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Exploring New Physics up to the MeV energy scale with XENONnT

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The XENON collaboration primarily focuses on detecting the first direct evidence for the existence of Dark Matter (DM) in the Universe using xenon double-phase time projection chamber detectors. The latest iteration of XENON experiments, XENONnT, is currently accumulating scientific data at the LNGS underground laboratory in Italy with a target mass of 5.9 tonnes of liquid xenon. The exceptional level of radioactivity reduction achieved in XENONnT makes it suitable for a broad range of rare-events searches beyond DM. Among these searches, the exploration of double-weak decays is of great interest. In particular, the Xe124 double electron capture and two-neutrino/neutrinoless double beta decay of Xe136 represent promising channels to investigate in XENONnT. These processes exhibit an expected electronic recoil signal that can reach up to the few MeV energy scale, which falls within a different region of interest than the standard DM search. We have demonstrated the ability of xenon dual-phase TPCs to conduct such research, validating the expansion of the physics reach accessible by this detector technology. This presentation will cover the latest results and current status of high-energy searches with the XENONnT experiment.

Submitted on behalf of a Collaboration?

Yes

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