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The NEXT way to neutrinoless double beta decay

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NEXT (Neutrino Experiment with a Xenon TPC) is aimed to search for neutrinoless double beta decay with a high pressure xenon TPC. It is being built in the Underground Laboratory of Canfranc, in the Spanish Pyrenees and it is going to start commissioning in late 2013- beginning of 2014, after a successful R&D period developed with prototypes.
NEXT-100 is an electroluminescent, asymmetric TPC which is going to host 100 kg of the Xe-136 isotope at 15 bar of pressure. Its original concept consists of the use of electroluminescence as an amplification mean and two separated-function capabilities for energy measurement and tracking. On one side, a sparse array of photomultipliers records both the primary scintillation signal, which gives the starting time of the event, and the total deposited energy, while, on the other side, a dense grid of silicon photomultipliers provides the reconstruction of the position. Being able of reconstructing the position is doubly useful: one hand, it allows the correction of the energy of the event, which is distortioned according to the position, and on the other hand it provides an extra handle for background rejection, since the topology is different for the signal and the principal backgrounds.

The two NEXT protoypes currently running have already demonstrated an energy resolution that extrapolates to 0.5-0.8% FWHM at the Qbb energy. Also, a a background count lower than 8 x 10^-4 c/(kgkeVyr) is estimated for NEXT-100, according to the tracking capability and the radiopurity measurements of the materials being used for the NEXT-100 construction. These two factors place NEXT among the most promising experiment in the field.

The purpose of this talk is to explain the operation of the NEXT-100 detector and the physics potential of the experiment.

Primary author: Ms FERRARIO, Paola (IFIC - Valencia)

Presenter: Ms FERRARIO, Paola (IFIC - Valencia)

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