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# MiniCLEAN

— Nathan Eggen —

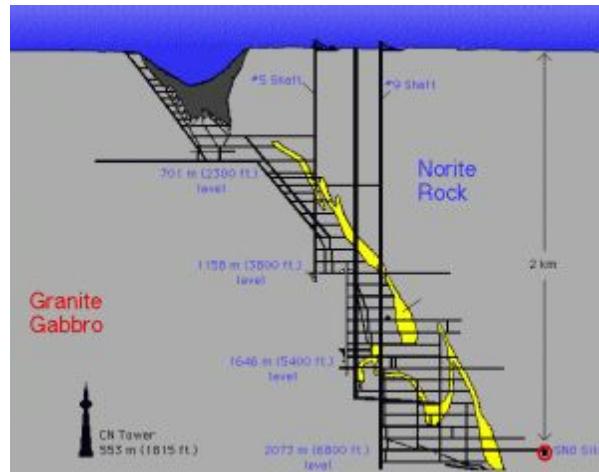
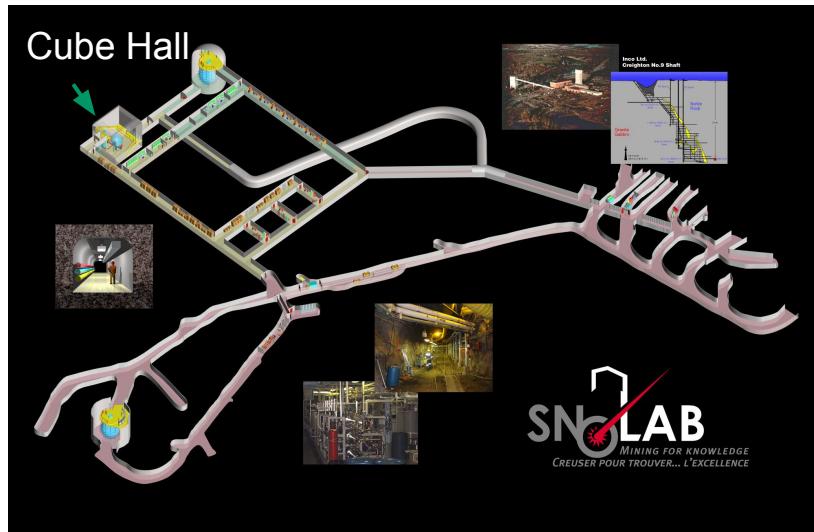
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# Snolab

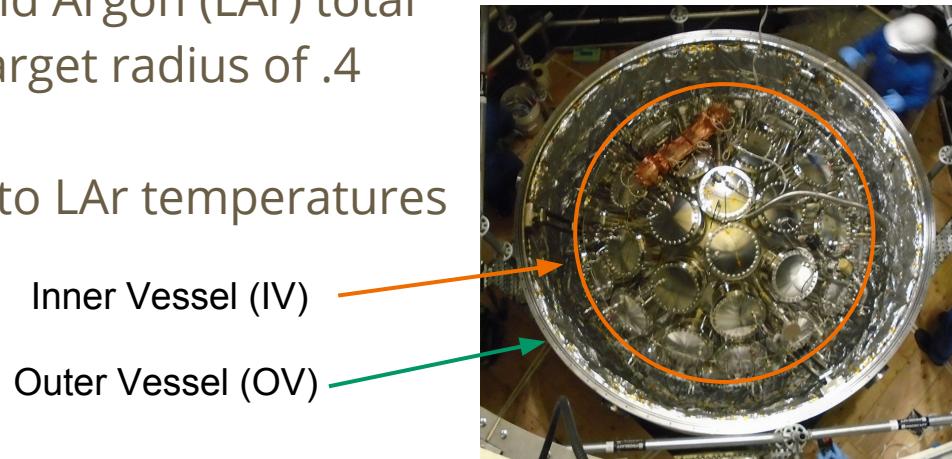
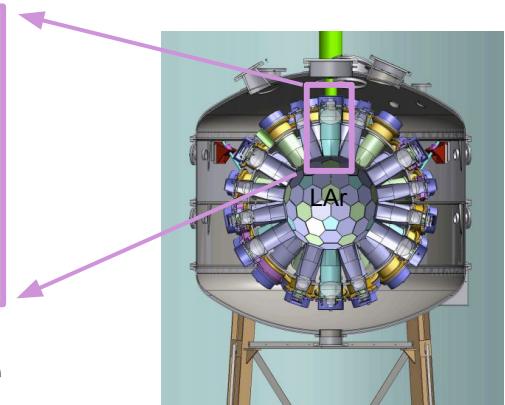
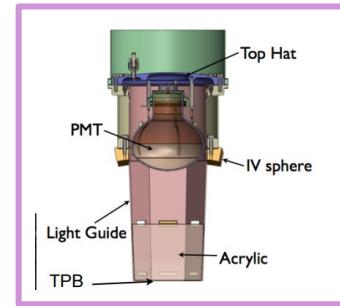


- Located in Sudbury, Ontario Canada.
- 6800 feet underground in a working Nickel mine.
- Home of Neutrino, Dark Matter, low radiation biology and supernova detection experiments.
- In Cube hall next to DEAP-3600, another direct dark matter detector



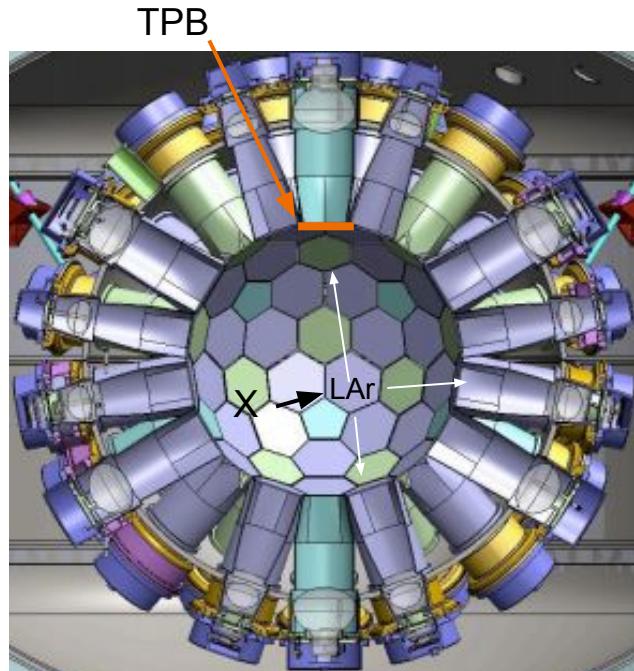
# MiniCLEAN

- A direct dark matter detection experiment prototype where the pmts are directly in the cryogenic liquid.
- Uses 2000 kilograms (kg) of liquid Argon (LAr) total
- Only look at 500 kg LAr with a target radius of .4 meters to detect dark matter.
- Recently finished cooling down to LAr temperatures and now filling with LAr.



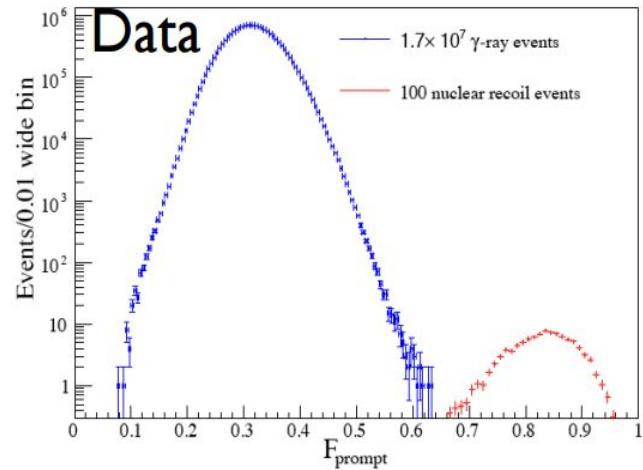
# Detecting Dark matter

- A WIMP,  $X$ , scatters off an Argon nucleus and excites the Argon atom.
- The LAr is a scintillator which then de-excites and emits a flash of light in the UV (128 nm).
- The PMTs have a layer of tetraphenyl butadiene (TPB) which absorbs the UV light and re-emits in the visible range which is then detected by the PMTs.



# Calibrations

- Use fraction of light seen in first 90 ns (fprompt) to discriminate between electronic and nuclear recoils.
- LAr will be doped with extra Ar-39 isotope in order to inflate the number of electronic recoils.
- Will use americium-beryllium (AmBe) neutron do neutron calibrations which will be used to calibrate WIMP interactions
- Currently doing work on neutron calibration simulations to get an estimate of how long the AmBe source will be needed to get enough statistics.



Number of Events	Number of Triggered Events	Pass PE Cuts	Pass Lrecoil Cuts	Pass Radial Cuts	Pass Fprompt Cuts	Pass PE, Lrecoil, and Fprompt	Pass All Cuts
200000	3186	838	360	1756	772	350	28