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Pulse Finding and Single Photon Counting for the DEAP-3600 Experiment

Wednesday, 15 June 2016 13:15 (15 minutes)

DEAP-3600, comprised of a 1 tonne fiducial mass of ultra-pure liquid argon, is designed to achieve world-leading sensitivity for spin-independent dark matter interactions. DEAP-3600 uses an array of photomultiplier tubes (PMTs) to measure the time distribution of scintillation light arising from the de-excitation of argon dimers. This measurement allows background events from Ar-39 decays to be rejected at a high level using pulse shape discrimination. The performance of this analysis relies critically on DEAP's ability to identify pulses in the PMT waveforms and accurately assess the number of photo-electrons contributing to each pulse. This talk will present an algorithm developed for finding pulses and identifying the number of photoelectrons, as well as removing pulses from unwanted PMT artifacts. A method for quickly identifying single-photoelectron-like pulses and its use to provide a high level of data compression will also be discussed.

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