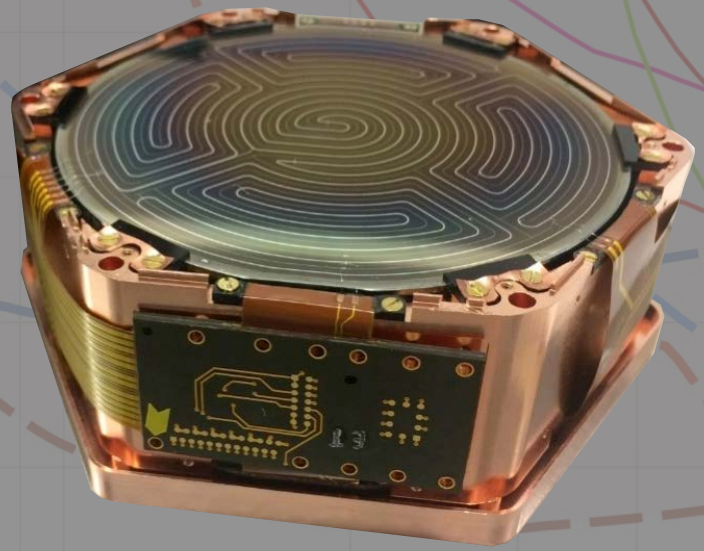


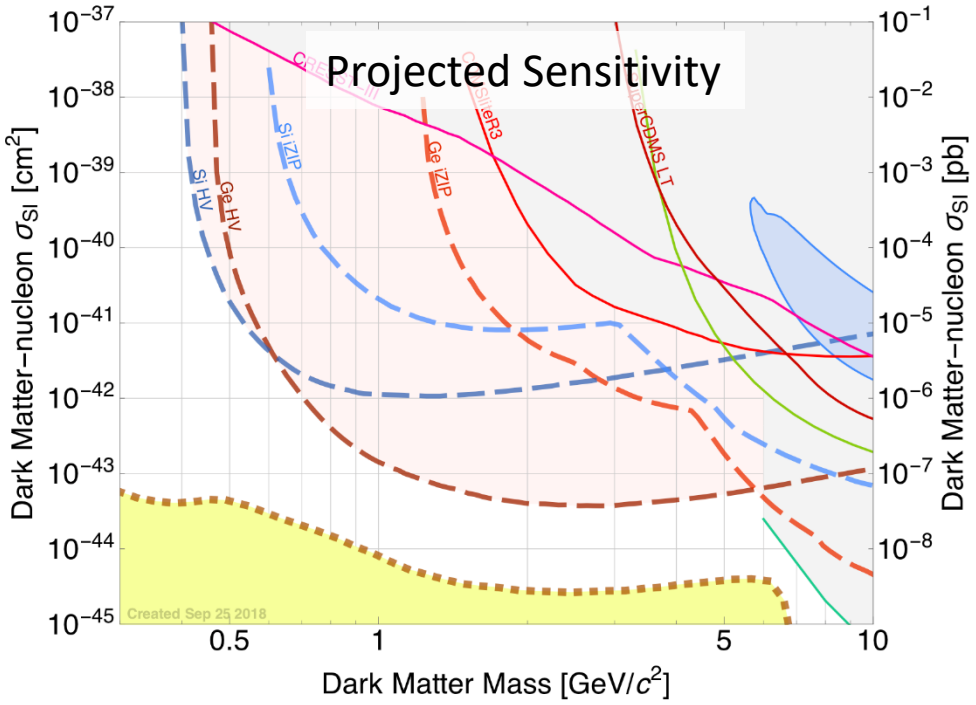
TRIUMF

SuperCDMS and CUTE Perspective for the 2025-2030 5-Year Plan

W. Rau

SuperCDMS

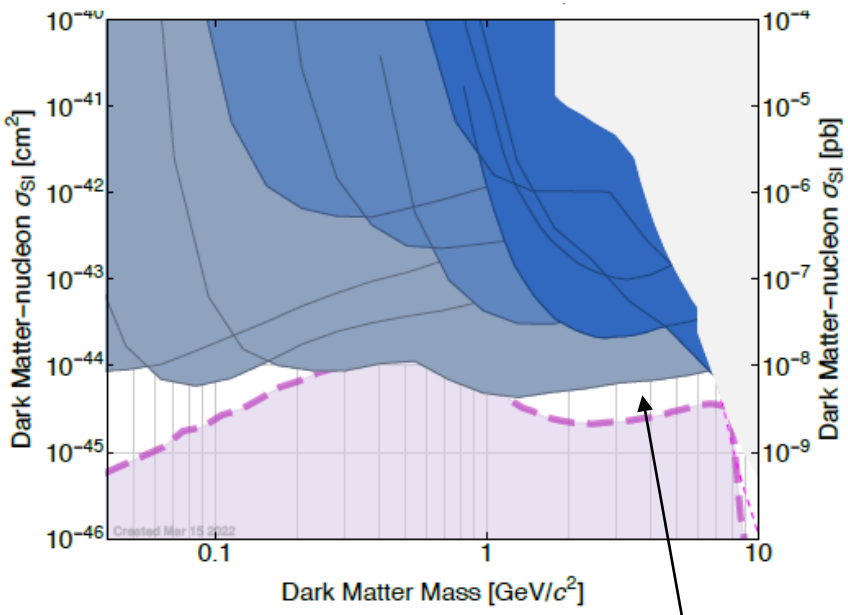
- Direct dark matter search with cryogenic Ge and Si detectors
- Focus on low-mass DM: few GeV range, with sensitivity down to eV range for certain types of DM
- Presently under construction at SNOLAB
- Start of science operations anticipated for 2023
- Expected to run for ~5 years; for analyses probably +2-3 years
- Several possible upgrade paths are being discussed, improving sensitivity or lowering mass range (arXiv: 2203.08463)
- Likely time scale for upgrades ~2025-2030, but no concrete plans exist so far



SuperCDMS upgrades

Some examples of sensitivity projections for possible upgrades (mostly improved/modified detectors; from arXiv: 2203.08463)

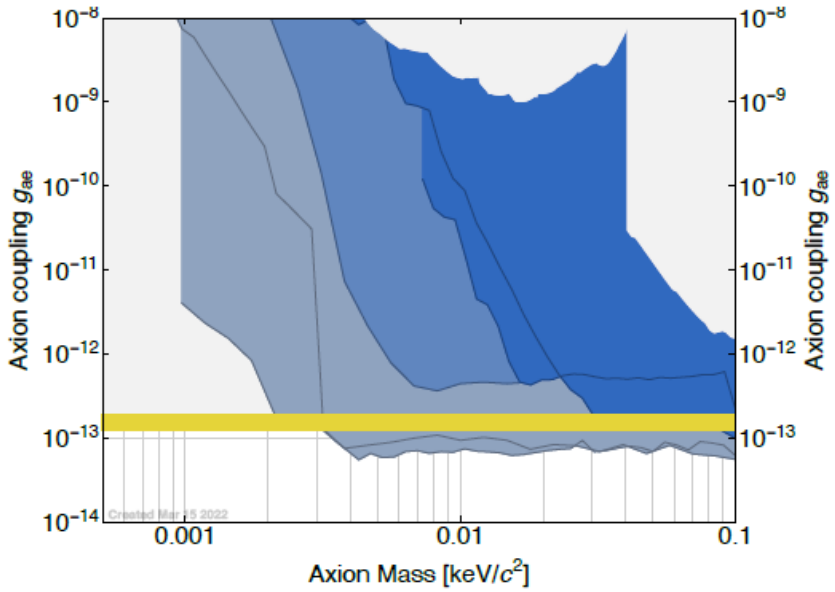
DM-nucleon scattering



Purple shaded: background from solar neutrinos

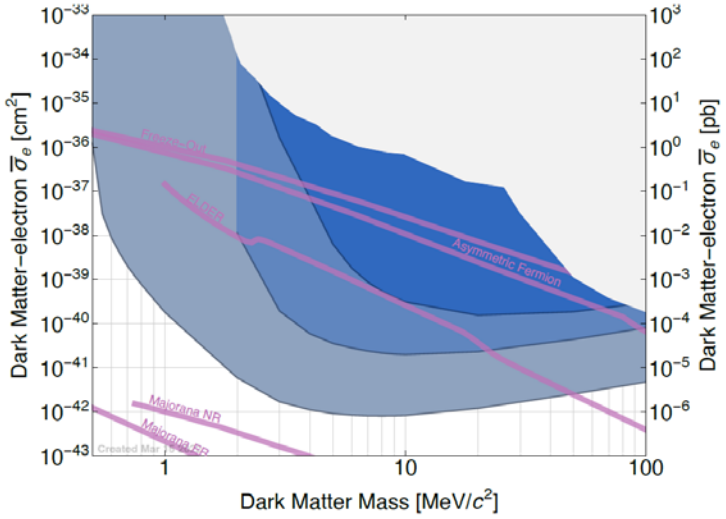
Different choice of detectors could also close this gap

Axion-like particles



Yellow bar: hint from stellar cooling

DM-electron scattering
(heavy mediator)

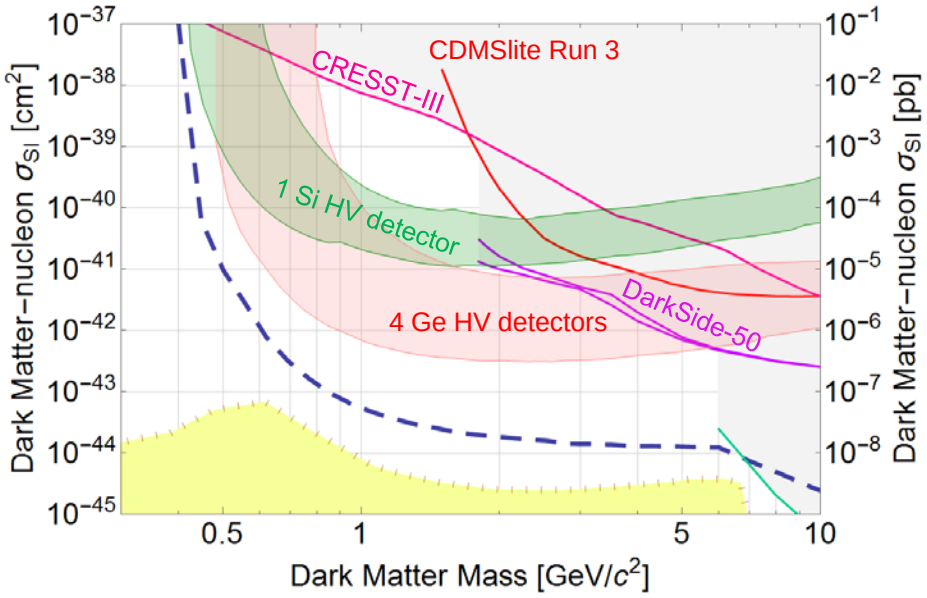


Purple lines: different DM models

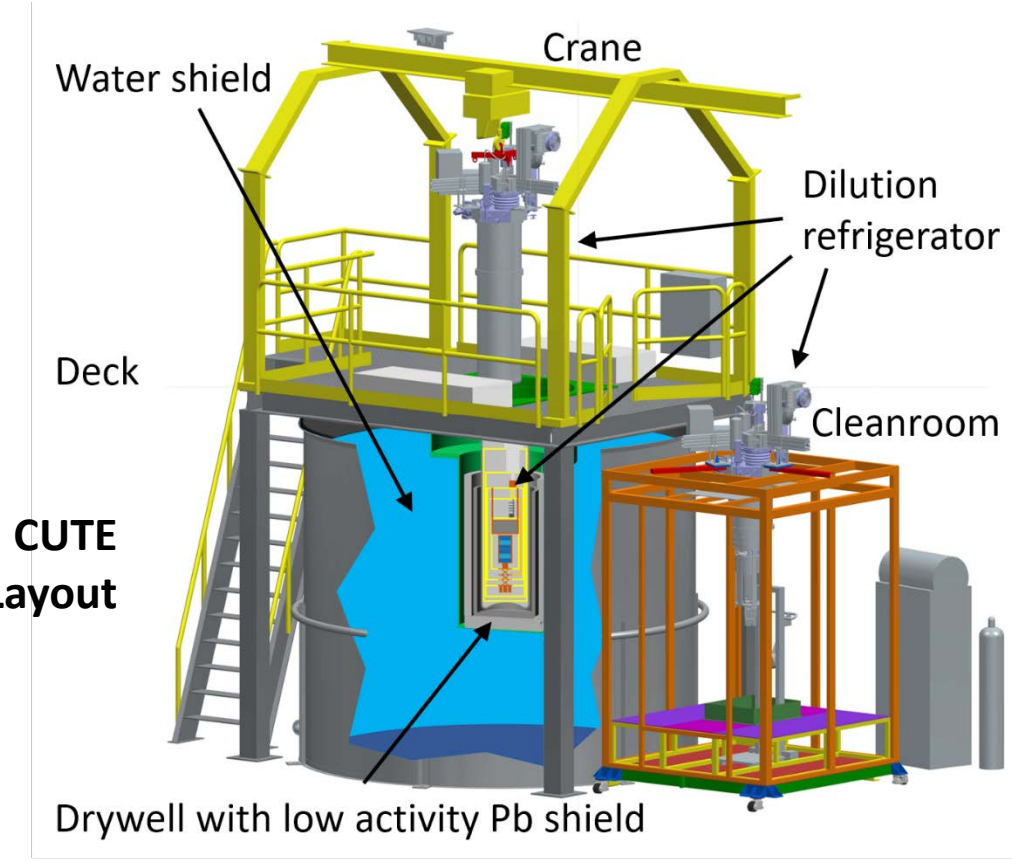
Dark blue: SuperCDMS expected
Light blue: Technology in hand
Grey blue: Some R&D needed
Lines: different detector types

CUTE

- Cryogenic detector test facility at SNOLAB, developed for SuperCDMS
- Low background (though much higher than SuperCDMS), low noise: can be used for science
- Will become SNOLAB user facility, available for the community (probably some time in 2023)
- Interest expressed e.g. by other DM search experiments (SPICE/HeRALD/TESSERACT) and cryogenic Q-Bit project
- We may get involved in any future CUTE projects



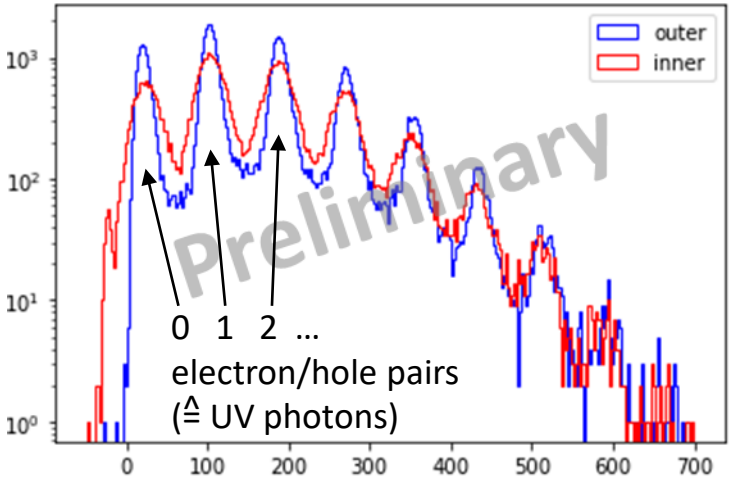
Sensitivity of SuperCDMS detectors in CUTE



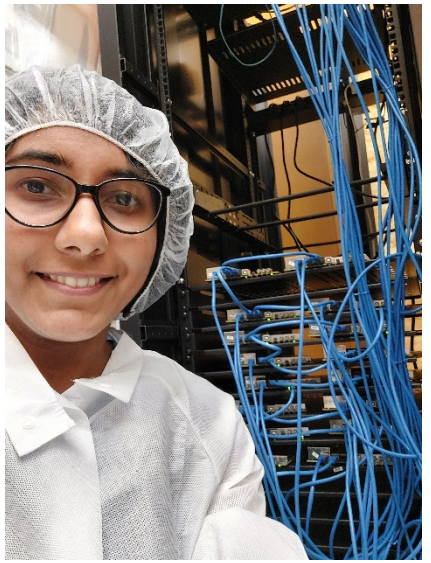
CUTE Layout

Local Work

- Cryogenic detector test facility (unshielded) in MOB (W. Rau's group)
  - Detector characterization
  - Trouble shooting of readout electronics
  - Development and testing of new calibration schemes
  - Testing of new hardware components
  - …
- DAQ development / testing for SuperCDMS (S. Oser's group)
- General support for SuperCDMS and CUTE (both groups)
  - Detector / facility operation
  - Data analysis
  - Data processing
  - Sensitivity projections
  - …
- Future
  - Continue the present work
  - Support R&D work for SuperCDMS upgrades and CUTE
  - …



Individual photons from UV LED@30 mK with a SuperCDMS HVeV detector



SuperCDMS DAQ testing at TRIUMF