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Construction, Testing, Installation, Commissioning and Operation of the CMS Calorimeter Trigger Layer-1 CTP7 Cards

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The CMS Phase 1 Calorimeter Trigger Upgrade Layer-1 CTP7 Card installation, commissioning and operation are described. The monitoring and performance of this system and interfaces are also covered.

Summary

The CTP7 Cards form the first layer of the CMS Calorimeter Trigger upgrade and are used to capture data from the CMS ECAL at 4.8 Gb/s and HCAL at 6.4 Gb/s synchronous to the 40 MHz LHC clock and to transmit this data at 10 Gb/s asynchronous time-multiplexed to about 10 MP7 cards that form the second layer. This poster describes the production construction, installation, commissioning and operation of the CTP7 cards in the first layer. Experience with operation and monitoring of the CTP7 multi-rate links will be described, including the clock synthesis and distribution. Power-usage, firmware development, layout and resource usage will be covered. Experience and programming of the embedded Linux on the CTP7 ZYNQ chip, along with the AXI chip2chip connection and Xilinx Virtual Cable will be described and performance analyzed. The utilization of continuous non-invasive online link monitoring will be evaluated. Finally, an analysis of the technologies and techniques that produced the high yield of 50 production cards will be presented.

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