Contribution ID: **13** Type: **Lightning talk**

Pre-Learning a Geometry Using Machine Learning to Accelerate High Energy Physics Detector Simulations

Friday 23 October 2020 15:00 (5 minutes)

The simulation of the passage of particles through the LHC detectors occupies already more than a third of the available computing resources and it's predicted to exceed them after 2026, for the example of the ATLAS detector. Significant portion of the most prevalent simulation toolkit, Geant4, is spent to explore the geometry of the detector volume in order to calculate a particle instance fly path. Machine learning algorithms are utilized to learn the geometry beforehand in order to reduce the computational demand while the actual simulation is being produced. A high dimensional map of the geometry is constructed that guides the simulation to explore complex geometries. To achieve this a complete pipeline of data generation and storage, ML training and optimization is employed at Argonne National Laboratory computing facilities. The purpose of the work presented is to demonstrate whether the ML assisted geometry exploration can achieve accelerated simulations compared to pure Geant4 in complex geometries.

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Session Classification: Workshop

Track Classification: 3 ML for simulation and surrogate model : Application of Machine Learning to simulation or other cases where it is deemed to replace an existing complex model