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Detector R&D for ANNIE and Future Neutrino Experiments

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The Accelerator Neutrino Neutron Interaction Experiment (ANNIE) is designed to serve as a test bed for new detector technologies in future water and liquid scintillator based neutrino experiments. Located on the Booster Neutrino Beam at Fermilab, ANNIE will be the first gadolinium-loaded water Cherenkov detector on a neutrino beam and will provide high statistics measurements of neutron yields from neutrino interactions in water. It is also the first particle-physics application of the new photosensor technology: Large Area Picosecond Photodetectors (LAPPDs). With single photon time resolutions of roughly 50 psec and mm-level imaging capabilities, LAPPDs bring considerable new capabilities for neutrino reconstruction in Cherenkov and scintillator detectors. Leveraging this technology to make detailed neutrino measurements, ANNIE will serve as a first demonstration of their impact on physics. In addition to LAPPDs, the ANNIE R&D program will likely explore other new technologies such as the addition of water-based liquid scintillator. The ANNIE Phase II detector is currently under construction and will start to take data in the summer of 2019. In this talk, I will present on the ANNIE detector R&D program and its relevance to current and future neutrino experiments.

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