

# Developments in Digital Optical Module Waveform Processing for the IceCube Neutrino Observatory

*Monday 10 July 2023 19:00 (2 hours)*

The IceCube Neutrino Observatory is a neutrino telescope located at the South Pole designed to detect Cherenkov radiation produced when neutrinos interact with the ice. It consists of 86 strings of digital optical modules, each containing a photomultiplier tube, embedded deep in the Antarctic ice. Each photon that encounters a photomultiplier tube produces a voltage waveform, and the photon information must be recovered from those waveforms. Currently, we utilize CPUs for this processing. However, if we need to reprocess this data it is very time consuming, power intensive, and expensive. Thus, it makes sense to accelerate this process with GPUs or FPGAs. Neural networks are highly compatible to both GPUs and FPGAs, so we are developing a neural network for PMT voltage waveform unfolding. In this poster presentation we present a simple compact neural network that is trained to find photon hits in simulated voltage waveforms. We find that the neural network is able to find single photon hit times nearly as reliably as the algorithms that are currently used. In the future, we plan to modify the neural network to find photon charge information as well, and we plan on implementing the CPU-based algorithm on GPU / FPGA.

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