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Bayesian signal processing of pulse shapes for background rejection in the Majorana Demonstrator[1] BENJAMIN SHANKS, Univ of NC - Chapel Hill, MAJORANA COLLABORATION — The MAJORANA DEMONSTRATOR uses high purity germanium (HPGe) detectors in the p-type point contact (PPC) geometry to search for neutrinoless double-beta decay ($0\nu\beta\beta$) in ^{76}Ge. Due to the unique electric potential created within the PPC geometry, the detailed pulse shape depends on the number of energy depositions contained within a given event. Pulse shape analysis (PSA) techniques can be used to estimate the number of separate depositions which combine to form a single pulse. This information can be used to discriminate between $0\nu\beta\beta$ candidate events, which deposit energy at a single detector site, and gamma ray background, which can scatter and deposit energy in multiple locations. The problem of determining whether a pulse is single- or multi-site is well suited to Bayesian classifiers. Once trained via supervised machine learning, these algorithms can perform nonlinear cuts against multi-site events using the estimated probability function as a discriminator. The Bayesian approach can also be naturally extended to incorporate a model of the physical process responsible for signal generation within the detector. Presented here is an overview of the Bayesian classifier developed for use on the DEMONSTRATOR.

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