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Calorimeter R&D for the Double Beta Decay Experiment SuperNEMO

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Summary

SuperNEMO is a next-generation double beta decay experiment based on the successful tracking plus calorimetry technology of the NEMO-3 experiment currently running in the Modane Underground Laboratory. Due to the separation of source and detector, SuperNEMO can study a range of isotopes. The baseline isotope choice is ^{82}Se and possibly ^{150}Nd . The total isotope mass will be in the range 100-200 kg. With this isotope mass a sensitivity to a half-life greater 10^{26} years can be reached which gives access to Majorana neutrino masses of 50-100 meV. One of the main challenges of the SuperNEMO project is the development of the calorimeter with an unprecedented energy resolution and radio-purity. The collaboration is carrying out a broad R&D programme focusing on the development of liquid and solid scintillators and ultralow-radioactive highly efficient photo-detectors in parallel. Extensive laboratory measurements are complemented by most up-to-date Monte Carlo optical simulations using GEANT4. The results obtained so far will be presented. SuperNEMO sensitivity dependence on the calorimeter parameters such as energy and time resolution, radio-purity, ageing etc. will be discussed.

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