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Recent Developments in Reactor Neutrino Physics

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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. If these discrepancies are taken seriously, then they must be indicative of a misunderstanding of neutrino production in nuclear reactor cores and/or the fundamental properties of neutrinos. A variety of reactor neutrino experiments at short ($< 20m$) and long ($> 100m$) reactor-detector distances have provided new insights into these two explanations for existing flux and spectrum anomalies. This talk will provide an overview of these developments while highlighting recent measurements performed by PROSPECT, which has operated a 4 ton segmented lithium-doped liquid scintillator detector covering baseline ranges of ∼7-11 meters from the U235-enriched High Flux Isotope Reactor at Oak Ridge National Laboratory. This experiment has demonstrated the feasibility of precision on-surface reactor antineutrino detection, advanced understanding of antineutrino production by the primary fission isotope U235, and placed world-leading limits on sterile neutrino oscillations.