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Event Reconstruction with GNNs at the FCC

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The FCC will deliver a large dataset thanks to its unprecedented luminosity. Improving the quality of the event reconstruction at different levels will allow to increase the accuracy of the physics measurements we can achieve. For example, at the particle-level reconstruction, where information from different sub-detectors e.g tracker and calorimeter is available, ML shows promise to improve the reconstruction by learning to disentangle complex or overlapping shower geometries. At a higher level, for reconstructing color-neutral resonances such W, Z or Higgs particles, similar tools can improve the clustering performance using an end-to-end approach, and reduce errors coming from inaccurately clustering soft particles from various resonances or incorrect jet pairing. Our work is focused on the study of GNN architectures that are scalable and improve the performance on these complex tasks over classical approaches.

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