Performance of the CMS HCAL QIE10 Chip

The Compact Muon Solenoid (CMS) Hadron Calorimeter (HCAL) is scheduled to be upgraded in order to increase longitudinal depth segmentation in the Barrel and Endcap regions and to improve anomalous signal rejection efficiency in the Forward Region. In order to achieve these goals, the phototransducers and the front-end and back-end electronics of the HCAL will be upgraded in stages over the next several years. New photomultiplier tubes (PMTs) in the Forward Detector and silicon photomultipliers (SiPMs) in the Barrel and Endcap detectors will be read out with charge integrator and encoder (QIE) deadtimeless Flash analog-to-digital converters (ADCs) operating at 40 MHz. During the HCAL Upgrade, the current QIE Version 8 chip (QIE8) will be replaced by the next generation QIE10 chip, which features a ten times greater dynamic range and the inclusion of time-to-digital conversion (TDC) data with 0.5 ns resolution. We present the results of single chip testing of the QIE10, which demonstrate that the chip's performance satisfies the HCAL requirements.

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