Contribution ID: **853** Type: **Parallel Talk**

The NEXT double beta decay experiment

Friday, July 7, 2017 4:30 PM (15 minutes)

NEXT (Neutrino Experiment with a Xenon TPC) aims to observe the neutrinoless double beta decay of Xe-136 in a high-pressure gas xenon Time Projection Chamber using electroluminescence to amplify the signal from ionization. The two main advantages of this technology are a high energy resolution and the possibility of reconstructing the electron tracks in events with energies close to the Q-value of the decay to use it to distinguish signal (two electrons) from background (single electron).

NEXT-100 is an electroluminescent, asymmetric TPC which is going to host 100 kg of the Xe-136 isotope at 15 bar of pressure. On one side, a sparse array of photomultipliers records both the primary scintillation signal, which gives the starting time of the event, and the electroluminescence signal, which gives a precise measurement of the total deposited energy.
On the other side, a dense grid of silicon photomultipliers provides the reconstruction of the electron tracks. Being able of reconstructing the position of a track 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 a two-electron track and a single-electron track show higher energy density at both ends, and only at one end, respectively.

After a protoyping period (2009-2014) NEXT has completed the construction and started the operation of its first phase (NEW) in the Canfranc Underground Laboratory, in the Spanish Pyrenees, with the objectives of measuring the NEXT background model and the two-neutrino mode of the double beta decay. In this talk I will describe the NEXT concept and present the latest results of the NEW detector.

Experimental Collaboration

NEXT

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Session Classification: Neutrino physics

Track Classification: Neutrino Physics