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An Assay of Radiopurity and Radon Emanation of the SuperNEMO Detector

SuperNEMO is a 0□□□ experiment designed to reach a half-life sensitivity of 10^26 years corresponding to an effective Majorana neutrino mass of □m_ββ □ < 50 – 100 meV. To ensure radiopurity of the detector, dedicated facilities have
been established for screening and selection of construction materials.
Gamma ray spectroscopy using high-purity germanium (HPGe) detectors
offers a standard method for the measurement of material contamination.
We will discuss sensitivities of HPGe detectors at Modane and Boulby underground laboratories and results obtained from screening of SuperNEMO detector materials and components.

Radon is one of the most dangerous backgrounds for SuperNEMO and most other low background experiments. To reach the target sensitivity, the 222Rn concentration inside the SuperNEMO tracker volume must be less than 0.15 mBq/m3. We will describe the design and performance of a 'Radon Concentration Line' which has been developed to make more sensitive measurements in large gas volumes than standard detectors. The apparatus has been commissioned and is capable of measuring radon
levels in large gas volumes down to ~10 μBq/m3. We will also describe Rn detection systems developed by the collaboration to measure radon emanation from large samples and to measure radon diffusion properties through different materials. Radon mitigation methods developed for SuperNEMO and applicable to other low background experiments will be presented.

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Track Classification: Neutrinoless Double Beta Decay