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NEXT: Searching for the $bb0n$ decay in the Canfranc Underground Laboratory

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Although different techniques are used to search for the neutrinoless double beta decay, the common challenges for all the existing or planned experiments are to achieve a good energy resolution and large background rejection factors. The NEXT collaboration addresses these two challenges with a high-pressure gas-Xenon electroluminescent TPC, where the isotope ^{136}Xe is used as both the source and the detection medium. The capabilities of this technology have been demonstrated with two small prototypes, NEXT-DBDM and NEXT-DEMO, which were built and operated between 2009 and 2013. The energy resolution has been measured to be below 1% at the Q value of ^{136}Xe , while the reconstruction of the electron tracks provides a powerful background identification handle. A larger prototype containing 10 kg of Xe, NEXT-NEW, is being built in the LSC. This detector will start operation in 2015 with the goal of measuring the $bb0n$ background and the $bb2n$ decay. Given the scalability of the TPC technology, NEXT-NEW will set the grounds for the NEXT-100 detector (100 kg of ^{136}Xe) that will be operated in the LSC in 2017, searching for the $bb0n$ decay up to a half-life of about 6×10^{25} years after 3 years of data taking.

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