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Hypergraph learning for full event reconstruction at pp and e+e- colliders

Particle flow reconstruction algorithms lay the foundation for physics analysis at collider experiments. Enhancing these algorithms with deep learning offers a unique opportunity to improve experimental sensitivity at the LHC and future facilities. In this talk, we present HGPflow, a deep learning approach based on hyper-graphs that provides a physics-motivated framework for the energy assignment problem in particle reconstruction. We demonstrate that HGPflow can reconstruct full proton-proton and electron-positron collisions while offering gains in both accuracy and interpretability over existing methods. We further highlight the importance of preserving locality when training on full collision events and propose a strategy to ensure that the model does not learn global event features.

Secondary track

T12 - Data Handling and Computing

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