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The ATLAS Trigger System: Ready for Run-2

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The ATLAS trigger has been used very successfully for the online event selection during the first run of the LHC between 2009-2013 at a centre-of-mass energy between 900 GeV and 8 TeV. The trigger system consists of a hardware Level-1 (L1) and a software based high-level trigger (HLT) that reduces the event rate from the design bunch-crossing rate of 40 MHz to an average recording rate of a few hundred Hz. During the next data-taking period starting in early 2015 (Run-2) the LHC will operate at a centre-of-mass energy of about 13 TeV resulting in roughly five times higher trigger rates.

We will review the upgrades to the ATLAS Trigger system that have been implemented during the shutdown and that will allow us to cope with these increased trigger rates while maintaining or even improving our efficiency to select relevant physics processes. This includes changes to the L1 calorimeter trigger, the introduction of a new L1 topological trigger module, improvements in the L1 muon system and the merging of the previously two-level HLT system into a single event filter farm. At hand of a few examples, we will show the impressive performance improvements in the HLT trigger algorithms used to identify leptons, hadrons and global event quantities like missing transverse energy. And finally, we will summarize the commissioning status of the Trigger system in view of the imminent restart of data-taking.

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