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# Neutrino-less double beta decay search with EXO-200 and nEXO

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The Enriched Xenon Observatory (EXO) is an experimental program designed to search for the neutrinoless double beta decay of $^{136}$Xe. Observation of this decay would prove that neutrinos are massive Majorana particles (i.e. they are their own anti-particles), and constitute physics beyond the Standard Model. The first phase experiment, called EXO-200, has re-started operation at the WIPP mine in New Mexico, USA, using 200 kg of liquid xenon enriched to 80% in $^{136}$Xe in an ultra-low background time-projection chamber (TPC). The detector performance and response has been thoroughly tested and is well understood. With the EXO-200 detector sensitive searches for neutrinoless and two neutrino double beta decays have been performed along with searches for exotic decay modes and decays to excited states. Some of these searches provided the most stringent limits on these decay modes.

In parallel to the operation of EXO-200, the development of nEXO, a next-generation liquid xenon TPC has started. The nEXO detector will consist of 5T enriched xenon and will be deployed at a selected underground laboratory, ideally the SNOLab facility in Sudbury. Advanced detection technologies are being developed to read out charge and scintillation signals from the xenon TPC, such as charge readout tiles and Si photo multipliers, respectively. With these technologies and the increased target mass, the nEXO detector has the potential to completely probe the inverted neutrino-mass scale.

The status of the EXO-200 detector, detector performance, and analysis techniques applied to achieve the current results will be discussed. In addition, current design efforts for the future multi-ton experiment nEXO will be discussed.

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