

# nEXO At TRIUMF

## Board Appointed Employees

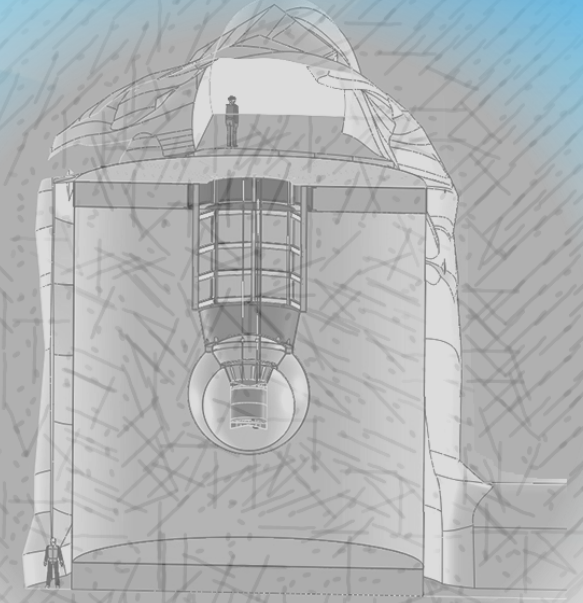
- Jason Holt – theory
- Annia Kwiatkowski – Barium tagging
- Annika Lennarz – Calibration
- **Chloe Malbrunot** - liquid Xenon
- Fabrice Retiere – SiPM

## Highly Qualified Personnel

- Stephanie Bron – Postdoc (2023-2024) – Light only Liquid Xenon experiment
- Sara Craft-Hamilton - Undergraduate (2024) – SiPM characterization
- Harry Lewis – Postdoc (2023-2024) – SiPM characterization
- Xiang (Alex) Li – PhD (2023-) – Light production, transport and detection in LXe
- Fandresena Ramonjisson – Msc (2024-2026) – Light only event reconstruction in LXe
- Lei Wang – Postdoc (2025-) – SiPM characterization

## Support personnel for SiPM testing work (CFI IF 2020)

- Maia Henriksson-Ward – Automation specialist (2023-2024) – SiPM mass testing
- Kurtis Raymond – System engineer in training (2023-) – SiPM characterization
- Feng Shi – Project Scientist (2023-2025) – SiPM mass testing



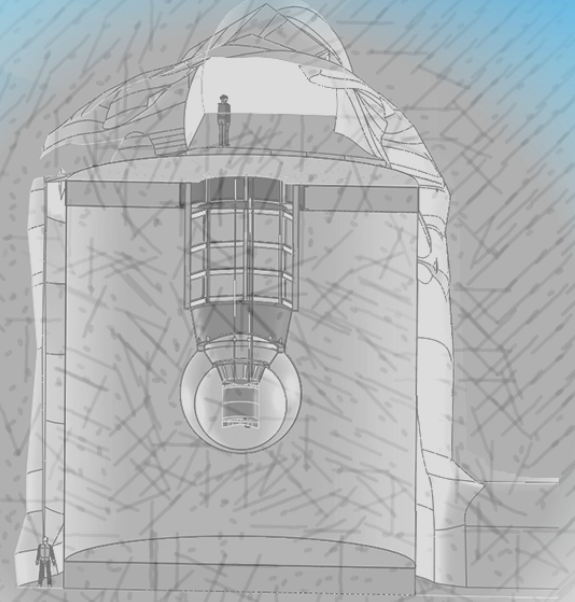


# Politics

# US in holding pattern

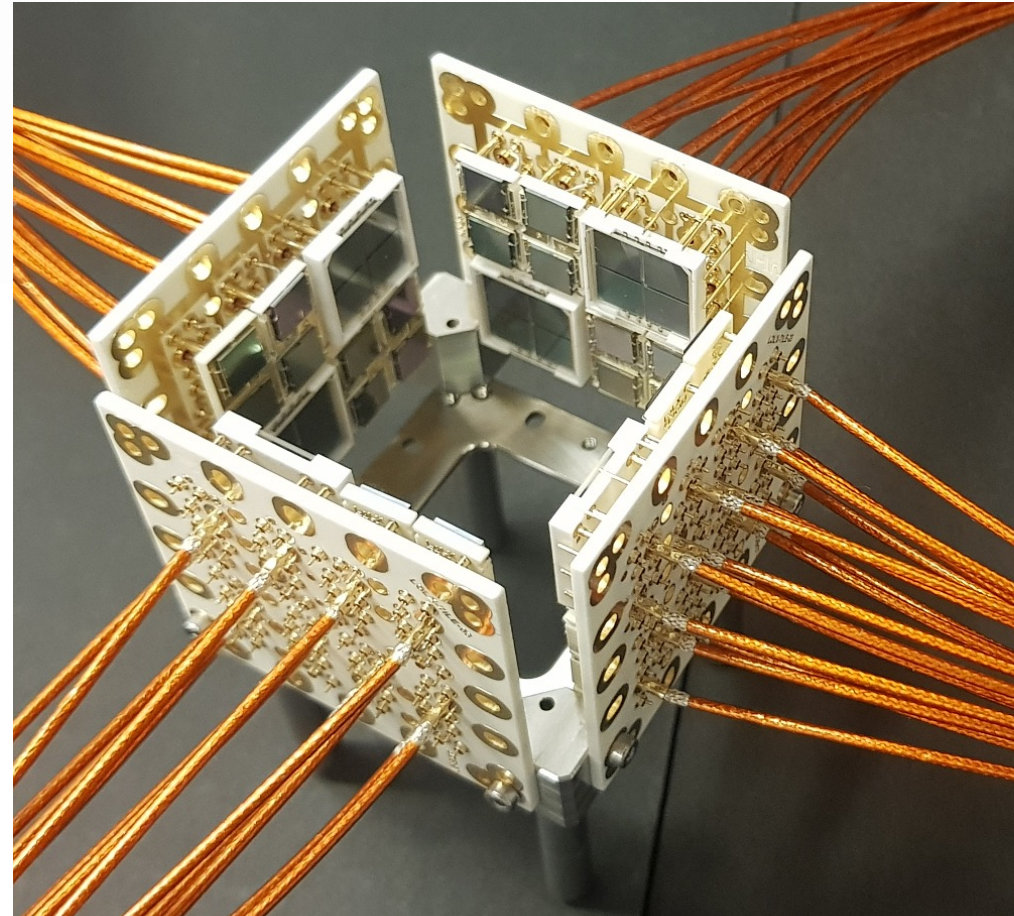
# No CD1 review scheduled

Focus on building infrastructure and doing R&D

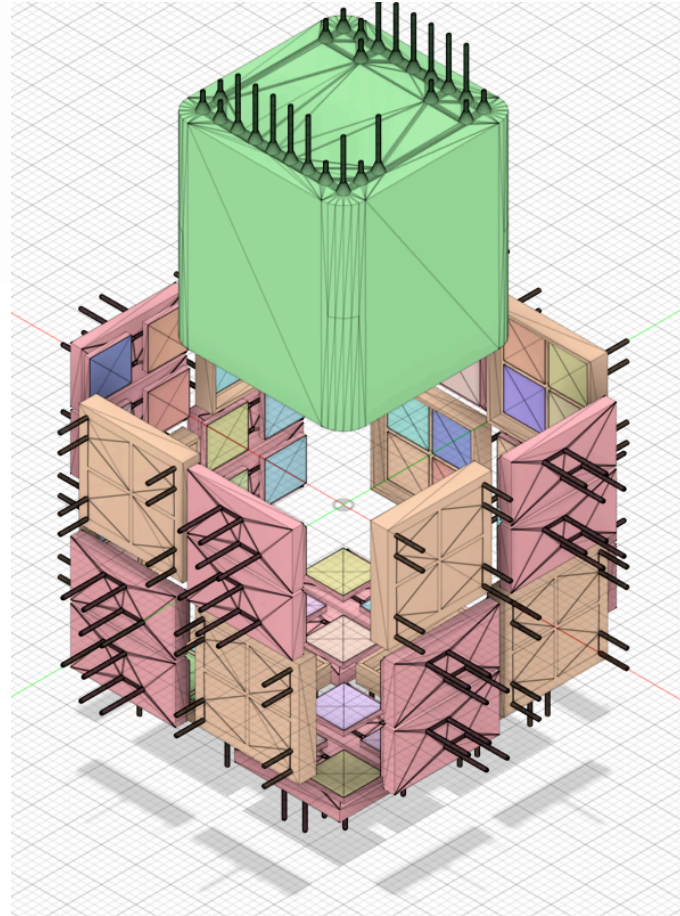


# Light only Liquid Xenon (LOLX)

LoLX2 Inner chamber built at TRIUMF



LoLX2 in simulations



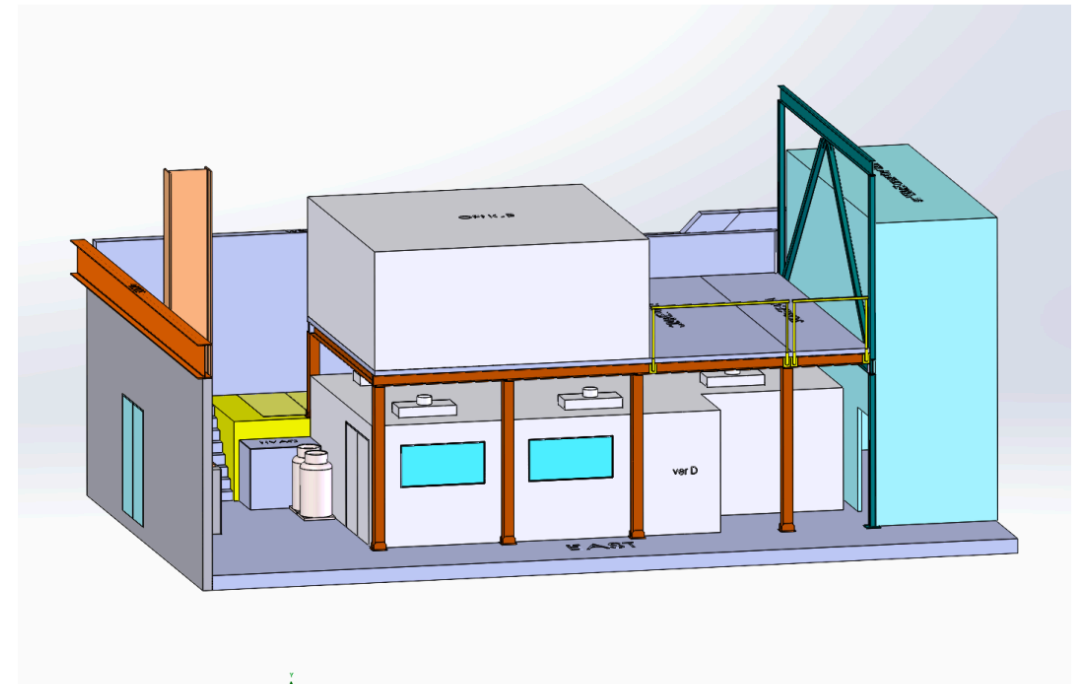
- LoLX1 in 2021
  - Paper in preparation
- LoLX2 Run 1 in 2023
  - SiPM comparison
  - Energy and position resolution in LXe
- LoLX2 Run 2 in 2024

# SiPM mass testing infrastructure

- CFI IF 2020 funded for testing 5 m<sup>2</sup> of SiPMs
- Aim to complete the clean room by mid 2025
- Aim to finalize testing methodology by February 2025
- First tile prototype in 1-2 months

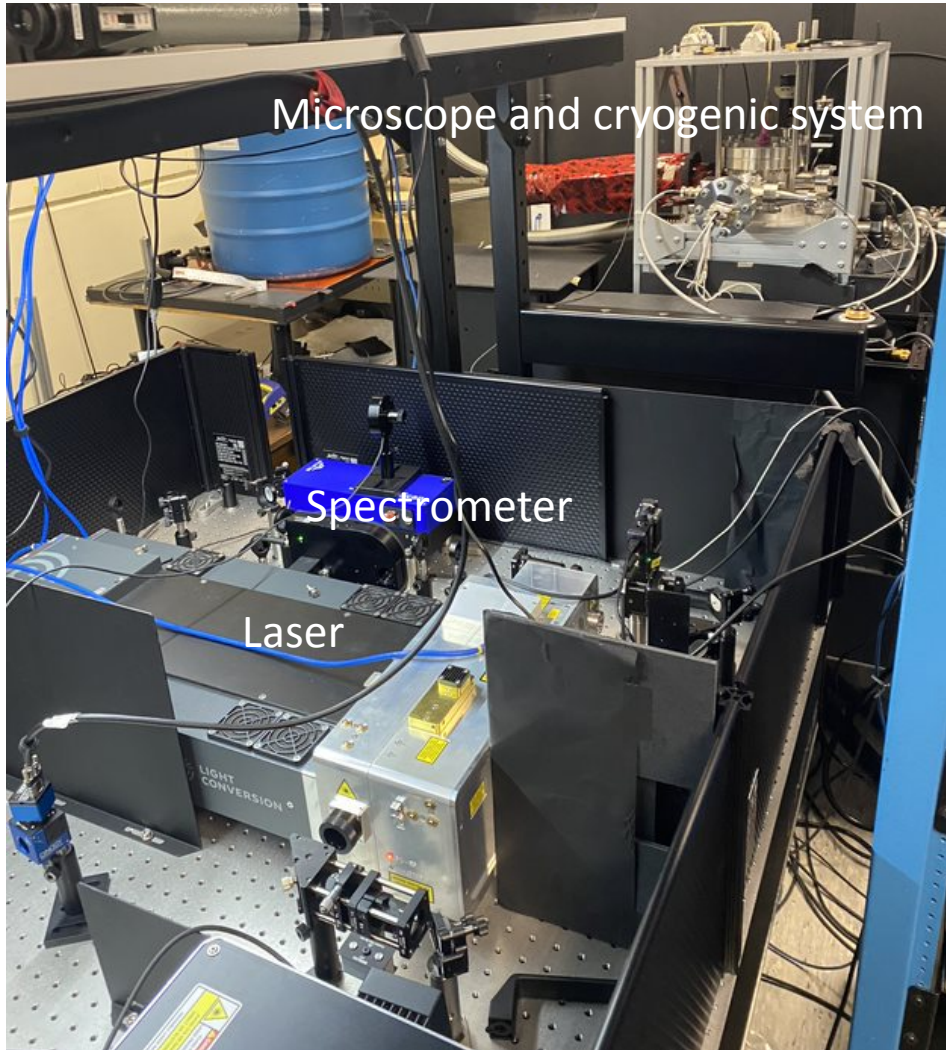


Proposed site of the nEXO clean room and above office facility in the Meson Hall Extension



Conceptual illustration of the proposed nEXO facility and above office on the mezzanine

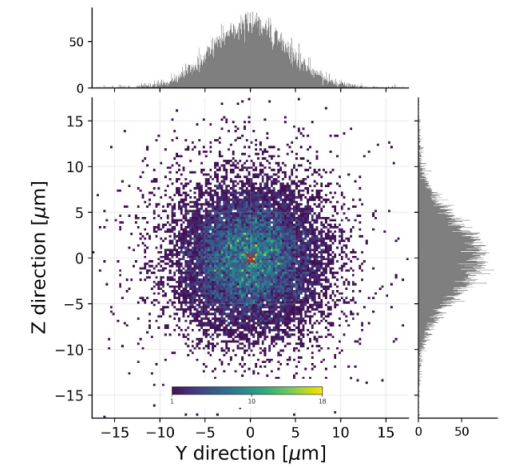
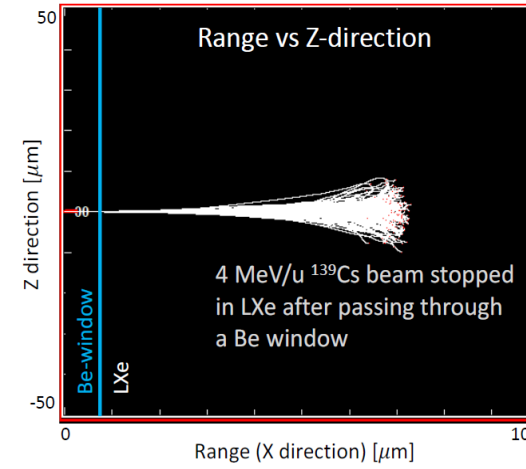
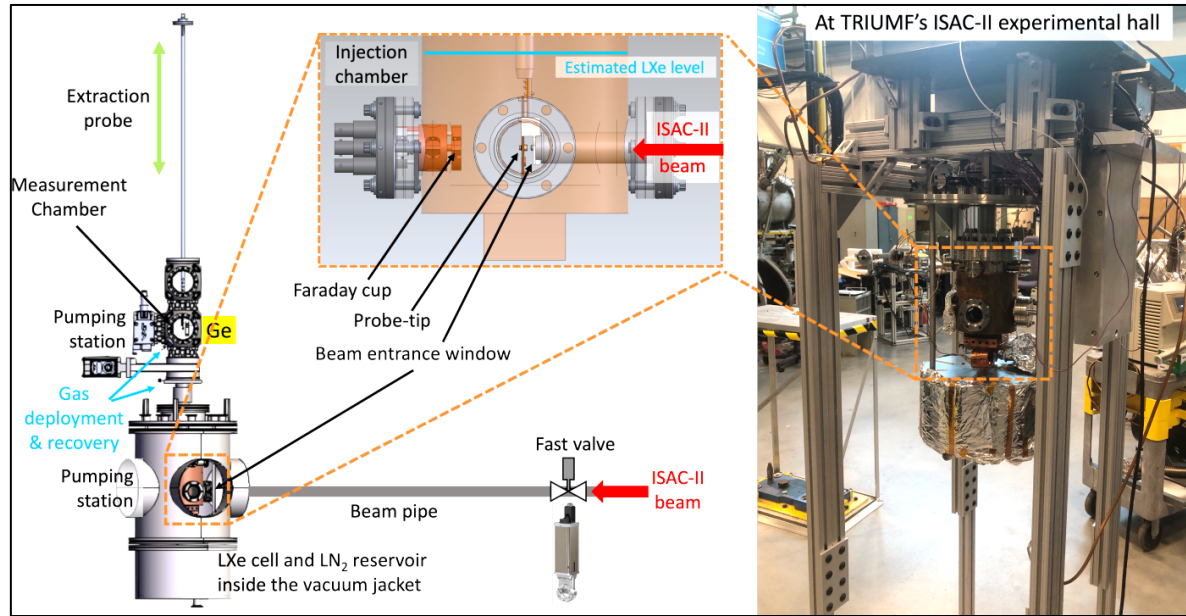
# SiPM characterization



- Upgrade of MIEL (Microscope for the Injection and Emission of Light) completed
  - New laser (300-2000nm tunable, 200fs pulse width)
- Papers
  - H. Lewis et al., “Measurements of the Quantum Yield of Silicon using Geiger-mode Avalanche Photodiodes”, submitted to IEEE Trans El. Dev., in Nov 2024
  - K. Raymond et al., “Stimulated Secondary Emission of Single-Photon Avalanche Diodes”, published in IEEE Trans El. Dev. in Oct 2024
  - “Dark noise source characterization”, in preparation (2024)
  - A. de Ste Croix, “Modeling SiPM efficiency from ultra-violet to infra-red”, in preparation (2024)

# Ba-tagging at TRIUMF for a future neutrinoless double beta decay search in nEXO

Novel radioactive beam approach for ion implantation into LXe volume and subsequent extraction



## Status updates on simulations and hardware progress

- COMSOL simulations of Ba ion motion in LXe and GAr were performed.
- Vertical motion of electrostatic probe into LXe chamber is configured with a servo motor.
- Set up of probe biasing with HV is underway.
- HPGe detector calibration and testing is in progress.
- HPGe detector simulations to characterize  $\gamma$ -signature of <sup>139</sup>Ba  $\rightarrow$  <sup>139</sup>Cs decay were completed.
- Machining components and acquisition of Be beam entrance window in progress.

