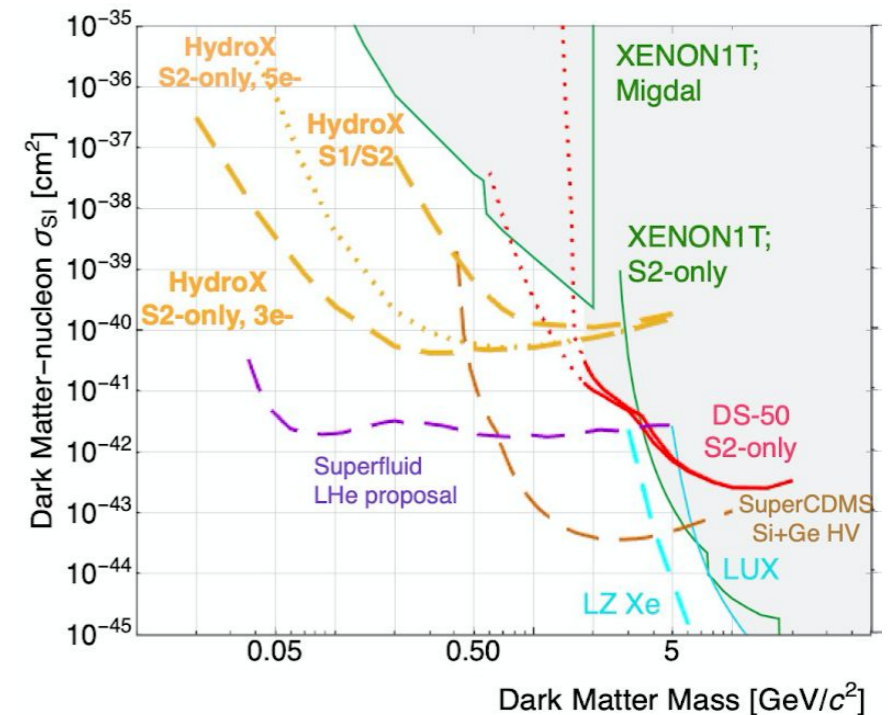


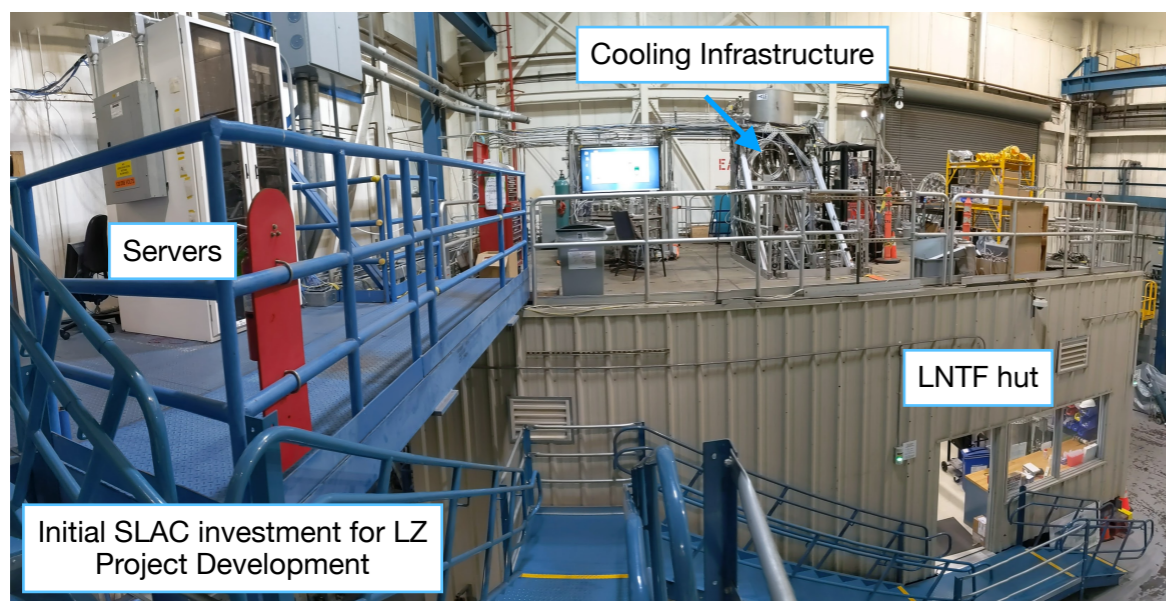
Expanding the reach of current dark matter experiments through xenon R&D & technology-centered facilities

- World-leading sensitivity of dark matter experiments such as LZ has been enabled by a strong foundation in liquid xenon detector R&D
- New areas in xenon detector R&D can lead to dramatic **improvements in current and future xenon experiment sensitivity**
 - HydroX: doping xenon with light atoms
 - CrystaLiZe, Liquid Xe Chromatography: radon mitigation

Ref: [Snowmass HydroX LOI](#)



Liquid Noble Test Facility (LNTF)



Picture from Yun-Tse Tsai

- **Technology-centered facilities** can help support needed R&D programs across HEP
 - Many sub-areas of HEP share common detector techniques/tools
 - Provide common infrastructure and place to share ideas

Increased investment into R&D and dedicated facilities

- Support **increased investment in xenon detector R&D at universities and labs** to upgrade existing dark matter experiments
- As these R&D efforts mature, supporting potential **upgrades to existing experiments** can greatly improve sensitivity
 - Also fills the timeline gap between G2 & G3 dark matter experiments
- Investing in **technology-centered facilities** can enable R&D work across areas of HEP
- R&D and related facilities serve as an important **training ground for early career experimentalists** as projects grow in scale

As an early career member of a large experiment, smaller R&D programs and facilities have been vital for me to learn about detector design, so I can help build the next generation experiment