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The ATLAS Level-1 Muon Topological Trigger Information for Run 2 of the LHC

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For run 2 of the LHC, the ATLAS Level-1 trigger system will include topological information on trigger objects in order to cope with the increased trigger rates. The existing Muon-to-Central-Trigger-Processor interface (MUCTPI) has been modified in order to provide coarse-grained topological information on muon candidates. A MUCTPI-to-Level-1-Topological-Processor interface (MuCTPiToTopo) has been developed to receive the electrical information and to send it optically to the Level-1 Topological Processor (L1TOPO). This poster will describe the different modules mentioned above and present results of functionality and connection tests performed.

Summary

For run 2 of the LHC, the ATLAS Level-1 trigger system will include topological information on trigger objects in order to cope with the increased trigger rates. A dedicated Level-1 Topological Trigger Processor (L1TOPO) has been developed for that purpose. Although the Muon-to-Central-Trigger-Processor Interface (MUCTPI) is planned to be replaced only for run 3 of the LHC in order to provide full-granularity muon candidate information to the L1TOPO, the existing MUCTPI has already been modified now to provide coarse-grained topological information on muon candidates. A MUCTPI-to-Level-1-Topological-Processor interface (MuCTPiToTopo) has been developed to receive the electrical information from the MUCTPI system, to collect it, to convert it, and to send it to the L1TOPO on an optical link.
This poster will describe the modifications to the MUCTPI and the development of the MuCTPiToTopo interface and of the L1TOPO up to the receiving part. Some details on the firmware development for encoding of the muon candidate topological information in the MUCTPI, the serialisation of the information at 320 MHz, the sending over NIM outputs existing in the current MUCTPI, and the testing of receiving the information with an FPGA development kit and dedicated firmware will be described as well as other functional tests. This poster will further present results of connection tests between the MUCTPI and the MuCTPiToTopo interface, the MuCTPiToTopo interface and the L1TOPO, as well as the full chain and provide typical bit error rates and bathtub plots proving the comfortable margin for the operation of the data transfer.

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