

2024/10/01

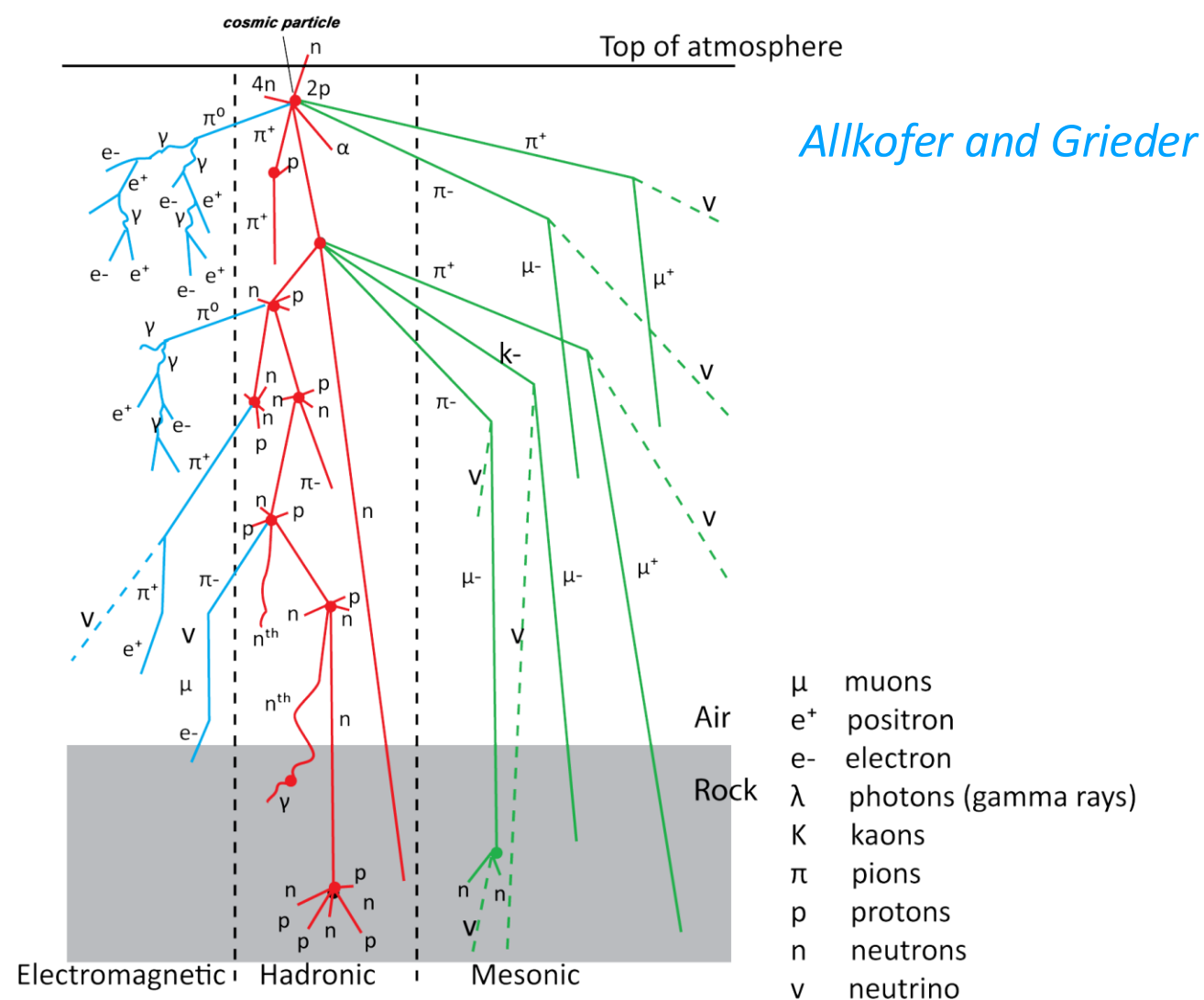
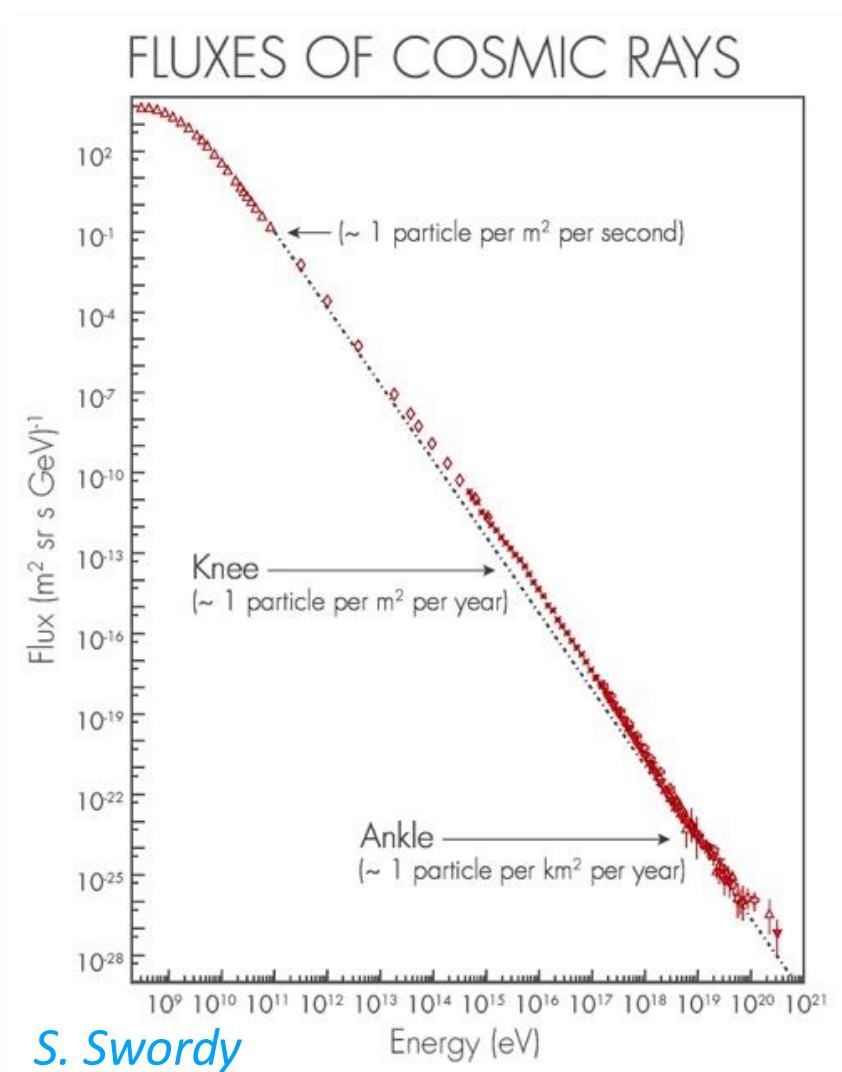
Deep Underground Laboratories in North America

Jeter Hall

Director of Research



High energy radiation from space is creating penetrating muons that constantly bombarding the surface of the Earth



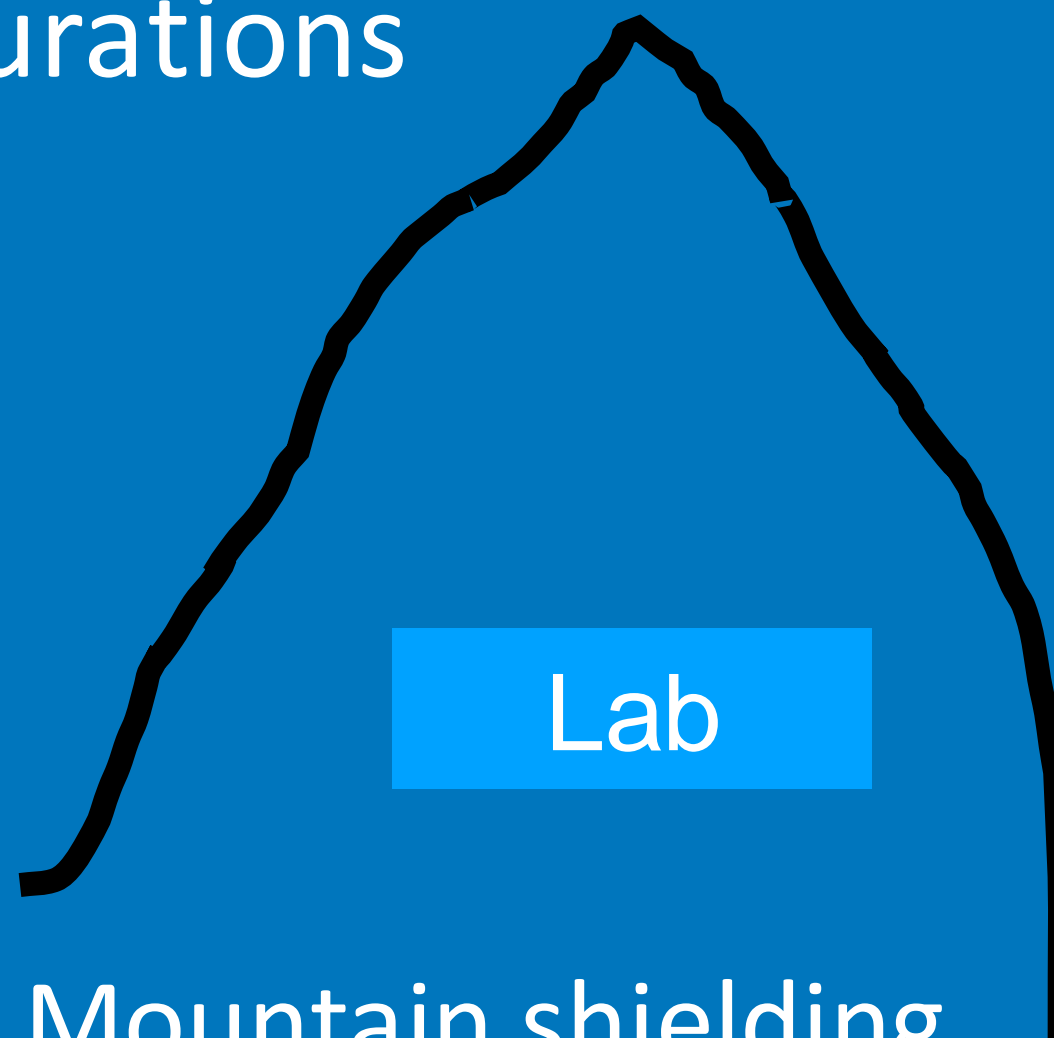
Deep underground laboratories come with two shielding configurations



Flat shielding

Typical for labs in mines

Lab

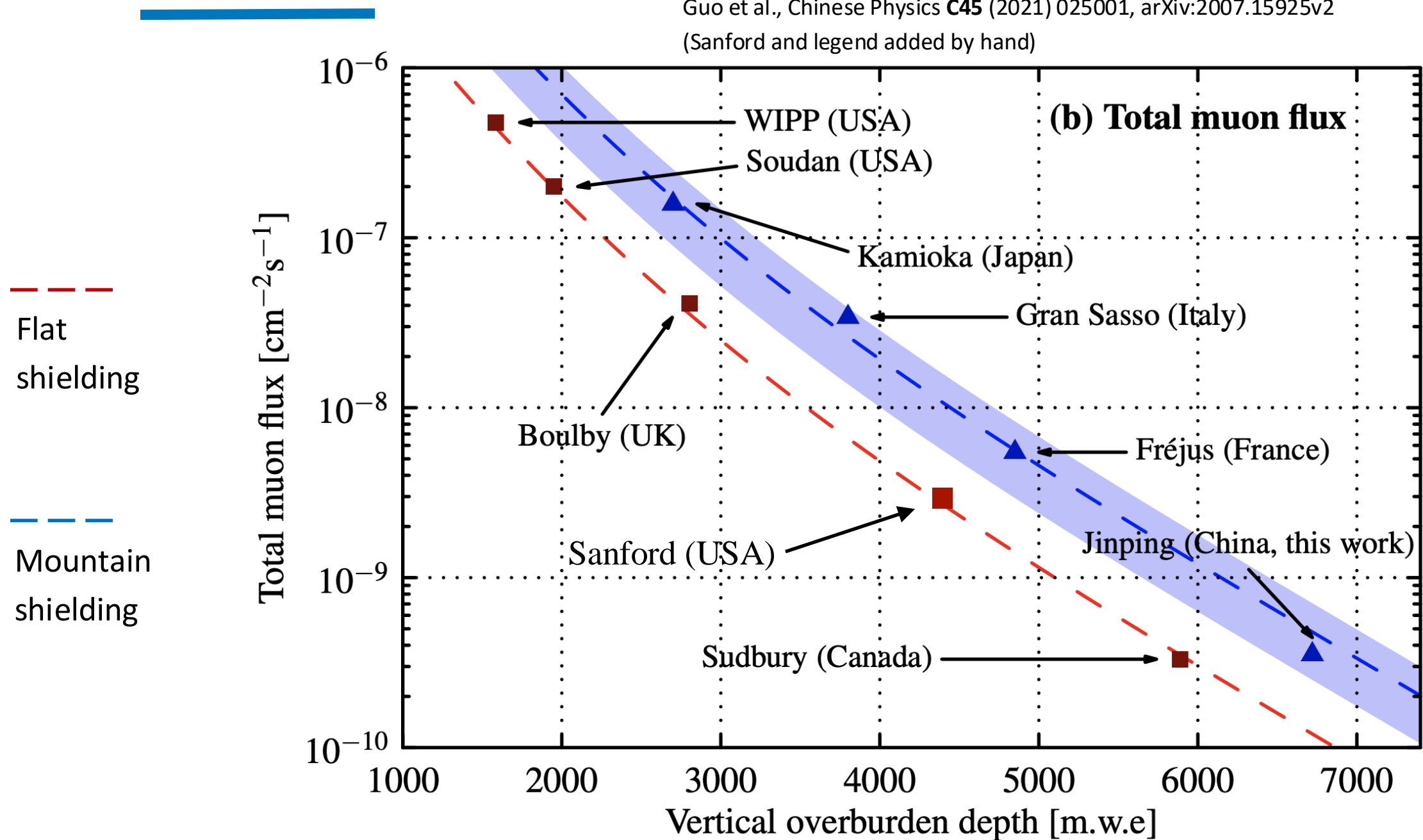


Mountain shielding

Typical for labs in tunnels

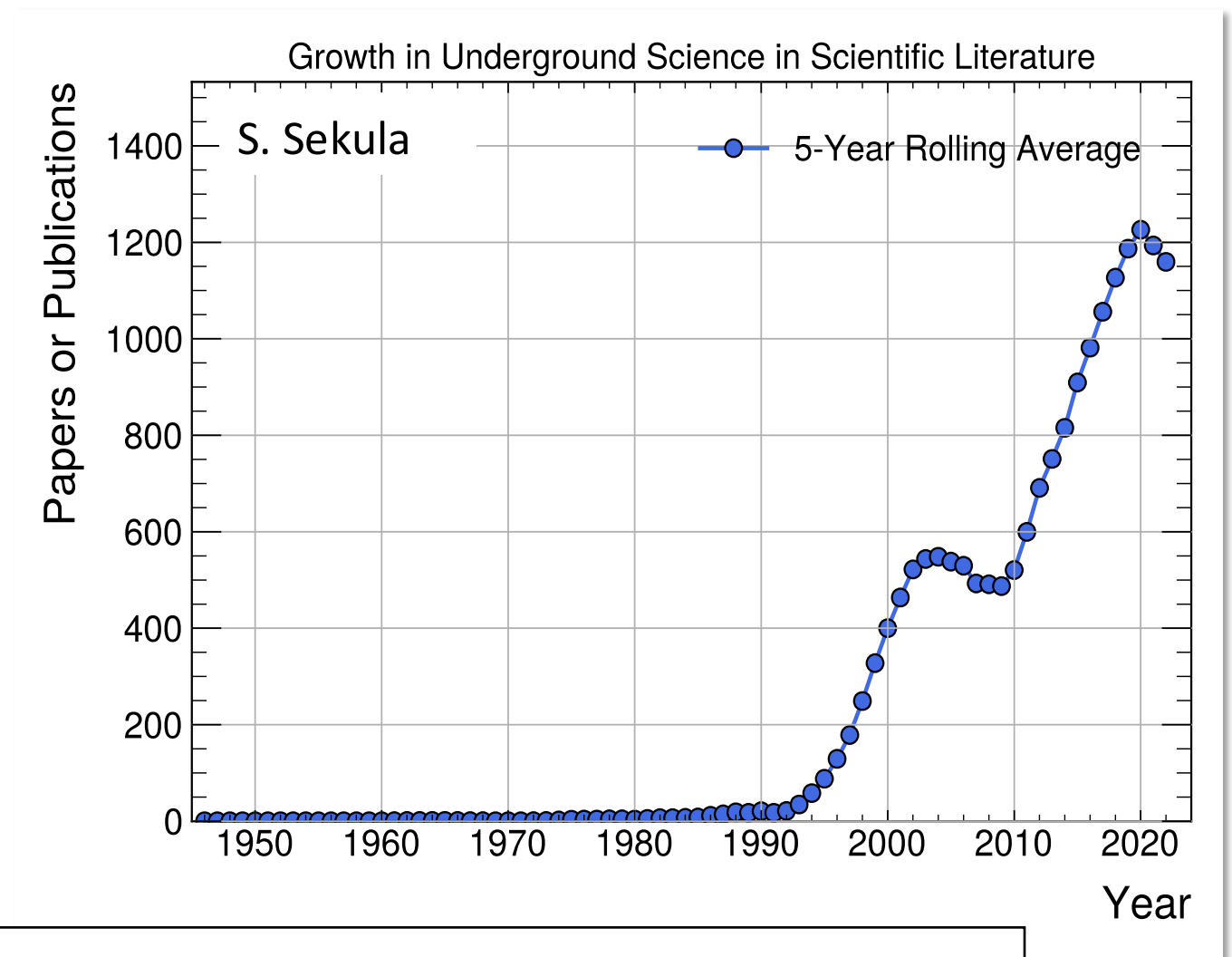
Deep underground laboratories offer 100,000-100,000,000 reduction in muon flux

Guo et al., Chinese Physics **C45** (2021) 025001, arXiv:2007.15925v2
(Sanford and legend added by hand)



Deep underground science is growing in quantity, quality and impact

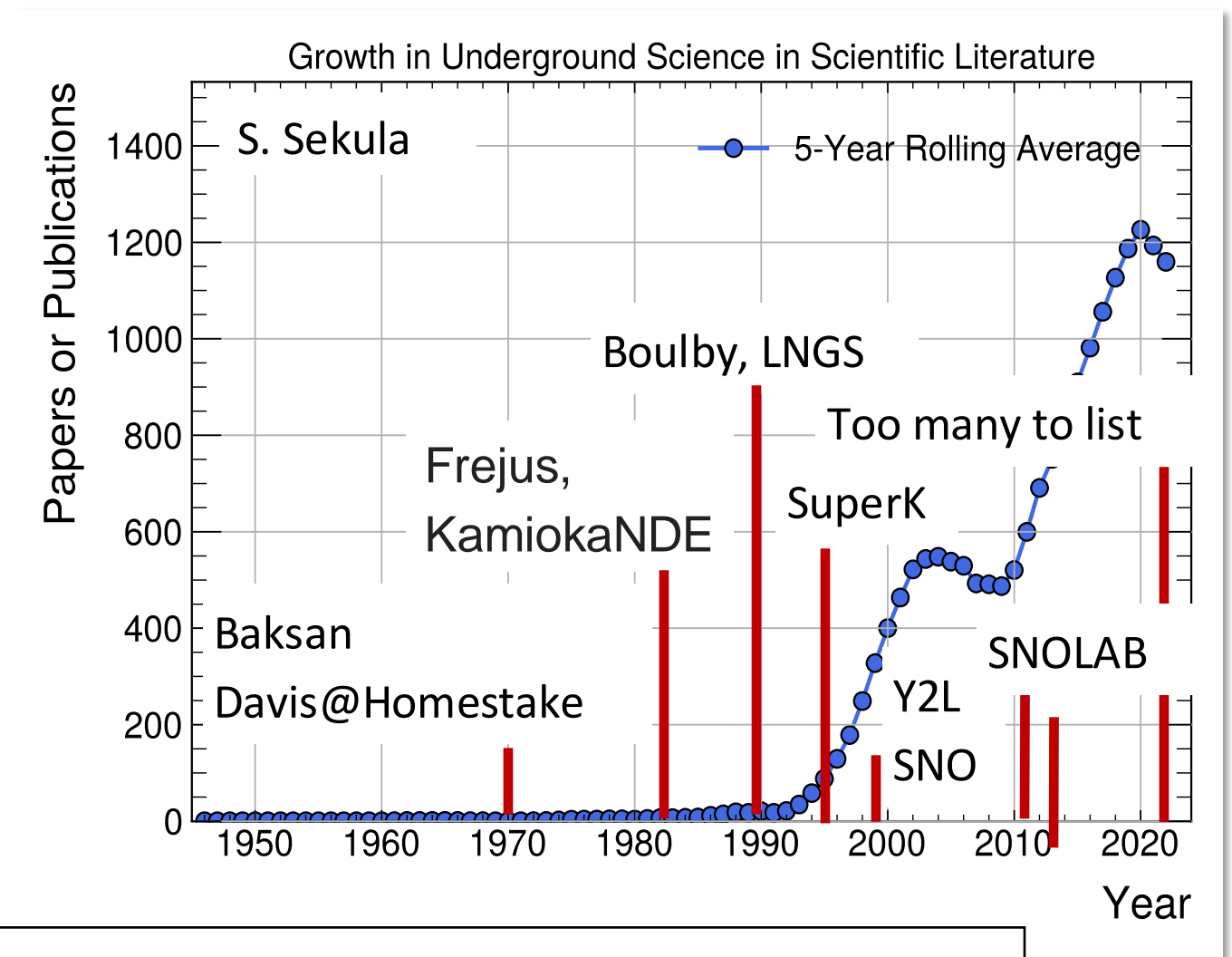
- Fundamental science projects, such as neutrino and dark matter, are at the forefront of physics community strategies
- Applied science is growing in project application and size



Publications in underground science.
Includes all underground labs.

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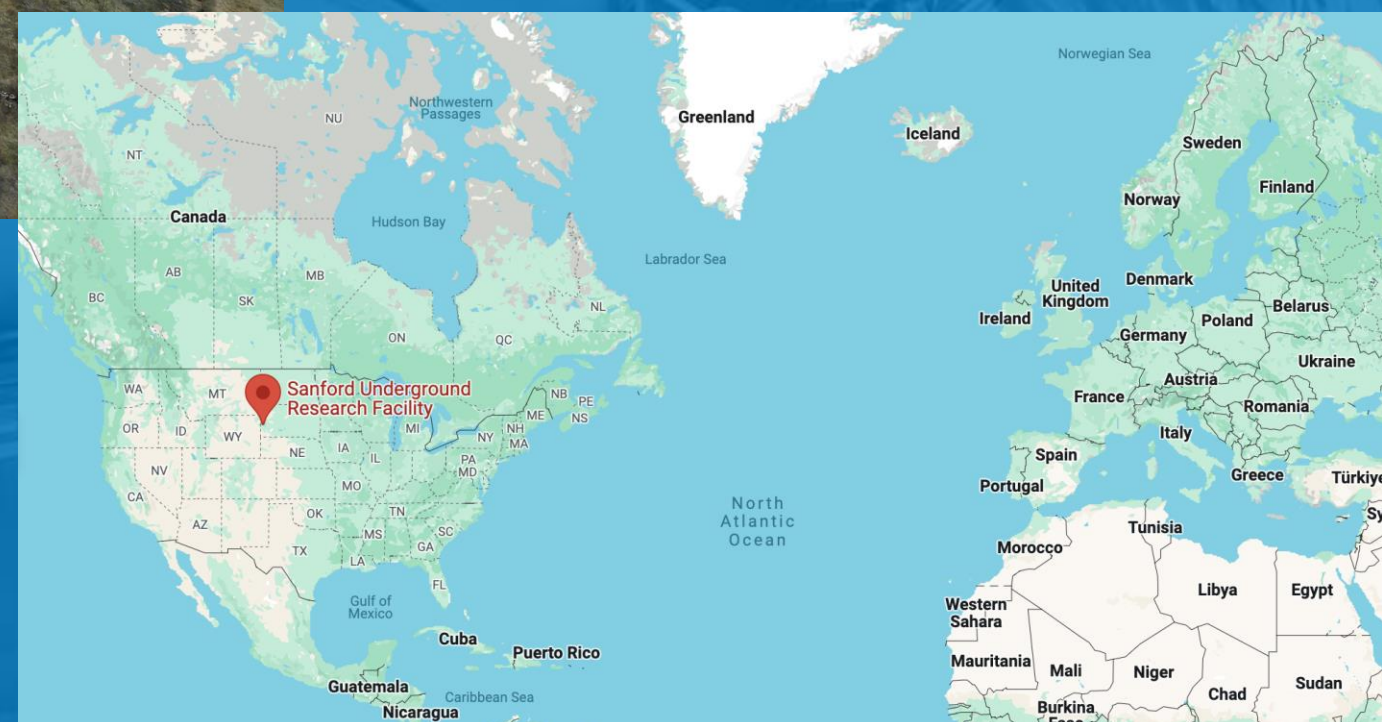
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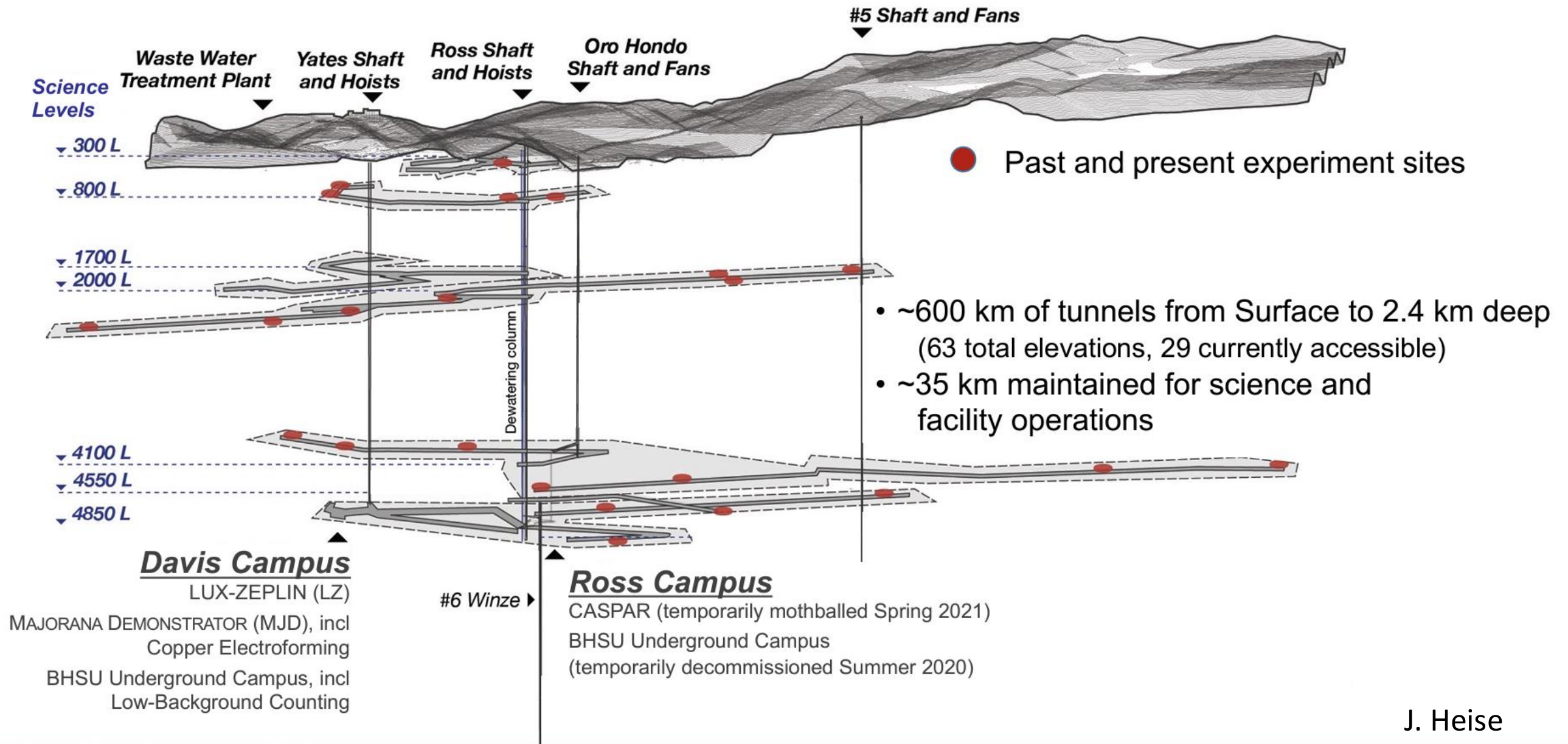


Sanford Underground Research Facility is located in South Dakota, USA



SURF Underground Lab Geography

Yates & Ross Shafts + ventilation shafts, multiple levels for science



J. Heise

SURF is a major US science infrastructure

Operated by the South Dakota Science and Technology Authority,

Operations funded through a cooperative agreement from FY20-FY24, and have just signed a new 5-year CA starting yesterday!

SURF is grateful for support from Dennis Sanford and the State of South Dakota

DUNE excavation is complete!



- Impressive experimental space
- Bypass drift for future expansion complete
- Outfitting has started

June 30, 2022



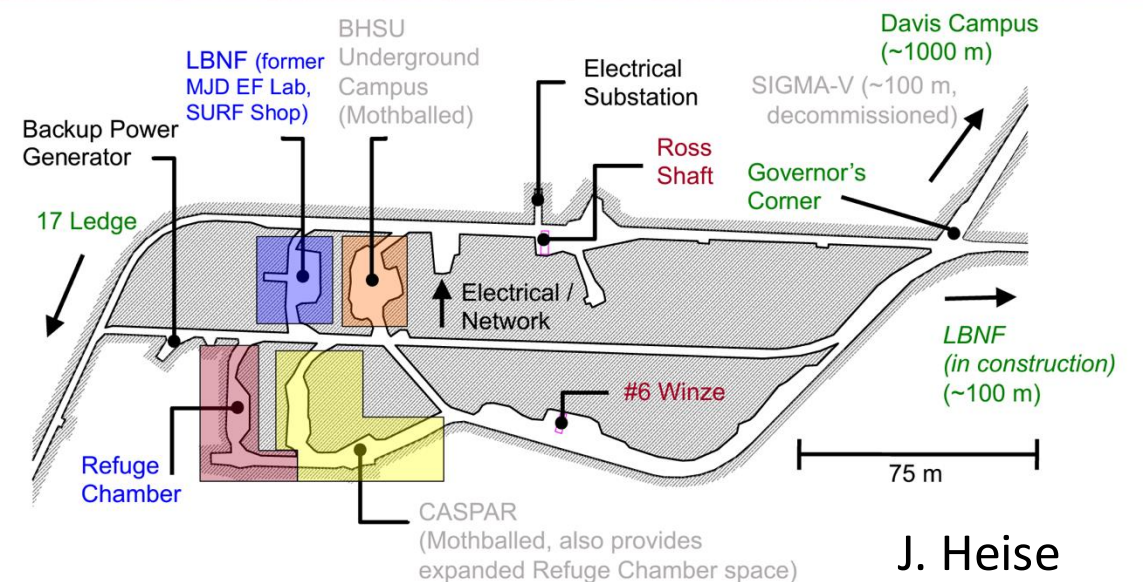
May 5, 2024



Ross Campus is reopening following DUNE excavation

- CASPER accelerator equipment has returned to site
- Cleaning ongoing
- Facility systems coming online
- Black Hills Underground Counting has not started to move

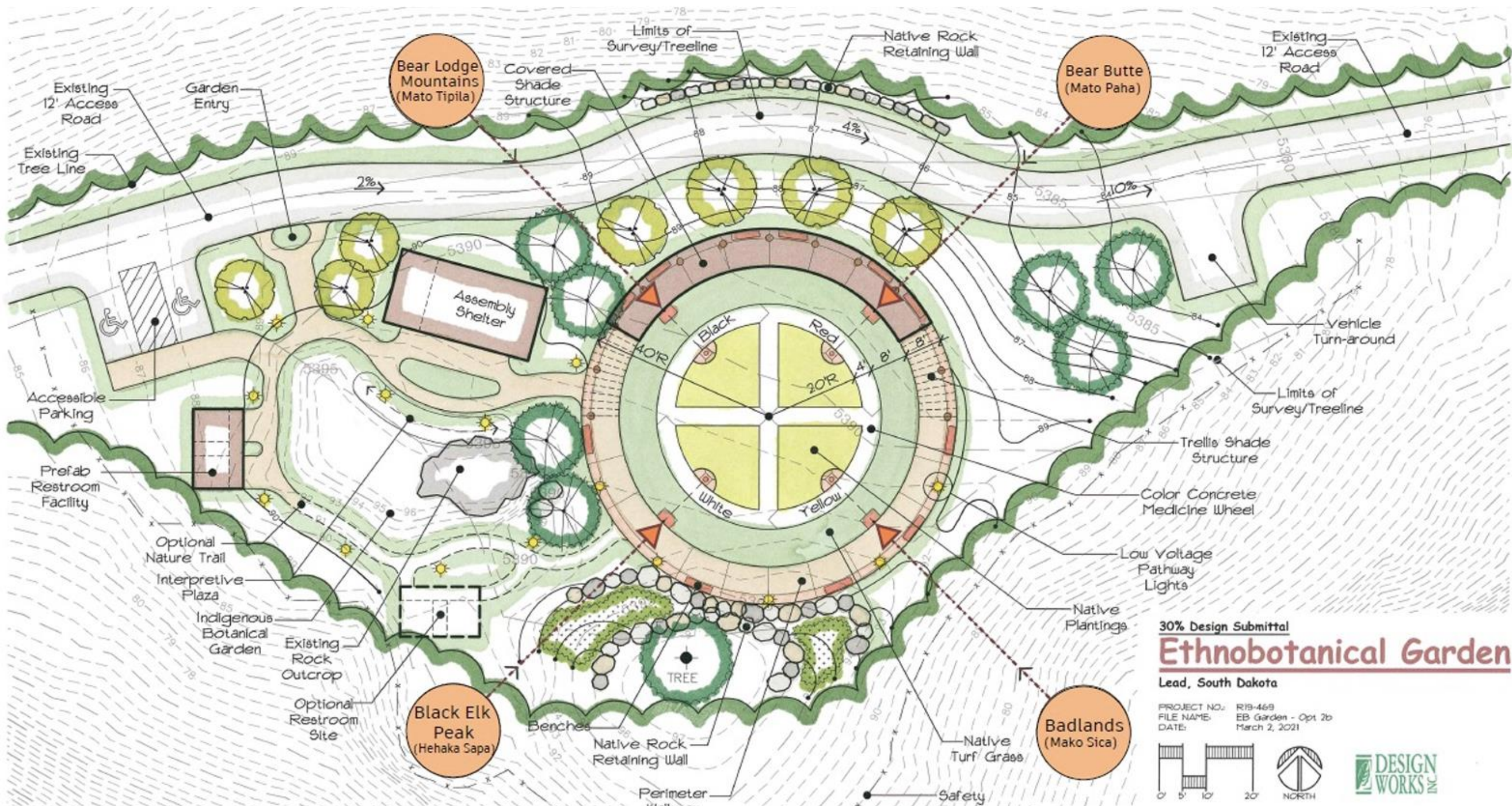
4850L Ross Campus 2,653 m² (Total) / 920 m² (Science)



SURF Working Alongside Region's Tribes

- The Black Hills are sacred to the Tribes of the region (“Paha Sapa” or “hills that are black”).
- U.S. Federal requirements:
 - National Historic Preservation Act.
 - Potential impacts of U.S. Gov’t investments must be assessed.
 - Tribes must be consulted.
- Beyond legal requirements, SURF has placed high priority on Tribal relations and building strong partnerships from the start.
- SURF’s efforts include:
 - Commitment to treat sacred lands with respect.
 - Regular interactions with Tribes—with staff dedicated to this purpose.
 - Public outreach efforts focusing on Native culture and history.
 - K-12 STEM education outreach efforts with Tribal schools in region.

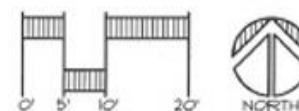
Cangleska Wakan (Sacred Circle) Garden



30% Design Submittal
Ethnobotanical Garden

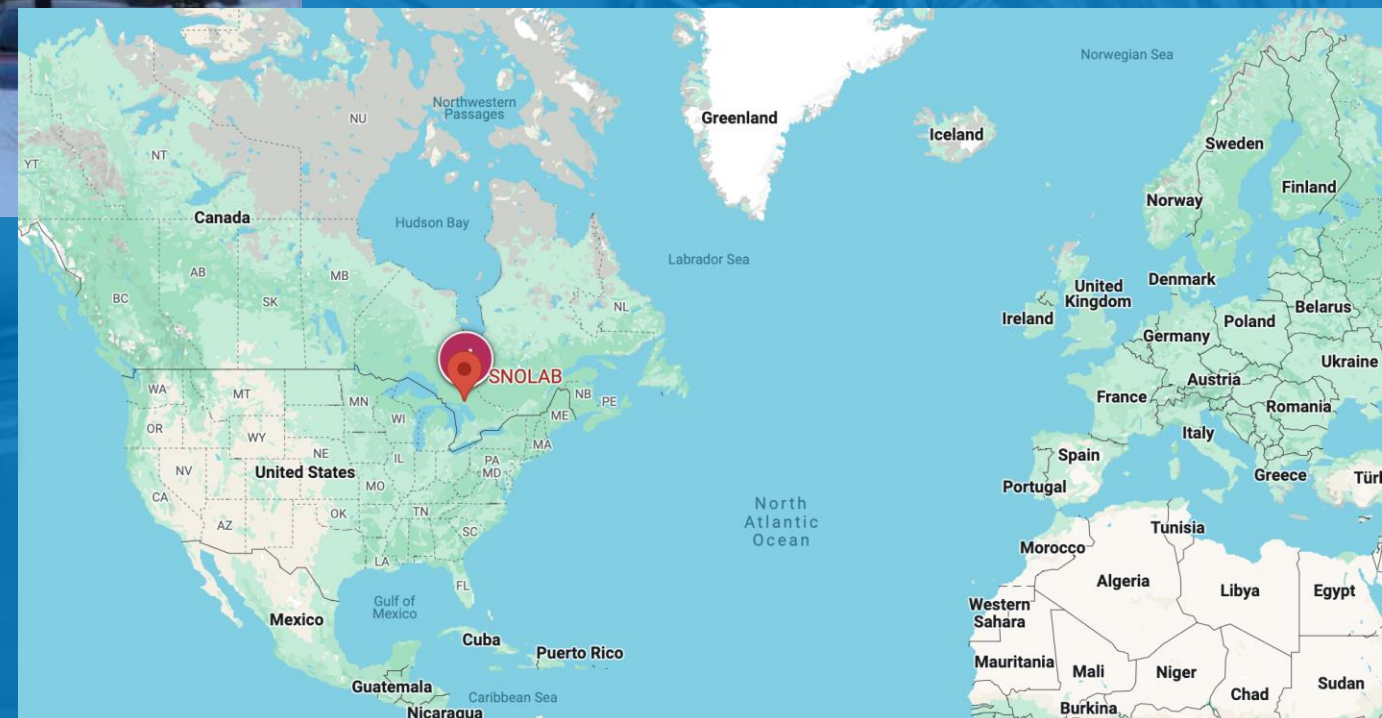
Lead, South Dakota

PROJECT NO.: R19-469
 FILE NAME: EB Garden - Opt 2b
 DATE: March 2, 2021





SNOLAB is located in Ontario, Canada



SNOLAB is a major Canadian science infrastructure



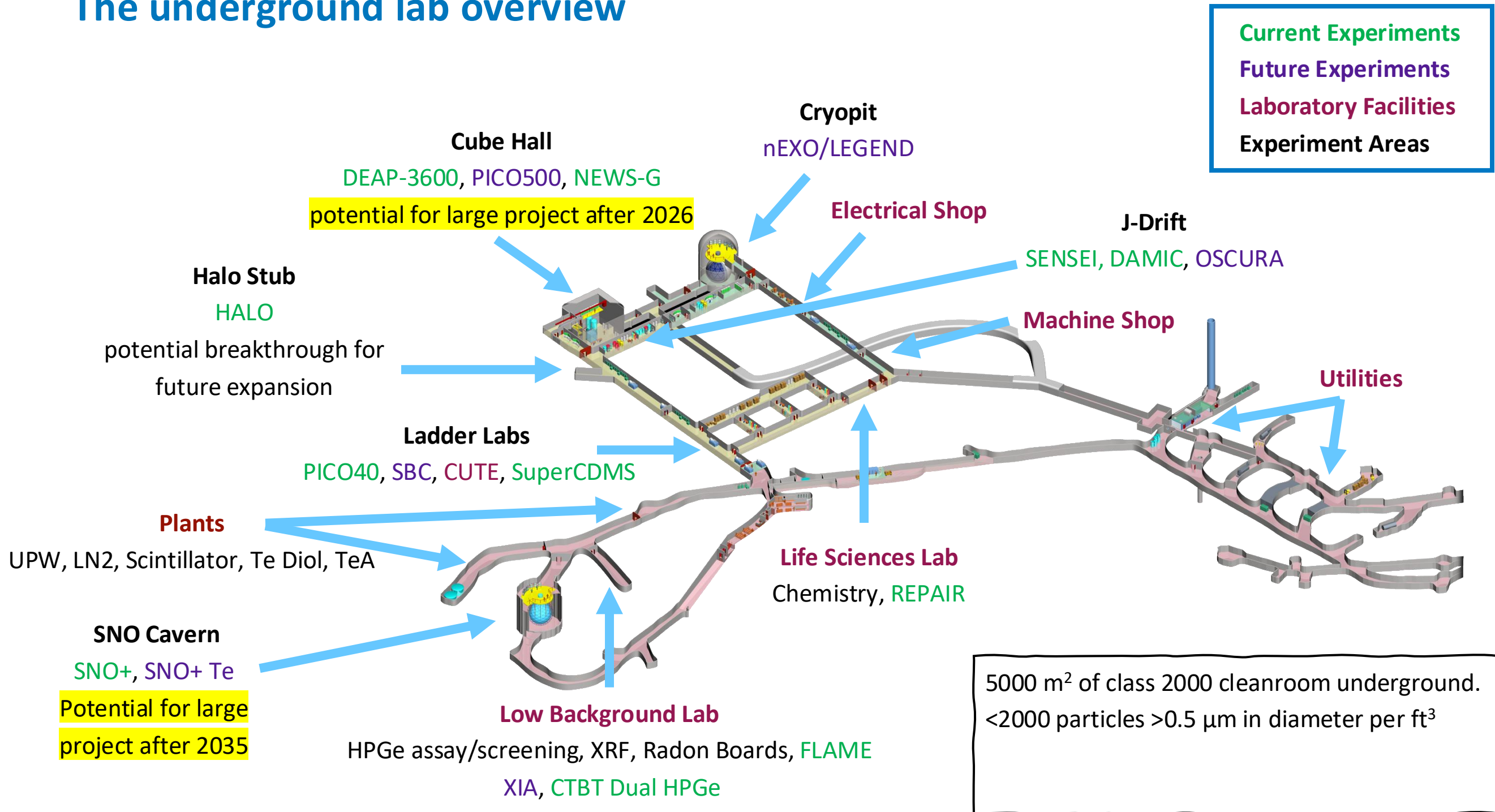
SNOLAB hosts rare event searches and measurements. It's located 2 km underground in the active Vale Creighton nickel mine near Sudbury, Ontario, Canada.

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.



SNOLAB – The underground lab overview



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.



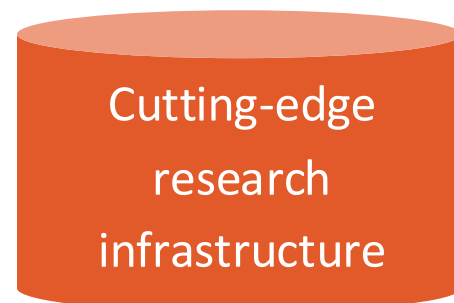
The SNOLAB strategic plan guides our work from 2023-2029



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.

Our Core Pillars:

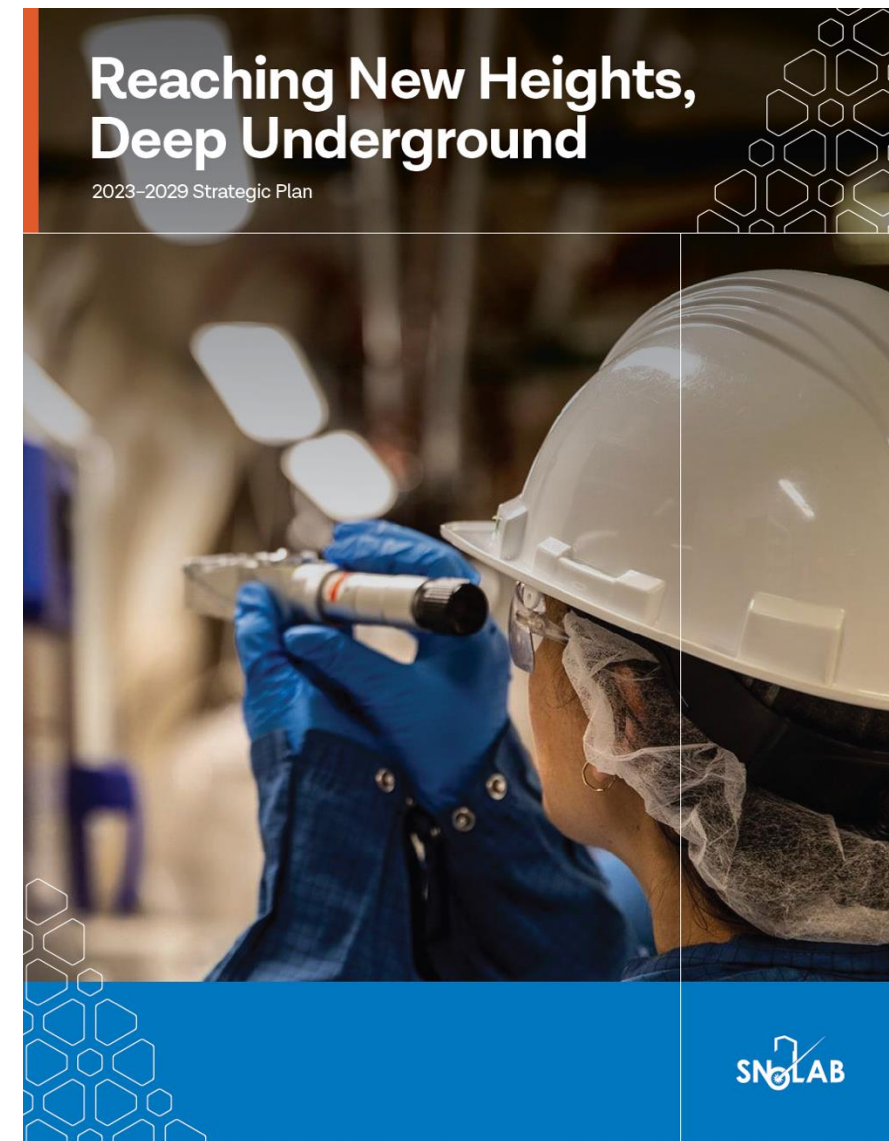


Our Mission

- 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



<https://www.snolab.ca/about/strategic-plan/> or search for “SNOLAB strategic plan”

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 the land and the waters.

Deep underground science in North America is strong with a bright future

- Two major deep underground labs in North America
- DUNE + expansion program will keep SURF busy for decades
- SNOLAB is full of projects, turning over experimental spaces to host new ones
- Underground labs in North America are fundamentally connected to the indigenous peoples
- Scientific output is growing in North America and globally



Title

Section title here

Example title here

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- Jane Doe



Additional Notes

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