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Neutrinos in XENONnT dark matter experiment

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The XENONnT experiment, which is the current phase of the XENON project, located at Laboratori Nazionali del Gran Sasso (Italy), aims to directly detect WIMP dark matter employing a dual-phase TPC with a 5.9 tonnes liquid xenon target. The first science run collected a total exposure of more than 1 tonne-year. The search for nuclear recoils induced by WIMPs, performed with a blind analysis, showed no significant excess and the ultra-low background achieved in XENONnT allowed the most sensitive searches for electronic recoils produced by solar axions and bosonic dark matter. The XENONnT experiment can also perform several neutrino searches besides dark matter, which will be illustrated. The neutrino magnetic moment, for which limits can be set, would enhance the elastic scattering of solar neutrinos with xenon electrons. Even without this enhancement, solar *pp* neutrinos could be observed via the ordinary elastic scattering off electrons.
Solar neutrinos are expected to induce nuclear recoils through coherent elastic scattering off xenon nuclei. The detection of this process, never observed for solar neutrinos, would be possible for ^{8}B neutrinos in XENONnT with increased exposure. In this way, supernova neutrinos can also be detected, resulting in a rise in the rate monitored by the triggerless data-acquisition system. Given the double-beta decaying ^{136}Xe with 8.9% abundance in the target mass, the XENONnT detector is sensitive to the neutrinoless double-beta decay of this isotope. The expected sensitivity is not competitive with dedicated experiments but demonstrates the feasibility of this search in the next-generation LXe dark matter detectors.

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