

Abstract:

SuperNEMO is an experiment aiming to search for the neutrinoless double beta decay using a Tracker-Calorimeter Technique. A first module, called Demonstrator, is under construction and testing at the Laboratoire Souterrain de Modane (LSM) at 4800 m.w.e. depth. The Demonstrator aims to reach a sensitivity of $T_{1/2}^{0\nu} > 6.5 \cdot 10^{24} \text{ y}$ corresponding to $\langle m_\nu \rangle < (260 - 500) \text{ meV}$ with 17.5 kg.y exposure of ^{82}Se ($Q_{\beta\beta} = 2.99 \text{ MeV}$), another goal is to demonstrate that a SuperNEMO module can reach its background specifications. The Demonstrator tracker is ready to be commissioned after going through some hardware fixing. The tracker gas is expected to be very radio-pure in ^{222}Rn , with an activity of 0.15 mBq/m^3 . The Demonstrator calorimeter is already commissioned with 712 optical modules of which 440 with energy resolution of 8% at FWHM at 1 MeV, aimed to detect individual particles energies and time-of-flight. A preliminary calorimeter alignment was performed using the ^{208}Tl background Compton edge, and photomultipliers (PMTs) gain was equalized with <10% HV gain spread over all PMTs. PMTs signals are sampled by electronic boards and were tested to be stable and with low noise, waveform parameter optimization was implemented. Time calibration of the optical modules was done using a ^{60}Co where the 2 emitted gammas were detected in coincidence, resulting in primarily time resolution of $\sigma < 600 \text{ ps}$ for γ s @ 1 MeV. Magnetic coils, anti-radon tent, gamma and neutron shields are yet to be installed. Better time and energy calibrations are expected with the full demonstrator commissioning and an electron source. An overview of the commissioning of the SuperNEMO Demonstrator is presented.