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Pulse Shape Analysis in Segmented Detectors as a Technique for Background Rediction in Ge $\beta\beta$ Decay Experiments[1] VICTOR M. GEHMAN, Los Alamos National Laboratory/University of Washington, MAJORANA COLLABORATION — The immense improvement in the sensitivity of $\beta\beta$ decay experiments has led to the need to use a variety of advanced signal processing techniques to further reduce experimental backgrounds. These techniques are primarily concerned with discerning single-site from multiple-site energy depositions. One such technique especially effective when using Ge detectors (for experiments utilizing ^{76}Ge as a $\beta\beta$ decay source) is pulse shape analysis. An exciting extension to this technique is the inclusion of detector segmentation. We present current status and results in support of the Majorana Project (a proposed next-generation $\beta\beta$ experiment using a large array of 86% enriched ^{76}Ge crystals as both source and detector), in which we study the effectiveness of this combination in discriminating between single and multiple-site energy depositions on an event-by-event basis. We performed this work using a commercial detector from Canberra known as a "Clover" (a Clover is a close-packed array of four 800g, two-fold segmented natural germanium detectors) on our test bench at Los Alamos National Laboratory. We report on our efficiency in distinguishing between single and multiple-site energy deposition as well as estimates of our effective spatial resolution using these techniques.

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