

Abstract Submitted
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An MCMC-based waveform analysis with p-type point contact detectors in the Majorana Demonstrator¹ BENJAMIN SHANKS, UNC - Chapel Hill, MAJORANA COLLABORATION — Statistical signal processing can be a powerful tool for extracting as much information as possible from raw data. By fitting data to a physical model of signal generation on an event-by-event basis, it can be used to perform precise event reconstruction and enable efficient background rejection. Searches for neutrinoless double-beta decay must achieve extremely low backgrounds to reach sensitivities required for discovery, and so can benefit greatly from this analysis technique. The MAJORANA DEMONSTRATOR has implemented a Markov Chain Monte Carlo (MCMC) signal processing algorithm to fit waveforms from p-type point contact (PPC) germanium detectors. After a machine learning step to tune detector fields and electronics response parameters, the MCMC algorithm is able to reconstruct the time, energy and position of interactions within the PPC detector. The parameters estimated with this method will find many applications within the DEMONSTRATOR physics program, including background identification and rejection. This will prove important as the DEMONSTRATOR aims to reach its background goal of < 3 counts/tonne/yr in the region of interest.

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