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XENON Dark Matter Search

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The XENON suite of experiments, situated at the Laboratori Nazionali del Gran Sasso (LNGS) in Italy, aim at the direct detection of Dark Matter in the form of WIMPs (Weakly Interacting Massive Particles) via their elastic scattering off xenon nuclei. The detector concept is based on a dual phase liquid xenon time projection chamber.

The currently operating phase of the XENON Dark Matter project is the XENON100 detector, which contains 161kg of xenon (61 kg inside the TPC) and is taking data since 2009. We present current constraints set by XENON100 for elastic WIMP-nucleon scatter cross-sections and highlight recent results from other Dark Matter and rare event searches, calibrations and tests.

Construction and commissioning of the next generation detector, XENON1T, is at an advanced state. The goal of this third XENON experiment is to achieve a sensitivity for the spin-independent WIMP-nucleon elastic scattering cross section of $2 \cdot 10^{-47}$ cm² for a 50 GeV WIMP. This sensitivity improvement by two orders of magnitude, compared to its predecessor XENON100, requires, beside a fiducial target mass of about 1 ton liquid xenon (LXe), a similar reduction in background (< 1 background event per year in 1 ton fiducial volume). Here, we present the status of the XENON1T experiment, an introduction to its sub-components and background reduction mechanisms as well as its WIMP discovery potential.

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