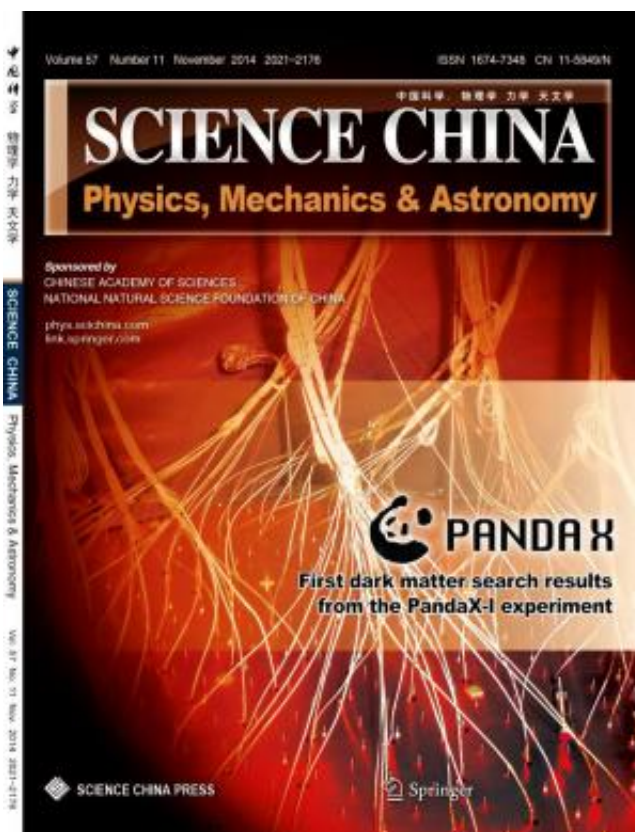


First dark matter search results from Chinese underground lab hosting PandaX-I experiment

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Scientists across China and the United States collaborating on the PandaX search for dark matter from an underground lab in southwestern China report results from the first stage of the experiment in a new study

published in the Beijing-based journal *Science China Physics, Mechanics & Astronomy*.

PandaX is the first dark matter experiment in China that deploys more than one hundred kilograms of xenon as a detector; the project is designed to monitor potential collisions between xenon nucleons and weakly interactive massive particles, hypothesized candidates for dark matter.

In the new study, [scientists](#) explain, "Dark matter is a leading candidate to explain gravitational effects observed in galactic rotational curves, galaxy clusters, and large scale structure formation."

"Weakly interacting massive particles (WIMPs), a particular class of dark matter candidates, are interesting in particle physics and can be studied in colliders [and in] indirect and direct detection experiments."

If confirmed, dark matter particles would extend understanding of the fundamental building blocks of nature beyond the Standard Model of particle physics, and would provide support for theories on supersymmetry and extra dimensions of space-time.

"Direct positive detection of WIMPs using ultra-low background detectors in deep underground laboratories would provide convincing evidence of dark matter in our solar system and allow the probing of fundamental properties of WIMPs," they add in the new study.

Direct detection experiments using different technologies have produced many interesting results, but not universally confirmed evidence of weakly interacting massive particles. These results have produced much excitement across the global scientific community and call for further examination of WIMP signals through other experiments.

"In recent years, new techniques using noble liquids (xenon, argon) have shown exceptional potential due to the capability of background suppression and discrimination, and scalability to large target masses," state the PandaX collaborators. "The XENON10/100 and LUX experiments using the dual-phase technique have improved WIMP detection sensitivity by more than two orders of magnitude in a wide mass range."

China's PandaX experiment, operated at the China Jinping Underground Laboratory, uses the dual-phase xenon technique to search for both low and high mass WIMP dark matter.

The initial success of the PandaX project demonstrates China has joined the global competition at the scientific frontier marking dark matter searches.

Today more than twenty dark matter search experiments are being conducted worldwide. Many dark matter search experiments, such as the DAMA/LIBRA experiment in Italy, the CoGeNT and CDMS experiments in the US, and the German-led CRESST experiment have reported findings that could be interpreted as positive signals of dark matter in recent years.

The PandaX collaboration joins this effort with results from a dark matter search that started in May of 2014.

No dark matter signal was observed in the first PandaX-I run, which places strong constraints on all previously reported dark matter-like signals from other similar types of experiments.

The PandaX experiment to date has collected about 4 million raw events; only about ten thousand events fell into the energy region of interest for dark matter. In the quiet central part of the xenon target only 46 events

were observed.

However, the data from these 46 events was consistent with signals marking background radiation, not dark matter.

PandaX stands for Particle and Astrophysical Xenon Detector. The experiment is being conducted by an international team of about 40 scientists, and led by researchers from Shanghai Jiao Tong University.

The goal of the first stage of PandaX experiment is to examine previously reported dark matter-like signals. The scale of the PandaX-I experiment is second only to that of LUX, which is currently the planet's largest [dark matter](#) experiment and is located in a South Dakota mine in the US.

To shield the Chinese experiment from cosmic rays, the PandaX detector is located at the China Jinping Underground Laboratory (CJPL), the deepest underground laboratory in the world. CJPL was developed by Tsinghua University and the Yalong River Hydropower Development Company in 2010.

More information: Xiao M J, Xiao X, Zhao L, et al. First dark matter search results from the PandaX-I experiment. Sci China-Phys Mech Astron, 2014, 57: 2024-2030, [DOI: 10.1007/s11433-014-5598-7](https://doi.org/10.1007/s11433-014-5598-7) .
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