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Evaluating ML-Accelerated Simulations of the Time Projection Chamber for the MPD Experiment.

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Computer-based simulations of high-energy physics experiments are critical for obtaining more accurate physics results, yet these simulations tend to be computationally expensive. Generative Machine Learning (ML) based approaches offer potential for accelerating the simulation for such experiments. However, a reduction in quality is often anticipated when comparing these fast ML-based simulations with detailed full simulations. In this contribution, we compare a ML-based simulation to a detailed simulation of the Time Projection Chamber (TPC) for the MPD experiment at the NICA accelerator complex. We evaluate the extent to which high-level characteristics, such as the quality of reconstructed tracks, can and should be reproduced by the ML-based fast simulation.

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