

Developing Machine Learning Techniques for Particle Flow in the ATLAS Experiment

Monday, August 19, 2024 1:55 PM (10 minutes)

The ATLAS detector records proton collisions at the Large Hadron Collider, where protons are accelerated to 99.999999% of the speed of light to probe our understanding of physics at the high energy frontier. Critical to the analysis of ATLAS data is event reconstruction, where we associate calorimeter and tracker signals to determine which particles caused them, with how much energy, and through what process. A key challenge in this process is particle flow, where we attempt to relate energy deposits in the calorimeter to tracks from the inner detector. One promising approach to particle flow is using a PointNet machine learning architecture for this association. While PointNet models show significant promise on simplified data sets, they struggle with the complexity of more realistic ATLAS data. This talk demonstrates the challenges of this segmentation using a PointNet model and the transfer-learning approaches that have been developed to improve performance in the complex collision environment of the LHC.

What area of study best describes your talk?

Physics

If you answered 'Other', please provide the study area.

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Session Classification: Presentations