Introduction

NEXT is a neutrinoless double beta decay experiment located at the Canfranc Underground Laboratory in Spain.

NEXT-White, a 5-kg radiopure detector has proven 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. It has also measured the background (<2.6 MeV) and the topology-based technology in terms of the energy resolution (<1% FWHM at 2.6 MeV) and the topology-based technology in terms of the energy resolution (<1% FWHM at 2.6 MeV).

In order to compare the rates for each data taking period some corrections on the gas density, selection efficiency and DAQ livetime have been applied.

Analysis

Both dependent and independent on the background model analysis have been accomplished. The latter performs a direct subtraction of the background (32Xe-depleted data) to the 136Xe-enriched data.

$T_{1/2}^{\beta\beta}$ measurement

Background model - dependent

Event energy fit

Background model - independent

No overlap selection

Blob energy fit

Best fit value of 4 parameters (one per isotope) + best fit value of $T_{1/2}^{\beta\beta}$

$T_{1/2}^{\beta\beta}$, derived from the energy/ subtraction rate dependence fitted to the corresponding MC expectations.

Fit blob 2 energy distribution of the rate excess

Work in progress!

Richardson-Lucy deconvolution

The inclusion of this novel technique in the event reconstruction removes the blurriness of the tracks produced by the diffusion of ionization electrons at the XY plane when traveling to the anode, and the spread of light produced in the electroluminescence process [1]. Eventually, this tool provides highly refined images of events leading us to a significant upgrade in the signal/background discrimination.

Selection cuts

Fundamental to increase the signal/background ratio.

Background selection

Inclusive sample

Event energy fit

No overlap selection

Blob energy fit

Energy_blob2 > Energy(evtx)

No overlap selection

Peaks

Decays

Background-subtracted spectrum superimposed to the best-fit 2$\nu$MC.

Although the obtained precision on the measurement is limited by the small amount of 136Xe mass, it is worth noticing that the NEXT-White results are compatible with the $T_{1/2}^{\beta\beta}$ values provided by EXO-200 [2] and KamLAND-Zen400 [3].

References:

