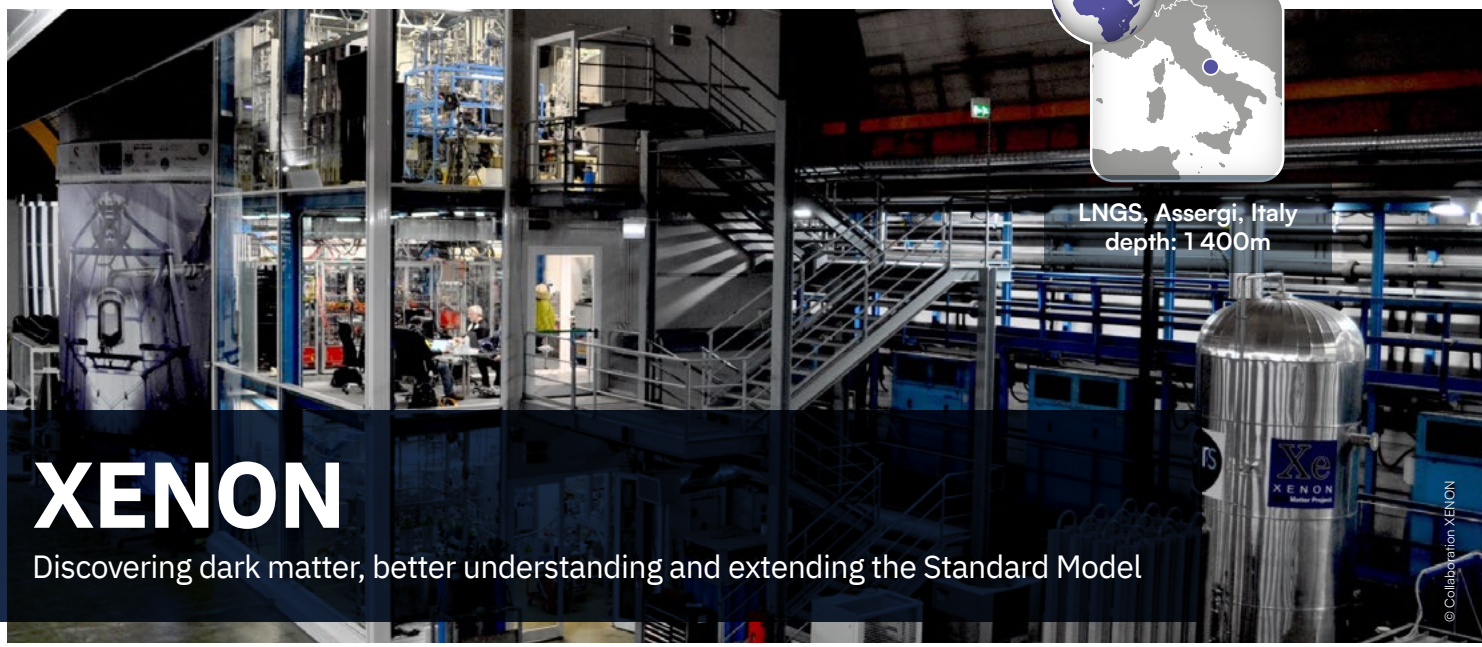
NUCLEAR & PARTICLES

National institute of nuclear and particles physics

Direct Search for Dark Matter



XENON

Discovering dark matter, better understanding and extending the Standard Model

Scientific leader: Luca Scotto-Lavina (LPNHE) *

Laboratories involved: LPNHE (Paris), Subatech (Nantes)

Nature: research infrastructure

Status: international collaboration involving 13 countries on 4 continents

Website: https://xenonexperiment.org/

Scientific objectives

The experiments of the XENON collaboration, with today XENONnT, aim to find the first direct evidence for the existence of "dark matter" in the Universe, via the scattering of particles of this matter with target xenon nuclei. The XENONnT phase will also be able to investigate other important phenomena that open up new physics, such as the search for axion-like particles and the detection of double beta decays without neutrino emission. XENONnT started collecting data in 2021.

Resources deployed

XENONnT is installed about 1 500 metres underground at the Gran Sasso underground laboratory in Italy, so that it is protected from external radiation. The telescope is a 1.5-metre-high, 1.5-metre-diameter tank filled with 10 tonnes of very pure liquid xenon, cooled to -95°C and protected from radiation by an additional water shield. Its core is the quietest place on earth.

10t of liquid xenon

€ 20M total cost

4 generations of detectors since 2006: XENON 10, 100, 1T and nT

190 scientists, including a dozen at IN2P3

26 research institutions in **13** countries

IN2P3 CONTRIBUTIONS

- Successive contributions since 2009 to the XENON100, XENON1T and XENONnT experiments.
- Construction, deployment and operation of the largest liquid xenon filling stations, the ReStoX1 and ReStoX2 units. These stations allow the storage, distribution and recovery of xenon from the XENON collaboration facilities.
- Contribution to the scientific activity of the collaboration.

2006 Taking data with the XENON 10 prototype

2008 Data collection with XENON 100

2009 IN2P3 joins the XENON collaboration

2014 Start of XENON1T construction with the installation of ReStoX1

2017 XENON1T becomes the most sensitive WIMPs detector in the world with 34 days of exposure

2019 XENON1T measures the slowest radioactive decay ever observed

2021 XENONnT starts its first scientific run

* Since 2023

April 2024