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The Phase-II upgrade of ATLAS Calorimeter

Thursday 28 September 2017 10:00 (30 minutes)

This presentation will show the status of the upgrade projects of the ATLAS calorimeter system for the high luminosity phase of the LHC (HL-LHC). For the HL-LHC, the instantaneous luminosity is expected to increase up to $L \approx 7.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ and the average pile-up up to 200 interactions per bunch crossing.

The Liquid Argon (LAr) calorimeter electronics will need to be replaced to cope with these challenging conditions: the expected radiation doses will indeed exceed the qualification range of the current readout system, and the upgraded trigger system will require much longer data storage in the electronics (up to $60 \mu\text{s}$), that the current system cannot sustain. The status on the R&D of the low-power ASICs (pre-amplifier, shaper, ADC, serializer and transmitters) and readout electronics design will be discussed.

Moreover, a High Granularity Timing Detector (HGTD) is proposed to be added on front of the LAr calorimeters in the end-cap region ($2.4 < |\eta| < 4.2$) for pile-up mitigation at Level-0 trigger level and offline reconstruction. The HGTD will correlate the energy deposits in the calorimeter to different proton-proton collision vertices by using time of flight information with high timing resolution (30 pico-second per readout cell) based on the Silicon sensor technologies. The current test beam results will be presented as well as performance expectation of the new detector.

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