



Poster session 2 – Tuesday 5 July

P2.033 **The Accelerator Neutrino Neutron Interaction Experiment (ANNIE)**

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The Accelerator Neutrino Neutron Interaction Experiment (ANNIE) is a water Cherenkov neutrino experiment at Fermilab, designed to study the abundance of final state neutrons from neutrino-nucleus interactions. Measurements of final-state neutron multiplicity will improve our understanding of the complex, many-body dynamics of neutrino-nucleus interactions and thus help to reduce dominant systematics on future long-baseline neutrino oscillation measurements. Identifying and counting final state neutrons also provides a useful experimental handle for signal-background separation in future neutrino experiments. Two enabling technologies make this measurement possible: (1) the first application of Large Area Picosecond Photodetectors, which will allow detailed timing-based reconstruction of the primary neutrino interaction, and (2) the first use of gadolinium enhanced water on a high energy neutrino beam to count final-state neutrons. Phase I of ANNIE, designed to provide a measurement of critical neutron backgrounds, is currently being deployed on the Booster Neutrino Beam and is described in detail in a separate poster. Here we describe the goals and plans for the full physics program (Phase II) of the experiment.