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4. TPC Track Denoising with Machine Learning Techniques

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Spurious signals caused by microdischarges are a known effect inherent to all gaseous detectors, namely micropattern gaseous detectors. During the reconstruction in imaging and tracking detectors, such as time projection chambers (TPC), these signals are added to the actual track-generated signal as extra pixels or clusters, compromising the performance of the detector. We study the capability of machine learning techniques to denoise events measured by TPCs. These techniques were applied to real data from a prototype TPC operating with the SAMPA chip integrated with CERN's SRS frontend. We attempt to evaluate to what extent difficult operating conditions that generate noisy data and artefacts in the signals can be overcome with such techniques. The events were mainly studied as 3D matrices as opposed to more common representations using waveforms or 2D projections. We measure the recognition performance by manual labeling of measured data and by applying several screening cuts, allowing to compare it with standard techniques. The methods were developed to be independent of the particular geometry of the measured tracks.

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