



Contribution ID: 781

Type: **Parallel Talk**

## Measurement of the $^{136}\text{Xe}$ $\beta\beta 2\nu$ half-life with NEXT-White

*Saturday, 9 July 2022 12:15 (15 minutes)*

The NEXT (Neutrino Experiment with a Xenon TPC) collaboration aims at the sensitive search of the neutrinoless double beta decay ( $\beta\beta 0\nu$ ) of  $^{136}\text{Xe}$  at the Laboratorio Subterraneo de Canfranc (LSC). The observation of such a lepton-number-violation process would prove the Majorana nature of neutrinos, providing also handles for an eventual measurement of the neutrino absolute mass. A first large-scale prototype of a high-pressure gas-Xenon electroluminescent TPC, NEXT-White, was operated at the LSC from 2016 to 2021. This 5-kg radiopure detector demonstrated the outstanding performance of the NEXT technology in terms of the energy resolution ( $<1\%$  FWHM at 2.6 MeV) and the topology-based background rejection. NEXT-White also measured the relevant backgrounds for the  $\beta\beta 0\nu$  search using both  $^{136}\text{Xe}$ -depleted and  $^{136}\text{Xe}$ -enriched xenon. In this talk, the measurement of the half-life of the two neutrino mode of the double beta decay ( $\beta\beta 2\nu$ ) will be presented. For this measurement, two novel techniques in the field have been used: 1) a Richardson-Lucy deconvolution to reconstruct the single and double electron tracks, boosting the background rejection, and 2) a direct subtraction of the backgrounds, measured with  $^{136}\text{Xe}$ -depleted data. These techniques allow for background-model-dependent and background-model-independent results, demonstrating the robustness of the  $\beta\beta 2\nu$  half-life measurement and the unique capabilities of NEXT.

### In-person participation

Yes

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