ANNUAL REPORT

2025 - 2026

Shaping tomorrow, deep underground.

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Message from the Executive Director

As we reflect on the past year, one theme stands out clearly: a commitment to building the future.

For years, researchers from around the world have come to SNOLAB to pursue answers to some of science's most profound questions. Our role extends beyond enabling today's research; we must also prepare for tomorrow's scientific opportunities.

This year, we advanced world-leading research while strengthening the infrastructure, partnerships, and capabilities that will support the next generation of underground science. We hosted major scientific meetings, joined international collaborations, and contributed to discussions shaping the future of large-scale research facilities.

We also continued to invest in people. Through programs such as the SNOLAB Underground Science Institute (SuSi), or our highly successful co-op and Engineers-in-Training programs, we are helping develop the next generation of scientists, engineers, technicians, and leaders.

A significant milestone this year was the development of SNOLAB's 15-Year Vision. Created through extensive consultation with our community, it sets out an ambitious path for SNOLAB to remain a global leader in discovery science, a vibrant training hub, a world-class research facility, and a source of scientific inspiration for Canadians.

To all who contribute to SNOLAB's successes, thank you for helping ensure our greatest discoveries still lie ahead.

Dr. Jodi Cooley
Executive Director, SNOLAB

LAND ACKNOWLEDGEMENT

SNOLAB is located on the traditional territory of the Robinson-Huron Treaty of 1850, shared by the Indigenous people of the surrounding Atikameksheng Anishnawbek First Nation as part of the larger Anishinabek Nation.

We acknowledge those who came before us, and honour those who are the caretakers of this land and the waters.

COMMITTMENT TO EDI

At SNOLAB, we believe advancing equity, diversity, and inclusion strengthens the scientific community and the quality of our research output. We are committed to creating, supporting, and maintaining a learning, research, and work environment free from discriminatory and intimidating behaviour, and to work collaboratively with other stakeholders, when appropriate, to do the same.

SNOLAB recognizes challenges remain in achieving the full participation of equity-seeking groups. This includes, but is not limited to, women, visible minorities, Indigenous persons, people with diverse gender identities, and people with disabilities in STEM. SNOLAB is committed to increasing equity across our organization and within our experimental collaborations.

OUR VISIONARY PARTNERS

Our five Canadian university visionary partners ensure that SNOLAB maintains an independent and effective Board of Directors. Vale provides invaluable support through access to the two-kilometre depth in its Creighton mine.

VALE

Queen's University

Carleton University

Laurentian University / Université Laurentienne

Université de Montréal

University of Alberta

OUR FUNDING PARTNERS

SNOLAB is generously supported by our federal, provincial, and local partners. Their essential investments in our facilities, research capabilities, infrastructure, and operations support leading edge discovery, research, and innovation for the benefit of all Canadians.

INNOVATION Canada Foundation for Innovation / Fondation canadienne pour l'innovation

VALE

Arthur B. McDonald Canadian Astroparticle Physics Research Institute

Ontario

Greater/Grand Sudbury

ABOUT SNOLAB

Located two kilometres underground, SNOLAB is the world's cleanest facility for deep underground science.

SNOLAB has established Canada as a global leader in underground science, infrastructure, and expertise. Our unique low-radiation environment enables world-class research in astroparticle physics, where we explore fundamental questions about the universe, including the nature of neutrinos and dark matter. While astroparticle physics remains the core of our research program, SNOLAB is now home to life sciences and quantum technology research projects, as well.

By hosting and enabling the world's most advanced and sensitive underground experiments, SNOLAB:

- Drives breakthrough discoveries at the frontiers of underground science;
- Bolsters Canada's scientific reputation;
- Attracts new talent to Canada and Northern Ontario;
- Trains more highly skilled people;
- Provides opportunities for Canadian researchers to lead international projects; and
- Generates economic benefits for Canadians.

As international demand for access to our unique environment and capabilities continues to grow, SNOLAB continues to be a centre for global science collaboration with more than 1,200 users from 186 institutions in 28 countries in 2026.

Vision

To be the leading international laboratory in deep underground science, hosting the world's most advanced experiments that provide insight into the nature of the universe.

Mission

In support of its vision, SNOLAB will:

- Enable world-class underground science performed by national and international collaborative research teams, supporting projects from concept to completion;
- Spearhead research and development that maximizes the potential scientific and societal impact from underground projects;
- Catalyze scientific collaboration and knowledge exchange through workshops, local engagements, and professional outreach;
- Promote innovation through transfer of arising technologies; and
- Inspire the next generation of scientists, innovators, and leaders through strong public and educational outreach and formative training opportunities.

Core Values

Safety

Excellence

Teamwork

Accountability

Diversity

SNOLAB IN 15 YEARS

SNOLAB has developed a long-term vision to guide the laboratory's evolution over the next 15 years. This effort was initiated in response to a new framework for Canadian Major Research Facilities and the opportunity to examine how SNOLAB can best support future scientific discovery, infrastructure needs, and community impact. The vision builds upon SNOLAB's existing strategic plan and explores multiple pathways for future growth, ranging from maintaining current capabilities to expanding capacity and increasing Canada's global competitiveness in underground science.

The development process was highly consultative and drew upon a broad range of perspectives across the SNOLAB community. Input was gathered through staff engagement sessions, discussions with users and collaborators, meetings with the Canadian physics community, consultations with SNOLAB's Board of Directors and visionary partners, and presentations at national scientific meetings.

A key milestone in this process was the Future Projects Workshop, held at SNOLAB from April 29 to May 1, 2025. The workshop brought together members of the scientific community to explore emerging research opportunities and the infrastructure, capabilities, and support systems that may be required to enable them. Feedback from the workshop helped identify future needs, assess potential growth opportunities, and inform discussions on the facilities, expertise, and investments required to ensure SNOLAB remains a world-leading destination for underground science.

The resulting 15-Year Vision is intended to guide the development of SNOLAB's scientific program and infrastructure, align partners, and ensure that SNOLAB continues to deliver scientific, technological, and societal value for Canada over the long term. The full vision document can be found on SNOLAB's website.

Here's how we envision SNOLAB in 15 years:

A global powerhouse in discovery science

Leading transformative experiments that push the boundaries of knowledge

A vibrant intellectual and training hub

Attracting and nurturing the next generation of leaders

A unique state-of-the-art infrastructure

Continuously evolving to support high-impact underground science and top-tier talent

A national centre for scientific knowledge

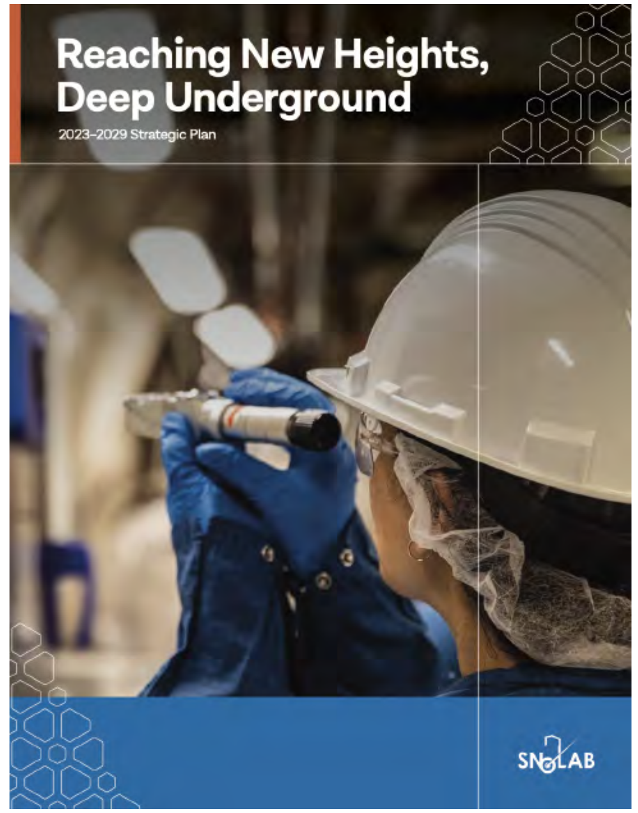
Inspiring Canadians and improving science literacy

STRATEGIC PLAN

SNOLAB's Strategic Plan 2023-2029:

Reaching New Heights, Deep Underground is owned by the SNOLAB Institute Board and, coupled with the Implementation Plan, serves as benchmarking documents for oversight, to assess the effectiveness and impact of the facility and of the management team.

The entire SNOLAB community drives the strategic direction, and, as such, the Strategic and Implementation Plans provide opportunities for continued engagement and alignment with the community SNOLAB serves.



Three core pillars underpin our Strategic Plan.

Excellent Science

GOAL: Drive breakthrough discoveries at the frontiers of underground science.

Cutting-edge Infrastructure

GOAL: Continuously improve our research infrastructure to remain state of the art

Skilled People

GOAL: Foster and develop diverse talent in an inclusive environment.

RESEARCH UPDATES

Dark Matter

Over the last century, astronomers have discovered that large objects in our universe move faster than expected. Galaxies spin too quickly. Stars at galaxy edges should fly off into space, yet they remain bound together as if held there by unseen matter. Other observations have shown light bending as if influenced by invisible mass. Together, these and many other clues point to the existence of dark matter, a form of matter that interacts through gravity but not light.

Today, scientists estimate that about 85% of the universe's matter is dark matter. Because it cannot be observed using conventional astronomical tools, detecting it is extremely challenging. At SNOLAB, experiments are designed to search for rare interactions between dark matter particles and conventional atoms, helping scientists uncover the nature of this mysterious substance.

DEAP-3600

DEAP-3600 uses a vessel of liquid argon to look for dark matter. When argon atoms are excited by particle interactions, they produce ultraviolet light with a specific pattern in time. This light is then detected by sensors surrounding the vessel and analyzed to determine what caused it.

What's New

The DEAP collaboration completed an ambitious set of hardware upgrades designed to improve its ability to detect rare signals from dark matter interactions. The detector is entering a new era of operations with the goal of collecting an even more sensitive data sample.

Additionally, the experiment expanded its dark matter search from keV to MeV energy scales and found first evidence of solar neutrino absorption in argon. Efforts have gone into identifying sources of backgrounds and addressing them through system upgrades. The team is focused on the new low-background data-taking, aiming to achieve a zero-background dataset and provide guidance for future detectors like DarkSide-20k and ARGO.

The DEAP collaboration published a paper on the profile likelihood analysis technique for dark matter search on an extended DEAP dataset as well as technical papers on radon emanation measurements and diffusion of lead-210 and polonium-210 in polymers.

Did you know?

DEAP-3600 gets its name because it uses about 3,600 kg of liquid argon as its target. The argon is kept liquid through high pressure and low temperature. If it became gaseous, it would take up almost 800 times as much volume.

The spherical acrylic vessel had to be brought into the lab in orange-slice shaped pieces because it was too big to fit in the mine cage in one piece.

DEAP trained more than 79 academic HQP in Canada (grad students and post-docs) in the last 10 years, and many technical and engineering personnel.

NEWS-G

NEWS-G (**N**ew **E**xperiments with **S**pheres – **G**as) uses a spherical copper vessel filled with a gas to search for dark matter. When a particle enters the sphere it ionizes some of the gas, generating electrons. An achino sensor in the centre of the sphere is held at a high voltage to attract the electrons, creating an electronic pulse that can be measured.

What's New

The NEWS-G collaboration successfully recommissioned the detector following repairs, completed characterization of an upgraded gas circulation and radon-removal system, deployed a significantly upgraded high-speed data acquisition system, and continued development of new detector components and analysis tools.

Did you know?

One of the pieces of lead shielding for NEWS-G is the heaviest object ever shipped underground to SNOLAB. Along with the specially reinforced rail car it travelled on, it weighed about 75,000 lbs.

A prototype of the detector operated at Modane in France and was originally intended to study low-flux neutrons. That detector had such excellent properties for ultra-sensitive measurements that the collaboration shifted their focus to dark matter.

NEWS-G has 31 collaborators from 10 institutions in four countries.

PICO-40L

PICO-40L uses a bubble chamber to look for dark matter. The fluid in the bubble chamber is superheated, so when a particle interacts, it boils and creates a bubble. This bubble is captured on camera and microphone. Studying these details of the bubble can tell scientists about the particle that caused it.

What's New

The technology decisions used in the design of PICO-40L were used as the starting point for the much larger PICO-500 experiment that is under construction. This makes PICO-40L an excellent place not only to collect data but to test choices and ideas before using them in PICO-500.

The focus in PICO-40L has been on measuring radon atom populations and understanding the kinds of bubbles radon decays can cause. There is always some radon produced by contaminants inside an experiment. PICO-40L has demonstrated excellent thermal and mechanical control and high-quality data from cameras and microphones, allowing for radon to be mapped in the target superheated liquid. In addition, work is ongoing to study events that might mimic dark matter so that these can be better characterized and controlled when looking for real dark matter interactions. The collaboration has been focused on developing publications about the PICO-40L experiment while also constructing PICO-500.

Did you know?

PICO-40L is the first large-scale "right-side up" bubble chamber that completely eliminates the need for a buffer liquid, which previously caused measurement noise.

The fluorine-rich target fluid is superheated, but since it's a refrigerant, the temperature is actually slightly cooler than room temperature.

PICO-40L has both cameras and audio sensors, so it is possible to both "see" and "hear" an event.

PICO-500

PICO-500 is a scaled-up bubble chamber currently under construction in SNOLAB's Cube Hall. PICO-500 will have a target mass of 250 kg, pushing the limit of our current ability to build and operate low background bubble chambers. Collaborators expect a factor of 10 increase in sensitivity in unique corners of the dark matter search landscape.

What's new

The massive steel pressure vessel was too large to bring underground in one piece, so it came down in multiple pieces and was welded together in place. The welding and passivation were done in a way that protected other experiments from the welding process, which produced particulates. The pressure vessel has been certified and is now being outfitted for the installation of the detector system.

The inner detector components have been cleaned and a test assembly was completed inside a clean tent that provided a more controlled environment than even the clean laboratory itself. Radon exposure was carefully minimized, monitored and tracked. All quality control tests of the cleaning process were met or exceeded.

Did you know?

PICO is not an acronym. It is an amalgam of two precursor experiments: PICASSSO and COUPP.

The fluid that will be used in PICO-500 is the same refrigerant formerly used in household fridges.

PICO has 68 collaborators from 17 institutions in five countries.

SBC

SBC (**S**cintillating **B**ubble **C**hamber) builds on the world-leading use of bubble chambers for detecting dark matter. Like the PICO technologies, a nuclear interaction produces a bubble that can be photographed and heard. What is novel about SBC is that the target liquid, argon, gives off special light — scintillation — in addition to the other features. This should provide additional powerful rejection of background events.

What's New

One of the advantages of the bubble chamber is the dramatically reduced sensitivity to background events which can cause false signals in the detector. This reduction is only applicable for larger masses of dark matter particles and diminishes for lighter dark matter particles. SBC strives to extend this background rejection through the use of argon as a target material. This increases the complexity of the detector, requiring it to be kept very cold (-186°C), but the use of argon makes the possibility of detecting lighter particles possible. The light generated by the background events will be detected by new silicon photomultipliers which will allow for even greater particle discrimination.

Did you know?

SBC will consist of two functionally identical detectors. The first is already built and operating at Fermilab and will be used for engineering and calibration studies.

Analysis from operating the Fermilab detector will allow the second detector not yet built at SNOLAB to achieve the lowest possible backgrounds.

The SBC collaboration has 42 members from the U.S., Canada and Mexico.

SENSEI

SENSEI (**S**ub-**E**lectron **N**oise **S**kipper **E**xperimental **I**nstrument) is a direct detection dark matter search experiment that uses ultra-low noise CCD sensors capable of detecting single electrons that recoil when struck by dark matter. Dislocated electrons leave energy deposits in the very sensitive instrument. The CCDs have millions of pixels, and SENSEI is able to count every electron within a pixel, leading to incredibly precise measurements with no background noise.

What's new

The SENSEI experiment has been taking science data since July 2025, and is producing world-leading results in low mass dark matter searches. Once this science run is complete, the SENSEI infrastructure will be leveraged for testing new sensor technologies at low background.

Did you know?

The SENSEI acronym "Sub Electron Noise Skipper-CCD Experimental Instrument" refers to the enabling Skipper CCD readout technology that allows for repeated oversampling of each pixel charge measurement, resulting in a noise figure of 0.06 electrons. It is this extraordinarily low-charge noise that allows for the detection of electron recoils from dark matter.

The latest generation of CCDs are so sensitive that scientists can now precisely count every single electron within a pixel, creating precise measurements with almost zero background noise. This is true whether the pixel contains only one electron, or more than 1,000 electrons.

SENSEI includes 33 members from nine institutions in five countries.

SuperCDMS

SuperCDMS (**S**uper **C**ryogenic **D**ark **M**atter **S**earch) uses silicon and germanium crystals held at cryogenic temperatures to detect dark matter. When a dark matter particle hits the crystals, it deposits a small amount of energy in them, which can be measured. The crystals are arranged in four towers and connected to electronics that monitor the data looking for an interaction.

What's New

The SuperCDMS collaboration made significant progress in the construction of the experiment. The experiment has been successfully cooled down to the base temperature required for the superconducting detectors to become operational. That temperature is just tens of milliKelvin, or thousandths of a degree, above absolute zero, or about one hundred times colder than outer space. The experiment is on target to begin taking science data in 2026.

Did you know?

SuperCDMS is a "light dark matter" detector. In this case, light refers to its mass and dark refers to it being impossible to see.

The detector's payload consists of 24 puck-like detectors of germanium and silicon crystals, grouped in four towers. The towers have been installed in the cryostat at the centre of six nested copper vessels. Each detector has hundreds of superconducting sensors on each side to detect energy from interactions.

The international SuperCDMS Collaboration consists of nearly 150 members from 28 institutions in six countries, with SLAC serving as the lead institution.

XLZD

XLZD (**X**enon-**L**ux-**Z**eppelin-**D**arwin) will be a next-generation xenon observatory sensitive to dark matter and neutrino physics. The XLZD underground rare event observatory based on liquid xenon technology will address some of the most important open questions in fundamental physics and cosmology: the nature of dark matter, which drives the formation of structures in the universe such as galaxies and clusters; and the fundamental nature of neutrinos, which is closely tied to the puzzling matter-antimatter asymmetry in the universe.

XLZD will conduct highly sensitive measurements with its quiet, massive detector, offering an unrivalled low energy threshold and background level required to tackle these mysteries. Additionally, XLZD will perform precision measurements of solar neutrinos, search for solar axions, and watch for neutrinos from supernovae in our cosmic neighbourhood.

Did you know?

XLZD will be an observatory with a target mass of 60 tonnes of cryogenic liquid xenon in its central detector, as xenon is an ideal medium for detecting ultra-rare particle interactions.

XLZD will operate as a dual-phase time projection chamber, a technology which revolutionized the field of direct dark matter searches about 20 years ago with its highly scalable detection principle, which has since led the field.

XLZD is being pushed forward by the leading teams in this area: XENON and LZ, which currently operate the largest liquid xenon detectors, and DARWIN conducting R&D towards a multi-tonne liquid xenon detector.

What's new

Eleven Canadian institutions, including SNOLAB, have officially joined the international XLZD collaboration while it undertakes a technical review of candidate sites.

Life Sciences

Life on Earth is constantly shaped by environmental stresses, from radiation and isolation to changes in gravity, temperature, and pressure. Understanding how living systems respond and adapt to these conditions can provide valuable insights into human health, disease, aging, and the limits of life.

Life sciences experiments at SNOLAB investigate how biological systems respond to reduced radiation exposure, explore the effects of extreme environments on living organisms, and test technologies that can support human health in remote and challenging settings. This research advances our understanding of life on Earth while informing future health care, environmental, and space exploration applications.

POLAR

The POLAR (**PO**CUS: **L**essons from **A**ustere and **R**emote Environments) collaboration is focused on advancing our understanding of how the human body responds to extreme underground environments. As human activity increasingly extends into remote and austere settings, such as deep mines, underground laboratories, and isolated industrial sites, it is essential to understand how environmental stressors affect human health. Factors such as increased pressure, temperature variations, limited access to natural light, and prolonged isolation may have significant impacts on cardiovascular and respiratory function, yet these effects remain insufficiently studied.

POLAR aims to investigate human physiological responses in deep underground settings using portable, handheld point-of-care ultrasound (POCUS) devices. POCUS offers a non-invasive, radiation-free method for assessing real-time cardiovascular and respiratory parameters, making it particularly well suited for use in environments where traditional medical imaging is impractical.

What's new

POLAR will be conducted in two stages. The first stage will focus on evaluating the technical feasibility of operating POCUS devices in an underground environment. The second stage will involve the collection of basic cardiovascular and respiratory measurements from volunteer participants. These measurements will be taken both at the surface and in the underground environment, allowing for direct comparison of physiological markers. By comparing these datasets, researchers will be able to identify potential changes associated with underground exposure.

Did you know?

The outcomes of this research will provide insights into how extreme underground environments influence human physiology.

Research from POLAR has potential applications in occupational health, remote medicine, and the development of medical strategies for other extreme settings.

The POLAR collaboration is led by the Cardiovascular Imaging Network at Queen's University.

REPAIR

REPAIR (**R**esearching the **E**ffects of the **P**resence and **A**bsence of **I**onizing **R**adiation) studies the effects of very low radiation levels – lower even than normal everyday ("background") doses – on living organisms. It looks for cancer risk and DNA changes in human cells, and whole-organism development and growth in lake whitefish embryos, desiccated yeast, and human skin cells.

What's New

Work on a new set of bioreactors designed to support the long-term culture of actively growing yeast at SNOLAB with minimal maintenance requirements is planned. The system requires only a weekly replacement of the culture media reservoir, enabling extended underground experiments with limited intervention. Yeast cultures will be maintained continuously for two months in both the underground low-background environment and a matched surface control. Samples will be collected at regular intervals to assess growth, survival, metabolism, and gene expression. This will be the first long-term study to investigate the biological response of actively growing yeast to a sub-background radiation environment. In parallel, processing of samples from previous short-term (one-week) experiments with actively growing yeast has been completed. These samples, collected in 2025, have now undergone RNA sequencing, and the resulting data have been analyzed.

Did you know?

REPAIR is testing the hypothesis that because all life on Earth evolved in the presence of natural background radiation, the absence of it could be detrimental to biological systems.

REPAIR is one of the deepest biological life sciences research projects in the world.

Scientists create an even lower-radiation environment than SNOLAB alone provides. In addition to the underground location, they use lead shielding and air filtration systems to reduce terrestrial radiation and radon exposure.

Low Background & Monitoring Capabilities

Many scientific, environmental, and security applications require the ability to detect and measure extraordinarily small amounts of radioactive material. Whether searching for rare particle interactions, monitoring environmental radioactivity, or tracking traces of nuclear materials, success depends on reducing background radiation and contamination to the lowest possible levels.

SNOLAB combines deep underground shielding, world-class cleanroom infrastructure, and specialized expertise in low-background measurement into one of the most sensitive detection environments in the world. These capabilities support fundamental research while also enabling environmental monitoring, radiological measurement, and national security applications. SNOLAB helps advance radiation detection technologies, monitor trace levels of radioisotopes, and contribute to programs that support public health, and monitoring efforts.

COSMO

COSMO (COsmic ray Seasonal Modulation Observatory) is a dedicated effort to track high energy muons underground using repurposed high-resolution muon tracking technology developed initially for border security and geological exploration. The detectors are approximately one tonne in mass each and use extruded triangular plastic scintillator bars, wavelength shifting fibre optic cables, and multi-anode photomultipliers to reconstruct the trajectory of individual muons.

What's New

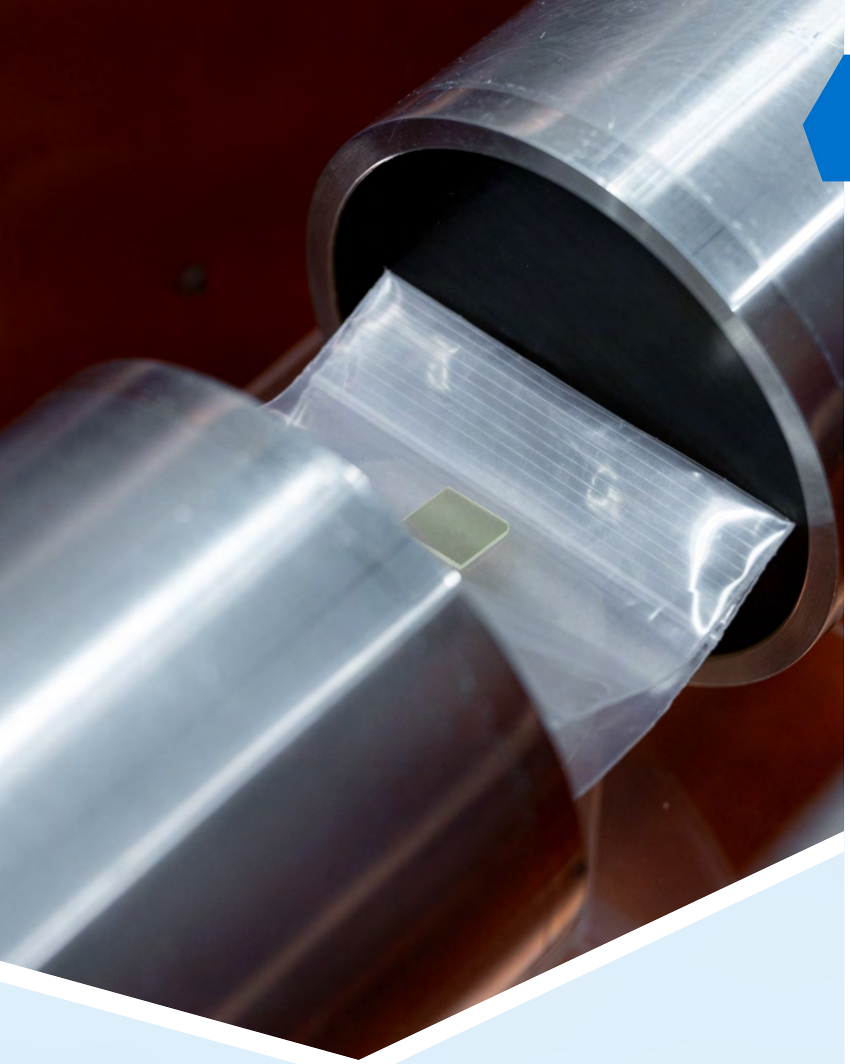
Various studies have observed a correlation between the muon flux in underground labs and the time of year. This annual modulation signal results from the effective thickness of the atmosphere growing in the summer months and contracting during the winter which changes the probability of pions and kaons decaying vs interacting to produce additional showers and consequently, muons above the minimum energy required to survive to the underground lab. The immense depth of SNOLAB effectively constrains this study to the highest energy cosmic ray interactions, putting COSMO at the depth/energy frontier.

Did you know?

COSMO will deploy eight robust muon tomography detectors coming from Canadian Nuclear Laboratories where they were repurposed following a decade of service as commercial imaging systems in the mining industry.

From their original geological exploration application, the COSMO detectors are optimized for efficiency and can operate with minimal intervention for long periods of time.

Based on the rate of muons at SNOLAB, each detector should see one muon every two days, on average. The information about the muons' direction will provide valuable insight into any anisotropies that exist due to the local geology of Creighton Mine itself.



CTBT Counter

SNOLAB's CTBT Counter is a highly sensitive radiation-counting system used to support Canada's role in the Comprehensive Nuclear-Test-Ban Treaty (CTBT) verification network. The CTBT is an international treaty that prohibits nuclear weapon test explosions and relies on a global monitoring system to detect signs of nuclear tests. The CTBT Counter measures extremely small amounts of radioactive isotopes that can be released into the atmosphere by a nuclear explosion. By counting radioactive decay events with very low background noise, it helps verify whether suspicious radioactive material originates from a nuclear test rather than natural sources.

The CTBT Counter typically uses ultra-low-background radiation detection techniques similar to those used in underground rare-event physics experiments: Samples are placed in a shielded detector; the detector records radioactive decays (gamma rays or beta particles); all while the underground environment reduces interference from cosmic radiation.

What's new

The CTBT Counter has a new home, having recently been moved to a concrete pad in the Low Background Counting Facility. A major milestone was completed this year when its custom-built shield was installed, providing a chance for an unparalleled background-shielded environment for highly sensitivity material studies. Its new configuration will be used for tests for the RadioActive isotope Measurement Program at SNOLAB (RAMPS) project and other projects requiring the coincidence capabilities of its two Ge detectors.

Did you know?

SNOLAB's thick rock overburden shields the laboratory from cosmic rays, allowing CTBT detectors to measure tiny amounts of radiation that would be difficult to detect at the surface.

The CTBT Counter is a key Canadian contribution to the United Nations nuclear non-proliferation efforts through verification of compliance with the Comprehensive Nuclear-Test-Ban Treaty.

The CTBT Counter also contributes to the development of ultra-sensitive radiation measurement techniques.

Health Canada

SNOLAB and Health Canada have developed a growing partnership focused on environmental radiation monitoring and radon research. The collaboration leverages SNOLAB's unique environment and scientific expertise to support Health Canada's radiation protection and public health programs.

What's new

Health Canada and SNOLAB collaborate under Canada's National Radon Program to evaluate the performance and reliability of commercially available radon detection devices. SNOLAB's underground facilities provide controlled environments with known radon levels, making them ideal for testing consumer and research-grade radon monitors. The study found noticeable differences in performance among various monitors, with some instruments showing indications of calibration or accuracy issues when compared against reference measurements. This research helps Health Canada improve public understanding and management of radon exposure risks, which are a significant source of natural radiation exposure in Canada. Tests are continuing with additional monitors for long-term stability tests and comparison to calibrated science grade radon monitors.

Did you know?

Health Canada operates two radiological monitoring stations at SNOLAB's surface facility as part of Health Canada's environmental radiation monitoring program:

1. The Fixed Point Surveillance Network (FPSN), provides real-time radiation measurements from more than 100 locations across Canada to support emergency preparedness and the Federal Nuclear Emergency Plan.

2. The Canadian Radiological Monitoring Network (CRMN), collects air particulate, precipitation, water vapour, and dosimeter data to track environmental radioactivity trends across Canada.

Neutrinos

Neutrinos are tiny elementary particles with no electric charge. They are among the most abundant particles in the universe and travel vast distances through space, stars, planets, and even entire galaxies almost undisturbed. This unique property allows them to carry information directly from some of the most energetic and inaccessible environments in the cosmos, earning them the nickname “messenger particles.”

Experiments at SNOLAB study solar neutrinos, search for the rare process of neutrinoless double beta decay, monitor for neutrinos from supernovae, and measure geo-neutrinos produced within the Earth. By observing and measuring neutrinos, researchers are advancing our understanding of how stars generate energy, how matter behaves at the most fundamental level, and whether new physics exists beyond our current understanding of the universe.

HALO

The HALO (Helium And Lead Observatory) detector is in its 14th year of continuous operations. HALO uses lead blocks and helium to detect neutrinos. When a neutrino hits lead, it creates neutrons. These neutrons are then recorded by the helium neutron detectors in HALO, creating a signal in the data.

What’s New

The HALO collaboration has strengthened its governance and is refocusing on the analysis of its 14-year data set. The collaboration is also working to improve its computing hardware and considering some modest experimental upgrades that might help improve their understanding of the data. HALO is able to provide information on other effects beyond supernova explosions, including cosmic ray nuclear processes underground at SNOLAB.

HALO has admitted two new partner institutions: Canadian Nuclear Laboratories and University of Colorado, Denver.

Did you know?

HALO is part of SNEWS (the SuperNova Early-Warning System), detectors around the world that alert astronomers to supernovae so they can view them with telescopes.

HALO is an upcycled detector built from excellent components developed by previous experiments. This includes 128 precious, low-background helium-3 neutron detectors reclaimed from the Sudbury Neutrino Observatory experiment and 79 tonnes of lead repurposed from a decommissioned cosmic-ray experiment in Chalk River, Ontario.

The collaboration consists of 19 active people, including a rotation of 13 people who take detector operations shifts and a “local group” at SNOLAB who focus on operations activities.

IceCube DOM Test

The IceCube Neutrino Observatory, located at the South Pole, is a high-energy neutrino telescope with a cubic kilometre of active volume. IceCube has discovered high-energy neutrinos originating from outside our solar system. It has also been leading studies of neutrino oscillations — the changing of neutrinos from one type ("flavour") to another — using neutrinos produced when cosmic rays, high-energy charged particles from space, collide with Earth's atmosphere.

The in-ice component of IceCube consists of 5,160 digital optical modules (DOMs), each with a 10-inch photomultiplier tube and associated electronics. The DOMs are attached to vertical "strings," frozen into 86 boreholes from 1,450 to 2,450 metres depth. The strings are deployed on a hexagonal grid with 125 metres spacing and hold 60 DOMs each. The vertical separation of the DOMs is 17 metres.

What's new

In 2025/26, IceCube deployed five new, densely instrumented cables of sensors, known as the IceCube Upgrade. However, when the original DOMs were deployed, IceCube saw the dark rate (signals the detector records even when no real particle event occurs) decrease over about a year. Several explanations have been suggested, including triboluminescence (light produced by mechanical stress in the ice and glass) and the gradual decay of radioactivity induced in detector materials by cosmic rays before deployment. SNOLAB is helping IceCube understand the background noise profile of the new DOMs to help understand the cause of these changes.

Did you know?

IceCube is the largest neutrino detector by volume ever built, encompassing a cubic kilometre of natural ice beneath the South Pole.

The experiment used a high-pressure hot water drill to melt 60-cm-diameter holes deep into the ice to place each sensor string. The drill delivered hot water that melted through the ice at record speeds, about two metres per minute. It took seven austral seasons (November to February) to complete 86 boreholes.

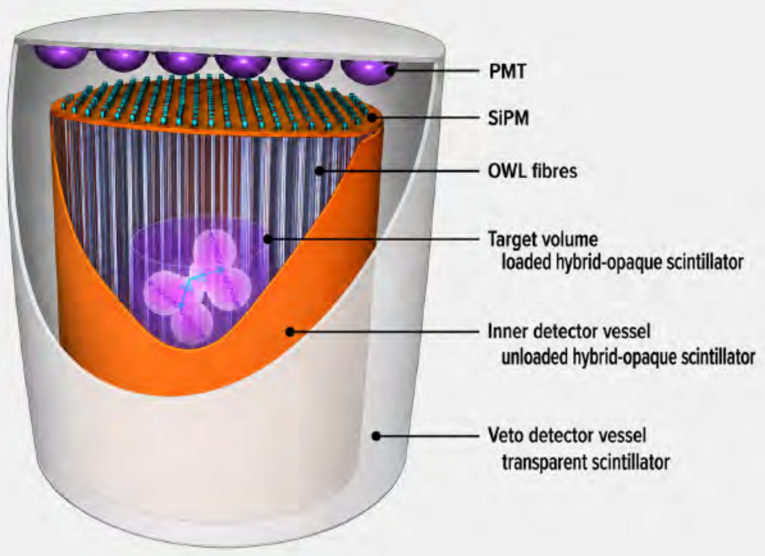
In 2013, scientists confirmed that IceCube detected high-energy neutrinos from outside our solar system. In 2017, a detected neutrino helped scientists trace a signal back to a distant active black hole four billion light years away.

NuDoubt^{++}

The NuDoubt^{++} experiment will explore a very rare nuclear process called double beta plus decay, which involves the release of two positrons (particles similar to electrons but with a positive charge). Detecting this decay is quite difficult due to its rarity and the scarcity of suitable materials for study. To overcome these challenges, NuDoubt^{++} proposes a unique detector designed to measure rare double beta decays and set new limits for these processes. If successful, it would represent the discovery of some of the rarest decay processes known in physics.

What's New

NuDoubt^{++} proposes to build a cylindrical detector prototype using about one metric tonne of a special scintillator material (a substance that emits light when it absorbs particles). This material helps distinguish between different types of particles based on how they emit light. The detector is equipped with advanced light sensors to measure energy and position precisely, allowing researchers to test particle discrimination methods.

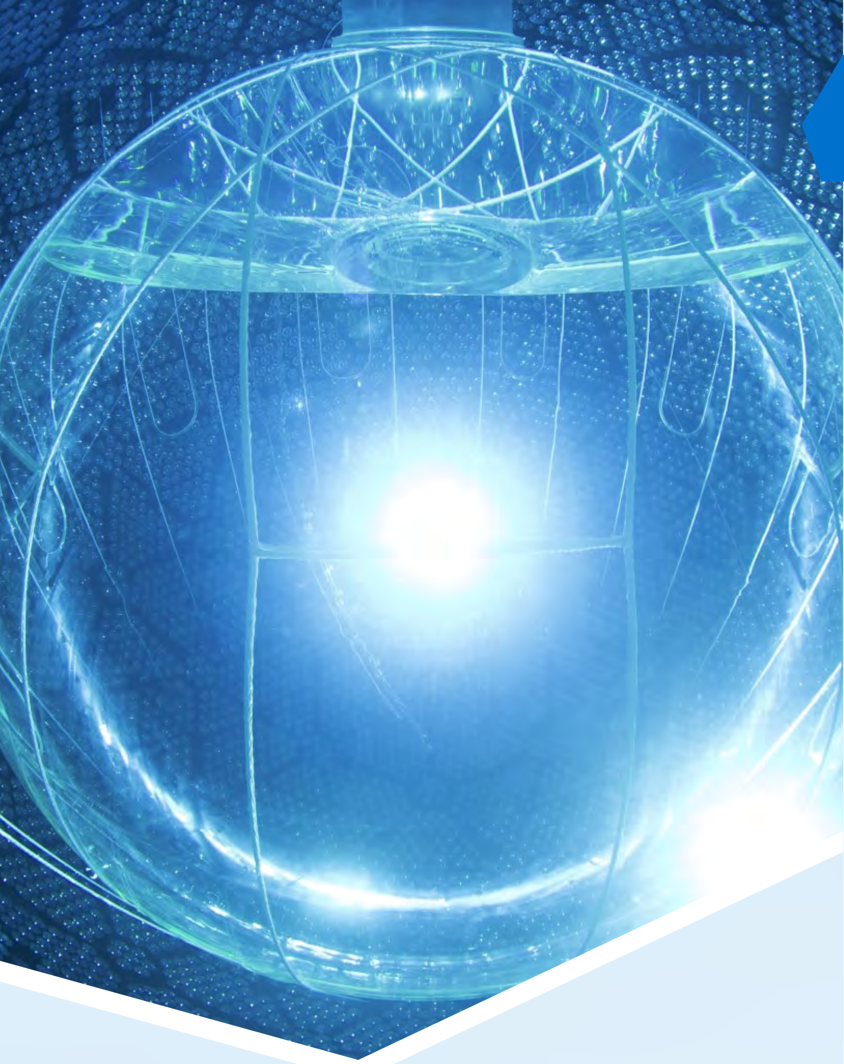


Did you know?

The collaboration hopes to greatly improve the detection limits for neutrinoless double beta plus decay exploration.

The search for neutrinoless double beta decay is crucial because it could reveal whether neutrinos (particles that are everywhere but hard to detect) are their own antiparticle.

NuDoubt^{++} proposes to use Optimized Wavelength-shifting optical fibres (OWL-fibres) to improve light collection efficiency. These fibres are designed to capture more photons, enhancing the performance of the detector.



Did you know?

The discovery of neutrino oscillations, by the Super-Kamiokande and SNO experiments, garnered the 2015 Nobel Prize in Physics.

The liquid scintillator in SNO+ is lighter than regular water, while the heavy water in SNO was heavier. This means the vessel now has ropes holding it down instead of lifting it up.

The SNO+ collaboration consists of 97 researchers from 18 institutions in seven countries.

SNO+

SNO+ is the continuation of the Sudbury Neutrino Observatory. In place of the heavy water that SNO used to detect solar neutrinos, SNO+ operates with 780 tonnes of liquid scintillator in a 12-metre diameter acrylic vessel at the heart of the detector. Neutrinos interacting in the detector will produce scintillation light that is around 50 times brighter than the Cherenkov light that was observed in the original SNO experiment. This enables SNO+ to detect lower energy neutrinos from the Sun, from the Earth and from nearby nuclear reactors, further exploring the phenomenon of neutrino oscillations. These neutrinos will also shed light on the reactions that power the Sun, the abundance of radiogenic elements deep in the Earth, and help understand processes that occur during a core-collapse supernovae (should one occur within the observable galaxy during SNO+ data taking).

An important property of neutrinos remains unknown – whether the neutrino is the same as its antimatter counterpart, or not. Understanding this neutrino property may provide insight into the balance of matter and antimatter in the Universe. This question will be the main focus when SNO+ begins searching for a rare nuclear process known as neutrinoless double beta decay. SNO+ will conduct this experiment by adding over 4 tonnes of the element tellurium to the liquid scintillator, attempting to discover this rare phenomenon of great significance for particle physics and cosmology.

What's new

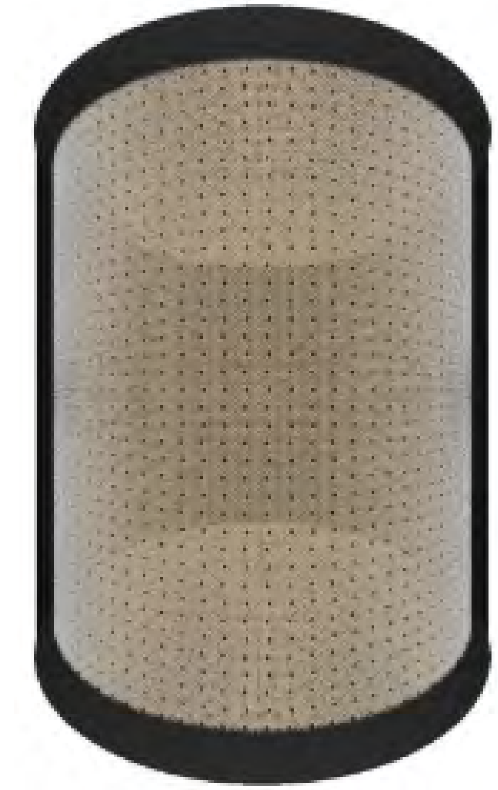
SNO+ continues performing physics analyses in its pure scintillator phase. Papers published include: Cosmogenic Neutron Production in the SNO+ Water Phase; the First Evidence Ever of Solar Neutrinos Interacting on Carbon-13; and a paper reporting the development of an innovative, machine-learning approach to detector calibration.

Theia

Theia is a potential multi-purpose, large-scale neutrino detector in its very early design stages. It aims to utilize water-based liquid scintillator as a detector medium coupled with very fast timing to study a rich physics program. Its prospects include the capability to detect and measure neutrinos over a very broad energy spectrum, with the potential to deduce the hierarchical nature of neutrinos, measure the level of charge conjugation and parity violation in the lepton sector, and potentially determine whether the neutrino is Majorana in nature, or its own antiparticle.

What's New

Theia is a detector that would make use of recent advances in liquid scintillators and fast photosensors to make a 50-kiloton scale optical detector with sub-Cherenkov threshold light detection at low energy, enhanced particle tracking at GeV energies, and loading with isotopes for double beta decay and solar neutrino physics. This detector will build on the phenomenal success of conventional organic liquid scintillator detectors such as SNO+, KamLAND, and Borexino by scaling up the size and resolution and locating it at deep depth.



Did you know?

Theia will be able to study neutrinos from multiple sources including the Earth's core, the Sun, galactic supernovae, and the diffuse flux of cosmological supernova neutrinos.

At 32,000 m^3, Theia would be by a wide margin the largest experiment at SNOLAB.

The Theia collaboration consists of 117 members, from 35 institutions across eight countries, including three Canadian institutes.

Xe-Still

Xe-Still (**Xe**non **Still**) at SNOLAB uses cryogenic distillation to separate different isotopes of xenon. The goal is to develop a potential alternative to centrifuge-based isotope enrichment, particularly for producing large quantities of xenon-136 used in rare-event physics experiments.

What's new

The Xenon Still operates like a sophisticated industrial distillation column. Xenon is cooled to cryogenic temperatures and partially liquefied and the liquid and vapour phases then move through a tall column. Because xenon isotopes have slightly different vapour pressures, lighter isotopes preferentially enter the vapour phase while heavier isotopes are slightly more concentrated in the liquid phase. Repeated evaporation and condensation cycles gradually separate the isotopes. The vapour-pressure differences are extremely small, so the column must be carefully designed and operated for long periods to achieve meaningful separation.

Did you know?

The Xenon Still is designed to measure the vapour pressure isotopic effect (VPIE) of xenon with high precision. It is calibrated using argon and krypton, for which the VPIE among all stable isotopes will also be measured with increased precision.

Researchers first measured the isotope-dependent vapour-pressure differences in xenon using a 1.8-metre test column at Carleton University. They then built and operated a 14-metre-tall still in the Cryopit.

Future searches for neutrinoless double beta decay may require more than five tonnes of enriched Xe, driving the need for increased xenon production as well as efficient enrichment methods.

Quantum Technology

Quantum technologies are based on the unusual properties of matter and energy at the smallest scales of nature. Unlike conventional technologies, which rely on classical physics, quantum devices can exploit phenomena such as superposition and entanglement to enable new capabilities in sensing, communications, and computing.

Many quantum technologies are extraordinarily sensitive to background radiation and environmental disturbances. SNOLAB leverages one of the quietest environments in the world to advance quantum sensors and materials that could enable breakthroughs in fundamental physics while also supporting future applications in areas such as healthcare, security, navigation, and communications.

CUTE

CUTE (**C**ryogenic **U**nderground **TE**st facility) was built to test components of other experiments. It is well shielded from background radiation, can operate at very low temperatures, and is designed to prevent microvibrations that could interfere with testing. CUTE is host to a collaboration between researchers from the Institute for Quantum Computing (IQC) at the University of Waterloo, Chalmers University of Technology in Sweden, Laurentian University, and SNOLAB to investigate the known link between cosmic rays and quantum bits, or qubits, which hold information at the quantum level.

What's new

In a follow-on project, CUTE will model charge and athermal phonon transport in cryogenic semiconductor crystals and superconducting devices. The four-year project aims to enhance a simulation tool called G4CMP to help researchers better predict and understand radiation effects in quantum devices. Called "G4CMP: Geant4-based Condensed Matter Physics Development for Quantum Information Science," the research project will expand the tool to model a broader range of materials and physical processes, validating simulations against real-world devices, and developing shared resources for the research community.

Did you know?

CUTE was built to test detectors for SuperCDMS, which was successfully completed after a five-month test run.

CUTE's experimental chamber holds up to 20 kg of payload and can achieve temperatures of ~12 mK, or roughly the temperature of outer space.

CUTE is owned and operated by SNOLAB.

GLOBAL REACH

NEXUS

SNOLAB expanded its international leadership in quantum science and technology through its role in the **North-South EXchange for Underground Science (NEXUS)**, a newly established consortium of underground laboratories supported by Horizon Europe funding.

Through NEXUS, SNOLAB and its partner laboratories will host and exchange researchers and technical experts over several years, fostering collaborative research and development, knowledge sharing, and specialized training in areas of mutual interest.

As lead of the consortium's Quantum Science and Technology work package, SNOLAB's Director of Research, Dr. Raymond Bunker, is helping shape an international research agenda that advances quantum technologies and strengthens connections between leading underground laboratories around the world.

Quantum technology remains a strategic research priority for Canada. Participation in NEXUS provides SNOLAB with access to a global network of expertise, infrastructure, and talent, helping to accelerate innovation in quantum science. Through these collaborations, SNOLAB is also contributing to the growth of Canada's quantum ecosystem and supporting the development of the next generation of quantum leaders.

SCIENCE WITHOUT BORDERS

Deep Underground Laboratories (DULs) are critical research infrastructure, providing the unique environments needed to investigate some of the most fundamental questions in science. While each facility has distinct capabilities and scientific strengths, many of the challenges and opportunities facing the underground science community are shared.

SNOLAB plays an active role in international discussions through the **G7 Group of Senior Officials (GSO) on Global Research Infrastructures**. The GSO is an official working group of the G7 that brings together leaders from major facilities around the world to promote international cooperation, share best practices, and align policies for large-scale, world-leading research facilities.

At this year's meeting, SNOLAB's Executive Director Dr. Jodi Cooley, demonstrated how collaborative efforts between DULs around the world are creating new opportunities to share expertise, strengthen technical capabilities, and address scientific challenges that extend beyond borders.

As one of the world's leading deep underground laboratories, SNOLAB continues to contribute to a growing global network that is helping to accelerate discovery and maximize the impact of underground science.

Locations of existing and planned Deep Underground Laboratories around the world.

INTERNATIONAL SUMMIT ON THE FUTURE OF NEUTRINOLESS DOUBLE BETA DECAY

The **International Summit on the Future of Neutrinoless Double Beta Decay** was held at the Max Planck Institute in May 2025.

In its third iteration, the summit brought together 80 representatives from research institutions, funding agencies, and experts in the field from leading European and North American countries, with the purpose of developing a strategy for next generation experiments.

Dr. Jodi Cooley represented SNOLAB at the summit and also became a member of the Joint Oversight Group comprised of interested funding agency representatives and facility directors to ensure a forum for communication and discussion, and, if applicable, coordination by the funding agencies for deployment of tonne-scale detectors in North America and Europe.

INTERNATIONAL RADIOBIOLOGY

SNOLAB Research Scientist Michel Lapointe supported the **Global Underground Yeast (GUY) Project**. Connected to the **REPAIR** collaboration, GUY is an international effort that is investigating how long-term exposure to deep underground environments influences biological systems. The project deploys desiccated yeast samples derived from a common source culture in deep underground laboratories around the world, providing a standardized model for comparing biological responses across sites. Participating laboratories periodically return samples for analysis of survival, growth, and metabolism.

Michel Lapointe visited the Stawell Underground Physics Laboratory in Australia to deliver yeast samples cultured at SNOLAB for underground deployment.

To date, samples have been deployed at the Stawell Underground Physics Laboratory (Australia), Boulby Underground Laboratory (United Kingdom), Laboratori Nazionali del Gran Sasso (Italy), Sanford Underground Research Facility (United States), and SNOLAB (Canada). The first four-month samples have already been returned from Boulby and Stawell for analysis.

Looking Ahead

Sample collection will continue through mid-2027, after which the complete dataset will undergo transcriptomic analysis to investigate whether prolonged underground exposure influences gene expression. The results will provide new insights into the biological effects of environments with extremely low levels of natural background radiation.

INTELLECTUAL HUB

SuSi2025

SNOLAB successfully concluded the second annual **SNOLAB Underground Science Institute (SuSi)** Lectureship Program from June to August 2025. Designed for graduate students and postdoctoral researchers, SuSi combines advanced academic instruction from leading experts with professional development opportunities that help participants build the skills and networks needed for successful research careers.

The 2025 program focused on three key areas of underground science: the dark cosmos, neutrino science, and quantum technology. Participants learned from experts in the field including three distinguished lecturers: Dr. Wouter van de Pontseele (Colorado School of Mines), Dr. Dan Hooper (University of Wisconsin-Madison and Director of the Wisconsin IceCube Astroparticle Physics Center), and Dr. Roxanne Guénette (University of Manchester).

Sixteen graduate students and postdoctoral researchers from institutions across Canada and abroad took part in SuSi2025, engaging in a unique learning experience that fostered scientific collaboration, knowledge exchange, and professional growth within the next generation of underground science leaders.

ENGINEERS IN TRAINING PROGRAM

SNOLAB's **Engineering in Training (EIT)** program is designed to develop the next generation of engineering talent. The program allows graduating engineers to obtain qualifying experience toward a professional P.Eng designation by fostering a structured environment for skills development, technical documentation, and mentorship. EITs collaborate with experienced engineers, scientists and technical staff to solve critical challenges encountered when doing world-leading science in SNOLAB's underground environment.

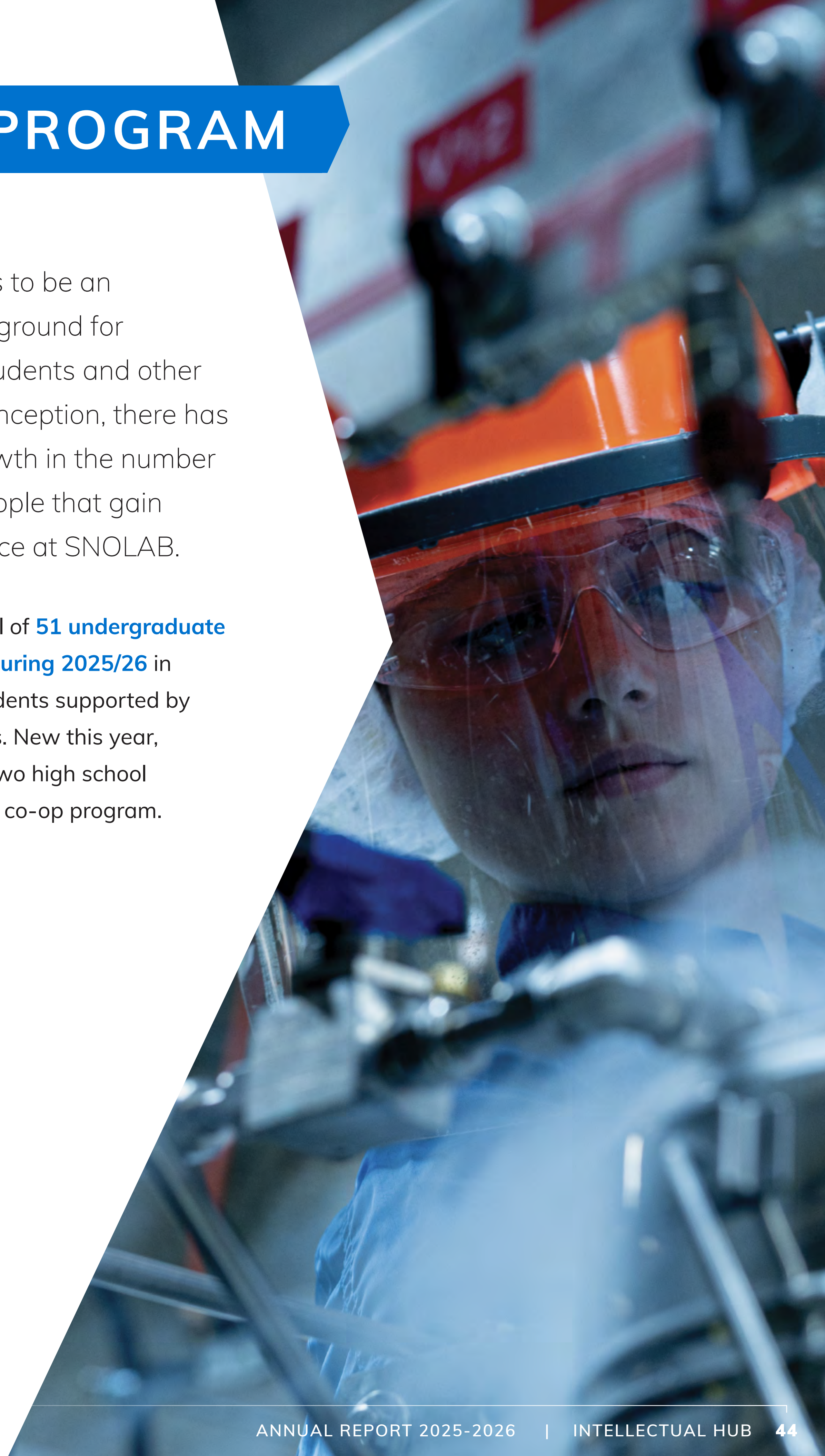
Through the EIT Program, SNOLAB not only strengthens its internal engineering capacity but also plays an important role in cultivating highly qualified personnel for Canada's science and innovation ecosystem. To date, ten EITs have achieved professional status, including two in 2025/26.

Ryan Schleehan (left) and Chanel Tanguay (right) are both EITs who earned their P.Eng designation this year and are now engineers at SNOLAB.

CO-OP PROGRAM

SNOLAB continues to be an important training ground for post-secondary students and other trainees. Since its inception, there has been a steady growth in the number of highly skilled people that gain formative experience at SNOLAB.

SNOLAB hosted a total of **51 undergraduate student co-op terms during 2025/26** in addition to several students supported by Research Group grants. New this year, SNOLAB also hosted two high school students as part of the co-op program.



NNN25

Alongside the McDonald Institute and McGill University, SNOLAB hosted the highly successful 24th International Workshop on **Next Generation Nucleon Decay and Neutrino Detectors (NNN25)** in the fall.

SNOLAB ED Dr. Jodi Cooley and Greater Sudbury Mayor Paul Lefebvre (right) thank Prof. Chanh Kee Jung at the Refettorio.

NNN25 drew approximately 80 international researchers from around the world to three venues in downtown Sudbury. The conference included a tour of the underground lab, the ENT$_{1/2}$ENTE pre-workshop, a full program of invited and contributed talks with broad participation from the international community, and a public lecture on the physics of sports by Prof. Chang Kee Jung from Stony Brook University in Sudbury's outdoor Refettorio theatre space.

PROJECT MANAGEMENT CONFERENCE

In May, SNOLAB hosted the **Canadian Laboratory Consortium Conference for Project Management Professionals**. The theme of the 2025 conference was Communication on Research and Development projects.

The annual conference drew 58 in-person attendees and 23 virtual attendees from SNOLAB, Canadian Light Source, Canadian Nuclear Laboratories, TRIUMF and Canada Foundation for Innovation, as well as current and potential collaborators from the Sudbury area.

SNOLAB TRIUMF Canadian Light Source Centre canadien de rayonnement synchrotron

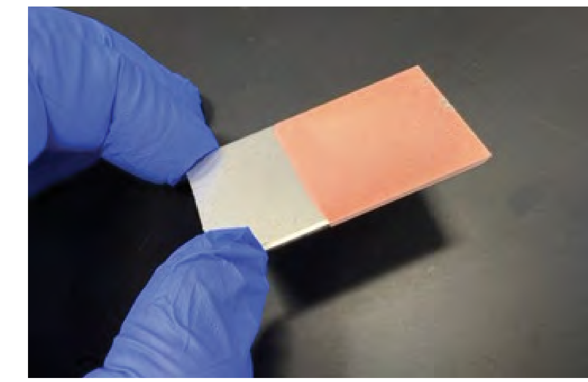
INNOVATION Canada Foundation for Innovation Fondation canadienne pour l'innovation

Canadian Nuclear Laboratories | Laboratoires Nucléaires Canadiens

FACILITY HIGHLIGHTS

INFRASTRUCTURE & CAPABILITY DEVELOPMENT

MAPLE and milliMAPLE



Copper is a critical material in many SNOLAB experiments due to its thermal and electrical conductivity, density, and versatility. However, commercially available copper often contains trace amounts of uranium and thorium and can acquire additional radioactive isotopes through exposure to cosmic rays during production and transport. For experiments searching for extremely rare signals at SNOLAB, even these tiny sources of radiation can create unwanted background noise.

Facilities capable of producing science-grade copper are limited, with none in Canada. To address this challenge, SNOLAB launched the Metal Assay and Production Laboratory using Electromagnetism (MAPLE) project this year to develop the capability to produce ultra-pure copper.

The electroforming process is simple, but delicate: a highly purified copper-bearing solution is prepared; a DC electrical current is applied between an anode and a cathode, and copper ions migrate through the solution and plate onto the cathode as metallic copper.

Electroforming copper on site has two key benefits for SNOLAB. First, it limits impurities from the growing copper layer, resulting in science-grade copper. Second, the ultra-pure copper can be molded into a desired shape and thickness.

The first phase of the project focused on developing a demonstrator called milliMAPLE. This system successfully electroformed a three-micron-thick layer of copper, which is now being assayed to determine its radiopurity.

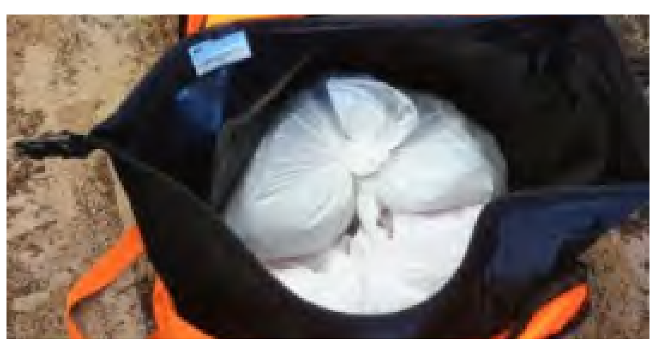
As the technology matures, MAPLE could support the next generation of particle physics and astrophysics research at SNOLAB while also serving as a platform to develop and test new copper purification techniques.

LAB SUSTAINABILITY EFFORTS

Reusable bags test pilot

Anyone who has worked in or visited SNOLAB's underground lab knows the procedure of **double-bagging your belongings**. Everything carried in and out of the lab for a shift – a lunch box, laptop or tablet, headphones, or anything else needed for the day – has to be wrapped and tied off in two 22 inch x 24 inch plastic bags; a white inner bag, wrapped in a black outer bag.

While very effective at keeping mine dust out of the lab, the double-bagging procedure has over the years generated a lot of waste. By Dr. Aleksandra Bialek's estimation, SNOLAB staff, users and visitors use 40,000 single-use bags a year, all of which end up in landfills. "We are throwing out garbage bags full of garbage bags," she said.



Bialek, a SNOLAB research scientist who also serves as lab cleanliness coordinator, decided there had to be a better way. The result was a pilot project to trial reusable storage bags that could be used by staff and users every day.

The reusable bags need to protect items as well as the garbage bags do, be durable, and be convenient enough to want to use every day. Bialek determined the waterproof dry pack bags often used for camping and canoeing were good candidates. Ten staff trialed dry bags for six months. That trial was successful enough that 10 more bags were distributed.

Bialek reports all the bags passed the cleanliness tests, and all but one is still in use. For the next step, she is sourcing other brands and sizes of dry bags to be tested.

With more experiments planned for SNOLAB in the coming years, more people and more trips to the underground lab will come, Bialek says. But increasing trips shouldn't mean increasing waste.

"Projects like this will help to ensure that SNOLAB remains a leader in deep underground science and that adjustments to the cleanliness culture are possible while maintaining the cleanroom protocols with better waste management," Bialek said.

Electrowinning for the win

To reduce chemical waste, SNOLAB has undertaken a number of projects designed to protect the environment and reduce costs.

The most ambitious of these initiatives is **electrowinning**, the process of removing metals from waste liquids before disposal. Over the past couple of years, SNOLAB etched and passified large copper pieces for SuperCDMS which created large quantities of waste liquids containing copper.

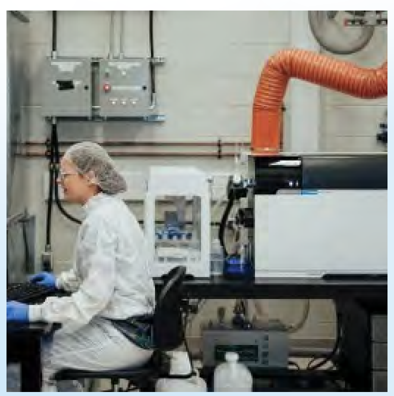
SNOLAB's scientific support department took it upon itself to clean and reduce wastewater by ensuring copper levels meet environmental regulations while also reducing waste disposal costs. The resulting electrowinning project deploys an Ionnet Recovery System designed to process large volumes of solution, collect more than 12 kilos of copper per cathode, and attain waste concentrations below 2g/L.

Another project places **decommissioned or expired chemicals** and equipment in colleges with chemical technology programs, such as Cambrian College in Sudbury. Repurposing chemicals and equipment in this way provides valuable resources for post-secondary students, directly enhancing their learning experience. For SNOLAB, this collaboration promotes sustainable laboratory practices by reducing disposal costs and preventing these materials from being incinerated.

SNOLAB's scientific support group is also revisiting its use of one-time-use plastics and cleaning products, looking for innovative ways to reduce costs and protect the environment.

SNOLAB'S SURFACE LAB CAPABILITIES

While SNOLAB is best known for its world-leading underground cleanroom laboratory, a lot of the work that enables underground science begins on the surface. The **Surface Laboratory** provides specialized facilities for sample preparation, detector development, materials testing, radiopurity measurements, and serves as a critical bridge between researchers and the underground environment. Together, these capabilities support the development, operation, and advancement of experiments at SNOLAB.



ICP-MS

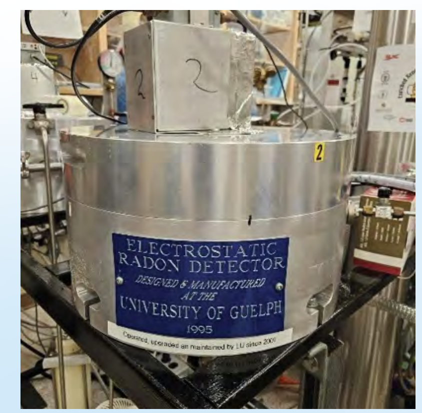
Inductively Coupled Plasma Mass Spectrometry is a highly sensitive analytical technique used to measure trace elements and isotopes in samples. SNOLAB has developed a method for ultrapure water and low matrix samples. The team is currently developing procedures for purity tests of electroformed copper and isotopic dilution tests for Th-229 and U-233.

XIA UltraLo-1800

The XIA UltraLo-1800 supports the radiopurity of materials used in rare-event physics experiments. By detecting extremely low levels of surface alpha contamination, it enables background characterization studies and helps verify the cleanliness of materials that are deployed in sensitive research environments.

Radon Emanation

The Surface Radon Emanation Board is used for radon emanation studies. The equipment measures ^{222}Rn to ensure radiopurity of materials for new, existing and future experiments at SNOLAB.



Electrostatic Counters

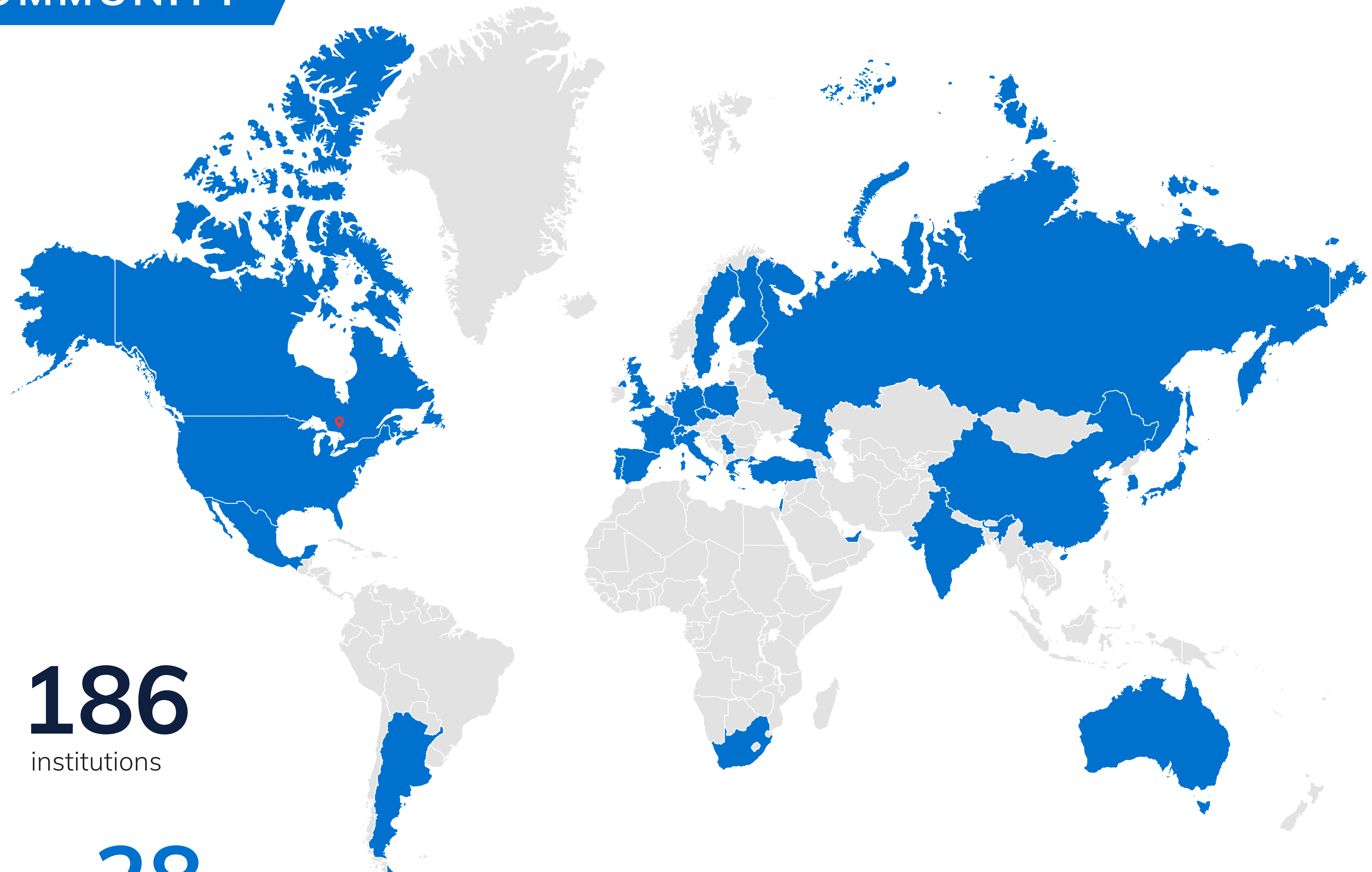
The Electrostatic Counters (ESCs) are used for radon measurements to ensure radiopurity of materials. The ESCs are currently being tested and re-commissioned for future radon studies.

Radium Assay Technique

To ensure the radiopurity of ultrapure water, SNOLAB uses a highly sensitive assay technique capable of detecting trace amounts of Ra-224. The process relies on Hydrous Titanium Oxide (HTiO)-loaded 0.1-micron filter membranes and consists of five stages: deposition, extraction, elution, secondary concentration, and β-α counting, enabling precise measurements of ultra-low levels of radioactivity.

A GLOBAL COMMUNITY

SNOLAB attracts researchers from universities and laboratories around the world, allowing experiments to draw on specialists in neutrino physics, dark matter detection, astroparticle physics, quantum technologies, and underground life sciences.



1250+
annual academic users and collaborators

186
institutions

20%
of users from Canadian institutions

28
countries

SNOLAB BY THE NUMBERS

221
onsite users

a **35%** increase from last year

219
citations in peer-reviewed publications

32
peer-reviewed academic publications

25
presentations at conferences

5,013
hours of training delivered to staff

352
people toured SNOLAB across 31 tours

51
Safety Flashes distributed to the SNOLAB community from the EHS group

373
rail cars of supplies and equipment shipped from the warehouse to the underground lab

3,651
youth engaged in outreach activities

SKILLED PEOPLE

ERICA CADEN

Senior Research Scientist

What is your role at SNOLAB?
I celebrate my 10th year working for SNOLAB in 2026! I came to Sudbury to work on the SNO+ experiment as a postdoc at Laurentian University in 2013. I've worked on the SNO+, HALO, nEXO, XLZD, and COSMO projects.

What drew you to work at SNOLAB?
For my PhD, I travelled 2-3 times per year from Philadelphia to the experiment site in France, or other science meetings. For the next step in my career, I wanted to be located where the action was happening! SNOLAB science is world leading, and I really enjoy being able to interact with the students who come here to work.

What does a typical day look like for you?
Every day is different. I meet with students working on the experiments I support, work on different writing projects, or read new papers that have popped up on the physics open-source publication repository, the ArXiV, and often meet with other collaborators. Sometimes I'll do more reading and writing in the evenings, depending on how close a deadline is looming 😉.

What is something you are really proud of?
One of my favourite parts of my job is building community and supporting women in science at all stages of their careers, through mentorship and searching for opportunities to promote colleagues. I chair the local organization of the Tri-Institute School on Elementary Particles (TRISEP), a summer school for graduate students in particle physics. I'm so proud to see students at different meetings as their careers progress.

What advice would you give someone wanting to work in science?
Mentorship!! Find someone to whom you can ask questions, bounce ideas off, and can help guide you through new situations. Then, when you have some experience, be that mentor to a younger scientist.

CHRISTA PAQUETTE

Systems Operator

What is your role at SNOLAB?

I have worked at SNOLAB for nearly eight years now as a Systems Operator.

What drew you to work at SNOLAB?

I was looking for a new career in an adjacent field that I was already in and happened upon a SNOLAB job posting for a Systems Operator. I had heard about SNOLAB but forgot it existed until seeing the posting. I jumped on it as quickly as I could, as it was exactly what I was looking for.

What does a typical day look like for you?

I work underground almost every day. Operators fulfill various roles in the underground lab including Lab Response Coordinator (LRC), which means accounting for all SNOLAB workers underground, clearing the lab, making sure that the air is safe, and that all systems are working before the shift can start. I also monitor and operate our ultrapure water and scintillator plants, cryogenic, ventilation, fire, chiller, and fluid cooler systems. Working in the Operations Group requires us to “roll with the punches” and work as a team to keep systems functioning.

What is something you are really proud of?

One milestone was the final filling of SNO+’s acrylic vessel with 780 tonnes of scintillator. It was a long time coming with many hiccups to work through, including a full-blown pandemic! Mostly, I'm proud of the knowledge I’ve gained and the skills I’ve learned along the way.

What advice would you give someone wanting to work in science?

SNOLAB is a unique place that has opportunities for people from nearly every work background. If there is a specific area that you'd like to work in, look into what it takes to reach that goal and work toward it. You don't necessarily require a PhD to work in science! Find something that inspires you and work with it!

PETER LUCZAK

Network Administrator, Information Technology

What is your role at SNOLAB?

I’ve been with SNOLAB for one year as the Network Administrator.

What drew you to work at SNOLAB?

Growing up in Sudbury, SNOLAB was always something I had heard about and I’ve also always had a strong interest in science. The opportunity to work at a local organization involved in world-class science really appealed to me.

What does a typical day look like for you?

My main focus has been a large-scale project to modernize SNOLAB’s network infrastructure. This work includes redesigning and improving the network topology, replacing end-of-life switches and wireless access points, and managing our firewalls and VPN infrastructure. I also spend time troubleshooting day-to-day network issues, supporting the networking needs of experiments, monitoring network performance, and helping ensure reliable connectivity for staff and collaborators accessing SNOLAB systems from around the world.

What is something you are really proud of?

I’m especially proud of the progress we’ve made modernizing SNOLAB’s network infrastructure. I’ve led the deployment of our next-generation firewalls and the planning and implementation of a major network infrastructure upgrade. As the project is nearing its end, it’s been rewarding to take a project of this scale from planning through implementation knowing that it will improve the reliability and security of SNOLAB’s network for years to come.

What advice would you give someone wanting to work in science?

I enjoy being surrounded by people who are genuinely passionate about science and the work they do. Even though my role is in IT, it’s rewarding to know that the work I do helps support research. I encourage anyone interested in working in a science environment to be curious, take pride in their own area of expertise, and be open to learning from everyone around them.

THEJUS TOM

Environmental Health and Safety Technician

What is your role at SNOLAB?

I have been working at SNOLAB for the past five years as a Health and Safety Technician.

What drew you to work at SNOLAB?

What drew me to SNOLAB is the uniqueness of the challenges. I was excited about the opportunity to work in an environment that brings together underground operations, engineering, technology, and scientific research.

What does a typical day look like for you?

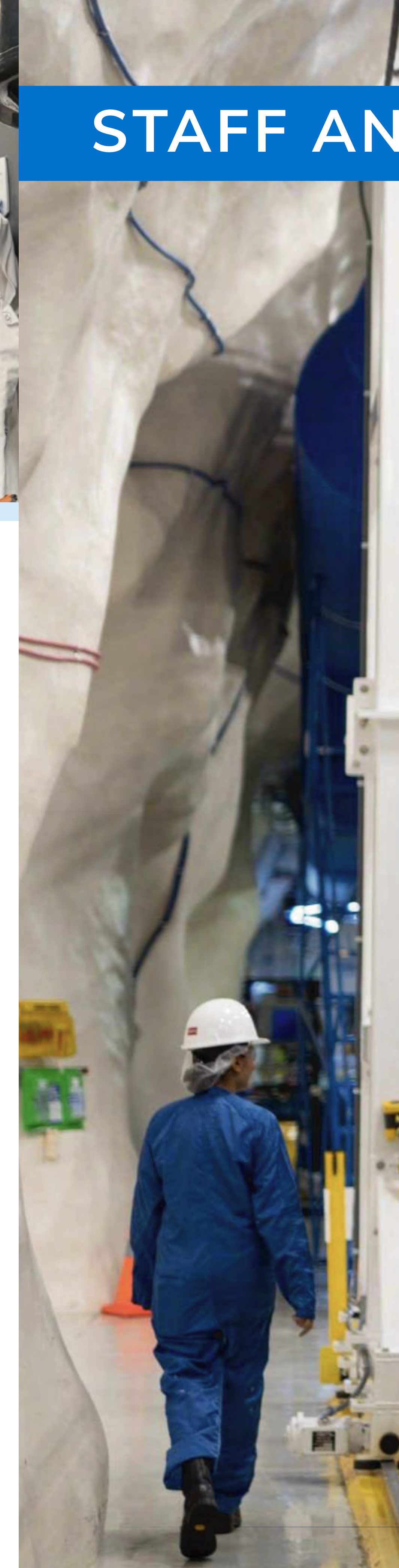
I work underground and on surface conducting inspections, observing work activities, following up on hazards or corrective actions, supporting workers with safety-related questions, reviewing hazard assessments, or completing reports. I may also be investigating incidents, supporting training, or leading other health and safety initiatives. Building strong relationships and earning trust are just as important as the technical aspects of the role, and it makes the work meaningful and rewarding.

What is something you are really proud of?

One thing I'm most proud of is how much I've grown professionally during my time at SNOLAB. The positive feedback I have received from colleagues and management for identifying hazards and implementing effective solutions is one of my greatest accomplishments. I take pride in knowing that my role contributes to ensuring people can work and return home safely at the end of the day.

What advice would you give someone wanting to work in science?

Stay curious and be willing to learn from everyone around you. You don't have to know everything when you start, and don't be afraid to ask questions. Some of the best learning opportunities come from simply asking why something is done a certain way. If you are willing to learn, take responsibility, work as part of a team, and continuously improve, then there are a lot of opportunities to grow in a place like SNOLAB.



STAFF ANNIVERSARIES

The success of SNOLAB is built on the talent, and dedication of its people. This year, we are pleased to **recognize team members celebrating service milestones** and to thank them for the many ways they have contributed to advancing science, supporting our community, and strengthening the organization.

5 Years

Andrew Kubik (Research Scientist)
Andrew Moss (Mechanical Maintainer)
Klaudia Linklater (Finance Support Specialist)
Michael Stoddart (Operations Manager)
Regan Picotte (Senior EHS Officer)
Richard Maki (Mechanical Tradesperson)
Steffon Luoma (Staff Scientist)
Tamsen Lahnalampi (EHS Tech)

10 Years

Ashley Mathewson (Project Engineer)
Blaire Flynn (Senior E&O Officer)
Edna Gareau (Accounts Payable Specialist)
John Flowers (Cleaner Maintainer)
Justin Cooper (Supervisor)
Mike Hood (Planner)
Sherri McBride (Cleaner Maintainer)

SNOLAB COMMUNITY

AWARDS AND RECOGNITIONS

Mehwish Obaid, Manager of the Project Management Office, received the Order of Honour from the Professional Engineers Ontario (PEO), in September 2025. This award is the PEO's highest volunteer recognition which identifies PEO volunteers who have made a substantial contribution to support PEO's mandate to regulate the engineering profession in Ontario. Mehwish also received the Ontario Volunteer Service Award, recognizing 10 years of continued service.

Prof. Gabriel Orebi Gann, University of California, Berkeley, was elected as a fellow of the American Physical Society in the Division of Nuclear Physics for innovative neutrino detectors for fundamental physics, leadership in the development of next-generation neutrino experiments, and contributions to precision studies of solar neutrinos. Prof. Orebi Gann is a member of the SNO+, Theia, and NuDoubt^{++} Collaborations.

Ruhani Ahluwalia, SNOLAB co-op student, from Southern Methodist University (SMU) received a Fullbright U.S. Student award for international study, research, and teaching. Ruhani was part of SNOLAB's 2026 winter-term student cohort, after completing her bachelor's degree in Physics. At SNOLAB she researched low-background radiation detection to support dark matter and neutrino experiments. As a Fullbright grantee, she will conduct particle physics research in Poland at the Institute of Nuclear Physics in Krakow.

Prof. Kyle Leach, Colorado School of Mines, was elected as a fellow of the American Physical Society in the Division of Nuclear Physics for pioneering work in applying superconducting sensors to the study of neutrino properties. Prof. Leach served as a member of the nEXO Collaboration and recently joined the faculty at Queen's University.

Dr. Nigel Smith, who has advanced large-scale research facilities as the former SNOLAB executive director and current TRIUMF executive director, was elected as a Fellow of the Royal Society of London. Past fellows include many world-renowned and highly impactful scientists, such as Isaac Newton, Albert Einstein, Stephen Hawking, and Charles Darwin.

Prof. Priscilla Cushman, University of Minnesota, shared this year's Breakthrough Prize in Fundamental Physics, which was awarded to hundreds of researchers from institutions across the globe for their work to precisely measure the anomalous magnetic moment of the muon as part of the Muon g-2 collaborations at CERN, Brookhaven National Laboratory, and Fermilab. Prof. Cushman currently serves as spokesperson for the SuperCDMS experiment at SNOLAB.

EDUCATION & OUTREACH

IN THE COMMUNITY

Photo by SCWIST

National STEM EXPO

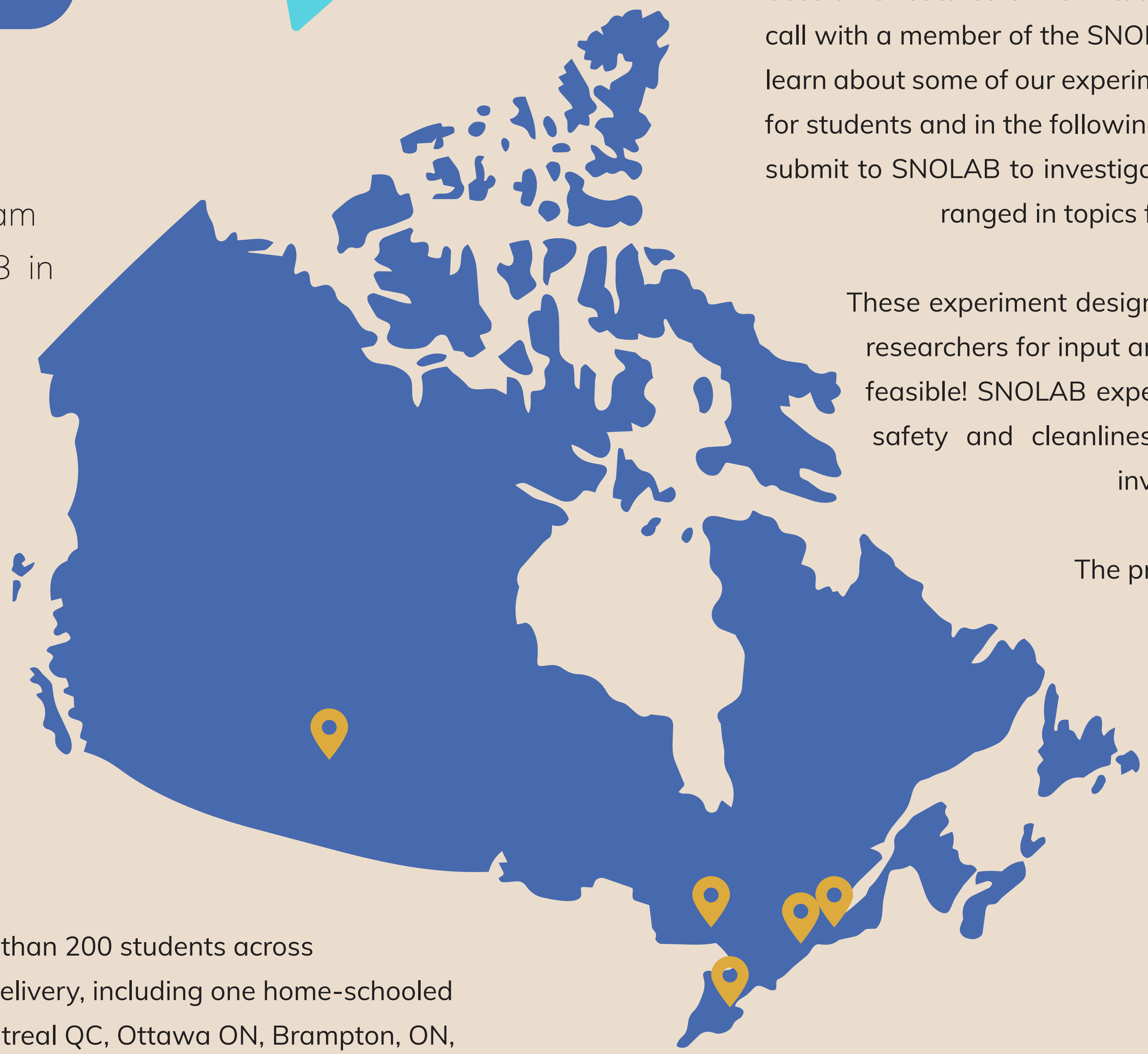
SNOLAB hosted an industry booth at the inaugural 2026 Youth STEM Expo, hosted by SCWIST (the Society for Canadian Women in Science and Technology) at the University of Toronto Scarborough. This event connected more than 400 youth with more than 40 STEM organizations from across Canada. The event provided an opportunity to inspire the next generation of scientists, build relationships with educators and industry partners, and showcase pathways into STEM careers. SNOLAB Education and Outreach Coordinator Rachel Richardson participated in a career panel alongside representatives from Perimeter Institute, TRIUMF, and the McDonald Institute, sharing insights on opportunities in physics and highlighting the programs, mentors, and support systems available to help students pursue careers in science.

Connected North Partnership

In January 2026, SNOLAB launched a partnership with Connected North, an Indigenous STEM organization that delivers live, interactive virtual learning experiences and educational resources to students in remote and northern communities across Canada. Through three classroom sessions in Whitehorse, Yukon; Gjoa Haven, Nunavut; and Inuvik, Northwest Territories, SNOLAB connected with more than 40 students. Tailored for both K to grade 6 and grades 7 to 12, the program brings SNOLAB's underground science directly into classrooms, giving students opportunities to engage with staff and scientists in real time. By encouraging curiosity, questions, and exploration, these sessions help foster STEM interest and broaden access to science learning opportunities for students in remote communities.

WONDERGROUND by SNOLAB

SNOLAB launched an exciting new program designed to reach students in grades 4 – 8 in classrooms across Canada. Thanks to NSERC PromoScience funding, the **Wonderground program (initially named SEEDLING)** was designed to encourage students to be curious by learning about the process of science. Inspiring the next generation of young scientists is one of SNOLAB's core missions, and Wonderground engaged students in an opportunity to do science, with hands-on learning in each session.



In its inaugural year, Wonderground reached more than 200 students across Canada that were a mix of remote and in-person delivery, including one home-schooled group. Classes were located in Saskatoon, SK, Montreal QC, Ottawa ON, Brampton, ON, and Sudbury, ON.

Each classroom that participated in the program completed a minimum of six sessions with SNOLAB's Education & Outreach team.

Session 3 featured a live virtual tour of SNOLAB, where students participated in a live video call with a member of the SNOLAB team who was underground to walk through the lab and learn about some of our experiments and unique infrastructure. This session sparked curiosity for students and in the following session, students were able to create experiment designs to submit to SNOLAB to investigate some of the questions they had! Questions from students ranged in topics from gravity to the effects of increased pressure underground.

These experiment designs and questions were then submitted to a panel of SNOLAB researchers for input and feedback. From this, 10 experiment ideas were selected as feasible! SNOLAB expertise was used to refine experiment ideas to meet our strict safety and cleanliness requirements. Members across many departments got involved in helping to make the ideas from students come to life.

The program wrapped up with a Celebration of Learning event held at Science North at the end of the school year. Following this successful pilot program, the program will re-launch in the fall of 2026 and SNOLAB is developing an interactive website loaded with educational resources.

GLOBAL PHYSICS PHOTOWALK

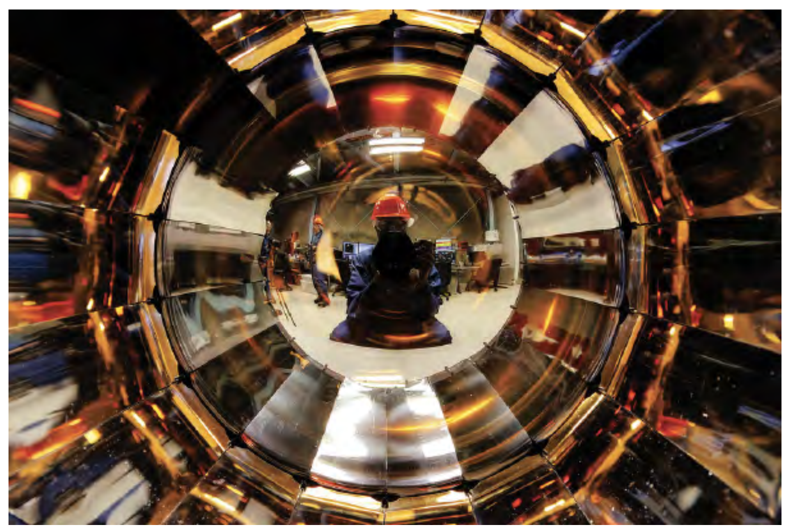
The **Global Physics Photowalk 2025** celebrated the beauty of science through the lens of creativity. This competition gives photographers a rare opportunity to visit world-leading physics labs across the world to capture behind-the-scenes photos of some of the most exciting science being carried out today. Participating labs around the world included CERN in Switzerland, Fermilab, Brookhaven, and SURF in the United States, and SNOLAB and TRIUMF in Canada.

A total of eight Sudbury-based amateur and professional photographers spent a full day in SNOLAB's underground facility capturing the people and science that make SNOLAB tick.

Featured here are some of our favourites.

To view more photos from the photowalk, visit SNOLAB's Flickr page.

Photos by Jason Innis



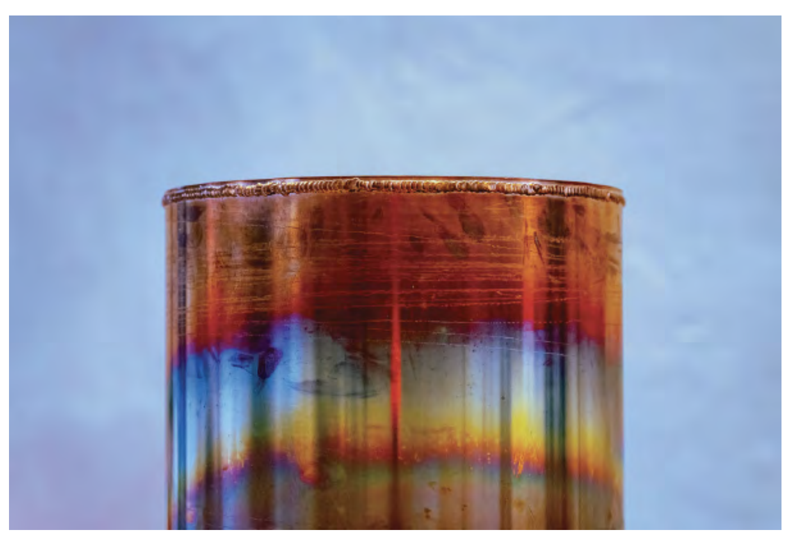


Photo by Sarah Reese

Photo by Terence Hayes

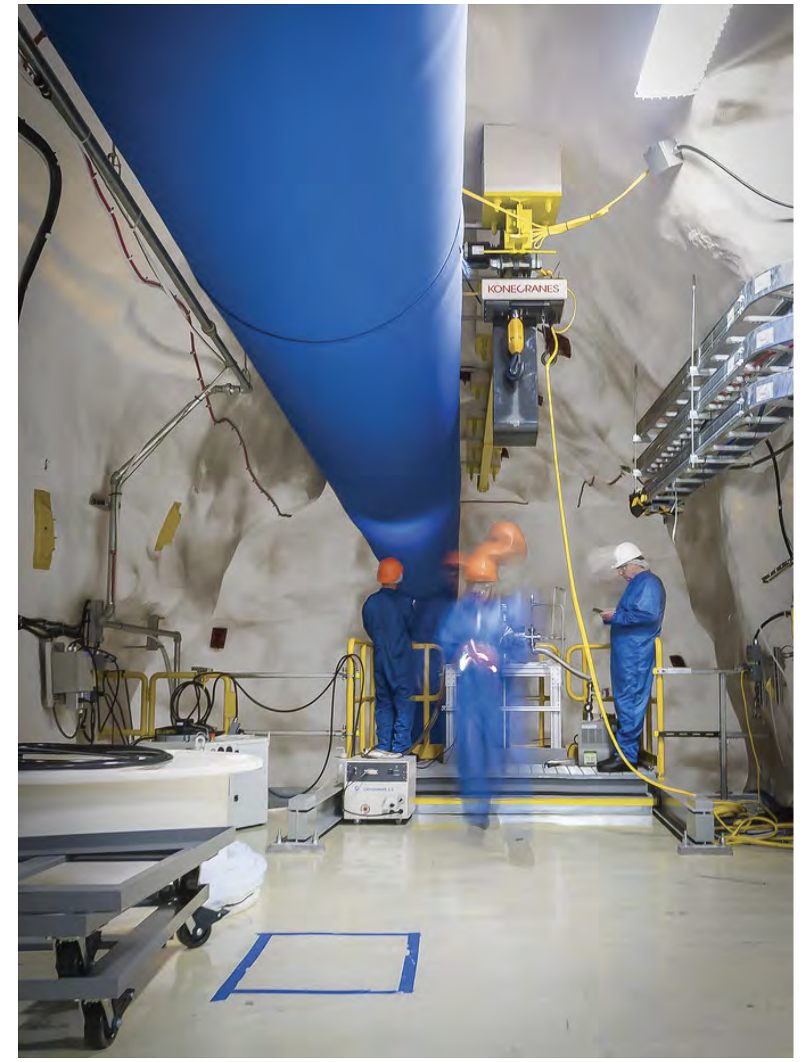


Photo by Mary Katherine Keown

Photo by Terence Hayes

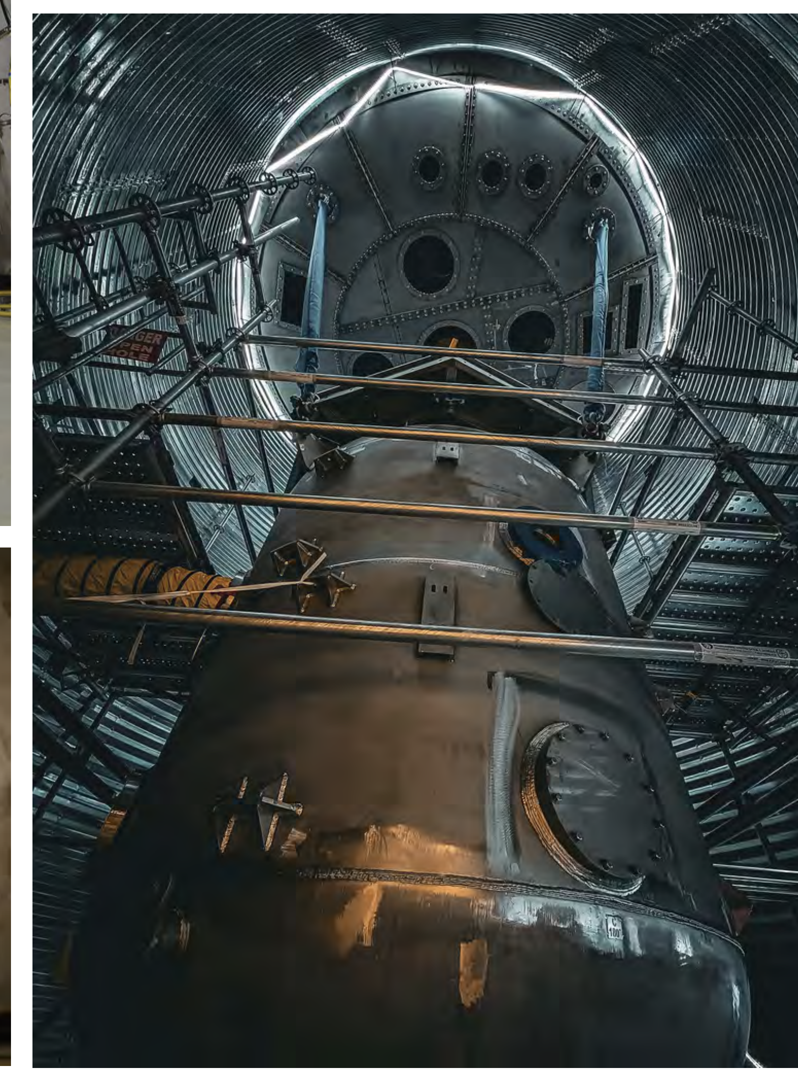
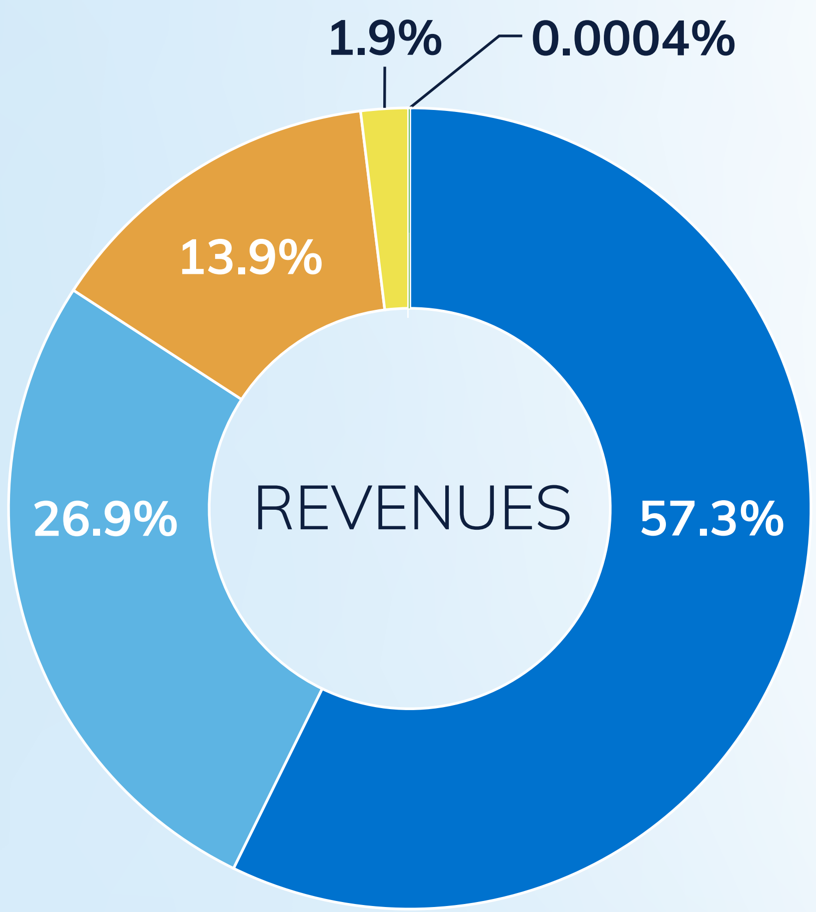


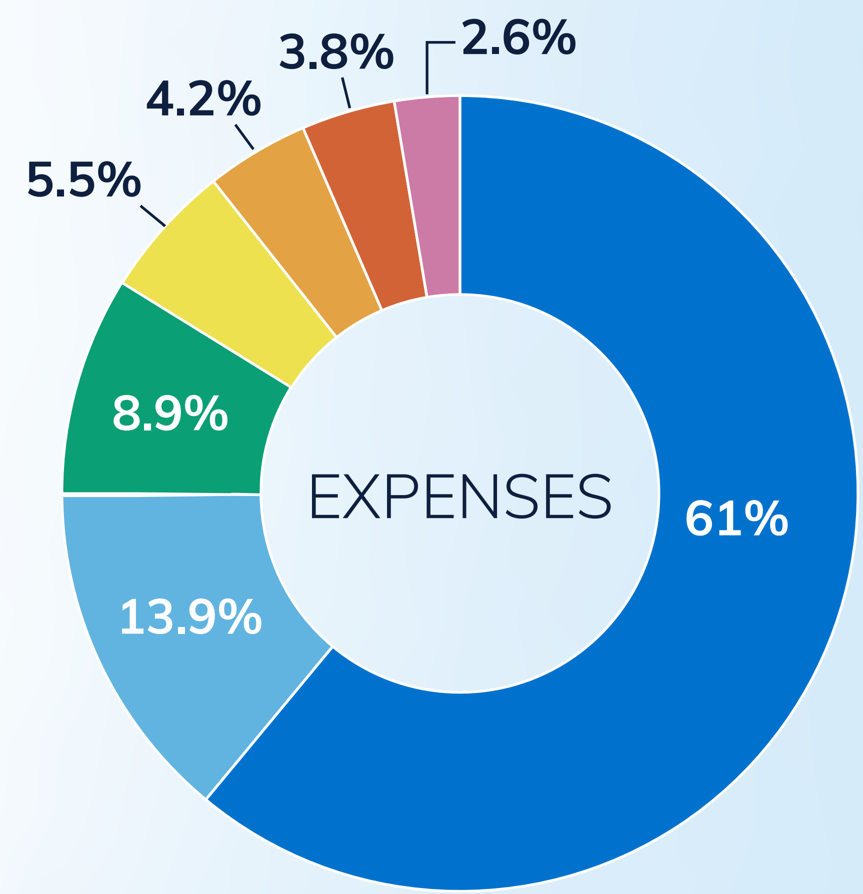
Photo by Ingris Leiva

FINANCIAL REPORT

For the complete audited financial statements of SNOLAB, visit www.SNOLAB.ca/about



Grant Funding – Federal	$14,905,072
Grant Funding – Provincial	$7,000,000
Amortization of deferred capital contributions	$3,612,366
McDonald Institute funding	$498,289
Other	$10,000
TOTAL	**$26,025,727**



Salaries and benefits	$15,890,059
Amortization of capital assets	$3,612,366
External Contracts (Other)	$2,318,922
Supplies	$1,435,474
Equipment	$1,083,953
External Contracts (Vale)	$999,238
Travel	$688,963
TOTAL	**26,028,975**

SNOLAB IN PHOTOS

TFO visits the lab for a feature on SuperCDMS and the search for dark matter.

Dr. Erica Caden hard at work on the set of Mission Unstoppable with Miranda Cosgrove.

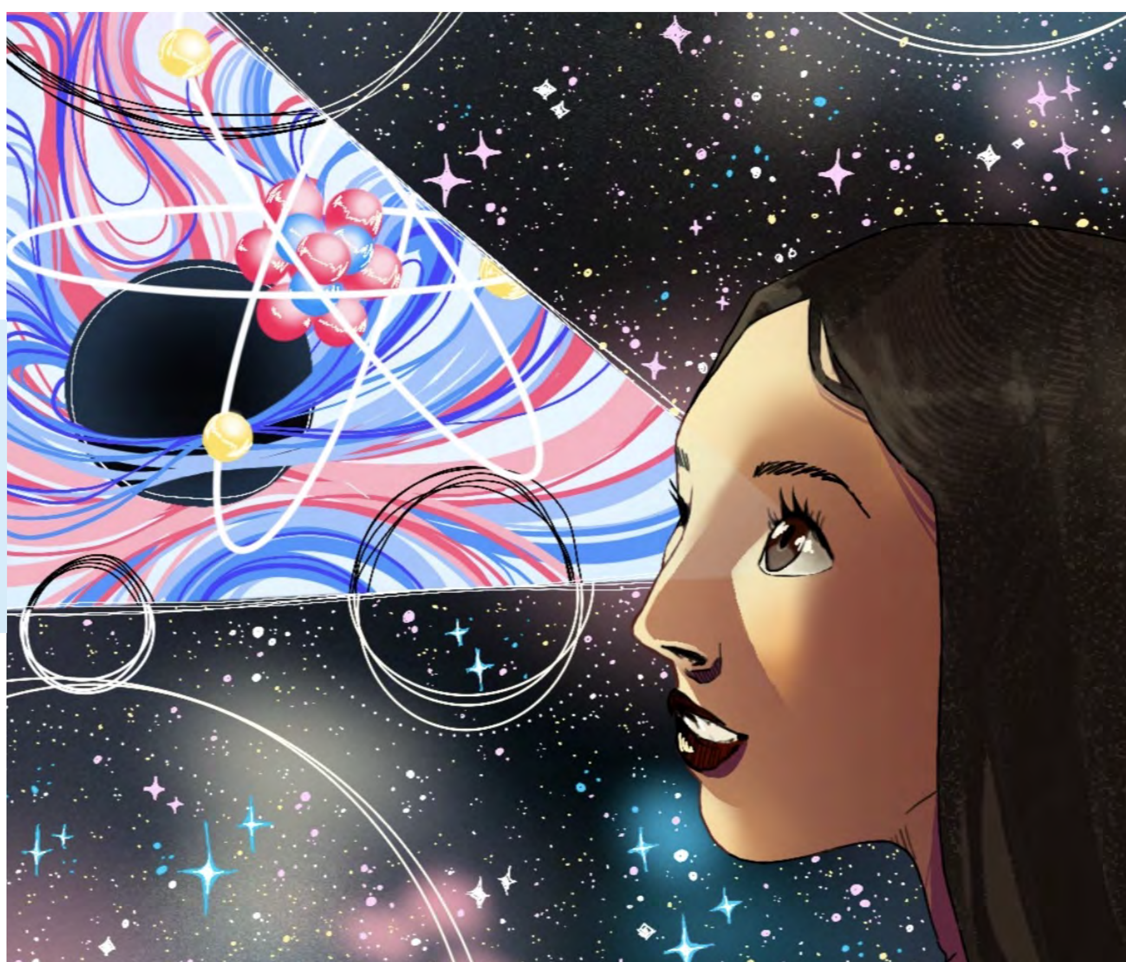
SNOLAB Executive Director Dr. Jodi Cooley catches up with Ontario Minister of Energy and Mines Stephen Lecce at the NORCAT test mine in Levack.

Research Scientist Dr. Michel Lapointe delivers a Science Cafe talk called REPAIR: Undoing the Damage, in the underground lab.

MCURES Minister Nolan Quinn, Algoma-Manitoulin MPP Bill Rosenberg and SNOLAB ED Dr. Jodi Cooley pose wth members of the PICO-500 collaboration.

SNOLAB staff organized a hike for summer students to the Cup and Saucer trail on Manitoulin Island.

A winning submission by Elizabeth from SNOLAB's 2025 Dark Matter Day poster design contest, which invited students and community members to explore dark matter through art.



SNOLAB staff were thrilled to take part in the Sudbury Santa Clause parade with the Neutrino Express.

SNOLAB proudly supports the Fierté Sudbury Pride Festival Block Party every year.

Prof. Chang Kee Jung delivers a public talk on Physics in Sports at the Sudbury Refettorio Theatre to close out the NNN25 conference.

Traditional Ojibway storyteller Will Morin leads SNOLAB staff in building a group dream catcher during Wellness Month.

SNOLAB staff whip up some liquid nitrogen ice cream for the Creighton Friends and Family Day.

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