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Surface Alpha Background Mitigation in DEAP-3600

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Radon and its decay daughters are a well known source of background in direct WIMP detection experiments, as either a radon decay daughter or an alpha particle emitted from a thin inner surface layer could produce a WIMP-like signal. The acrylic vessel, which is the central part of the DEAP-3600 detector, is susceptible to surface diffusion of radon, when exposed to natural air. To remove diffused isotopes from the inner acrylic vessel, a sanding robot (called the Resurfacer) was designed to remove approximately 1 mm from the interior surface. Commissioning and testing has been carried out at Queen's University. Surface Polonium-210 alpha events have also been simulated with GEANT4 to study the signature of these backgrounds in the detector. Details of the Resurfacer, along with the results of tests and simulations will be presented.

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