

## ANNIE in 10 minutes: multiplicities, cross sections, and models (oh my!)

*Monday, 10 June 2019 17:15 (15 minutes)*

The Accelerator Neutrino Neutron Interaction Experiment (ANNIE) is a gadolinium-doped water Cherenkov detector located in the Fermilab Booster Neutrino Beam line. Many long-baseline neutrino measurements rely on efficient reconstruction of charged-current quasi-elastic (CCQE) neutrino interactions, whose final-state particles include only the recoiling nucleus, a proton, and an outgoing lepton. One known indicator of an event's inelasticity is the presence of final-state neutrons, which are often challenging to detect. Understanding the expected number of neutrons following CCQE-like inelastic events is pivotal for identifying and rejecting such events from CCQE datasets. ANNIE is sensitive to final-state neutrons and will measure the neutron multiplicity of neutrino charged-current interactions. This neutron multiplicity measurement can also help constrain and refine models for atmospheric neutrino interactions, a dominant background in proton decay searches and supernova neutrino detection. Throughout operation, ANNIE will also measure the total muon neutrino charged-current cross section and perform exclusive cross-section measurements, with an emphasis on the CC0pi cross section. This talk will provide an overview of the ANNIE physics goals and event reconstruction chain that will be used to complete these measurements.

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