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The Enriched Xenon Observatory (EXO) for Double Beta Decay

The Enriched Xenon Observatory (EXO) is an experimental program designed to search for the neutrinoless double beta decay of Xe-136. Observation of this decay would determine an absolute mass scale for neutrinos, 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 is running at the WIPP salt mine in New Mexico using 200 kg of liquid xenon enriched to 80% in Xe-136 in an ultra-low background TPC. Data taken up to April 2012 has yielded the first measurement of two-neutrino double beta decay in Xe-136, the most precise two-neutrino double beta decay measurement of any isotope to date, and a limit on the neutrinoless double beta decay mode that places one of the most stringent limits on the effective Majorana neutrino mass. The EXO-200 detector performance and analysis techniques to achieve the current results will be discussed. In addition, current design efforts for a future multi-ton experiment called nEXO based on the success of EXO-200 will be discussed.

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