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Graph Neural Network for Large Radius Tracking

Particle tracking is a challenging pattern recognition task in experimental particle physics. Traditional algorithms based on Kalman filters show desirable performance in finding tracks originating from collision points. However, for displaced tracks, dedicated tunings are often required in order to reach sensible performance as the quality of the seed for the Kalman filter has a direct impact on its performance.

We developed a Machine Learning-based end-to-end particle track finding algorithm for the High Luminosity LHC. The algorithm is designed so as to be agnostic about global track positions. Previous studies demonstrated that the algorithm achieves a competitive physics and computing performance for tracks coming from the collision points. In this work, we study the performance of our ML-based algorithm for reconstructing displaced tracks, which may result from displaced leptons or jets as motivated by several Beyond the Standard Model theories. The datasets are generated under the ACTS framework and simulated for a generic detector. For the first time, we compare directly the performance of our ML algorithm with the ACTS combinatorial Kalman filter.

Significance

References

https://arxiv.org/abs/2103.06995, https://arxiv.org/abs/2106.13593

Speaker time zone

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