Contribution ID: **57** Type: **not specified**

PROSPECT: A Precision Reactor Oscillation and Spectrum Experiment

Monday, 8 June 2015 13:30 (15 minutes)

Current reactor antineutrino production models predict an antineutrino spectrum shape and normalization which are inconsistent with the existing reactor antineutrino measurements. These discrepancies could be due to the lack of understanding of the underlying nuclear physics leading to imperfect reactor antineutrino production models. Sterile neutrinos with an eV-scale mass splitting could also explain the disagreements. PROSPECT is a U.S.-based multi-phased reactor antineutrino experiment designed to make a precise measurement of reactor antineutrino spectrum and perform a search for sterile neutrino oscillations via electron antineutrino disappearance. PROSPECT utilizes segmented detectors with lithium-loaded liquid scintillator as the target and will be deployed at short baselines of ~ 7-20 m from the High Flux Isotope Reactor, a highly-enriched uranium reactor at Oak Ridge National Laboratory. With a single year of data, PROSPECT has significant sterile neutrino discovery potential in the current global best-fit region. A suite of prototype detectors have been installed laying groundwork for deploying full-size PROSPECT detectors. This talk will focus on the PROSPECT detector design in the context of the physics goals of the experiment.

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Session Classification: Session 3 - Reactor Neutrinos, and More!