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A Real-time Histogramming Unit for Luminosity Measurement of each Bunch Crossing at CMS

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The Real-time Histogramming Unit (RHU) is a VME board for sampling and processing discriminated signals from detectors in real time and free of dead-time. The RHU is used at the CMS experiment to measure the arrival time of signals from the BCM1F detectors relative to the orbit trigger of the LHC at CERN. The RHU incorporates a FPGA, 21MBit memory and an embedded Linux system for readout. For each input channel a histogram is produced by the FPGA algorithm in real time that contains the hits per bunch over several orbits. A postmortem buffer can be used for data analysis after a beam dump.

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