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Stopless removal in the Tile Muon trigger system of the Tile Calorimeter in the ATLAS detector

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ATLAS (A Toroidal LHC Apparatus) is one of the two general-purpose detectors at the Large Hadron Collider (LHC). The Tile Calorimeter (TileCal) is the hadronic calorimeter of the ATLAS experiment, it is made out of iron plates and plastic scintillator. The TileCal is divided into three cylinders along the beam direction, each of which is segmented azimuthally into 64 modules. The photo multiplier tubes (PMTs) and the front-end electronics are located in the super-drawers in the outermost part of the modules. TileCal online software is a set of Trigger and Data Acquisition (TDAQ), and its main purpose is to readout, transport and store physics data originating from collisions at the LHC. The Tile Muon trigger system is part of the trigger system, it is used for the detection of interesting muon events using the outermost radial layers (D5 and D6 cells) of the TileCal system. A special board called "Tile Muon Digitizer Board" (TMDB) is responsible for digitizing the analogue muon trigger output from the D5 and D6 cells. The TMDB is also a Read Out Driver (ROD) that sends outputs to the Read Out System (ROS), just like most RODs and it provides a busy signal to regulate the trigger rate due to bandwidth limitations. The main source of the Level-1 Muon-Trigger background in the end-cap region is low momentum protons emerging from magnets and shielding in the forward region. They produce correlated hits leading to coincidences in the trigger muon chambers up to the highest transverse momentum muon threshold. Requiring a coincidence with some other detectors lying inside the toroid magnets and shielding, lowers the fake event trigger rate. There is always a possibility to result in a permanent busy assertion by the TMDB boards due to hardware or firmware failures. Tile muon trigger system requires functionalities that will aid in detecting changes in conditions of an asserted permanent busy and send the stopless removal (recovery commands) to instruct the TDAQ system to remove the corresponding TMDB. This ensures that the corresponding input is ignored, allowing the triggers to flow again. This contribution discusses in detail the stopless removal software for the TileCal online software.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD, N/A)?

MSc

Main supervisor (name and email) and his / her institution

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Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

Yes

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