Contribution ID: **349**   Type: **Parallel session talk**

A High-Granularity Timing Detector for the ATLAS Phase-II upgrade

Tuesday 27 July 2021 10:15 (15 minutes)

The increase of the particle flux (pile-up) at the HL-LHC with instantaneous luminosities up to L ~ 7.5 × 10^{34} cm$^{-2}s^{-1}$ 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 momentum resolution will be particularly affected. A High Granularity Timing Detector (HGTD) will be installed in front of the LAr end-cap calorimeters for pile-up mitigation and luminosity measurement.

The HGTD is a novel detector introduced to augment the new all-silicon Inner Tracker in the pseudo-rapidity range from 2.4 to 4.0, adding the capability to measure charged-particle trajectories in time as well as space. Two silicon-sensor double-sided layers will provide precision timing information for minimum-ionising particles with a resolution as good as 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 3.7 million channels. Low Gain Avalanche Detectors (LGAD) technology has been chosen as it provides enough gain to reach the large signal over noise ratio needed.

The requirements and overall specifications of the HGTD will be presented as well as the technical design and the project status. The on-going R&D effort carried out to study the sensors, the readout ASIC, and the other components, supported by laboratory and test beam results, will also be presented.

First author

Sandra Leone

Email

sandra.leone@cern.ch

Collaboration / Activity

ATLAS Collaboration

Primary authors: MAZINI, Rachid (Academia Sinica (TW));   ATLAS COLLABORATION

Presenter: MAZINI, Rachid (Academia Sinica (TW))

Session Classification: T12: Detector R&D and Data Handling

Track Classification: Detector R&D and Data Handling