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Optimizing the wavelength-shifter thickness for alpha suppression in the DEAP-3600 detector

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The DEAP-3600 experiment is a spherical dark matter detector searching for WIMPs by detecting scintillation light in a 3600 kg mass of liquid argon. Before the ultraviolet scintillation light passes through the optically clear acrylic vessel and light guides to the surrounding photomultiplier tubes, it must pass through a wavelength-shifting layer of tetraphenyl butadiene (TPB). Trace amounts of polonium 210 will contaminate the inner surface of the acrylic vessel as well as the TPB layer, and alpha particles resulting from its decay is expected to contribute background events to the WIMP signal. This talk will present the dependence of this background alpha signal on the thickness of the TPB layer, as well as the expected background events per 3 years of data taking at the optimized TPB thickness.

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