

Physics Opportunities with a PROSPECT Upgrade

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The Precision Reactor Oscillation and Spectrum Experiment, PROSPECT, at the High Flux Isotope Reactor at ORNL has made world-leading measurements of reactor antineutrinos at short baselines. PROSPECT provides some of the best limits on eV-scale sterile neutrinos, has made a precision measurement of the reactor antineutrino spectrum of ^{235}U from a highly-enriched uranium reactor, and has demonstrated the observation of reactor antineutrinos in an aboveground detector with good energy resolution and well-controlled backgrounds. The PROSPECT collaboration is now preparing an upgraded detector, PROSPECT-II, to probe yet unexplored parameter space for sterile neutrinos and fully resolve the Reactor Antineutrino Anomaly, a longstanding puzzle in neutrino physics. By pressing forward on the world's most precise measurement of the ^{235}U antineutrino spectrum and measuring the absolute flux of antineutrinos from ^{235}U , PROSPECT-II will sharpen a tool with potential value for basic neutrino science, nuclear data validation, and nuclear security applications. An additional deployment at a low-enriched uranium reactor would expand this contribution with complementary measurements of the antineutrino yield from other fission isotopes. PROSPECT-II provides a unique opportunity to continue the study of reactor antineutrinos at short baselines in the US while training a new cohort of neutrino physicists.

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