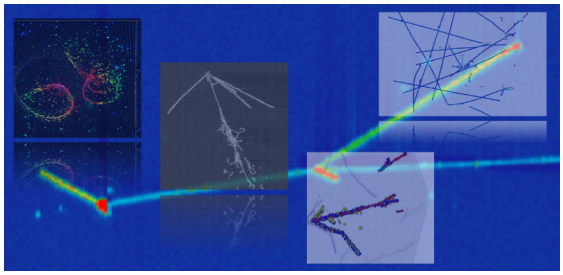

Contribution ID: **30** Type: **Individual Talk**

NuGraph2: A Graph Neural Network for Event Reconstruction in Liquid Argon Time Projection Chambers

Tuesday, 22 August 2023 16:15 (25 minutes)

We present NuGraph2, a Graph Neural Network (GNN) for reconstruction of liquid argon time projection chamber (LArTPC) data, developed as part of the ExaTrkX project. We discuss the network architecture, a multi-head attention message passing network that classifies detector hits according to the particle type that produced them. By utilizing a heterogeneous graph structure with independent subgraphs for each 2D plane's hits and for 3D space points, the model achieves a consistent description of the neutrino interaction across all planes.

Performance results will be presented based on publicly available samples from MicroBooNE. These will include both physics performance metrics, achieving ~95% accuracy for semantic segmentation of detector hits. We will also discuss applications of the network for additional LArTPC reconstruction tasks, such as event classification, background hit rejection, vertex reconstruction and instance segmentation (clustering).

We will also summarise a suite of general-purpose tools developed to provide boilerplate solutions for common ML workflow problems, and discuss prospects for integration in the data processing chains of experiments.

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Session Classification: Session 2