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Determining the Feasibility and Precision of an On-Site Radioactivity Test Chamber A.S. REDDY, Center for Experimental Nuclear Physics and Astrophysics, University of Washington, North Dakota State University Deptartment of Physics, J.A. DETWILER, P.J. DOE, R.A. JOHNSON, WESLEY KETCHUM, M.G. MARINO, A.G. SCHUBERT, B.A. VANDEVENDER, J.F. WILKERSON, CENPA, University of Washington — Backgrounds are a limiting factor to the sensitivity of many high precision nuclear physics experiments. Lowering these backgrounds is essential to experiments like Majorana and KATRIN, which look at neutrinoless double beta-decay and tritium beta-decay respectively. These backgrounds could be significantly reduced by using materials with low radioactivity. In order to aid these experiments in lowering backgrounds, we performed simulations to assess the feasibility and sensitivity with which an in-house radioactivity test chamber could be operated. Simulations were done in parallel with initial tests of the system. The system consists of two Ortec high purity germanium detectors housed in a lead chamber, which is shielded by scintillators used to determine cosmic coincidence. The programming utilized the Geant4 monte carlo toolkit, and analysis was done using ROOT. Simulations of calibration sources were compared with data in terms of spectral shape and overall normalization. The efficiency of the system was explored as a function of energy, detector orientation, and sample geometry. Simulations of the lead shielding and cosmic veto coverage were also done.

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