

Searching for the neutrinoless double beta decay with NEXT-100

Tuesday, 18 June 2024 17:30 (2 hours)

The NEXT experiment aims at the sensitive search of the neutrinoless double beta decay ($\beta\beta 0\nu$) in ^{136}Xe , using high-pressure gas electroluminescent time projection chambers. After the successful operation of the NEXT-White detector, which performed the first searches of the double beta decay with the novel NEXT technology using a limited amount of Xe (~ 5 kg), the collaboration has started the operation of the NEXT-100 detector. This detector, holding up to 80 kg of Xe at 15 bar, was installed during 2023 in the Laboratorio Subterráneo de Canfranc (LSC), and it is currently undergoing a commissioning and calibration stage. NEXT-100 is equipped with 60 PMTs for the detection of the primary scintillation light and the energy measurement, as well as with 3584 SiPMs meant to provide the topological signature of the events. According to an extensive radiopurity screening campaign, and the energy resolution ($< 1\%$ FWHM) and topology-based background rejection factors measured in NEXT-White, the expected background index in NEXT-100 is below 10^{-3} counts/keV/kg/year. This corresponds to a sensitivity to the half-life of the $\beta\beta 0\nu$ decay of 6×10^{25} yr (90% C.L.), after 3 years of data taking. This detector will also set the grounds for the construction of a ton-scale detector, NEXT-HD, boosting the sensitivity above 10^{27} yr. Thus, after the first years of operation, NEXT-100 will be upgraded to demonstrate the advanced readout solutions to be implemented in NEXT-HD.

Poster prize

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Session Classification: Poster session and reception 1

Track Classification: Neutrinoless Double Beta Decay