

LNGS SEMINAR SERIES

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Latest results from NEMO-3 and status of SuperNEMO

The NEMO-3 experiment performed precise measurement of the double beta decay and searched for the neutrino-less double beta decay on seven isotopes, among which ^{100}Mo and ^{82}Se were the dominant ones. No evidence of $0\nu\beta\beta$ events has been found with an exposure of 34.7 kgxy of ^{100}Mo , providing a limit for the light Majorana neutrino mass mechanism of $T^{0\nu\beta\beta}_{1/2} > 1.1 \times 10^{24}$ y (90 % C.L.) which corresponds to an effective neutrino mass of $|m_{\beta\beta}| < 0.3 - 0.9$ eV, depending from the Nuclear Matrix Element considered. The same experimental technique has been adopted for the next generation experiment called SuperNEMO. The new detector has a modular design with the capability to measure different isotopes at the same time, ^{48}Ca , ^{82}Se and ^{150}Nd are currently under consideration. With 20 detection modules observing for 5 years 100 kg of ^{82}Se , the expected sensitivity should reach $T^{0\nu}_{1/2} > 10^{26}$ y ($|m_{\beta\beta}| < 0.04 - 0.10$ eV). In order to demonstrate the feasibility of the full experiment, the first step is the imminent construction of a first demonstrator module containing 7 kg of ^{82}Se . With an expected sensitivity of $T^{0\nu}_{1/2} > 6.6 \times 10^{24}$ y ($|m_{\beta\beta}| < 0.2 - 0.4$ eV) after 2.5 y, the demonstrator module will also be able to perform a competitive measurement. After a brief overview on the physics of the double beta decay and the current experimental scenario, the seminar will focus on the recent results obtained by NEMO-3 and on the status of SuperNEMO. A particular attention will be given to the imminent construction of the first demonstrator module.

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