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Mitigation of Near-Surface Cosmogenic Background for the PROSPECT Experiment

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PROSPECT will measure the antineutrino flux close to a research reactor core, where little-to-no cosmic-ray attenuating overburden is available. Therefore, a detailed understanding of the background radiation fields is necessary. While time correlated detection of the products of Inverse Beta Decay (IBD), $\bar{\nu} + p \rightarrow e^+ + n$, provides powerful background rejection, greater background reduction is required for near-surface operation. Monte Carlo studies and validation with surface measurements have allowed PROSPECT to develop a detailed understanding of how near surface backgrounds differ from those experiments with significant overburden, how they can mimic signals of antineutrino interactions, and the originating particles and generation mechanisms. This poster describes the important features of near-surface cosmogenic backgrounds and how detector design features such as shielding, segmentation, and particle identification can be used for background mitigation.

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