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Measuring Final State Neutrons From Neutrino-Neutron Interactions Using The ANNIE Experiment

Saturday, August 6, 2016 6:00 PM (2 hours)

The Accelerator Neutrino Neutron Interaction Experiment (ANNIE) is a water Cherenkov (WCh)-based 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 (LAPPDs), 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 efficiently 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 (BNB) with the support of the Fermilab directorate. In this poster we will describe recent developments in the execution of ANNIE Phase I, as well as the goals and plans for the full physics program of the experiment.

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