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Radon contamination measurement in the SuperNEMO demonstrator

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SuperNEMO is searching for the hypothesised lepton-number-violating process, neutrinoless double-beta decay (0vbb). The detector is based on the tracker-calorimeter technique, where the trajectories of the charged particles are first reconstructed, before the energies of the electrons being measured. The SuperNEMO Demonstrator is currently taken data with the full tracker and calorimeter.

The search for this very rare process implies a crucial reduction of all backgrounds, either originating from the allowed in the Standard Model double-beta decay with two neutrinos emission or from the natural radioactivity. Due to their high energy release, two isotope decays, if present in the double beta sources, could contribute : Thallium 208 and Bismuth 214. Moreover the contamination of the tracker with Radon 222 could lead to Bi-214 contamination on detector components adjacent to the double-beta source, which could mimic decays in the source. To render this contribution negligible, our goal is to keep radon activity in the tracker below 0.15mBq/m3.

To measure this activity, we look for the classic Bi-Po signature of Bi-214 decay, which emits electron followed by an alpha particle. Our selection of these events in the SuperNEMO Demonstrator is presented, as well as a preliminary measured activity for the tracker.

Submitted on behalf of a Collaboration?

Yes

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