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Results and Prospects of Neutrinoless Double Beta Decay Search with EXO

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The Enriched Xenon Observatory (EXO) is an experimental program, which aims to perform the most sensitive search for neutrinoless double beta decay using ^{136}Xe. Such a search can shed light on the Majorana nature of the neutrino (whether the neutrino is its own anti-particle), the absolute mass scale of neutrinos, and beyond standard model processes that violate lepton number conservation. The first phase of the experiment, EXO-200, uses 200 kg of xenon with 80% enrichment in ^{136}Xe in a single-phase liquid xenon time projection chamber (TPC). The double beta decay of xenon is detected in the ultra-low background TPC by collecting both the scintillation light and the ionization charge. The detector has been taking low background physics data with enriched xenon at the Waste Isolation Pilot Plant (WIPP) in New Mexico since early May 2011. The collaboration has produced two high impact physics results, the first observation of two-neutrino double beta decay of ^{136}Xe and a neutrinoless double beta decay search result that places one of the most stringent limits on the effective Majorana neutrino mass. Building on the success of EXO-200, the collaboration is performing feasibility studies and R&D work for a future multi-tonne scale experiment named nEXO. During the talk, I will discuss the latest results from EXO-200 and prospects of neutrinoless double beta decay search with both EXO-200 and nEXO.