

## **ROADSTR studies for the Mobile Antineutrino Demonstrator**

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Near field anti-neutrino detection is an emerging technology capable of monitoring reactor contents. The success of the Precision Oscillation and Spectrum Experiment (PROSPECT) and similar projects has led to a demand for in-field testing of the technology. The Mobile Antineutrino Demonstrator (MAD) group was formed to design a portable nearfield above ground antineutrino detection system. As a testbed, the Reactor Operations Antineutrino Detection Surface Testbed Rover (ROADSTR) detector prototype, as shown in Figure 1, was constructed from  $^6\text{Li}$ -doped Pulse Shape Discriminating plastic scintillator. Comprising 36 bars of 50cm length arranged in a 6x6 array. With over one year of operation, the device has allowed studies of scintillator characteristics and inverse beta decay like backgrounds. We will describe the detector's characterization and various background measurements conducted with it. This work covers the performance of the aging of the experimental material, and how we can extend its life for long-life missions. We then analyze the sensitivity of the bars in the full ROADSTR system. Data on the effects of cosmic radiation in combination with shielding materials was collected, to evaluate our background prediction capability. Completion of this work enables improved above-ground detection of antineutrinos using the future MAD system.



Figure 1. ROADSTR refurbished and collecting data