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Type: **Short talk (15min. + 5 min. Q/A)**

Graph Neural Networks for Fast Simulation Reconstruction in the ESSnuSB Neutrino Detector

Tuesday 28 October 2025 11:15 (15 minutes)

Graph neural networks (GNNs) have proven to excel at Cherenkov detector event reconstruction, where the signal is sparse, varying in size, and non-euclidian in structure. For the European Spallation Source Neutrino Super Beam (ESSnuSB) - which aims to measure CP-violation in the leptonic sector with an accuracy less impaired by systematic uncertainties than other proposed experiments - we have already demonstrated how GNNs can play an important role in event reconstruction in the development as well as deployment phases. This talk recounts the main highlights of these results, and presents new studies on how GNNs can be used for fast exploration of variations in detector geometries and PMT properties in the developing stages of the ESSnuSB.

Presenter: ENDRUP IVERSEN, Kaare

Session Classification: Experiments - Cherenkov-based Neutrino Telescopes