Contribution ID: **476** Type: **Oral**

ATLAS Trigger and Data Acquisition Upgrades for High Luminosity LHC

Tuesday 11 October 2016 11:15 (15 minutes)

The ATLAS experiment at CERN is planning a second phase of upgrades to prepare for the "High Luminosity LHC", a 4th major run due to start in 2026. In order to deliver an order of magnitude more data than previous runs, 14 TeV protons will collide with an instantaneous luminosity of 7.5 × 1034 cm−2s−1, resulting in much higher pileup and data rates than the current experiment was designed to handle. While this extreme scenario is essential to realise the physics programme, it is a huge challenge for the detector, trigger, data acquisition and computing. The detector upgrades themselves also present new requirements and opportunities for the trigger and data acquisition system.

Initial upgrade designs for the trigger and data acquisition system are shown, including the real time low latency hardware trigger, hardware-based tracking, the high throughput data acquisition system and the commodity hardware and software-based data handling and event filtering. The motivation, overall architecture and expected performance are explained. Some details of the key components are given. Open issues and plans are discussed.

Secondary Keyword (Optional)

DAQ

Primary Keyword (Mandatory)

Trigger

Tertiary Keyword (Optional)

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Session Classification: Track 1: Online Computing

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