



**SANFORD
UNDERGROUND
RESEARCH
FACILITY**

Sanford Underground Research Facility

SURF Update - Cultural Relations Committee

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Sanford Underground Research Facility



SURF Mission:

We advance world-class science and inspire learning across generations.

SURF Vision:

The world's preferred location for underground science and education.



SURF's Core Values

Values are a core part of hiring process and performance evaluations.

- **Safety Focused:** We do not compromise safety or endanger the environment.
- **Care for Others:** We embrace and honor the fundamental value and dignity of all individuals. We listen knowing everyone has something to offer and to learn.
- **Professional:** What we do is important to our community and the world. We sweat the details to achieve big things. Our behavior and ethics exemplify our best.
- **Team Players:** We provide unmatched service. We are respectful and deliver for our customers and partners. We build trust not barriers.



SURF Long-Term Goals

By 9/30/2035, SURF will have world-leading multi-disciplinary experiments in operations with proposed experiments actively competing for newly developed underground laboratory space including:

1. The Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) have been constructed and are fully operational.
2. Yates Shaft and Hoists have been fully reconstructed and modernized.
3. Maximize science with existing space to include a cryogenic user facility and potential LUX-ZEPLIN (LZ) upgrade.
4. Additional lab space on the 4850L has been constructed and is fully operational to support next generation science, including at least one Generation 3 Dark Matter experiment.
5. The Institute for Underground Science at SURF has been constructed and is fully operational with compelling, vibrant science, and education programs.
6. Foster commercial partnerships to advance technology development in the region, increase facility operations efficiency and safety, and expand workforce development opportunities.



Progress Highlights

- SDSTA has worked over half million (515,319) hours since last lost time incident (12/14/2023). 2024 work comp experience was strong, resulting in 19% premium refunded.
- Expanded LBNF support. Performing end-to-end LBNF BSI construction logistics.
- Continued Yates Shaft heavy TDM. Hoist upgrades and shaft rehab plans advancing.
- Science Strategic Plan – non-physics emphasis nearing completion.
- Ross Campus operational again with CASPAR and BHUC.
- 3650L pumphouse rehabilitated with new modern pump installed. Replaced 1970s RBCs at the WWTP with new MBBR technology. Replaced legacy SCADA system sitewide.
- E&O worked with over 22,000 students, 400 teachers in 2024-25 school year.
- Institute for Underground Science programming advanced: 2025 CETUP workshop, Quantum Partnership discussions, and monthly science colloquiums with increasing participation
- Visitor Center and Cangleska Wakan (the Ethnobotanical Garden at SURF) had a successful summer with 29,000 visitors.



4850L Yates Shaft: New Structural Timber and Station Gates





Geology and Engineering

Enhanced Geothermal Systems
Mining Technology

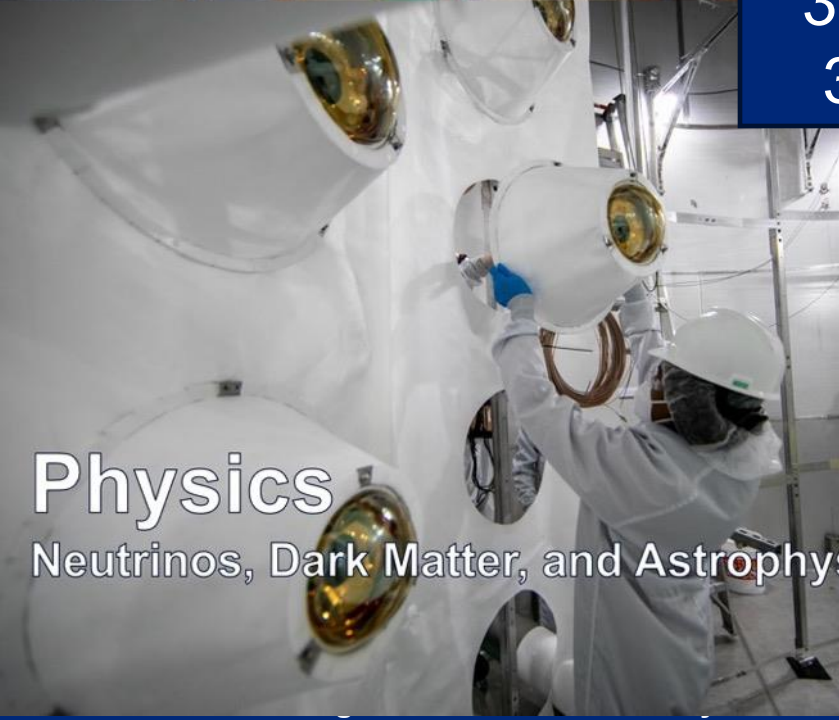


Biology

Extremophiles, Biodiversity

Science Program

30 Expts with 2401 Collaborators,
309 Institutions in 40+ Countries



Physics

Neutrinos, Dark Matter, and Astrophysics



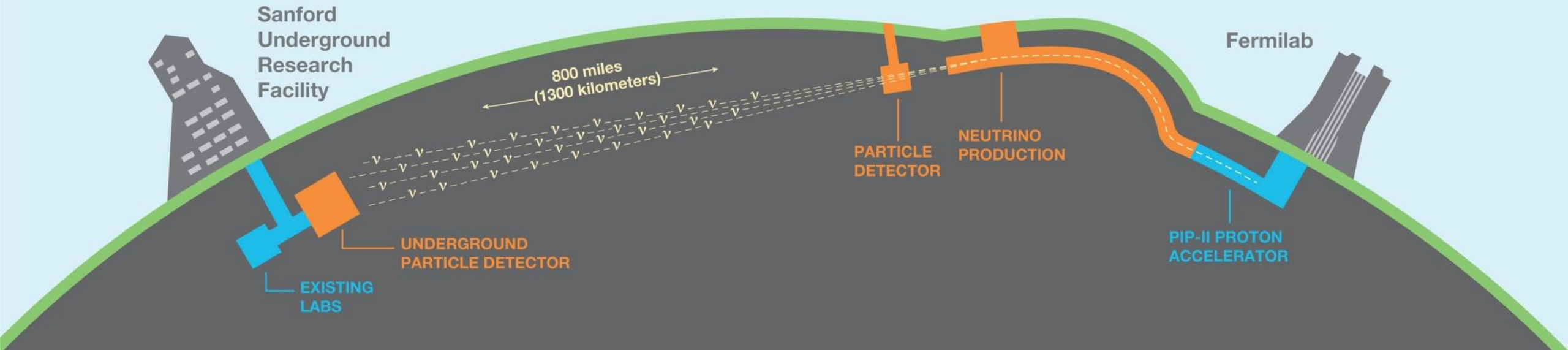
Partnerships

Commercial, Technology,
Industrial, Workforce development

Long-Baseline Neutrino Facility (LBNF)

LBNF will host the Deep Underground Neutrino Experiment (DUNE)

U.S. DOE's Flagship Neutrino Study Experiment



Origin of matter: Investigate CP violation. Are neutrinos the reason the universe is made of matter?



Supernova explosions and black hole formation: Ability to observe neutrinos from supernovae events and neutron star (or possibly black hole!) formation in real time.

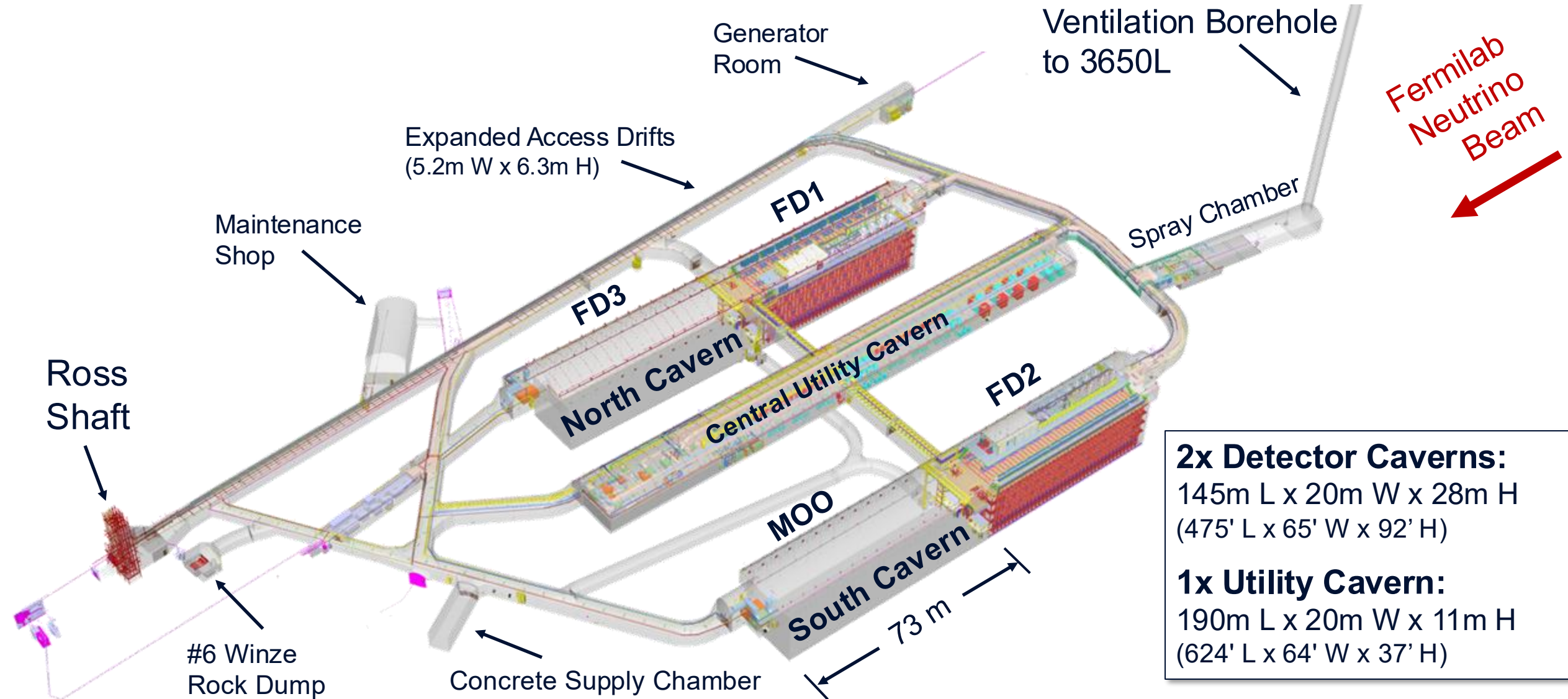


Unification of forces: Investigate nucleon decay, advance unified theory of energy and matter.



Long-Baseline Neutrino Facility (LBNF)

Will lower steel for first cryostat in 2026



North Cavern



LBNF Infrastructure Construction Underway



Cryostat Steel in Rapid City



Steel for Both Cryostats in Rapid City

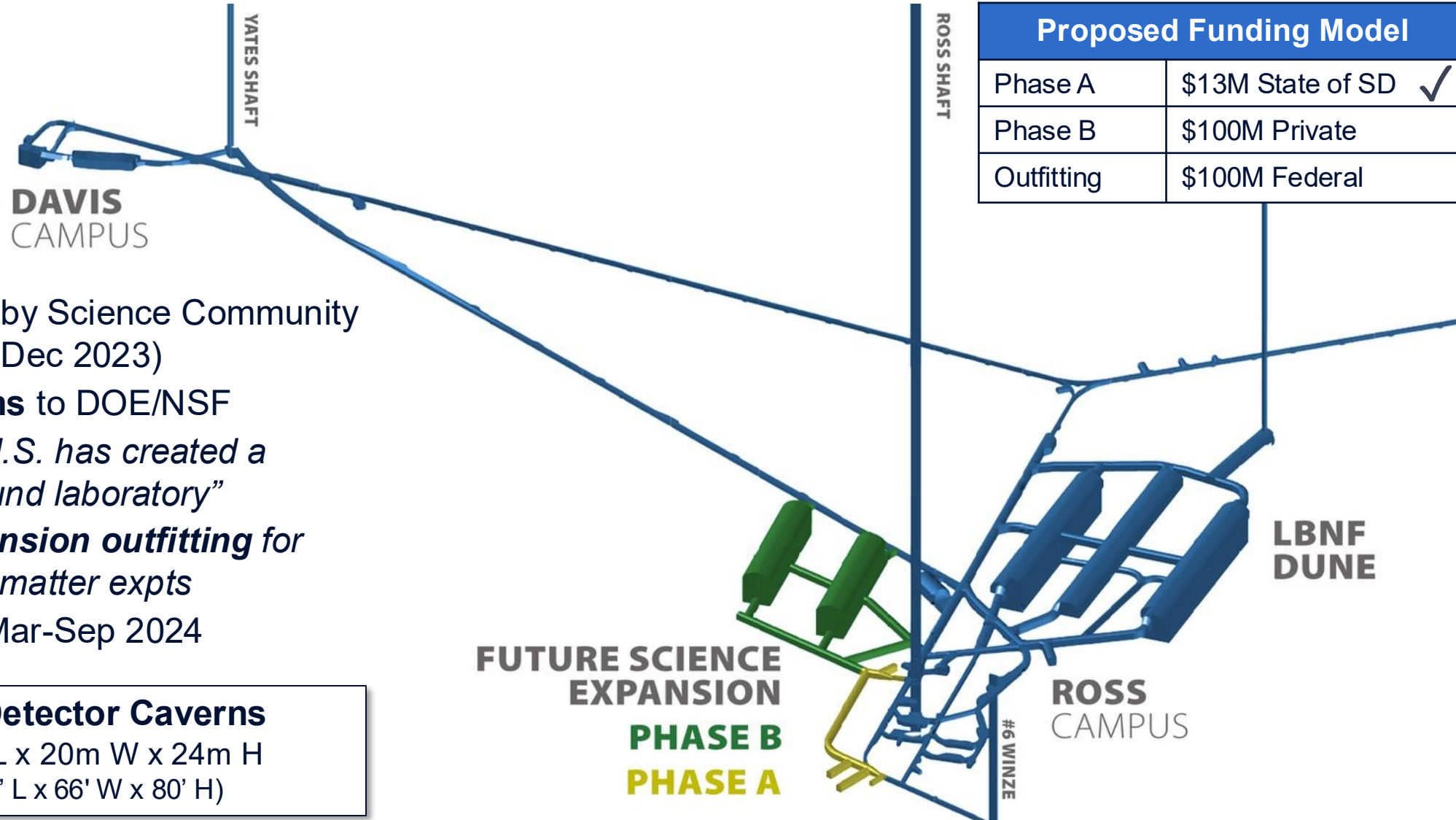


4850L Space Needed for Future Experiments

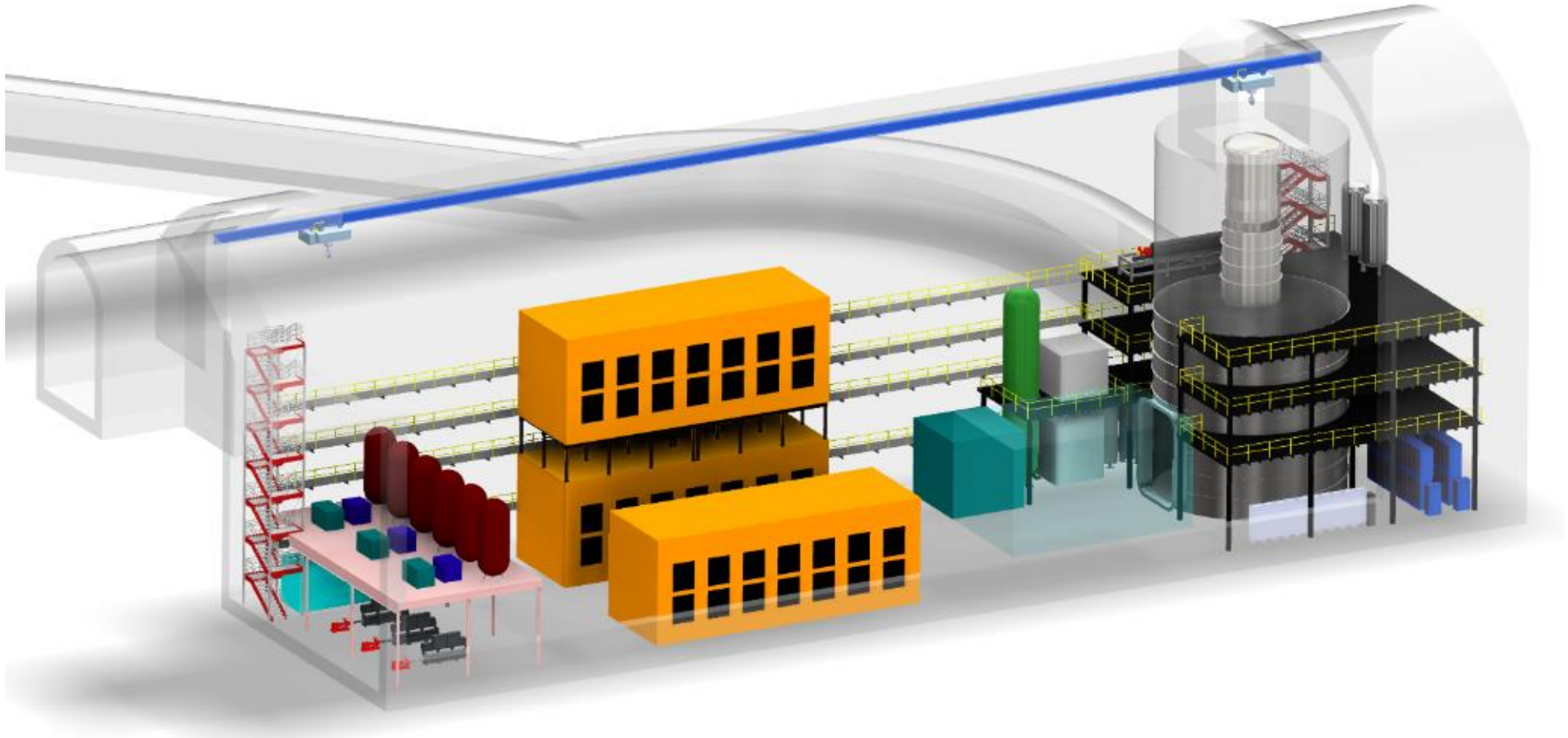
U.S. strategic plan recognized need for more UG space, endorsed expansion

- Expansion endorsed by Science Community in P5 Strategic Plan (Dec 2023)
- **P5 recommendations** to DOE/NSF
 - “With SURF, the U.S. has created a premier underground laboratory”
 - **Fund SURF expansion outfitting** for neutrino and dark matter expts
- Phase A completed Mar-Sep 2024





Two Detector Caverns
100m L x 20m W x 24m H
(330' L x 66' W x 80' H)



XLZD – Generation 3 Dark Matter Experiment



SURF K-12 Education & Outreach

Presentations and Field Trips	Curriculum Units and Resources	Career Exploration and Development	Supporting Teachers
<ul style="list-style-type: none">• K12 presentations• Face to face• Virtual options• Field trips	<ul style="list-style-type: none">• 17 unique curriculum units available for checkout• 5-15 hours of fully designed and resourced science curriculum	<ul style="list-style-type: none">• Davis-Bahcall Scholars Program• Summer internship opportunities• Pre-service educator program support	<ul style="list-style-type: none">• Professional development offerings• Curriculum resources• Science content support• Just-in-time support
			



Education & Outreach – By the Numbers

School Year	2019-2020 (covid begins)	2020-2021 (during covid)	2021-2022	2022-2023	2023-2024	2024-2025
Field Trips	254	58	485	972	966	1,501
Classroom Presentations	3,704	2,005	14,038	12,799	10,281	14,712
Curriculum Units	3,236	3,384	3,718	2,554	3,965	4,171
Other	918	298	1,468	1,596	1,368	1,729
Total Student Contacts	8,112	5,745	19,709	17,921	16,580	22,113

August 2024 – July 2025: Developed and facilitated more than **6,000 people hours of professional development for more than **400** educators**



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Thank You!



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