

The GCT μ TCA Matrix Card and its Applications

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The Matrix card is the first in what is expected to be a series of xTCA cards produced for a variety of projects at CERN, Trieste and LANL. Developed as a joint collaboration between colleagues at Princeton, Imperial College, LANL and CERN, the device comprises the latest generation of readily-available Xilinx FPGAs, crosspoint-switch technology and optical links in a 3U form factor. In this presentation we will discuss the development and test results of the Matrix card, followed by some of the tasks to which it is being applied.

Summary

The Matrix card was originally designed as part of the CMS GCT Muon and Quiet Bit system. As such it was developed to provide a combination of reconfigurable optical links and firmware that can be adapted to different tasks without the redesign of the hardware itself. In addition to this, the board includes a microcontroller for host management and DDR memory.

In this presentation we will discuss the board's design in detail, and the prototype testing of the various systems on board. This includes the infrastructure required to control the board (based on 10/100Mb Ethernet). The I/O and computing performance of the Matrix card have been studied in detail and the results of these studies will also be presented and discussed.

Since the production of the original design, the board has been used by a number of projects, such as the LLRF control system for the FERMI free electron laser at Trieste, the calorimeter trigger upgrade at CMS. In the FERMI project, the Matrix card provides a central control point for the RF system, as well as a centralized timing and control system. For the calorimeter trigger, its flexibility allows for changes in the algorithms without modification of the basic hardware. These different applications will be briefly reviewed.

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