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Neutrinoless double beta decay search using liquid xenon (I)

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The use of enriched liquid Xe-136 (LXe) offers significant advantages to search for double beta decay processes. A discovery of the neutrinoless mode (0νββ) would reveal new properties of neutrinos including first measurement of its mass scale, evidence that they are their own antiparticles, and a first observation of lepton number violation.

The Enriched Xenon Observatory (EXO) employs a time projection chamber filled with LXe to search for 0νββ, which allows an efficient and monolithic detector, ideal to identify and separate background arising from gamma rays. The EXO-200 is a 100-kg class detector in operation at the WIPP mine in New Mexico, USA. Its latest search for 0νββ is among the world's best, with sensitivity to the 0νββ half-life of 3.7×10^{25} yr at the 90% confidence level. To further reject backgrounds, this search introduced a boosted decision tree trained on multiple topological variables. Rooted in the success of EXO-200, nEXO is a tonne-scale detector being designed to reach a sensitivity near 10^{28} yr.

In this talk, the latest results with EXO-200 as well as projections for nEXO, the next generation experiment, will be discussed.

Primary author: Prof. LICCIARDI, Caio (Laurentian)

Presenter: Prof. LICCIARDI, Caio (Laurentian)

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