Contribution ID: **111** Type: **Regular Talk (15'+5')**

Improved Inverse Beta Decay event selection and its impact on the PROSPECT oscillation analysis

Tuesday 30 November 2021 16:35 (20 minutes)

The Precision Reactor Oscillation and Spectrum Experiment (PROSPECT) is an above-ground antineutrino experiment at short baselines located at the High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory (ORNL). The PROSPECT detector comprises 4-tons of Li-6 doped liquid scintillator (6LiLS) divided into an 11x14 array of optically separated segments. This experiment's physics goals include searching for the existence of sterile neutrinos and precisely measuring the antineutrino energy spectrum. Antineutrinos are detected via the inverse beta decay (IBD) interaction which provides a near-unique space-time correlated signal pair consisting of a positron energy deposition and a delayed neutron capture in the liquid scintillator, both of which are recorded by each double-ended PMT segment. First data-taking campaign concluded in 2018 resulting in the publication of both oscillation and spectrum results. However, during the data collection period, information coming from a small number of PMT's had to be excluded causing an overall statistical impact on previous results. A new analysis will extract significantly more information from the data set by making use of Single Ended Event Reconstruction capabilities of the detector, along with parsing the available data into five independent periods. In this talk, I will describe the impact that this new analysis has on the signal-to-noise ratio, effective IBD statistics, optimized selection process used to identify IBD events, and its impact on the oscillation analysis.

This work is supported by the US DOE Office of High Energy Physics, the Heising-Simons Foundation, CFREF and NSERC of Canada, and internal investments at all institutions.

Author: VENEGAS VARGAS, Diego

Presenter: VENEGAS VARGAS, Diego

Session Classification: Neutrinos - Experimental

Track Classification: Neutrinos - Experiments