Contribution ID: **99** Type: **Contributed Oral**

Identifying New Long-Lived Particles (LLPs) Using Graph Neural Networks with the ATLAS Detector

Saturday, 17 February 2024 09:15 (15 minutes)

Many extensions to the Standard Model (SM) predict the existence of strongly interacting dark sectors, which behave similarly to Quantum Chromodynamics (QCD) but interact weakly with SM particles. Depending on the parameters of the dark sector, one potential LLP signature could be that of an "emerging jet" –a spray of particle tracks after proton-proton collision dominantly composed of displaced tracks and containing many displaced vertices within the jet cone. Graph Neural Networks (GNN) have shown great promise in capturing complex dependencies and patterns in graph-structured data, making them well-suited for analyzing the intricate topology of emerging jets. GNN-based architecture is used to tag emerging jets with high accuracy while significantly suppressing the QCD background. The architecture of the GNN also enables the classification of displaced tracks as well as the identification of displaced vertices within the jet cone. I will present a comprehensive evaluation of the GNN's performance in these jet, track, and vertex-level classification tasks providing valuable insight into the long-lived particle decay signatures.

Your Email

ppa45@sfu.ca

Supervisor

Matthias Danninger

Supervisor Email

mdanning@sfu.ca

Affiliation

Simon Fraser University

Your current academic level,

MSc student

Primary author: POKHAREL, Paras (Simon Fraser University)

Presenter: POKHAREL, Paras (Simon Fraser University)

Session Classification: Morning 3 - Feb. 17, 2024