

The ATLAS Level-1 Muon to Central Trigger Processor Interface

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The Muon to Central Trigger Processor Interface (MUCTPI) is part of the ATLAS Level-1 trigger system and connects the output of muon trigger system to the Central Trigger Processor (CTP). At every bunch crossing, the MUCTPI receives information on muon candidates from each of the 208 muon trigger sectors and calculates the total multiplicity for each of six pT thresholds. This multiplicity value is then sent to the CTP, where it is used together with the input from the Calorimeter trigger to take the final Level-1 decision. In addition the MUCTPI provides data to the Level-2 trigger and to the data acquisition (DAQ) system for events selected at Level-1. This information is used to define regions of interest (RoIs) that drive the Level-2 muon-trigger processing.

The MUCTPI system consists of a 9U VME64x chassis with a special backplane and 18 custom designed modules. Each of the 16 octant modules (MIOCT) receives and processes the muon candidate data from 13 sectors of the muon trigger detectors. It calculates the local muon candidate multiplicities and avoids double counting of muon tracks detected in overlapping sectors of an octant. The MIBAK backplane sums the multiplicity values of all MIOCT modules and also provides for readout data transfer and distribution of timing and trigger signals to all the modules in the chassis. The MICTP receives the external timing and triggers signals and sends the final multiplicity value to the CTP. The MIROD module collects information from the MICTP and the MIOCT modules and sends this data after formatting to the Level-2 trigger and the DAQ system via an optical S-LINK interface. The design of the modules is based on state-of-the-art FPGA devices and special attention was paid to low-latency in the data transmission and processing.

We present the design and implementation of the final version of the MUCTPI. Results from integration testing with the CTP, the muon trigger system as well as the DAQ and Level-2 systems including data from cosmic ray runs will also be shown.

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