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Testing of the MicroMegas detector trigger electronics for the New Small Wheel Phase I upgrade of ATLAS detector

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In conjunction with the High Luminosity upgrade of the LHC, the ATLAS detector is also undergoing an upgrade to handle the significantly higher data rates. The muon end-cap system upgrade in ATLAS, lies with the replacement of Small Wheel. The New Small Wheel is expected to combine high tracking precision with upgraded information for the Level-1 trigger. To accomplish this, sTGC (small Thin Gap Chamber) and MicroMegas (MicroMesh Gas chamber) detector technologies are being deployed.

The MicroMegas detector technology is equipped with three types of electronics boards to produce trigger signals and track muons. These boards are the MMFE8 (MicroMegas Front End with 8 VMM chips), the L1DDC (Level 1 Data Driver Card) and the ADDC (ART Data Driver Card). The ART (Address in Real Time) signals produced by the MMFE8s are propagated through the ADDC and sent to the MicroMegas Trigger Processor for the decision of the Level 1 Accept trigger signal.

In order to test the functionality and efficiency of the trigger electronics, various tests are being conducted at building 899 (BB5). During the "MicroMegas ART connectivity test", internal test pulses are sent through the trigger electronics to simulate ART hits from the Front Ends to the Trigger Processor. This test is performed to validate every New Small Wheel sector and is essential to identify ADDC boards or fibers that must be replaced, tested and then repaired. Issues on MMFE8s and L1DDCs can be identified as well. Finally, the trigger processor's decision logic is being tested with cosmics data. Using the cosmics data, data acquisition, firmware and trigger logic are being improved. In this poster, the various tests and results from cosmics data will be presented.

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