

NUCLEAR SEMINAR SERIES

Dr. Alfredo Galindo-Uribarri
Oak Ridge National Laboratory

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4:00 pm - Rm 123 NSH

Opportunities of Neutrino Physics at ORNL – First Results

Oak Ridge National Laboratory (ORNL) has two powerful neutrino sources providing unique opportunities for basic and applied research. Firstly, the 85MW High Flux Isotope Reactor (HFIR) at ORNL is an intense source of low energy electron antineutrinos. HFIR burns highly-enriched uranium fuel, meaning that >99% of antineutrinos emitted by the compact core derive from ^{235}U fissions. Secondly, the high-quality pion-decay-at-rest neutrino source at the Spallation Neutron Source (SNS) provides an intense flux of neutrinos in the few tens-of-MeV range, with a sharply-pulsed timing structure that is beneficial for background rejection.

Two new experiments, PROSPECT and COHERENT, make use of these unique capabilities and will enable us to broaden the understanding of neutrino properties. The Precision Reactor Oscillation and Spectrum Experiment, PROSPECT, is located at the HFIR. PROSPECT consists of segmented ^6Li -loaded liquid scintillator antineutrino detectors designed to probe short-baseline neutrino oscillations and precisely measure the reactor antineutrino spectrum. PROSPECT will be able to address the major interpretations of the current 'reactor anomalies' the existence of sterile neutrinos and/or deficiencies in our ability to predict reactor antineutrino emissions. The COHERENT collaboration aims to measure CEvNS (Coherent Elastic Neutrino-Nucleus Scattering) at the SNS. The CEvNS process is cleanly predicted in the Standard Model and its measurement provides a Standard Model test; furthermore, the process is involved in supernova explosion processes and supernova neutrino detection. I will present first results of these experiments.



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