Contribution ID: **488** Type: **parallel**

ATLAS Upgrades for the High Luminosity LHC

Tuesday 7 January 2025 15:10 (20 minutes)

While the on-going Run-3 data-taking campaign will provide twice the integrated proton-proton luminosity currently available at the LHC, most of the data expected for the full LHC physics program will only be delivered during the HL-LHC phase. For this, the LHC will undergo an ambitious upgrade program to be able to deliver an instantaneous luminosity of 7.5×10^{34} cm^{-2} s^{-1}, allowing the collection of more than 3 ab^{-1} of data at $\sqrt{s}$ =13.6 (14) TeV. This unprecedented data sample will allow ATLAS to perform several precision measurements to constrain the Standard Model Theory (SM) in yet unexplored phase-spaces, in particular in the Higgs sector, a phase-space only accessible at the LHC. To benefit from such a rich data-sample it is fundamental to upgrade the detector to cope with the challenging experimental conditions that include huge levels of radiation and pile-up events. The ATLAS upgrade comprises a completely new all-silicon tracker with extended rapidity coverage that will replace the current inner tracker detector; a redesigned trigger and data acquisition system for the calorimeters and muon systems allowing the implementation of a free-running readout system. Finally, a new subsystem called High Granularity Timing Detector will aid the track-vertex association in the forward region by incorporating timing information into the reconstructed tracks. An important ingredient, relevant to almost all measurements, is a precise determination of the delivered luminosity with systematic uncertainties below the percent level. This challenging task will be achieved by collecting the information from several detector systems using different and complementary techniques. This presentation will describe the ongoing ATLAS detector upgrade status and the main results obtained with the prototypes, giving a synthetic, yet global, view of the whole upgrade project.

Author: CAI, Huacheng (University of Pittsburgh (US))

Presenter: CAI, Huacheng (University of Pittsburgh (US))

Session Classification: Parallel session 1: Particle Detectors and Instrumentations/Future Experimental Facilities (1/2)