

LNGS SEMINAR SERIES

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The EXO program and the quest for Majorana Neutrino Masses

With the definitive evidence for neutrino oscillations collected in the last decade, we now believe that neutrino masses are non-zero. Oscillation measurements, however, only measure mass differences and give us little information about the absolute values of neutrino masses. The hypothetical phenomenon of neutrino-less double-beta decay can probe the neutrino mass scale with exquisite sensitivity. This process, if observed, would also imply that neutrinos, unlike all other spin-1/2 particles, are of the Majorana type, that is they have wave functions with only two components. The observation of the neutrino-less double-beta decay would also imply the non-conservation of the lepton number. Following the well-known principle that there is no free lunch in life, interesting half-lives for neutrino-less double-beta decay exceed 10^{25} years (or $\sim 10^{15}$ times the age of the Universe) making experiments rather challenging. I will describe the the EXO program, including the recent measurements by EXO-200 that establish the present state of the art and the plans for a 5-ton enriched Xe detector, nEXO, that will have a sensitivity to Majorana masses below 10meV.

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