

# The Accelerator Neutrino Neutron Interaction Experiment (ANNIE): measuring the neutron multiplicity from neutrino-nucleus interactions

*Saturday, 1 December 2018 13:45 (15 minutes)*

Energy reconstruction of neutrino interactions in long-baseline experiments is heavily driven by the kinematics of leptons produced in charged-current interactions. Accurate reconstruction often relies on selecting charged-current quasi-elastic (CCQE) events, containing no particles other than the nuclear recoil and the produced lepton, while rejecting inelastic events mimicking a CCQE interaction (CCQE-like). One large indicator of an event's inelasticity is the presence of final-state neutrons; having an understanding of the expected number of neutrons following CCQE-like inelastic events is key to tagging inelastic events. A measurement of the neutron multiplicity in neutrino interactions on water can also help constrain and refine models of neutrino-nucleus interactions. ANNIE (Accelerator Neutrino Neutron Interaction Experiment) is a gadolinium-doped water Cherenkov detector that will measure the number of neutrons produced following charged-current events caused by muon neutrinos in the Fermilab Booster Neutrino Beam line. ANNIE will also be the first neutrino experiment to deploy Large Area Picosecond Photodetectors, photosensors with  $\sim 60$  ps time and  $< 1$  cm position resolutions, with the primary purpose of improving final-state muon reconstruction. This talk will provide an overview of the ANNIE detector, ANNIE Phase I results (background measurements), and current progress on ANNIE Phase II

## Session

Works in Progress (15+5 min)

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**Session Classification:** Works in Progress