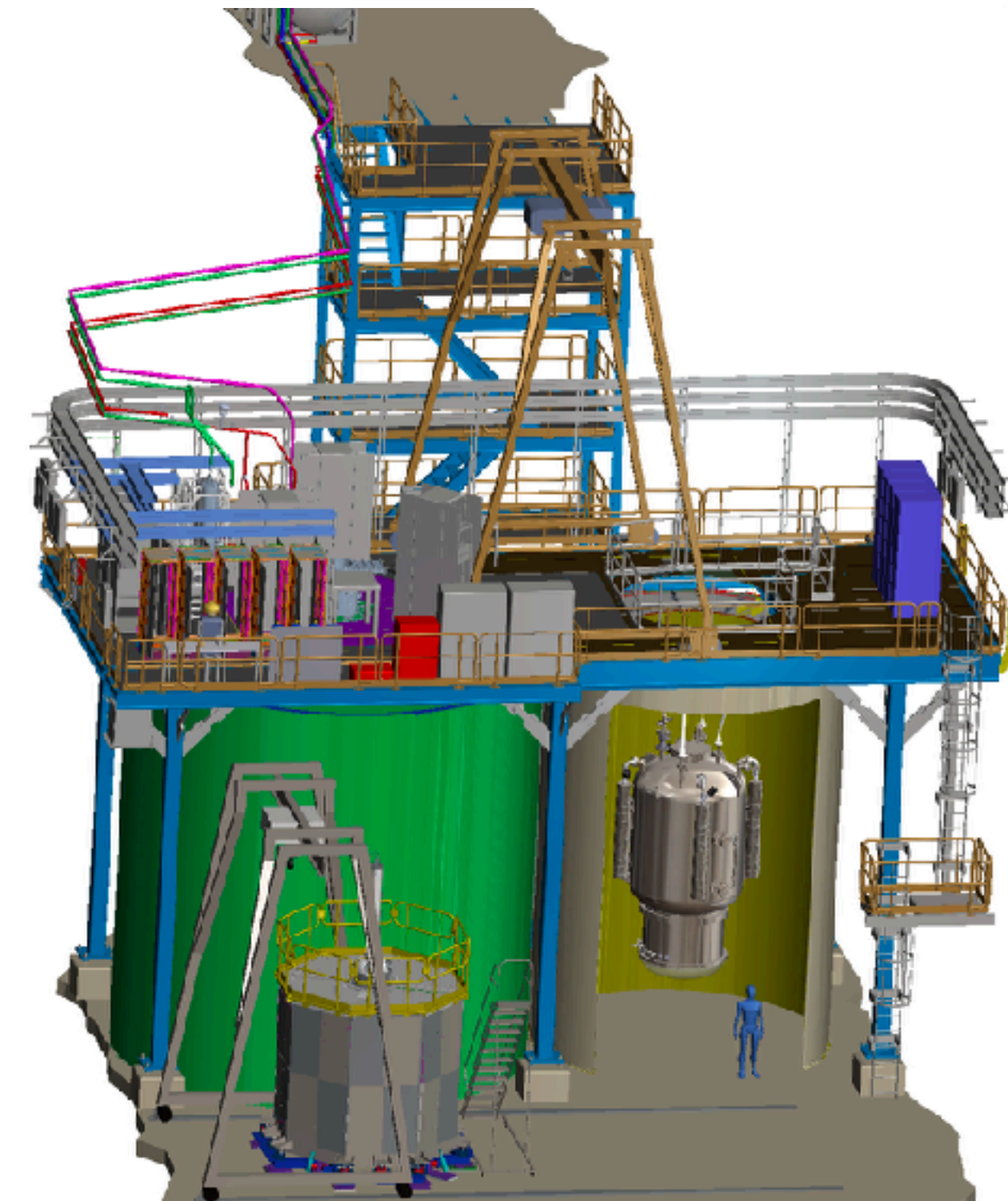


2024/07/31

# PICO Status

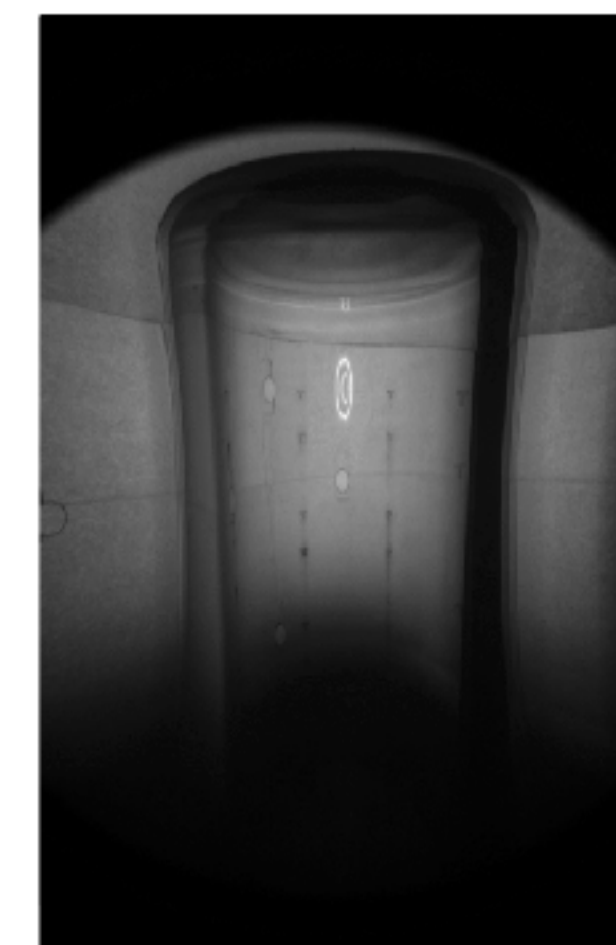
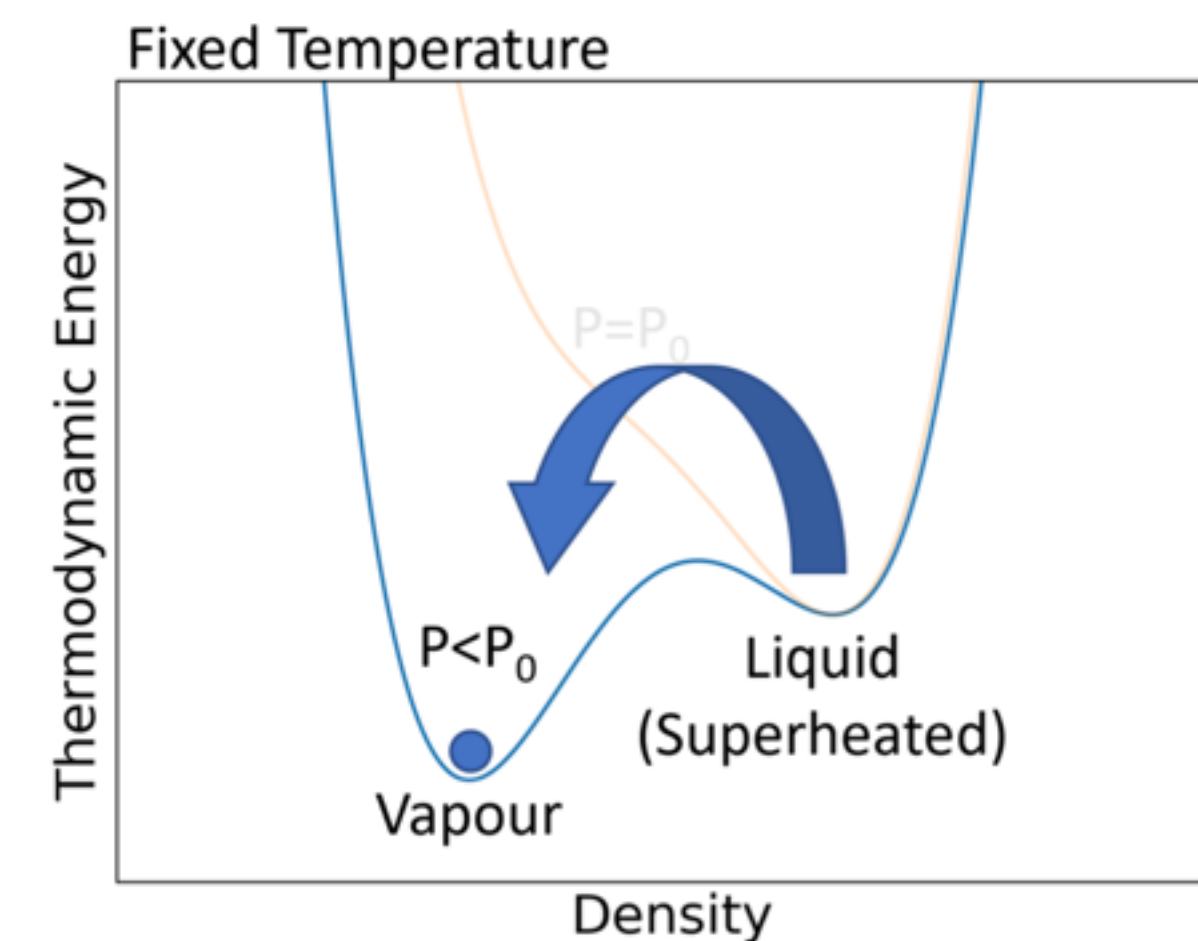
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Carsten B Krauss for the PICO Collaboration  
Canadian Spokesperson



# PICO Overview

- PICO uses freon as active liquid in a superheated state to be exclusively sensitive to nuclear recoils and other highly ionizing particles
- PICO can discriminate alpha particles by acoustic signal reconstruction
- At the moment the PICO collaboration is operating the PICO-40L detector, the first of a new type with an inverted geometry compared to previous generations of dark matter bubble chambers
- We also are constructing the largest dark matter bubble chamber ever designed: PICO-500



# New science developments



- **PICO-40L** has been operating in 2023 and early 2024, since then two chillers have broken consecutively and no new data could be taken
- In the meantime the existing data has been analyzed to get a good handle on acoustic performance in the detector, on systematic uncertainties in the internal temperature profile. We are also making progress in our analysis of the acoustic alpha spectrum and the optical position reconstruction.
- The analysis of the background events we saw in 2023 is very advanced by now. To make more progress with background events, we need to get back to operating the detector.
- One PhD student graduated in July 2024



# New science developments



- **PICO-500** started underground work in the Cryopit
- The cleaning and assembly of the inner detector will start there as soon as all components arrive underground
- The components that are underground could be tested and have been verified to be fully operational
- The pressure vessel components are fully constructed and are awaiting shipping to site (partially on site already)
- The welding operation is scheduled to start in the fall and the pressure vessel testing will be complete by early next year.
  
- We will arrange for regular meetings with the other cube Hall occupants to minimize the impact from our construction activities











# Collaboration Health



- PICO has an active and very impactful EDI committee. We are working towards implementing a regular collaboration health survey
- We have started regular EDI activities at the collaboration meetings, led by the EDI committee
- This is graduate student driven and has been received very well by the collaboration

# Schedule impacts & milestones



- The PMP and loss of logistical support impacted the PICO-500 schedule
- It is now expected that the inner detector will be assembled by Dec 2024
- The pressure vessel will be welded, cleaned and tested by April 2025, after which the detector assembly will start
- Detector commissioning of PICO-500 is now scheduled to start in spring 2026



# Challenges



PICO-40L has been challenged by the lack of chilling power - we have been operating the detector successfully for more than a year with this chiller before it failed.

We are working with a repair company to get it working again.

The second chiller is on the way to being fixed on warranty

PICO-500 has been challenged by logistical issues. Underground progress was astounding given the circumstances



# Conclusion



- PICO is underway to construct the large and challenging PICO-500 detector underground
- PICO-40L will continue to play its main role in informing the operational behaviour of large dark matter bubble chambers
- PICO-40L is going to lead to the first publications (scientific and technical) in the coming year
- We are looking forward to seeing our detectors produce quality data at SNOLAB!