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P4.066 The NEW detector: construction, commissioning and first results

M Nebot-Guinot

Instituto de Física Corpuscular (IFIC), CSIC & Universitat de València, Spain

on behalf of NEXT Collaboration

NEXT (Neutrino Experiment with a Xenon TPC) is a neutrinoless doublebeta ($\beta\beta 0\nu$) decay experiment at the Canfranc Underground Laboratory (LSC). It seeks to detect the $\beta\beta 0\nu$ decay of Xe-136 using a high pressure gas TPC with electroluminescent (EL) amplification. The EL light can be detected in two separate sensor planes, one optimized for calorimetry and another for tracking. Energy resolution and background suppression are the two key features of any neutrinoless double beta decay experiment. Prototype detectors of the NEXT concept have been used to demonstrate energy resolution of better than 1% FWHM at $Q_{\beta\beta}$ as well as to demonstrate the background rejection power of track reconstruction in a TPC.

The NEW (NEXT-White) detector implements the solutions found for and improved from those used in the prototypes at a larger scale and with radiopure components. NEW, with an active xenon mass of about 10 kg at 15 bar, will benchmark the signal selection and reconstruction algorithms developed at a scale more compatible with extrapolation to the future NEXT-100 under the same conditions. In this way the sensitivity to the observation of $\beta\beta 0\nu$ will be assessed. The detector is currently under commissioning at the LSC. In this poster we describe the technical solutions adopted for NEW construction, the lessons learned from the commissioning phase, and the first results on energy calibration and energy resolution obtained with low-energy radioactive source data