



Poster session 2 – Tuesday 5 July

P2.032 **Measuring Neutron Backgrounds with ANNIE**

M Malek and M O'Flaherty

University of Sheffield, UK

on behalf of ANNIE collaboration

The Accelerator Neutrino-Nucleus Interaction Experiment (ANNIE) is a new project operating in the Booster Neutrino Beam (BNB) at Fermilab. It consists of an upstream muon veto, a gadolinium-loaded 30 tonne water Cherenkov detector, and a downstream muon range detector, all located 100 meters downstream from the BNB target. ANNIE's physics goals include characterising neutron multiplicity as a function of energy in neutrino interactions, and measurements of neutrino cross-sections on oxygen.

ANNIE's technical goals include running the first Gd-loaded water Cherenkov experiment to be situated in a neutrino beam, and the first particle physics experiment to use the next-generation photon sensors known as Large Area Picosecond Photodetectors (LAPPDs). ANNIE Phase I has been running as a test experiment since Spring 2016; the goals of this initial run are to make a position-dependent determination of the neutron backgrounds in the experimental hall. A neutron capture volume (NCV) of Gd-loaded scintillator can be moved within 30 tonnes of pure water viewed by 60 eight inch photomultiplier tubes. Captures in the NCV will tag the incoming neutrons from neutrino interactions in rock, as well as the 'skyshine' neutrons reflected downwards from the atmosphere. These crucial measurements will enable Phase II, where the physics goals will be realised. This poster presents details on the experimental setup and preliminary data from Phase I.