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Robustness Studies against Noise in the IML-2020 EXA.TrkX Particle Tracking Pipeline. ADITI CHAUHAN, University of Washington — Collisions in the LHC tell us important information about particles, like their properties and origins of decay. These collisions are detected through the electrical charge deposited on sensors on the detector. From which we calculate properties like the particle's position and energy distribution, further using them to reconstruct the particle's trajectory. However, with the exponential increase in available data we encounter the combinatorial problem in track reconstruction, as the number of interactions increase exponentially, with the increase in number of particles. In the recent years machine learning approaches have been used to tackle this problem. Architectures based on graph neural networks (GNN) that take into account our detectors geometry have the capacity to learn performance metrics and classify tracks accurately. Previous project pipelines focused on cleaned, simplified or ideal data. In order to handle realistic data, testing with irregularities like the presence of noise and misalignment is required. We present studies of how the performance of GNN architectures in embedding and filtering is affected by the addition of aforementioned irregularities, as well as insights into improving robustness and further outlook.

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