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Status of the NEXT project

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The NEXT program is developing the technology of high-pressure Xe gas TPCs with electroluminescent amplification (HPXe-EL) for neutrinoless double beta decay searches. The first phase of the program included the operation of two small prototypes, NEXT-DEMO and NEXT-DBDM, which demonstrated the robustness of the technology, its excellent energy resolution and its unique topological signature. The NEXT-White radiopure demonstrator (50 cm diameter and length) is the second phase of the program and has been operating in Canfranc underground laboratory since October 2016 with 5 kg of depleted Xe (to be replaced by Xe enriched to 90% 136Xe). NEXT-100 constitutes the third phase of the program. It will deploy 100 kg of enriched Xe at 15 bar and is a scale-up of NEXT-White by ˜2:1 in linear dimensions. In addition to a physics potential which is competitive with the best current experiments in the field, NEXT-100 can be considered as a large scale demonstrator of the suitability of the HPXe-EL technology for detector masses in the ton-scale. In this talk we will describe the NEXT-White detector and its latest results on energy resolution, topology and background rate, discuss the expected physics reach of NEXT-100 and outline ongoing R&D activities towards a ton-scale HPXe-EL detector. These include, in particular, the use of low-diffusion Xe gas mixtures for better imaging, cryogenic operation of the TPC and the development of barium tagging techniques.

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