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Neutrinoless double beta decay with nEXO

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Neutrinoless double beta (0νββ) decay is a process in which a nucleus (A,Z) decays to (A,Z+2) with the emission of two electrons (but no neutrinos). Experimental searches for such a decay are the most sensitive test of lepton-number conservation and its discovery would unambiguously prove the Majorana nature of neutrinos, with profound implications for cosmology in addition to particle and nuclear physics. This process is also a sensitive probe of the absolute neutrino mass scale.
EXO (Enriched Xenon Observatory) is an experimental program searching for 0νββ decay of 136Xe. After a successful 200-kg experiment (EXO-200), a next generation experiment, nEXO, is proposed and in advanced design phase. nEXO is a 5-tonne liquid xenon TPC with a sensitivity to the 0νββ decay half-life of 136Xe of ˜10ˆ28 years. It builds on the EXO-200 experience while introducing novel technical solutions, such as the use of VUV-sensitive silicon photomultipliers (SiPMs) placed behind an optically open electric filed shaping electrode structure, a novel planar tiled charge collection system, in-xenon low-radioactivity cryogenic read out electronics, and minimal use of plastic materials to minimize the outgassing of electronegative impurities into the LXe volume.
This talk introduces the physics case for the investigation of neutrinoless double beta decay and overviews the nEXO design and expected sensitivity.

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