Abstract Submitted
for the NWS16 Meeting of
The American Physical Society

Using tracking in dense environments to investigate designs for a new ATLAS Inner Detector FELIX CORMIER, The University of British Columbia, ATLAS COLLABORATION — Designing the next generation of charged particle trackers for ATLAS under the High-Luminosity LHC regime has the dual challenge of having to operate efficiently at both unprecedented energy - 14 TeV center of mass energy; and at tremendous collision rate - a bunch crossing every 25ns with an estimated 200 pp collisions each bunch crossing. Higher collision energy leads to heavy particles being produced; these then decay into lower mass, high momentum particles that are very close together. Being able to correctly reconstruct these grouped particles, through tracking algorithms like TIDE (Tracking In Dense Environments), is essential for the ATLAS experiment as they are important signatures to many searches.
This characterization is implemented starting with a full ATLAS simulation using a baseline geometry; then an algorithm based on track extrapolation is used to cluster each energy deposit independently of the initial geometry, allowing the study of a variety of ATLAS layouts and detector element sizes. Simulated three-prong τ decays as well as high mass Z' decays - causing collimated particle showers due to hadronization of a quark - are studied to identify the track reconstruction efficiency of different detector geometries to be used in design recommendations.

Felix Cormier
The University of British Columbia

Date submitted: 15 Apr 2016 Electronic form version 1.4