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Search for 2νββ- and 0νββ-decay with EXO

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In the search for the nature of the neutrino, neutrinoless double beta decay (0νββ) plays a significant role in understanding its properties. By measuring the 0νββ decay rate, it is hoped to verify the nature of the neutrino (Majorana or Dirac particle), lepton number violation and help determine the values for the absolute neutrino masses. The Enriched Xenon Observatory (EXO) is aiming at search for the 0νββ decay of Xe-136. EXO-200 is a Time Projection Chamber (TPC) that uses liquefied Xenon (LXe) as source for the nuclear decay and as detection medium. EXO-200 detector is located at deep underground salt mine (˜1585) m.w.e. at WIPP (Waste Isolation Pilot Plant) facility in New Mexico - USA.
EXO has published new results for the half lives of the 2νββ and a lower limit for 0νββ decays of Xe-136. The collaboration has reported T1/2 = (2.11 ± 0.04stat ± 0.21sys)x10ˆ21 yr for the 2νββ decay [2] and
T1/2 > 1.6x10ˆ25 yr (at 90% C.L.) for the 0νββ decay corresponding to effective Majorana masses less than 140-380 meV. Here we shed more light on these two results. As well as on the current R&D programs running in order to improve background suppression and the base lines for the next EXO phase (nEXO).

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