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Background Assessment for the PROSPECT Short-Baseline Reactor Experiment

PROSPECT is a U.S.-based, multi-phase, 2-detector reactor antineutrino experiment whose primary goals are to probe short-baseline oscillations and perform a precise measurement of the reactor antineutrino spectrum. Potential detector deployment locations 4-20m from compact research reactor cores have been identified at three U.S. research reactor facilities. While these facilities have many attractive features including 235U cores and frequent on-off cycles allowing many background measurement opportunities, they also present several experimental challenges. These include little-to-no cosmic ray attenuating overburden and the potential for reactor correlated neutron and gamma ray backgrounds. The PROSPECT Collaboration has conducted an extensive background survey of multiple locations at each of the three sites. Several important sources of background have been identified, as well as variations amongst the sites. In this poster we detail the measurements conducted, the results obtained, and describe background mitigation strategies thus developed.

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