

Investigating Improvements to Event Selection Cuts Against Neck Alpha Backgrounds for DEAP-3600

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DEAP-3600 is a large liquid argon detector located 2 km underneath Earth's surface at SNOLAB. DEAP-3600 searches for evidence of dark matter in the form of weakly interacting massive particles (WIMPs), via direct detection. The detector is a spherical acrylic vessel containing 3.3 tonnes of liquid argon. A typical event in DEAP-3600 begins with a nuclear recoil or electronic recoil: this results in UV scintillation light that is then wavelength-shifted to visible, and detected using photomultiplier tubes (PMTs). To discern WIMP-candidate events from background events, an event selection has been implemented in data analysis. Some of these event selection cuts are designed to isolate background events that come from alpha decays in the neck region of DEAP-3600, from potential WIMP-candidate events originating in the spherical vessel. A re-optimization of these cuts against neck alpha backgrounds will be presented, that will improve the dark matter sensitivity by maintaining the same WIMP signal efficiency, while reducing background leakage.

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