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Using Fast Photosensors in Massive Water Cherenkov Neutrino Detectors

Future experiments rely on the precision measurements of rare events with low cross section, such as neutrino interactions and proton decay. Using very large detectors and new advances in photosensor technology are both important towards the achievement of high sensitivity to these measurements. New photodetectors based on micro-channel plates are being developed by the Large-Area Picosecond Photo Detector (LAPPD) Collaboration. These photosensors have been shown to have excellent spatial and timing resolution. Using these devices can enable better capabilities in massive megaton-scale water Cherenkov detectors by resolving track features to within a few centimeters and enhancing background rejection for neutrino oscillation experiments. We present preliminary results on the reconstruction capabilities for single particles in water Cherenkov detectors using fast photosensors.

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