

# Heterogeneous Graph Representation for Identifying Hadronically Decayed Tau Leptons at the High Luminosity LHC

*Thursday 3 November 2022 10:20 (20 minutes)*

We present a new algorithm that identifies reconstructed jets originating from hadronic decays of tau leptons against those from quarks or gluons. No tau lepton reconstruction algorithm is used. Instead, the algorithm represents jets as heterogeneous graphs using the associated low-level objects such as tracks and energy clusters and trains a Graph Neural Network (GNN) to identify hadronically decayed tau leptons from other jets. Simulated events are generated to emulate the dense environment at the High Luminosity Large Hadron Collider (HL-LHC). We compare the physics performance and the computational effectiveness for different graph representations of jets and for different GNNs (homogeneous vs heterogeneous). In addition, we compare the GNNs with the RNN that is used in ATLAS.

**Primary authors:** HUANG, Andris (University of California-Berkeley); JU, Xiangyang (Lawrence Berkeley National Lab. (US))

**Presenters:** HUANG, Andris (University of California-Berkeley); JU, Xiangyang (Lawrence Berkeley National Lab. (US))

**Session Classification:** Classification