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Background decomposition of the GERDA data with BAT

GERDA is an ultra-low background experiment, designed to search for the neutrinoless double beta decay of Ge-76. The main background sources of such an experiment are minute radioactive contaminations of the experimental setup itself. Gaining a good understanding of the individual contributions to this radioactive background is vital not only for data analysis, but also guides the design of the next stage of the experiment.

The Bayesian Analysis Toolkit (BAT) was used to perform a full background decomposition of the GERDA Phase-I data. The Bayesian approach allowed the implementation of prior knowledge and the ability to handle competing models in a consistent way. It also yields a straightforward uncertainty propagation, taking the correlations between model components into account.

We describe the formulation of the analysis problem and the technical realization. The techniques described here are of general validity and interest, and have proven to be very successful.

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