

2024/06/21
IUPAP WG9 Meeting

SNOLAB Update

Jeter Hall

Director of Research		SNOLAB
Assistant Professor		Laurentian University
Adjunct Professor		University of Toronto



SNOLAB is a major Canadian science infrastructure



- SNOLAB hosts rare event searches and measurements. It's located 2 km underground in the active Vale Creighton nickel mine near Sudbury, Ontario, Canada.
- SNOLAB is operated jointly by University of Alberta, Carleton University, Laurentian University, University of Montreal, and Queen's University.
- SNOLAB operations are funded by the Province of Ontario, and the Canada Foundation for Innovation.



Reaching New Heights, Deep Underground

2023–2029 Strategic Plan



Our 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.



<https://www.snolab.ca/about/strategic-plan/>

Our Mission

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

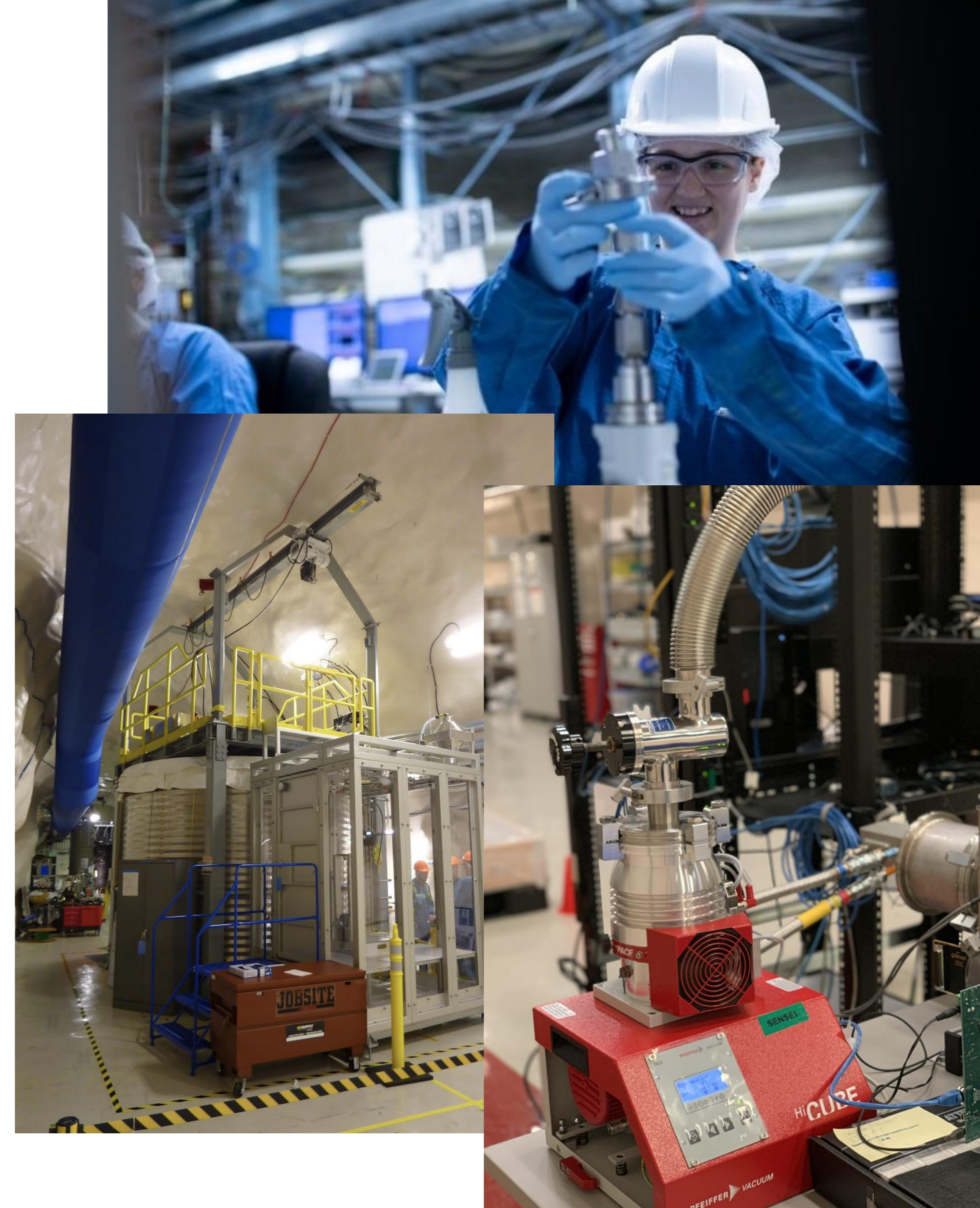
and knowledge exchange through workshops, local engagements, and professional outreach.

Promote innovation

through transfer of arising technologies.

Inspire the next generation

of scientists, innovators, and leaders through strong public and educational outreach, and formative training opportunities

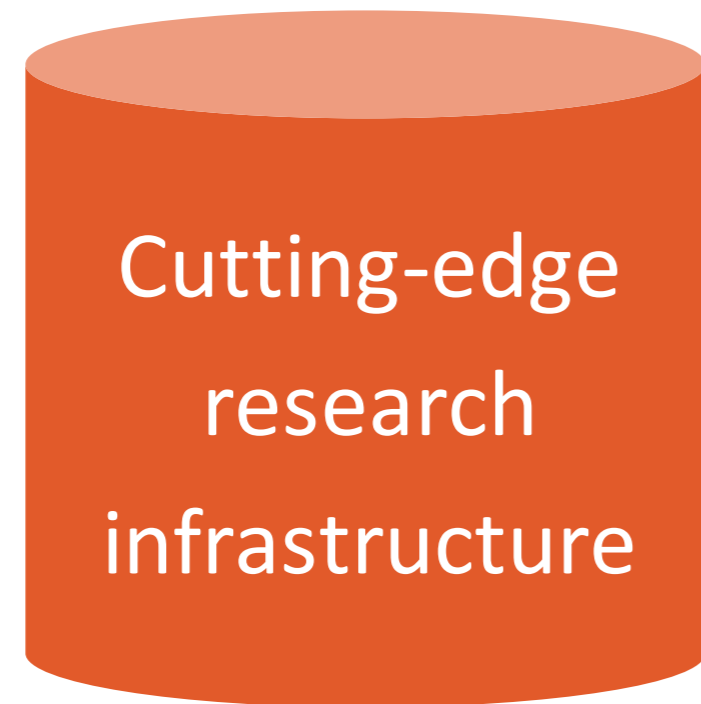


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Our Core Pillars:

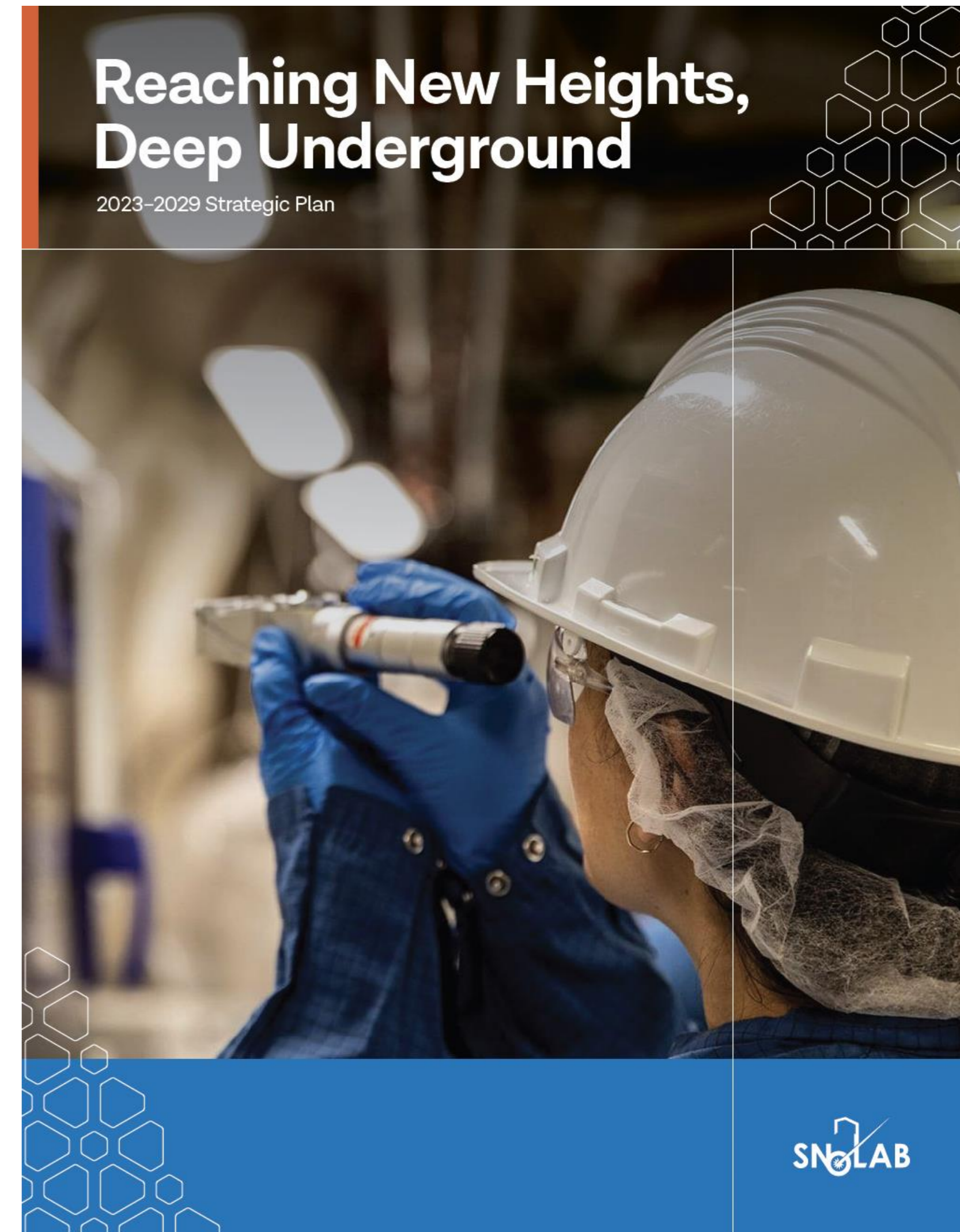


Our Mission

Enable world-class underground science
Spearhead research and development
Catalyze scientific collaboration
Promote innovation
Inspire the next generation

Our Core Values

Safety
Accountability
Diversity
Excellence
Teamwork

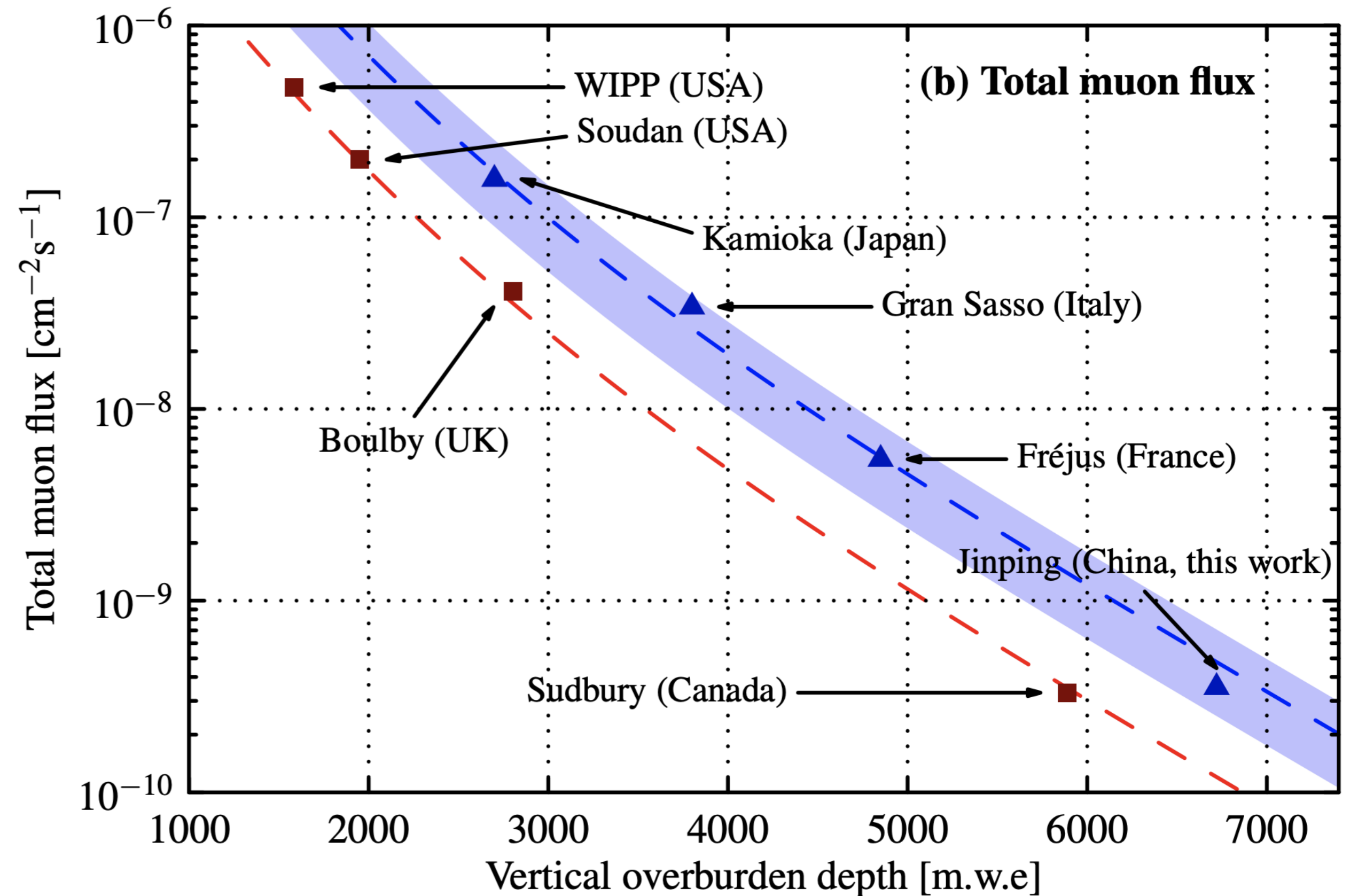


SNOLAB has the lowest available muon flux



- A growing community of users *needs* environments that are both shielded from radiation and clean to achieve sensitivity for rare event searches.
- Astrophysical systems emit high energy radiation which create muons in Earth's atmosphere
- Clean room throughout the underground facility

Guo et al., [arXiv:2007.15925v2](https://arxiv.org/abs/2007.15925v2)



Science Strategy



The science at SNOLAB is focused on increasing our understanding of the particles and forces that have shaped the universe.

- What is the nature of dark matter?
- What is the nature of the neutrino?

SNOLAB collaborates with scientific research requiring deep underground facilities.

- Neutrino observatories (solar, supernovae, geo, reactor, etc.)
- Effects of radiation on biological systems
- Environmental monitoring (nuclear non-proliferation, aquifers, etc.)

SNOLAB is interested in pursuing new collaborations and opportunities in emerging areas of underground science

- Effects of radiation on quantum technologies



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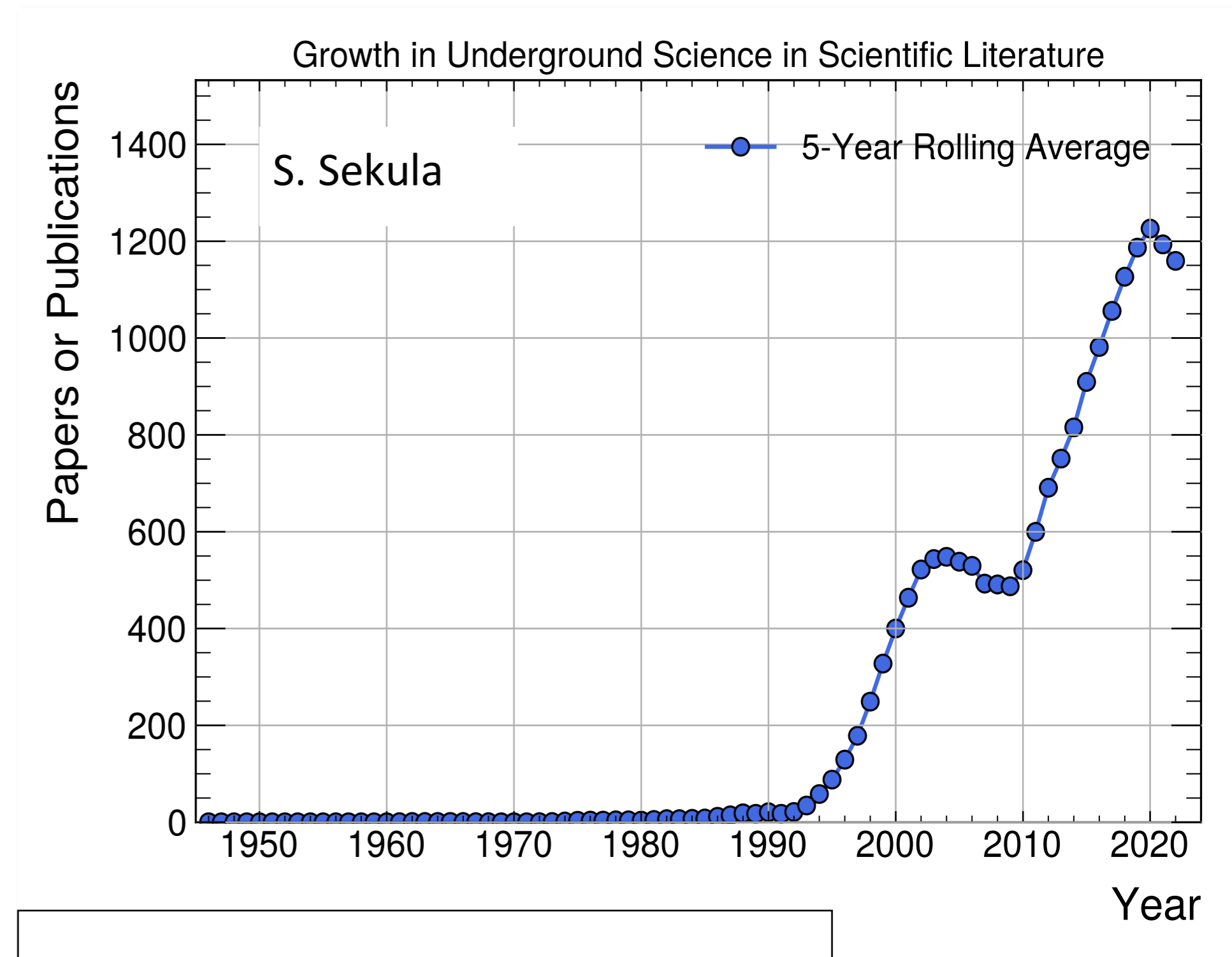
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Publications in underground science.
Includes all underground labs.

SNOLAB by Numbers



1000+ 

annual academic
users/collaborators

25% 

of those users/
collaborators are
Canadian researchers

24 

Our international
collaborators come
from 24 countries

164 

Our international
collaborators come
from 164 institutions

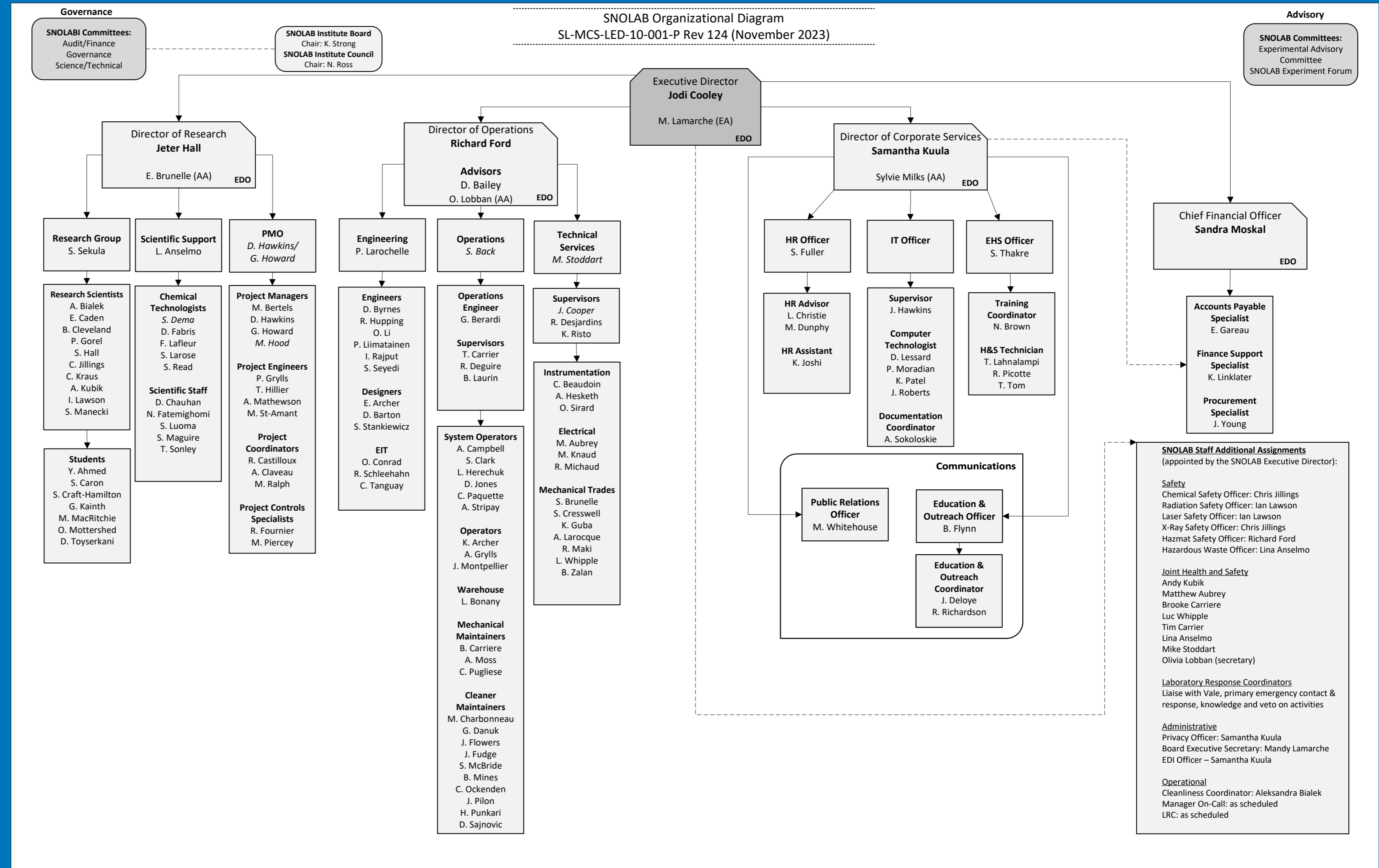
 - Participating Countries



SNOLAB by Organization

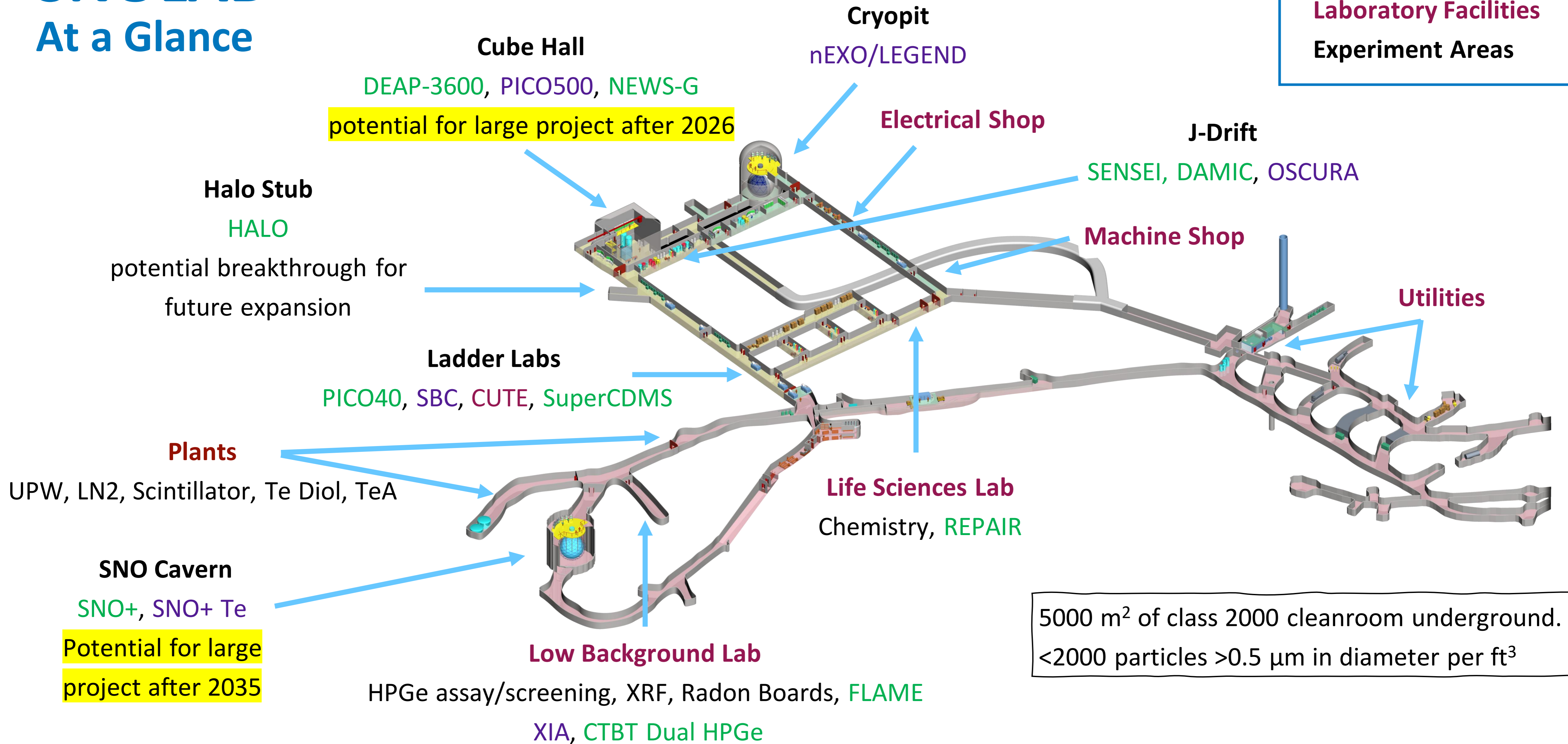


- ~150 employees
- Dedicated to operating the laboratory space and experiments
- Scientists, Project Managers/Coordinators, Project Engineers, Design Engineers, Operators, Millwrights, Electricians, Instrumentation, Chemical Support
- Human resources, IT support, Environment Health and Safety, Communications, Finance



SNOLAB – At a Glance

Current Experiments
Future Experiments
Laboratory Facilities
Experiment Areas



5000 m² of class 2000 cleanroom underground.
<2000 particles >0.5 μm in diameter per ft³

Infrastructure: Surface Spaces & Support



Offices, Clean Labs, Shipping/Receiving on Surface

- Dedicated office space for users.
- Clean room laboratories for surface work and final checks before shipping underground.
- Multiple meeting rooms (10-20 people) and auditorium seating 150.

Create Welcoming Environment - SNOLAB Summer of Science

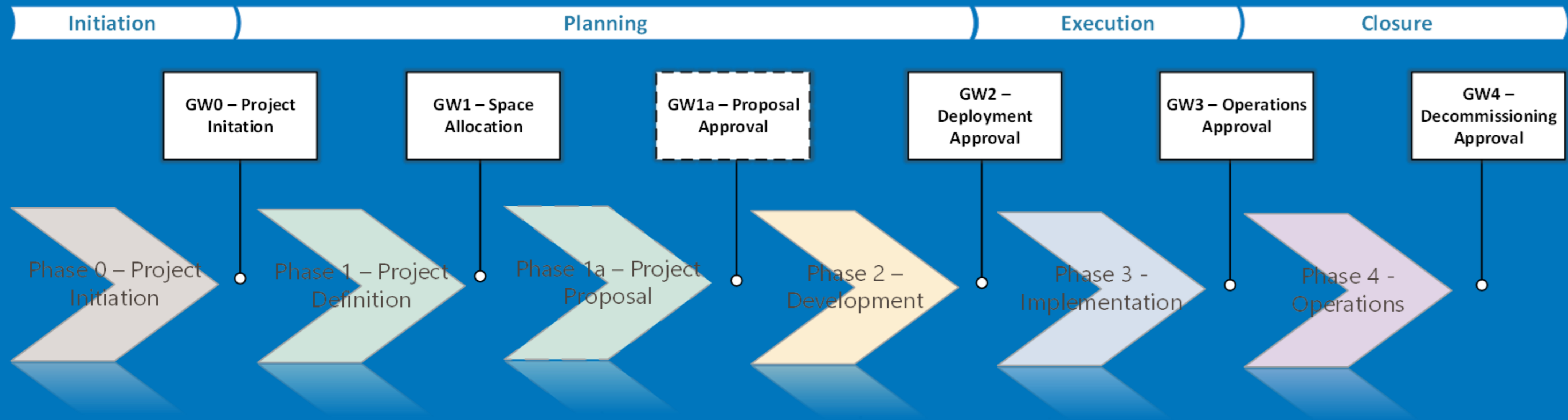
SNOLAB will host a series of meetings and workshops in Summer 2024:

- Invited senior scientists in-residence will give/lead topical and relevant lectures and discussions in weeks between.
- Goal of increasing the interactions between scientific collaborations while accomplishing the experimental goals.



Accountability of Collaborations

SNOLAB PROJECT LIFECYCLE



- SNOLAB life cycle process whereby SNOLAB supports experiments through their life cycle at the lab.
- Latest modification: All collaborations seeking space allocations are required to have both an EDI plan and a code of conduct which is reviewed as part of the life cycle process for an experiment.

Conclusions



- SNOLAB is a clean, underground laboratory with a vibrant experimental program.
- SNOLAB hosts projects at a variety of lifecycle stages, and we plan to turn over the spaces to host new projects over the next decade.
- SNOLAB is full, but by turning over the experimental spaces we continue to have availability for small, medium, and large experiments.