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ANNIE and the Future of Hybrid Neutrino Detectors

The Accelerator Neutrino Neutron Interaction Experiment (ANNIE) will continue to develop advanced neutrino detector technology in addition to pursuing an ambitious physics program in the Fermilab Booster Neutrino Beam. The current gadolinium-loaded water detector will develop new techniques using Large Area Picosecond PhotoDetectors (LAPPDs) to reconstruct muons from neutrino interactions in the forward direction. This talk describes using ANNIE to take the next step in the development of hybrid (Cherenkov plus Scintillation) optical detectors by replacing the current gadolinium-water target with Water-based Liquid Scintillator (WbLS) to allow reconstruction of neutron capture vertices, and increasing the coverage of LAPPDs to allow multi-track fitting in all directions using fast timing and precision photon location. This is a critical step towards demonstrating the power of hybrid detectors for a new generation of far detectors in long-baseline neutrino oscillation experiments and observatories for low-energy neutrinos.

Primary frontier topic

Neutrino Physics Frontier

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