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Time projection chamber design for the nEXO neutrinoless double beta decay experiment[1] JOHN ORRELL, Pacific Northwest Natl Lab, NEXO COLLABORATION — The nEXO Collaboration is developing a ton-scale neutrinoless double beta decay experiment employing an enriched Xe-136 target. The enriched liquid xenon is operated as a time projection chamber (TPC) providing event timing and position reconstruction. The goal is to search for excess events at the 2458 keV endpoint of the Xe-136 double beta-decay energy spectrum. An event excess at this energy would imply the existence of a decay branch that does not emit the otherwise required two antineutrinos that should accompany the beta particles. Current measurements set a limit on the neutrinoless double beta decay of Xe-136 at a half-life of greater than 10^{26} years. To investigate the possibility of neutrinoless double beta decay with a longer half-life of order 10^{28} years, a large 5-ton volume of LXe will be operated in a time projection chamber format. This presentation will describe the single-phase, LXe time projection chamber design concept, emphasizing the choices made to minimize sources of radioactive backgrounds while enhancing the ability to discriminate single-site, signal-like events from multiple-site, background-like events. Some of the technical challenges of designing such a large time project chamber will also be presented.

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