Contribution ID: **34**   Type: **WG4 - Simulations**

TCAD + AllPix2 pipeline for the ATLAS ITk-Strip Digitization Model

Wednesday 4 December 2024 16:40 (20 minutes)

The ATLAS ITk-Strip detector is a planned tracker upgrade for the High-Luminosity LHC which utilizes n+-in-p silicon sensors fabricated by Hamamatsu Photonics with 300 μm signal-generation thickness and approximately 75 μm strip pitch. The sensors must withstand severe irradiation over their operational lifetimes, corresponding to fluences of up to 1.6×10^{16} 1-MeV neq/cm^2, with consequences on the charge collection efficiency. To achieve a precise understanding of the expected performance and Monte Carlo simulations with realistic tracking performance, TCAD models of irradiation effects on internal electric fields are developed and coupled with AllPix2 simulations of ionization-charge propagation through the sensors. A software pipeline has been created that automatically configures & connects simulations for several intermediary fluence estimates, translates per-fluence models to detector-wide per-luminosity models using GEANT4 predictions, and parameterizes the dependence of the charged collection efficiency on charge deposition depth for faster simulations in the ATLAS Athena reconstruction framework.

Type of presentation (in-person/online)

online presentation (zoom)

Type of presentation (I. scientific results or II. project proposal)

I. Presentation on scientific results

Authors: JESSIMAN, Callan (Carleton University (CA)); KLEIN, Christoph Thomas (Carleton University (CA)); STAATS, Ezekiel (Carleton University (CA)); DANDOY, Jeff (Carleton University (CA)); KELLER, John Stakely (Carleton University (CA)); KOFFAS, Thomas (Carleton University (CA)); ZHAO, Yuzhan (Carleton University (CA))

Presenter: DANDOY, Jeff (Carleton University (CA))

Session Classification: WG4 - Simulation