Crystal bolometer output raw data process with optimal filter assisted

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Luminescent bolometric technique is a promising approach to detect extremely rare events in particle physics (such as neutrino-less double beta decay and dark matter), as it has low detection threshold, unparalleled energy resolution and unique particle discrimination. The output raw data of bolometer is a continuous stream binary file, which was obtained via sampling the electronics readout signal with a certain sampling frequency in no-trigger mode. In this paper, we developed a data processing program based on optimal filter to further reduce the noise contribution, and a new trigger algorithm was applied to effectively extract signal events.

Summary

The raw average noise power is reduced by the optimal filter from 2.09 ADC (19.837
12 keV) to 0.26 ADC (2.468 keV), also the new trigger algorithm give a efficient signal triggers due to its ability to distinguish closed pileups. An effective PSD parameter was designed and give a better energy resolution of 0.4% FWHM at 2614 keV.

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