

Abstract Submitted
for the DNP19 Meeting of
The American Physical Society

Simulation and Random Coincidence Rejection of $2\nu 2\beta$ Decay Background in the CUPID Experiment RUOXI WANG, East China Normal University — The CUPID experiment (CUORE Upgrade with Particle ID) is a proposed experiment to search for neutrinoless double beta decay using both light and heat detectors. Due to the time resolution limits of those detectors, the random coincidence of two-neutrino double beta decay events (pile-up events) in the same crystal has become the main background that could limit the experimental sensitivity. Therefore, it is crucial to distinguish and reject pile-up events of two-neutrino double beta decay in CUPID. In this project, software simulations of two-neutrino double beta decay backgrounds have been built and algorithms of pile-up rejection, such as the mean-time method and derivative mean-time method, are discussed. Background index of pile-up two-neutrino double beta decay events is also computed with rejection efficiencies of such algorithms, and requirements on the risetime and signal-to-noise ratio of the detector pulses are derived. These results can provide possible constraints on detector sampling rate, energy and time resolutions, which are essential for future development of CUPID and the next-generation bolometric experiments.

Ruoxi Wang
East China Normal University

Date submitted: 27 Jun 2019

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