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Machine learning using NuDot

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NuDot is a ton-scale liquid scintillator research and development testbed. It aims to develop techniques to reduce one of the dominant backgrounds in large modern and future liquid scintillator neutrinoless double beta decay ($0\nu\beta\beta$) searches: the solar neutrino background. With the help of machine learning and high-speed electronics, NuDot will demonstrate the ability to extract directional information by separating the prompt Cherenkov radiation within the isotropic scintillation emission. This separation is done using low time-transit-spread photomultiplier tubes. We are using U-Net architecture, a convolutional neural network originally developed to perform image segmentation that aims to find the hit time of the photon and extract the charge. In addition, efforts are underway to integrate these machine learning models into the front-end data acquisition systems, such as RFSoC platforms, to enable real-time processing and decision-making.

Type of Contribution

poster / flash talk (for work in progress)

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