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Development of the PROSPECT Source Calibration System
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PROSPECT, the Precision Reactor Oscillation and Spectrum Experiment, is a short-baseline antineutrino experiment consisting of a movable liquid scintillator detector operated near Oak Ridge National Laboratory's High Flux Isotope Reactor (HFIR). PROSPECT is designed to make a precise measurement of the antineutrino spectrum emitted from ^{235}U fissions in a highly-enriched uranium reactor core, and to probe for eV-scale sterile neutrinos by examining neutrino oscillations at a distance of 7-12 m from the reactor. These measurements will address the observed reactor anomalies: the deficit in the reactor flux and the deviation in the spectral shape. PROSPECT consists of a 2-ton segmented liquid scintillator detector. Each segment is read out with two photomultipliers. Energy response and position reconstruction are calibrated using radioactive gamma and neutron sources. We have developed a retractable source deployment system that allows the placement of sources along the length of the detector segments and tested it using PROSPECT-50, a 50-liter detector prototype consisting of two segments. We will present the design of the PROSPECT source calibration system and results from PROSPECT-50.

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