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Neutron Event Simulation for AI-Based Data Processing

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Recent developments of scintillator-based event-driven detectors have opened up the possibility of utilizing AI to identify single neutron events from sparse data readout. A crucial aspect for AI-based event detection is to provide training datasets that can be utilized to accurately train a neural network. Such training datasets require a "ground-truth" to avoid errors in the event identification process. To accommodate this, we present work on a Python-based simulation of neutron events to support AI-driven analysis of event data with a focus on position reconstruction of the events. The training-data simulation is based on observed distributions of photon characteristics utilizing event-mode neutron imaging, enabling the generation of large quantities of synthetic data. The objective of this project is to lay the groundwork for AI-based neutron event-mode imaging at the MLZ.

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