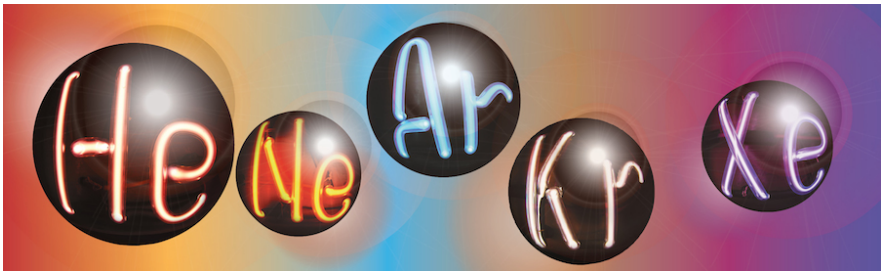

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Status and prospects of the NEXT experiment

Thursday, 22 September 2022 14:15 (15 minutes)

NEXT is an experimental program aimed at the detection of neutrinoless double beta (ββ0ν) decay in 136Xe. The collaboration has recently concluded the operation of NEXT-White: a 50-cm diameter and length TPC holding Xe at 10 bar. The experiment, hosted at the Laboratorio Subterráneo de Canfranc, under the Spanish Pyrenees, has demonstrated the two key features of the NEXT technology: an excellent energy resolution (≤1% FWHM at Qββ) and an efficient topology-based background suppression capability. Furthermore, the data collected with NEXT-White has yielded an independent measurement of the half-life of the two-neutrino mode of the decay using a unique model-independent background subtraction method.

The collaboration is currently beginning the construction of the next stage of development: NEXT-100. This TPC, twice as large as NEXT-White in every dimension, will hold 100 kg of 136Xe-enriched gas at 15 bar. This apparatus will serve as a large-scale demonstrator, with a ββ0ν half-life sensitivity in excess of 1025 y.

In parallel, the collaboration is running an R&D program to develop the technology to be implemented in a tonne-scale detector succeeding NEXT-100 in about five years, with a sensitivity on the scale of 1027 y. In addition, extensive research focuses on developing the capability of detecting the 136Ba ion resulting from the ββ decay that could make NEXT an essentially background-free experiment, promoting the sensitivity of the detector to 1028 y.

This talk will summarize the status of the NEXT program, present the most recent results and outline the road to the following stages of the experiment.

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