Contribution ID: **446** Type: **Talk**

A High-Granularity Timing Detector for the Phase-II upgrade of the ATLAS Calorimeter system: detector concept, description and R&D and beam test results

Tuesday 28 July 2020 18:30 (15 minutes)

The increase of the particle flux (pile-up) at the HL-LHC with luminosities of L ⊠ 7.5 × 10ˆ34 cm−2s−1 will have a severe impact on the ATLAS detector reconstruction and trigger performance. The end-cap and forward region where the liquid Argon calorimeter has coarser granularity and the inner tracker has poorer longitudinal vertex position resolution will be particularly affected. A High Granularity Timing Detector (HGTD) is proposed in front of the LAr end-cap calorimeters for pile-up mitigation and for luminosity measurement.

It will cover the pseudo-rapidity range from 2.4 to 4.0. Two Silicon sensors double sided layers will provide precision timing information for MIPs with a resolution better than 30 ps per track in order to assign each particle to the correct vertex. Readout cells have a size of 1.3 mm × 1.3 mm, leading to a highly granular detector with 3 millions of channels. Low Gain Avalanche Detectors (LGAD) technology has been chosen as it provides enough gain to reach the large signal over noise ratio needed. A dedicated ASIC is being developed and some prototypes have been already submitted and measured.

The requirements and overall specifications of the HGTD will be discussed. LGAD R&D campaigns are carried out to study the sensors, the related ASICs, and the radiation hardness. Laboratory and test beam results will be presented.

I read the instructions

Secondary track (number)

Primary author: RIZZI, Chiara (CERN)

Presenter: RIZZI, Chiara (CERN)

Session Classification: Detectors for Future Facilities (incl. HL-LHC), R&D, Novel Techniques

Track Classification: 13. Detectors for Future Facilities (incl. HL-LHC), R&D, Novel Techniques