Contribution ID: **5** Type: **Contributed Oral**

Machine Learning Approaches to Segmentation for Reconstruction in the ATLAS Calorimeter

Saturday, 15 February 2025 11:00 (15 minutes)

The ATLAS experiment at the Large Hadron Collider (LHC) records events with energies up to 13TeV using multiple complementary detectors. As a general-purpose detector, ATLAS employs a highly sophisticated software system to reconstruct events for a variety of analyses. These analyses encompass many orders of magnitude of energy and momentum requiring accurate reconstruction at all energy levels. Critical to this reconstruction is particle flow, where we attempt to relate coincident signals in each detector, particularly tracks in the inner detector, to calorimeter hits. Doing so allows us to combine the high accuracy of the calorimeter at higher energies with the high accuracy of the tracker at low transverse momenta.

Currently, particle flow is performed using hand-chosen parameters to categorize cells by their proximity to extrapolated track paths. This system fails in dense jet environments where many tracks are present in close proximity. One promising approach to particle flow is JetPointNet which builds on the PointNet framework to perform inference using a machine learning model. JetPointNet has shown potential at segmenting cells in both high and low energy events without pileup. JetPointNet stands to significantly improve the accuracy of jet reconstruction. This talk will discuss the ongoing efforts to develop and integrate a machine learning approach to cell attribution for event reconstruction.

Your Email

jhimmens@triumf.ca

Affiliation

TRIUMF

Supervisor

Dr. Maximilian Swiatlowski

Supervisor Email

mswiatlowski@triumf.ca

Your current academic level

Undergraduate student

Primary authors: Mr HIMMENS, Joshua (TRIUMF); SWIATLOWSKI, Maximilian (TRIUMF)

Presenter: Mr HIMMENS, Joshua (TRIUMF)

Session Classification: Morning 4 - Particle Physics

Track Classification: Particle Physics