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Vision transformers for fast and generalizable detector simulation

The speed and fidelity of detector simulations in particle physics pose compelling questions on future LHC analysis and colliders. The sparse high-dimensional data combined with the required precision provide a challenging task for modern generative networks. We present a general framework to train generative networks on any detector geometry with minimal user input. Vision transformers allow us to reliably simulate the energy deposition in the detector phase space starting from the detailed Geant4 detector response. We evaluate the networks using high-level observables, neural network classifiers, and sampling timings over various datasets with different dimensionalities and physics content.

Significance

Faster detector simulation with minimal impact on accuracy; method applicable to any detector geometry;

References

Experiment context, if any

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