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Electronics and Calibration system for the CMS Beam Halo Monitor

In the context of increasing luminosity of LHC, it will be important to accurately measure the Machine Induced Background. A new monitoring system will be installed in the CMS cavern for measuring the beam background at high radius. This detector is composed of synthetic quartz Cherenkov radiators, coupled to fast photomultiplier tubes (PMT). The readout chain of this detector will make use of many components developed for the Phase 1 upgrade to the CMS Hadron Calorimeter electronics, with a dedicated firmware and readout adapted to the beam monitoring requirements. The PMT signal will be digitized by a charge integrating ASIC (QIE10), providing both the signal rise time and the charge integrated over one bunch crossing. The backend electronics will record bunch-by-bunch histograms, which will be published to CMS and the LHC using the newly designed CMS beam instrumentation specific DAQ. A calibration monitoring system has been designed to generate triggered pulses of light to monitor the efficiency of the system. The detector system, and in particular, the validation of the electronics choices with measurements will be presented.

Summary

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