

Abstract Submitted
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Locating a Radioactive High Voltage Nut for the Majorana Project BENJAMIN ROSE, Whitworth U., TUNL, MAJORANA COLLABORATION — MAJORANA is looking for a neutrinoless double beta decay in ^{76}Ge . Due to the necessity of low background radiation in MAJORANA, we wanted to see if one could locate a radioactively hot component, by analyzing GEANT4-generated Monte Carlo data. We used the data to determine the probabilities that a crystal will be hit given a source location. Our sources were the high voltage insulator nuts (HV nuts) spread through out the detector. We looked at their ^{224}Ra decay series, especially the ^{208}Tl peak with a region of interest (ROI) from 2.58 – 2.65 MeV. We studied the distribution of crystals that have events with energies in the ROI. We call this distribution the “hit” distribution. We created randomly filled hit distributions based on the probabilities obtained from simulation and used the Kolmogorov-Smirnov test to compare the random fill to all the possible source distributions. The source distribution with the best KS value is used to determine the location of the source. The results show that with approximately 200 counts from a HV nut and no background you can resolve the source to the exact HV nut to within 90% accuracy. With few events, we show that you can determine the region of the detector containing the HV nut to a 50% accuracy.

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