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New Muon Trigger Chambers for ATLAS Phase I upgrade: TDAQ system

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The ATLAS muon spectrometer is an essential component of the detector, providing trigger and track reconstruction for every physics process containing high-energy muons. This is accomplished using several types of tracking sub-detectors, providing both a very fast trigger system and an accurate track reconstruction. A dedicated toroidal magnetic field, in order to measure the muon momentum, is provided in this outer region of the detector.

The higher interaction rate that the ATLAS detector is going to sustain during Phase I requires a better fake track rejection in critical detector regions without hindering the trigger efficiency. This is accomplished by adding new track points to the reconstruction, in particular in the pseudo-rapidity region $1 < |\eta| < 1.3$. These new detector chambers, denominated BIS78, are updated Resistive Plate Chambers design, thinner than the one previously installed in order to fit in the small space made available by the upgrade of the Monitor Drift Tube chambers. The Trigger and Data Acquisition system for the new detector chambers are illustrated in this presentation, from the Front-End electronics to the Read Out software, including results from prototype tests. The system is comprised of a combination of custom and commercially available hardware of the same type that will be adopted by every ATLAS system in Phase II, thus representing also a first test-bench for the whole detector.

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