



# SuperCDMS SNOLAB In Canada 2017-2022



New groups are welcome

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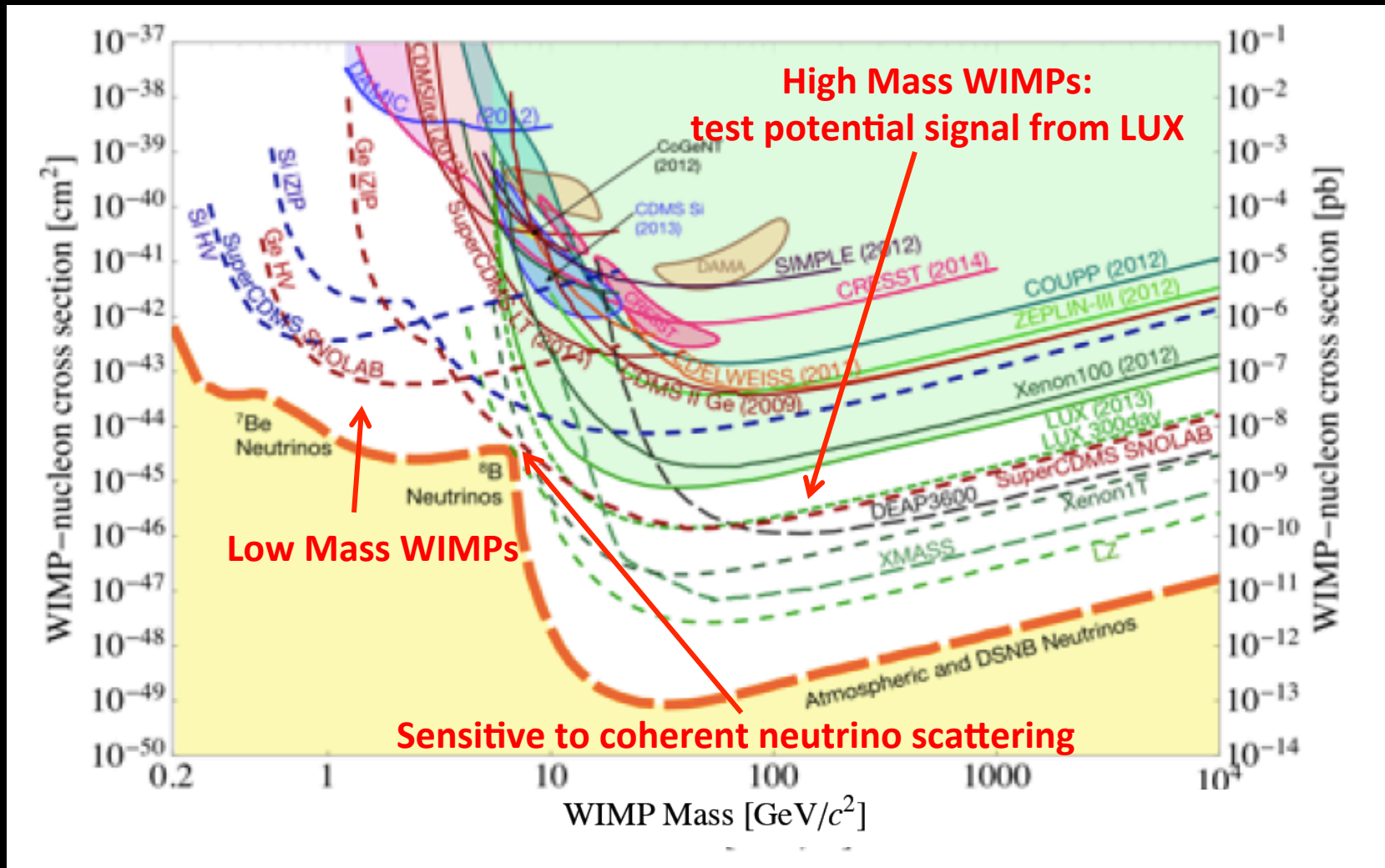


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# Research Goals

Ge/Si iZIP (50 /3.7 kg), discrimination NR/e  
Ge/Si HV (4.6/1.2 kg), no discrimination NR/e  
5 y operation



Additional opportunities: search for anomalies in low energy electron recoil spectrum, e.g.:  
Axions or Axion-like particles (solar or relic), Lightly Ionizing Particles (fractional charge)

# HQP Training

## Presently

- 4 graduate students (3 @ Queen's, 1 @ UBC)

## Committed (2015)

- +1 graduate student, 2 postdocs (1 @ UBC, 1 @ Queen's, CERC funded),  
1 research associate (CERC funded)

## Goal for 2017-22:

- 10 graduate students  
(data analysis, detector performance studies and R&D, DAQ, data processing, neutron veto studies)
- 3 postdocs (DAQ development, Test facility operations, data analysis)
- 1 RA (Coordination of the test facility at SNOLAB)
- 1 technician (SuperCDMS operation at SNOLAB)

(potentially more if additional groups join)

# Funding Perspective

## Equipment:

- Total project cost: ~\$29M – already funded through DOE/NSF and CFI (existing funding from CFI/Ontario: \$3.4 + in-kind)
- Additional support from CERC funding
- Upgrade planned: CFI request of order of \$2-3M expected for ~2020 (in coordination with upgrade funding request from DOE/NSF and potentially other international partners)
- No major equipment request for NSERC anticipated

## Operations

- Operational funding from NSERC expected to ramp up over the next few years (required to support the Canadian contribution to the installation and later operation of the experiment)
- Aim to reach roughly steady state of ~\$0.5M/year in ~2018

# Computing

## CPU/storage:

- Major computing resources for the experiment are expected from the US
- In Canada: small 'private' online-analysis farm at SNOLAB, only minor use of general computing resources.  
(this may change if new groups with focus on Monte Carlo or Data Analysis/  
Processing join)

## Networking:

- Data link from SNOLAB to the outside world might become a bottleneck  
(general issue for all SNOLAB experiments)

# Technical Support

## SNOLAB:

- During planning/installation (until 2018) and for upgrade (2020): moderate engineering support from SNOLAB required (review of proposed design).
- Some technical support for transporting and installing equipment underground
- Moderate technical support during operation (mostly funded through CFI operating funds and DOE/NSF)

## TRIUMF

- TRIUMF support requested for DAQ development (2016-2018; however, we expect this effort will be fully funded through DOE)

## MRS

- Expect to use some resources from Queen's MRS (technician time)

# Relationship to Other Projects (Canada)

## Dark Matter searches:

- SuperCDMS expects to have world leading sensitivity to low mass WIMPs and an independent test of potential signals that may emerge from noble liquid experiments
- It is complementary to other dark matter searches in Canada
- Experiments presently operating:
  - PICO: focus on spin dependent interaction
  - DAMIC (US project at SNOLAB): low mass WIMPs, very limited total detector mass
- Experiments in commissioning:
  - DEAP: excellent for high mass WIMPs
- Planned experiments:
  - NEWS: low mass WIMPs; expected to operate earlier than SuperCDMS, but not the same reach in mass and cross section, and different systematics.

## Low Background Experiments

- Other low-background experiments (SNO+, EXO) have similar requirements for material screening and cleaning.

# International Partners

## SuperCDMS

- ~100 scientists (incl. grad students) from over 20 institutions
  - US National Labs: Fermilab, SLAC, PNNL
  - US Universities: Berkeley, Caltech, Colorado (Denver), Evansville , Florida, Minnesota, Northwestern, Santa Clara, South Dakota (Vermillion), South Dakota School of Mines & Technology, Southern Methodist, Stanford, Texas A&M
  - Europe: Durham University
  - Associated members: NIST, CNRS/LPN (France)
- In negotiation with a group from India
- Discussions with EURECA (EDELWEISS/CRESST) to form a joint collaboration (regular technical meetings; EURECA is working on adapting their detectors for the SuperCDMS SNOLAB setup)