



## **The ATLAS Run-2 Trigger: Design, Menu, Performance and Operational Aspects (12' + 3')**

*Thursday 4 August 2016 15:30 (15 minutes)*

The LHC, at design capacity, has a bunch-crossing rate of 40 MHz whereas the ATLAS experiment has an average recording rate of about 1000 Hz. To reduce the rate of events but still maintain high efficiency of selecting rare events such as physics signals beyond the Standard Model, a two-level trigger system is used in ATLAS. Events are selected based on physics signatures such as presence of energetic leptons, photons, jets or large missing energy. Despite the limited time available for processing collision events, the trigger system is able to exploit topological informations, as well as using multi-variate methods. In total, the ATLAS trigger systems consists of thousands of different individual triggers.

The ATLAS trigger menu specifies which triggers are used during data taking and how much rate a given trigger is allocated. This menu reflects not only the physics goals of the collaboration but also takes into consideration the instantaneous luminosity of the LHC and the design limits of the ATLAS detector and offline processing Tier0 farm. We describe the criteria for designing the ATLAS trigger menu used for the LHC Run 2 period. Furthermore, we discuss how the trigger menu is deployed online, through different phases: validation before being used online, decision on prescale values for different triggers (ahead of running, or online in case of sudden rate changes), and monitoring during data taking itself. The performance of the high-level trigger algorithms used to identify

leptons, hadrons and global event quantities which are crucial for event selection relevant to wide range of physics analyses is presented at hand of a few examples.

**Presenter:** MACHADO MIGUENS, Joana (University of Pennsylvania (US))

**Session Classification:** Detector: R&D and Performance

**Track Classification:** Detector: R&D and Performance