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Using Deep Learning to Aid Track Reconstruction in the Active-Target Time Projection Chamber JOHN BLUE, Davidson College, DULCE PACHECO, Johnson C. Smith University, MICHELLE KUCHERA, RAGHU RAMANUJAN, Davidson College, YASSID AYYAD, DANIEL BAZIN, WOLFGANG MITTIG, JASPREET RANDHAWA, National Superconducting Cyclotron Laboratory (NSCL), ROBERT SOLLI, University of Oslo — Machine learning methods were used to aid track reconstruction in the Active-Target Time Projection Chamber (AT-TPC) at the National Superconducting Cyclotron Laboratory in Michigan State University. The AT-TPC is a gas-filled detector where the gas is both the scattering target and detection medium, allowing for three-dimensional reconstruction of reaction target tracks. During the recently run $^{22}Mg(\alpha, p)$ experiment, 45% of the pads comprising the AT-TPCs sensor plane were overbiased, resulting in particle tracks with significant discontinuities. In an effort to make these broken tracks suitable for event classification and analysis, we used deep learning techniques, including fully-connected neural networks and an implementation of a context encoder neural network architecture developed by Pathak et al. for image inpainting. Preliminary results have shown the context encoder to be successful at inpainting simulated particle tracks in the AT-TPC. A comparison of methods as well as reconstructed tracks in two and three dimensions generated by the networks will be presented.

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