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Machine learning for improved resolution and fast predictions in a parallel-plate avalanche counter with optical readout (O-PPAC)[1] KATE ROBERTS, Kalamazoo College, MICHELLE KUCHERA, RAGHU RAMANUJAN, Davidson College, YASSID AYYAD, MARCO CORTESI, National Superconducting Cyclotron Laboratory, MORTEN HJORTH-JENSEN, Michigan State University — The O-PPAC is a detector for tracking beam particles. It detects electroluminescence produced by the beam ionizing the detector gas. This work provides a method for faster, more accurate position measurements from the O-PPAC. The traditional method applies a truncated Gaussian fit, where the position of the particle event is localized by the event's centroid, as recorded by the collimated photo-sensors (e.g. SiPMs) lining the inner four walls of the O-PPAC. We replace this fit with a fully connected neural network, and we train a model to apply X,Y localizations to simulated data with known locations, so the model correlates event data with location. The next step is to test how well the model generalizes to experimental data to make consistently accurate predictions. Preliminary results indicate that the neural network yields improved event resolution. We achieve a resolution of 0.034mm in the X dimension and 0.042mm in the Y dimension using the neural network model.

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