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Study of neck alpha backgrounds in the DEAP-3600 dark matter detector

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DEAP-3600 is dark matter detector that will be searching for spin-independent interactions of weakly interacting massive particles with a 1000 kg fiducial volume of liquid argon contained in an acrylic sphere. Strict material selection has been implemented to minimize the presence of uranium and thorium. Alpha decays of these elements in the detector neck will produce scintillation light capable of mimicking a dark matter signal.

In order to estimate the backgrounds in the detector, projected material radioactivity levels have been incorporated into Monte Carlo simulations. A likelihood ratio algorithm has been developed based on these simulations to identify possible background events in the DEAP-3600 detector. The results of the Monte Carlo simulations, with focus on the algorithm developed, will be discussed.

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