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The XENON program: performances of the XENON100 detectors and development of the new detector XENON1T

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The aim of the XENON program is to search for dark matter particles through their interaction in an ultra-pure medium. A favourite dark matter candidate are the so-called WIMPs, which can be detected via their elastic scattering off Xenon nuclei. The XENON dark matter program consists in operating and developing 3-D position-sensitive double-phase time projection chambers (TPCs) using ultra-pure liquid Xenon as both target and detection medium by employing an increasing fiducial target mass scale. The ability to localise events within millimetre resolution, enables to minimise the background by selecting events in the fiducial volume and exploiting the self shielding property of Xenon. The current phase of the project is the XENON100 detector with 160 kg of liquid Xenon, located deep underground in the Gran Sasso National Laboratory (LNGS), in Italy. We will give an overview of the XENON100 detector performances, describing in detail the energy and position reconstruction. We will present also the adopted improvements for the next detector, XENON1T, currently under construction at LNGS, that will host 3.3 tonnes of ultra-pure liquid Xenon.

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