Contribution ID: **80** Type: **Poster**

New Fast Beam Conditions Monitoring (BCM1F) system for CMS.

Tuesday, September 29, 2015 5:08 PM (1 minute)

The CMS Beam Radiation Instrumentation and Luminosity (BRIL) project is composed of several systems providing the experiment protection from adverse beam conditions, measuring the online luminosity and beam background. Although the readout bandwidth of the Fast Beam Conditions Monitoring system (BCM1F), was sufficient for the initial LHC conditions, the foreseen enhancement of the beams parameters after the LHC Long Shutdown-1 (LS1) imposed the upgrade of the system. This paper presents the new BCM1F, which is designed to provide real-time fast diagnosis of beam conditions and instantaneous luminosity with readout able to resolve the 25 ns sub-bunch structure.

Summary

The new BCM1F system is based on 2×12 sCVD diamonds, each of 5×5×0.5 mm3 with two metalized readout pads, which are uniformly clockwise arranged on the X and Y axes on either side of beams Interaction Point (IP). Thus, the entire system has 48 readout channels with each channel serving 2.5×5.0 mm2, a half of the sensor area. The two-pad sensor split improves the system redundancy, while twice-smaller sensitive area proportionally decreases the channel occupancy and therefore signal pileup. The sensor is connected to the amplifier-shaper ASIC designed in 130 nm CMOS technology, after which the signal is transmitted to the counting room over an analog optical link built from the CMS tracker optical components. All front-end components are housed by a complex flex-rigid board, which also provides all inter-connections to the system services. The existing VME standard based back-end system has been upgraded by novel commercial FMC and uTCA components equipped with custom data handling and processing firmware. New triggerless and deadtimeless back-end data is integrated into the CMS luminosity data acquisition system (LumiDAQ) which is decoupled from experiment data acquisition runs.
All parts of the system were successfully installed in their final positions and exhaustively tested through implemented facilities during the LS1 and actually in service with LHC Run2 beams.

Primary author: Ms ZAGOZDZINSKA, Agnieszka (CERN/WUT)

Co-authors: BELL, Alan James (University of Canterbury (NZ)); DABROWSKI, Anne (CERN); STICKLAND, David Peter (Princeton University (US)); PRZYBOROWSKI, Dominik Wladyslaw (AGH University of Science and Technology (PL)); HENSCHEL, Hans Martin (Deutsches Elektronen-Synchrotron (DE)); MIRAGLIA, Marco (Universita di Pisa & INFN (IT)); PENNO, Marek (Deutsches Elektronen-Synchrotron (DE)); HEMPEL, Maria (Deutsches Elektronen-Synchrotron (DE)); KARACHEBAN, Olena (Deutsches Elektronen-Synchrotron (DE)); WALSH, Roberval (Deutsches Elektronen-Synchrotron (DE)); RYJOV, Vladimir (CERN); Dr LANGE, Wolfgang (DESY)

Presenter: Ms ZAGOZDZINSKA, Agnieszka (CERN/WUT)

Session Classification: Poster

Track Classification: Systems