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Direct Dark Matter search with the XENON program

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Astronomical and cosmological observations indicate that a large amount of the energy content of the Universe is made of dark matter. Particle candidates, under the generic name of Weakly Interacting Massive Particles (WIMPs), arise naturally in many theories beyond the Standard Model of particle physics. The XENON100 detector, the current phase of the XENON direct dark matter search program, is a dual phase time-projection chamber operated at the Laboratori Nazionali del Gran Sasso (LNGS), that aims to detect galactic dark matter through the elastic nuclear scattering of WIMPs from xenon target nuclei.
We present in detail the analysis procedure and the results from Run10 data, the latest science data run (lasting for 13 months during 2011 and 2012), focusing on the spin-independent WIMP-nucleon interaction. A blind analysis of 224.6 live days 34 kg exposure has yielded no evidence for dark matter events. Thanks to the ultra-low electromagnetic background of the XENON100 detector, about 5 x 10^-3 events (kg day keV)^-1, our collaboration has set the most stringent limit to date, excluding spin-independent WIMP-nucleon cross-sections above 2 x 10^-45 cm^2 for a 55 GeV/c^2 WIMP mass at 90% confidence level.
In addition, we show further ongoing analyses and describe the status and physics goal of XENON1T, the next phase of the program.

Auteur principal: Dr BELTRAME, Paolo (Weizmann Institute of Science)

Orateur: Dr BELTRAME, Paolo (Weizmann Institute of Science)

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