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Reactor Neutrino Measurement with PROSPECT

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Current models of antineutrino production in nuclear reactors predict absolute detection rates and energy spectra at odds with the existing body of direct reactor antineutrino measurements. These discrepancies are indicative of a misunderstanding of neutrino production in nuclear reactor cores and/or the neutrino oscillation involving a sterile neutrino. New short-baseline reactor antineutrino measurements performed at highly enriched uranium reactors will enable independent testing of these two explanations for existing flux and spectrum anomalies. PROSPECT, the Precision Reactor Oscillation and Spectrum experiment, is currently operating a 4-ton segmented ^{6}Li-doped liquid scintillator detector covering baseline ranges of ˜7-9 meters from the ^{235}U-enriched High Flux Isotope Reactor at Oak Ridge National Laboratory. This presentation describes the recent reactor antineutrino measurements performed by the PROSPECT experiment, which have demonstrated the feasibility of precision on-surface reactor antineutrino detection, advanced understanding of antineutrino production by the primary fission isotope ^{235}U, and placed world-leading limits on sterile neutrino oscillations.

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