

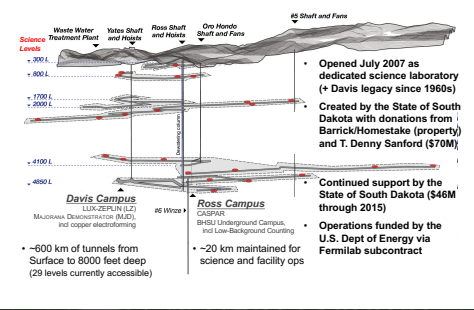
# The Sanford Underground Research Facility

J. Heise on behalf of SURF

**Abstract:** Building on rich legacies, the Sanford Underground Research Facility (SURF) has been operating for over 10 years as a facility dedicated to supporting underground research. Laboratory facilities include a Surface Campus with recently upgraded capabilities as well as two main campuses at the 4850-foot level (4300 m.w.e.) - the Davis Campus and the Ross Campus - that host a range of significant physics projects: the LUX-ZEPLIN (LZ) dark matter experiment, the MAJORANA DEMONSTRATOR neutrinoless double-beta decay experiment and the CASPAR nuclear astrophysics accelerator. Furthermore, a laboratory dedicated to critical material assays for current and future experiments is operational. Plans to accommodate the Fermilab-led international Deep Underground Neutrino Experiment (DUNE) at the Long Baseline Neutrino Facility (LBNF) are well advanced. SURF is a dedicated research facility with significant expansion capability, and applications from other experiments are welcome.

## 1. Underground Lab Geography

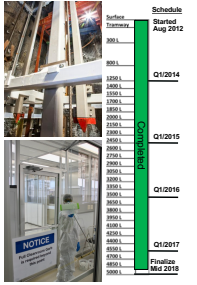
Significant Expansion Potential, Maximum Depth 2450 m



## 2. Facility Overview

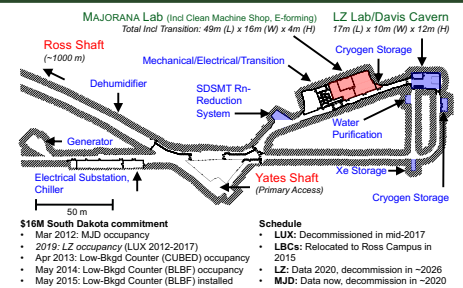
Supporting current science while upgrading for future projects

- **Facility Highlights**
  - Deep (4300 mwe) underground facility dedicated for science, with significant capacity & expansion possibilities
  - Redundant safe access with 2 principal shafts (incl. redundant power and network utilities)
- **Ross Shaft Rehabilitation**
  - Full replacement of steel & ground support -99% complete
  - Total project \$32M, on track for 2018 completion
- **Yates Shaft**
  - Provides main access for personnel and materials
  - Schedule accommodates 24-hour underground coverage
- **Ventilation**
  - Total underground air flow = 510,000 m<sup>3</sup>/hr (300,000 cfm)
  - Surface: Surface Lab renovation complete, and low-Rn cleanroom and Rn-reduction system (~300 m<sup>3</sup>/hr)
  - Dedicated air handling units + chillers for main laboratories
- **Laboratories**
  - Underground: Ross and Davis Campuses + non-lab areas
  - Surface: Surface Lab renovation complete, and low-Rn cleanroom and Rn-reduction system (~300 m<sup>3</sup>/hr)
  - Other support: underground storage/staging + warehouse
  - LBNF (surface + UG), exploring additional cavern options



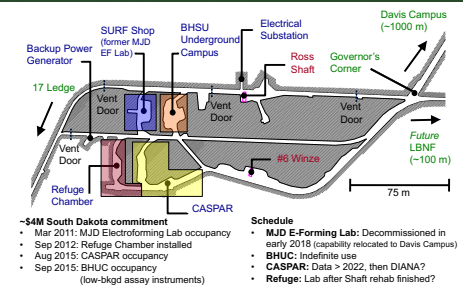
## 3. 4850L Davis Campus

3,015 m<sup>2</sup> (Total) / 1,015 m<sup>2</sup> (Science), New Excavation + Davis Cavern



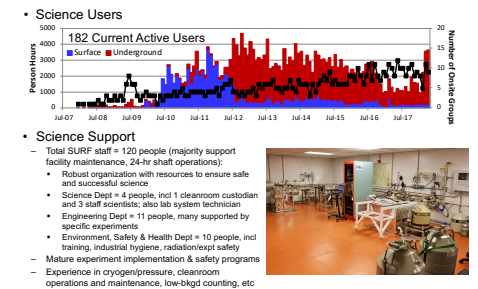
## 4. 4850L Ross Campus

2,645 m<sup>2</sup> (Total) / 1,150 m<sup>2</sup> (Science), Improve Existing Excavations



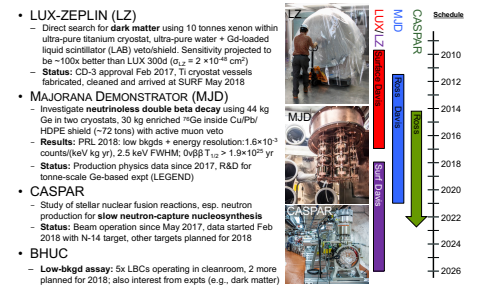
## 5. Science Overview

Expanding community of researchers from multiple disciplines



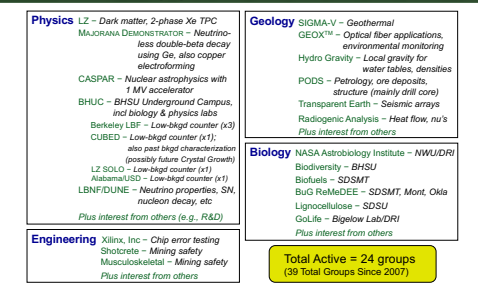
## 6. Science Program

Current physics projects



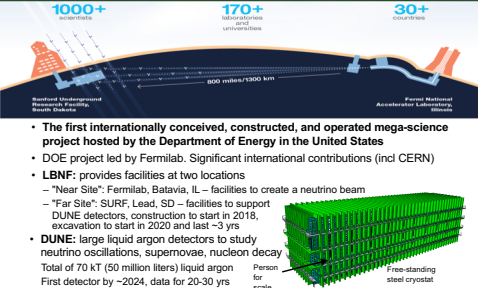
## 7. Science Program

Research activities ranging from the surface to the 5000L



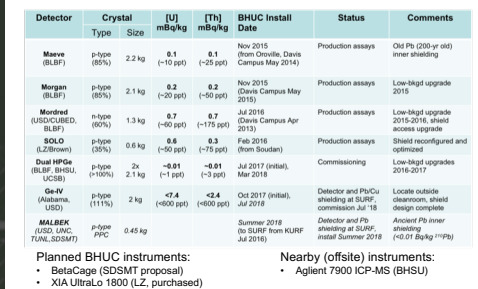
## 8. Long Baseline Neutrino Facility

LBNF will host the Deep Underground Neutrino Experiment (DUNE)



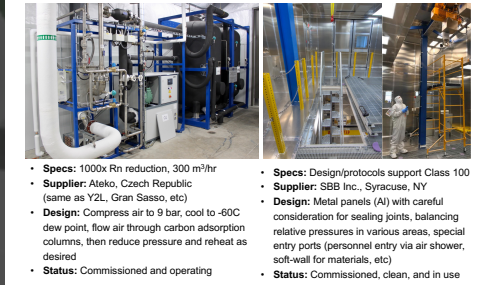
## 9. Science Support – Material Assay

Establishing national-level capability for low-background assays



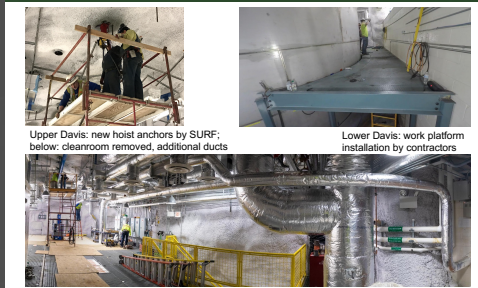
## 10. Surface Campus Upgrades

SURF reduced-Rn system supplies air to new LZ low-Rn cleanroom



## 11. Davis Cavern LZ Upgrades

Reconfigure hoists, extra work platforms, more space / ducts



## 12. Current & Future Underground Facilities

SURF research through 2050 and beyond

