

Abstract Submitted
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Point Cloud Based Machine Learning for Event Classification and Track Identification of Nuclear Reactions¹ ANDREW RICE, ANELA DAVIS, ERIKA NAVARRO, MIKE REMEZO, ANNABEL WINTERS-MCCABE, MICHELLE KUCHERA, RAGHU RAMANUJAN, Davidson College, YASSID AYYAD, Instituto Galego de Física de Altas Enerxías, DANIEL BAZIN, Facility for Rare Isotope Beams — PointNet++, a deep neural network architecture for three-dimensional point cloud data, was used for classification tasks of time-projection chamber data of nuclear reactions at the National Superconducting Cyclotron Laboratory at Michigan State University. This chamber, known as the Active-Target Time Projection Chamber (AT-TPC), functions as both target and detector for nuclear reactions. We used simulated data from the $^{22}\text{Mg} + ^4\text{He}$ experiment [1] and the upcoming $^{10}\text{Be} + ^4\text{He}$ experiments in the AT-TPC to train our models. Event classification models achieved an accuracy and F1 score of .96 in both experiments, which is comparable to the performance achieved by Convolutional Neural Networks with significantly less data processing. Track identification tasks achieved an accuracy of .96 and an F1 score of 0.94 for the selection of alpha particles in the $^{22}\text{Mg} + ^4\text{He}$ experiment.

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