



Contribution ID: 366

Type: Poster

Parameters of the preproduction series SiPMs for the CMS HCAL Phase I Upgrade

Monday, 25 May 2015 16:16 (1 minute)

The CMS Barrel (HB) and Endcap (HE) Hadron Calorimeters are scintillator sampling calorimeters with embedded wavelength shifting fibers (WLS) in scintillator tiles. The fibers from the sampling layers are ganged together to form towers whose light is currently detected by HPDs. In 2012 the HCAL SiPM photo sensor upgrade was approved for the increased luminosity ($5 \cdot 10^{34}$) of SLHC. A key aspect of the upgrade to SiPMs is to add longitudinal segmentation to improve background rejection, energy resolution and scintillator radiation damage compensation. The SiPMs have to operate in a very hostile SLHC radiation environment (1012 n/cm^2).

To ensure good mechanical alignment and handling of large number of production channels ($>20\,000$) we have developed a custom ceramic package. Each package holds 8 channels of SiPMs. Two candidates HPK and KETEK have developed custom large dynamic range SiPMs with large PDE and small ENC for this CMS HCAL Upgrade project. These manufactures produced a preproduction series of 175 Arrays each.

Here we report and compare the final SiPM parameters of the 2014 preproduction run including the results of 1400 SiPMs per manufacturer. An overview of our QA results and our measurements of the photon detection efficiency, spectral response, cell recovery time, as well as the results on the radiation hardness will be presented.

Summary

We report and compare the final SiPM parameters of the 2014 preproduction run including the results of 1400 SiPMs per manufacturer. An overview of our QA results and our measurements of the photon detection efficiency, spectral response, cell recovery time, as well as the results on the radiation hardness of SiPMs will be reported in this presentation.

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Session Classification: Photo Detectors and PID - Poster Session

Track Classification: S2 - Photon Detector and PID