



SNOLAB in 15 years:

The world's leading underground
science facility

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.

Our visionary partners

SNOLAB is the result of an alliance of six founding partners. Our five Canadian university joint venture members 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.

SNOLAB is sincerely grateful to our many funding partners. Their essential investments in our facilities, research capabilities, infrastructure, and operations support leading-edge discovery, physics research, and innovation for the benefit of all Canadians.



Commitment 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 (including, but 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.

Core funding partners

SNOLAB is generously supported by the Canada Foundation for Innovation and the Province of Ontario.



Message from Executive Director

At SNOLAB, we push the frontiers of underground science by making transformative discoveries that unlock the mysteries of the universe. We also inspire and train the next generation of scientists and innovators. SNOLAB is a world-leading underground science facility. We are a cornerstone of Canada's research and innovation ecosystem and represent the country on the global science stage. We contribute to Canada's reputation as a research dynamo and are an indispensable partner in discovery science.

We are proud of everything that we have accomplished at SNOLAB, and we know we can deliver even greater value for Canada and Canadians in the future. Strengthening national resilience and sovereignty is a key priority in these turbulent geopolitical times. That's why we set about to articulate and communicate our long-term direction and ambitions for SNOLAB, a critical research infrastructure for Canada, in this 15-year vision document.

SNOLAB is poised to become the leading underground science facility in the world. We envision SNOLAB as an interdisciplinary science powerhouse in Northern Ontario supported by cutting-edge infrastructure and technology, a vibrant intellectual and training hub that draws and develops the best talent from around the globe, and a national centre for scientific knowledge that inspires and educates Canadians.

This vision document is the product of a robust community engagement process. Thank you to everyone, especially SNOLAB's dedicated staff and members of our research community, who contributed their views and helped shaped the ideas and aspirations into a clear and strong vision.

We are excited about pursuing the ambitions outlined in this vision and ensuring our continued leadership. SNOLAB is ready to meet the challenges and opportunities ahead as an influential leader of world-class research collaborations here in Canada—for the benefit of Canadians and the rest of the world.

Jodi Cooley,
Executive Director



Message from Board Chair

On behalf of the SNOLAB Institute Board of Directors, I am proud to present and endorse SNOLAB's inaugural 15-year vision. This vision positions SNOLAB as the world's leading laboratory for deep underground science. It affirms SNOLAB's long-term commitment to achieving maximum impact for Canada's investments in science. It also recognizes the importance of capitalizing on the strengths of Canada's research infrastructure to bolster sovereignty.

The document presents a bold vision of SNOLAB as a global research powerhouse and vibrant intellectual hub of collaboration, learning, and community, situated on an expanded purpose-built campus. The embedding of sustainability and operational excellence into the infrastructure will demonstrate that large-scale research facilities can advance discovery while aligning with Canada's environmental and responsible stewardship goals.

As SNOLAB evolves to respond to the shifting global science landscape, the Board will ensure responsible management of this critical national asset. Strong governance and risk oversight are key as the Board stewards the growth and evolution of SNOLAB over the next 15 years.

The Canadian and international research communities guided the development and aspirations of the vision. The Board thanks SNOLAB staff, partners, and stakeholders for their contributions.

Peter Krieger,

Chair - SNOLAB Institute Board of Directors



SNOLAB in 15 years: The world's leading underground science facility

SNOLAB is unique. We are Canada's only deep underground laboratory and one of the world's premier environments for ultra-low-background science. For more than a decade, our interdisciplinary research community has helped solve long-standing mysteries of the universe. Our internationally recognized discoveries in astroparticle physics include those of Dr. Arthur McDonald, who was awarded the Nobel Prize in 2015.

It is time to take the next step in our evolution and become the leading underground science facility in the world. Advances in technology, a growing appetite for international collaboration, and increasingly complex scientific questions are reshaping the landscape of discovery science. We must build on our strengths to seize these emerging opportunities. This vision presents a clear and ambitious direction for SNOLAB's future.

Realizing it requires focus, sustained investment, and deliberate choices on how to drive maximum impact. It is not a detailed roadmap. Rather, the vision is intended to guide the development of our scientific program and infrastructure, align partners, and ensure that SNOLAB continues to deliver scientific, technological, and societal value for Canada over the long term.

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

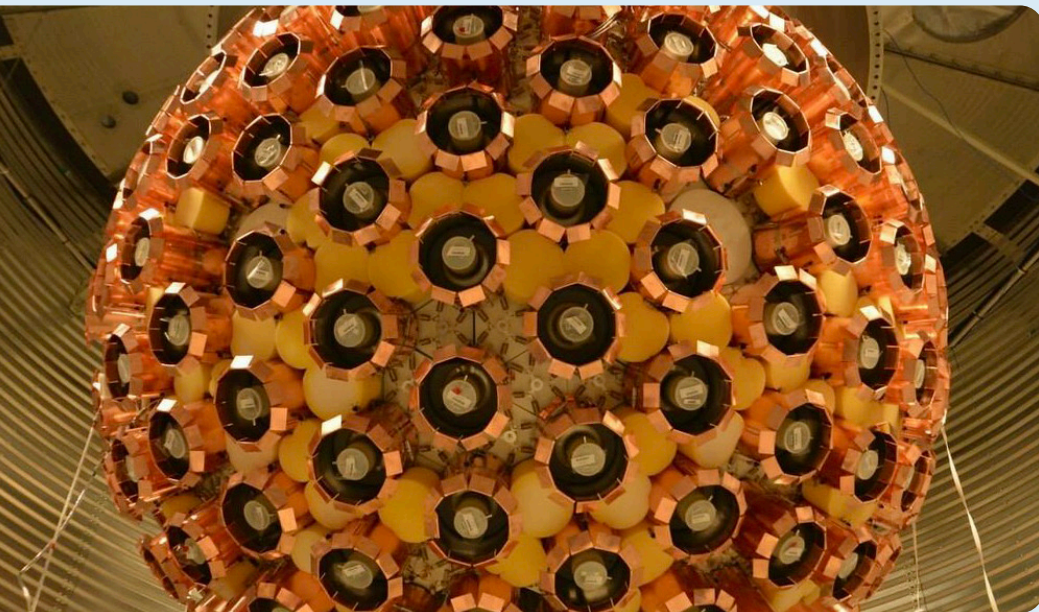
Continuously evolving to support high-impact underground science and top-tier talent

A national centre for scientific knowledge

Inspiring Canadians and improving science literacy

A global powerhouse in discovery science

Leading transformative experiments that push the boundaries of knowledge



At SNOLAB, we host and lead internationally recognized experiments that solve long-standing cosmic mysteries. Our ground-breaking research projects are not possible anywhere else in Canada and, in some cases, in the world. We will continue striving to achieve Nobel Prize-deserving discoveries that transform fundamental understanding of the universe. And we will step up our pursuit of bold, high-risk ideas that push the boundaries of underground science.

Deepening our knowledge of the particles and forces that have shaped and govern the universe will remain at the core of our scientific program. In our unmatched low-radiation environment, we will pursue answers to some of the most profound questions in modern physics:

- **What is the nature of dark matter?**
Invisible dark matter makes up most of the matter in the universe, but its exact composition is a mystery. Scientists thus far have only detected it indirectly, through its gravitational effects on the formation and motion of galaxies. Directly detecting it from Earth would have enormous implications for understanding how the structure of the universe has evolved over billions of years.
- **How do neutrinos acquire mass and influence the universe?**
Neutrinos are fundamental, nearly massless particles that seldom interact with matter. They pass effortlessly through planets and stars. Despite their elusive nature, they carry critical information about the universe, from the Sun's core to exploding supernovae.
- **Are there unseen processes that signal new physics?** Extremely rare processes that have never been observed may unlock the universe's deepest secrets. For example, observation of neutrinoless double beta decay may reveal whether neutrinos are their own antiparticles. Searching for and precisely measuring such rare events is uncharted territory.

Seeking answers to these questions will test and expand the Standard Model of particle physics, while opening doors to new physics and driving technological innovation. The expertise gained will increase the demand for Canadians to lead international scientific collaborations, both at home and abroad.

Advancing new regimes of science is another priority for SNOLAB. We have targeted quantum science and the life sciences as growth areas in the coming years:

- **Pushing the limits of quantum sensing and computing.**
In an ultra-low-background environment, quantum sensors achieve extraordinary precision by detecting signals that natural radiation would otherwise obscure. Advancing quantum sensing and computing will enable breakthroughs in fundamental physics. It will also drive innovations in technology, from next-generation imaging to materials characterization, and lay the foundation for future quantum-enabled applications.
- **Understanding life without natural background radiation.**
Our uniquely controlled setting allows us to study how biological systems respond when shielded from radiation. These studies offer rare insights into cellular processes, DNA repair, and biological resilience in conditions not found on Earth's surface. They will inform space exploration, radiation protection, and health sciences.

We will expand our efforts in more applied areas of science that serve national and global needs, such as **ultra-low-background radiation detection and nuclear measurement science**. SNOLAB's ultra-low-background environment enables unparalleled experimental sensitivity, making possible measurements that cannot be achieved elsewhere. These capabilities are critical to nuclear security, environmental monitoring, advanced materials characterization, and next-generation radiation detection technologies.

Our portfolio will feature a range of experiments at different stages of their life cycle—from large-scale multi-tonne flagship experiments funded by multiple countries to smaller rapidly deployed projects that explore exciting new ideas. This structure will keep SNOLAB agile, quick to address emerging scientific questions, and at the forefront of multidisciplinary underground research.



We will make disciplined choices about where to invest, where to scale, and when to conclude programs that have fulfilled their purpose. This approach will ensure that Canada's investment in SNOLAB, and in Northern Ontario, continues to deliver maximum scientific, technological, and strategic return.

Our scientific discoveries and expertise will cement Canada's leadership in leading-edge particle physics, astrophysics, and underground science. They will also help ensure Canada remains a sovereign and indispensable partner in the most consequential discoveries of our time.

A vibrant intellectual and training hub

Attracting and nurturing the next generation of leaders



Achieving transformative scientific discoveries requires Canada to attract and develop the brightest minds from around the world. As the world's pre-eminent underground research facility, we will become a vital intellectual hub where curiosity, collaboration, and innovation converge. We will foster a diverse, inclusive, and supportive community that empowers researchers, students, and collaborators to push the boundaries of knowledge.

SNOLAB offers a uniquely immersive environment. Our trainees and staff work directly on experiments in an ultra-low-background setting that demands precision, interdisciplinary collaboration, and technical ingenuity. The ambition and scale of the laboratory's experimental program enable researchers at all career stages to take on meaningful leadership roles, accelerating their development as independent scientific leaders.

Elevating and evolving the role of SNOLAB's first-class research staff is a key element of our vision. We will empower staff to lead experiments, moving beyond operating and supporting them. They will shape scientific direction, pursue deep scientific questions, and analyze data to advance scientific discovery. This evolution will boost SNOLAB's intellectual vitality and global scientific visibility, and reinforce Canada's competitive standing in international research collaborations.

We will further strengthen SNOLAB's position as the destination of choice for the next generation of underground scientists, engineers, and technical professionals. Trainees will continue to gain hands-on experience with some of the world's most sensitive and innovative experiments, spanning dark matter and neutrino physics, low-background technologies, cryogenics, quantum systems, life sciences, and radiation detection. They will develop deep technical expertise alongside the professional skills needed for impactful careers across academia, industry, and government. We will embed trainees in a truly global, cross-sector research ecosystem by providing opportunities for them to engage in international collaborations, interdisciplinary initiatives, and industry partnerships.

We will establish a continuum of structured learning and mentorship, spanning undergraduate co-op placements, graduate research, postdoctoral fellowships, and early-career engineering development. Expanded partnerships with universities and colleges will increase student participation in hands-on underground research. Structured training in advanced instrumentation, cryogenics, data analysis, and science communication will ensure that trainees develop both technical excellence and leadership capacity. Programs such as the Engineer-in-Training pathway will enable recent graduates to gain practical experience towards professional certification, thus strengthening Canada's technical workforce.

SNOLAB will be much more than a centre for world-class research. By combining unparalleled facilities with a culture that values diverse perspectives and expertise, we will produce Canada's next generation of leaders in discovery science, technological innovation, and evidence-based progress. SNOLAB will increase Canada's capacity to lead complex international projects, sustain domestic expertise in ultra-sensitive measurement science, and anchor a highly skilled workforce in areas of strategic importance.



A unique state-of-the-art infrastructure

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



World-class infrastructure is the foundation of transformative research, technology development, and attraction and training of talent. As Canada's only deep underground laboratory, SNOLAB represents irreplaceable national research infrastructure essential to maintaining scientific sovereignty and technological competitiveness. Our facilities combine cutting-edge experimental spaces, specialized equipment, and advanced processes that support multidisciplinary research across physics, biology, quantum technology, and more.

SNOLAB's infrastructure will evolve to support the most ambitious science of the future. Flexible and sustainable facilities will provide researchers with the tools and environment needed to pursue frontier experiments and high-precision measurements.

We envision expanded and enhanced laboratory facilities, both underground and on the surface. Our modular, multi-purpose laboratory spaces will be capable of supporting a wide range of projects—from large-scale multi-tonne detectors to life sciences experiments and quantum-ready setups. Additional cleanroom space and a new large underground cavern will enable hosting of the most ambitious astroparticle physics experiments. Upgraded equipment, storage, and environmental systems will ensure experiments operate efficiently, safely, and at the leading edge.

Our flexible, scalable infrastructure will expand to meet emerging scientific needs and equip researchers with the tools for next-generation experiments. Key to this growth is the development of new cutting-edge capabilities, including cryogenic test environments in both our underground and surface laboratories. Additionally, a new underground materials fabrication centre will produce ultrapure metals by leveraging a specialized suite of techniques: electroforming, chemical vapour deposition, advanced 3D printing, and crystal growth.

We will integrate artificial intelligence (AI)-enabled systems across both operations and research, including the application of machine learning to facility optimization, predictive maintenance, and the identification of ultra-rare signals in complex datasets. Combined with advanced data management platforms and state-of-the-art capabilities in quantum sensing, radiation detection, cryogenics, and low-background instrumentation, this digital ecosystem will accelerate discovery while reinforcing Canada's leadership in applied AI.

In parallel, we will leverage emerging national investments in sovereign and secure high-performance computing infrastructure to ensure seamless access to next-generation supercomputing capabilities for the SNOLAB scientific community. Building on established partnerships within Canada's research ecosystem, we will use these resources to manage, analyze, and interpret increasingly complex datasets at scale.

By embedding sustainability and operational excellence into our infrastructure, we will demonstrate that large-scale research facilities can advance discovery while aligning with Canada's environmental and responsible stewardship goals. Priorities will include energy-efficient systems, maintaining a minimal environmental footprint, and smart resource use and management. We will carefully plan and optimize new processes and experimental setups to minimize waste generation.

We are planning an expanded purpose-built campus including residential and convening space that supports a vibrant intellectual hub of collaboration, learning, and community.



A national centre for scientific knowledge

Inspiring Canadians and improving science literacy



In an increasingly complex and fractured global landscape, Canada must strengthen public trust and interest in science. SNOLAB will seek to be a visible symbol of Canada’s commitment to evidence, curiosity-driven discovery, and the responsible application of scientific knowledge. As a trusted national centre for knowledge, we will use education, outreach, and communication to improve Canadians’ scientific literacy, spark curiosity and imagination, and inspire future generations to pursue careers in science and innovation.

We will expand our public engagement and outreach programs to reach audiences at all stages, from schoolchildren to post-secondary students, educators, and lifelong learners. These efforts will take place locally at SNOLAB and virtually, enabling participation from communities across the country.

Immersive educational experiences, including hands-on exhibits, interactive demonstrations, and virtual modules, will allow learners to explore the principles and impact of cutting-edge underground science, connecting them directly to our research and discoveries. Partnerships with schools, colleges, universities, Indigenous communities, and science culture institutions will amplify the reach and impact of these programs. A new SNOLAB visitor centre will provide a permanent hub for in-person engagement. It will bring the underground laboratory to life for Canadians of all ages.

We will continue to emphasize inclusion, accessibility, and representation. Engaging Northern and Indigenous communities, supporting educators, and creating programs for underrepresented groups will help broaden participation in STEM. By fostering an environment where science is accessible, inclusive, and inspiring, we will cultivate a diverse pipeline of future scientific talent. At the same time, we will strengthen the connection between Canadians and their national research infrastructure.

Discovery science is deeply connected to everyday life and national progress. We will demonstrate how science drives practical outcomes—from advanced materials and quantum technologies to health and environmental applications. Through our reputation for research excellence and transformative discoveries, we will be a trusted source of scientific insights for governments, policy makers, and communities seeking to develop evidence-based guidance. In collaboration with industry, local communities, and academia, we will help translate scientific knowledge into societal benefits, technological innovation, and informed decision-making.

By combining world-class research with a national mandate to inform, educate, and inspire, SNOLAB will reinforce Canada's leadership in discovery science. As a model of excellence for how research, education, and society can advance in step, we will help Canada to both engage with and shape global scientific advances.





Photo by Ingrid Leiva

