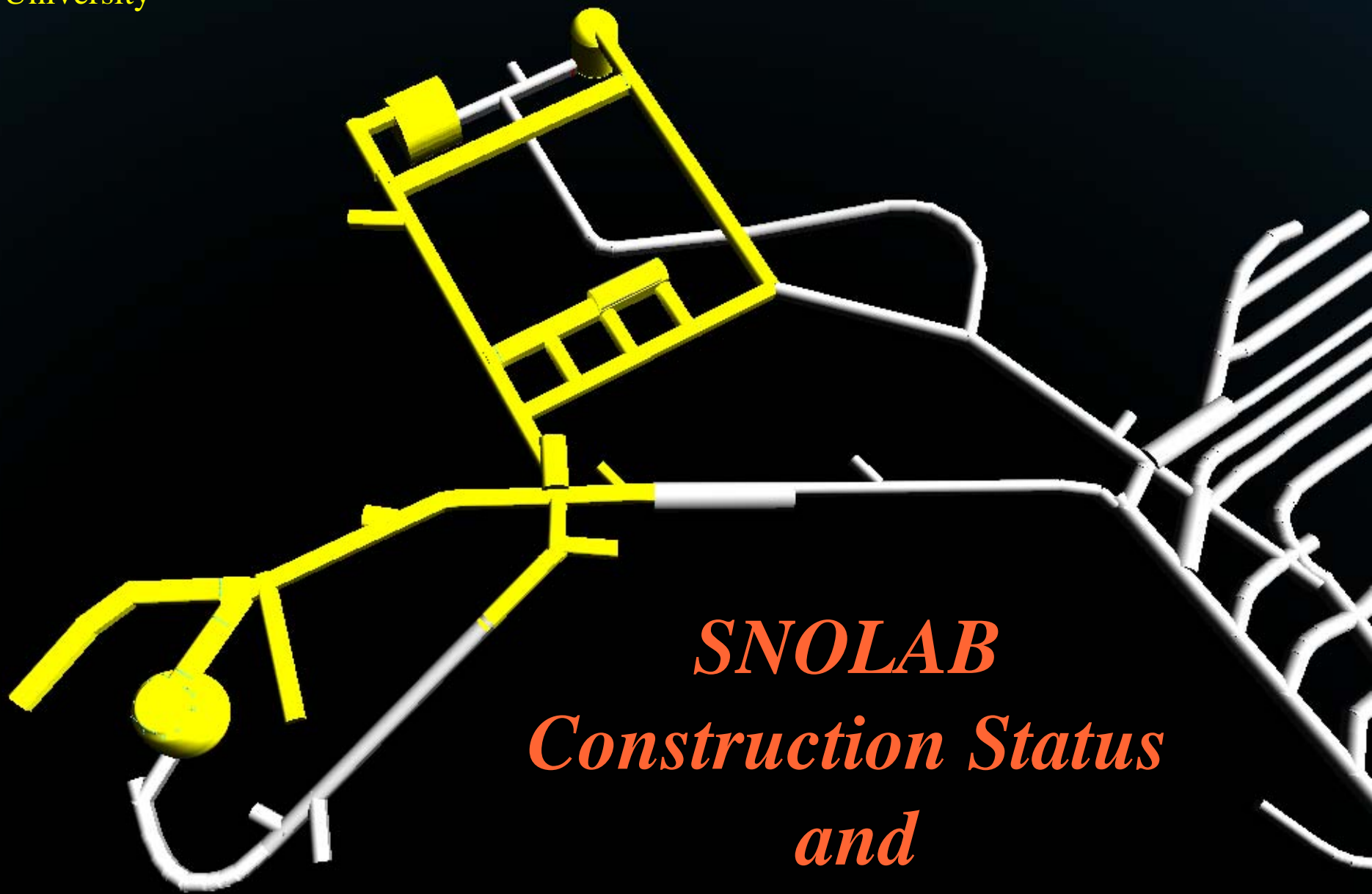


M. Chen
Queen's University

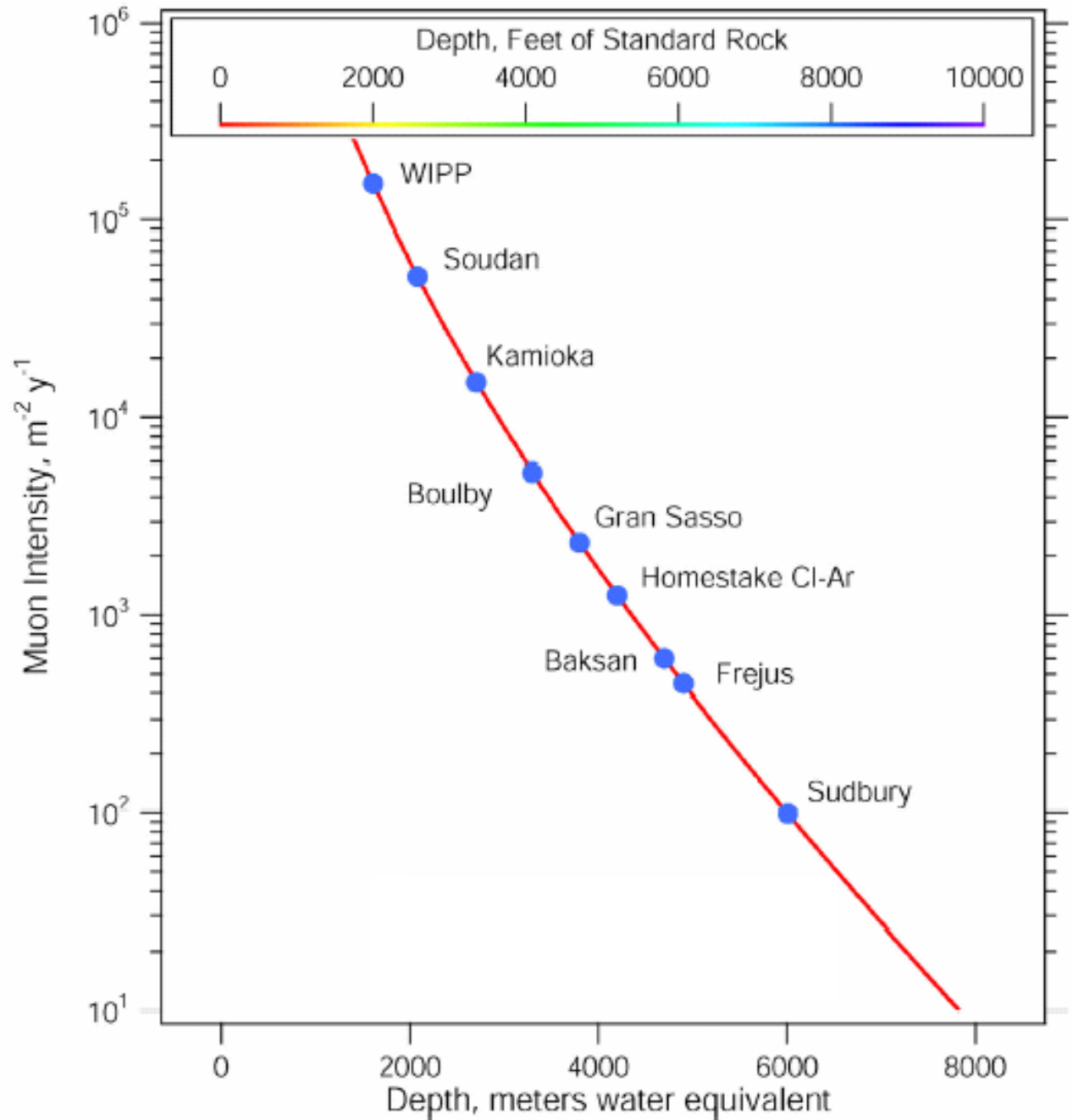


SNOLAB
Construction Status
and
Experimental Program

SNOLAB

located **2 km underground**
in an active nickel mine
near Sudbury, Canada

it's an expansion of the
underground facility on
the same level as the
SNO experiment



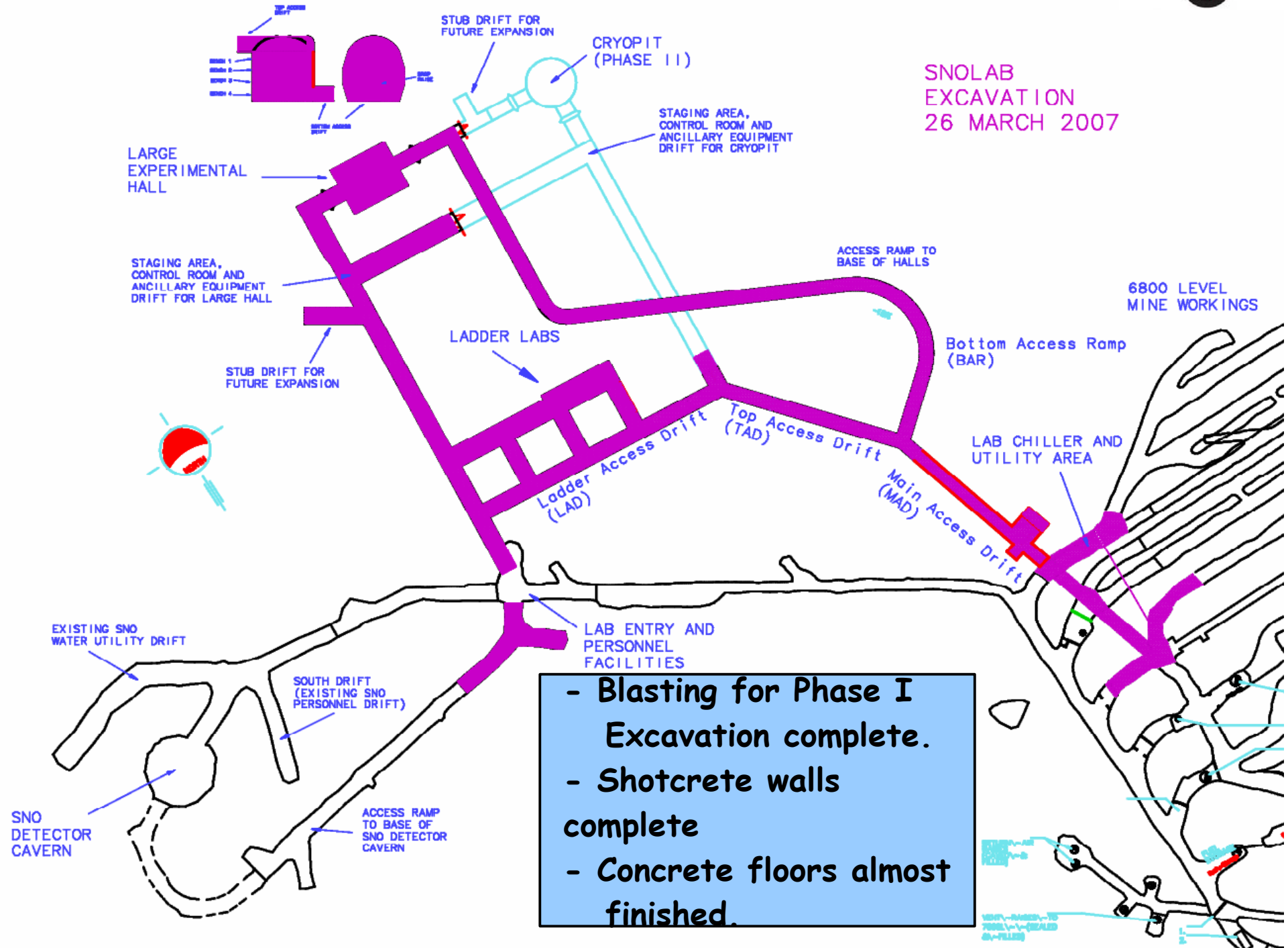
Surface Facility



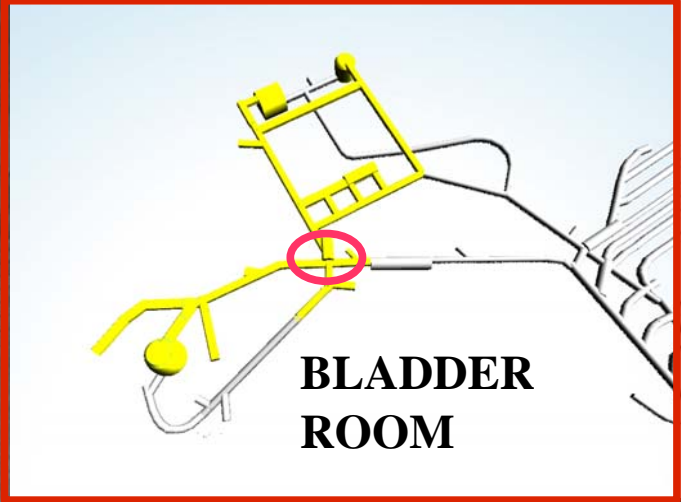
Excavation Status (Today)

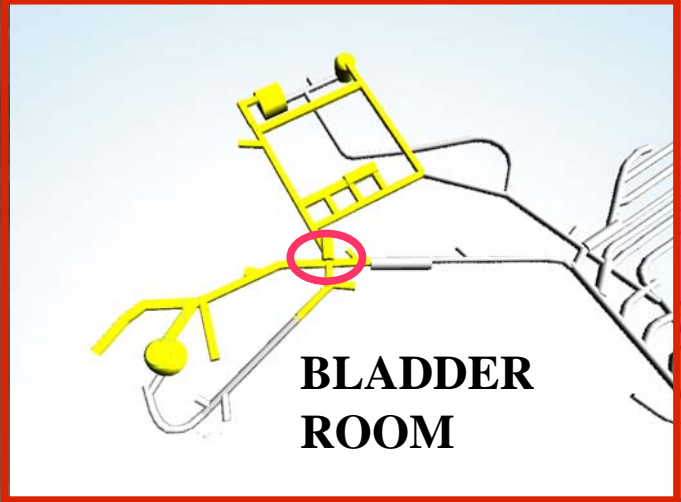


SNOLAB
EXCAVATION
26 MARCH 2007

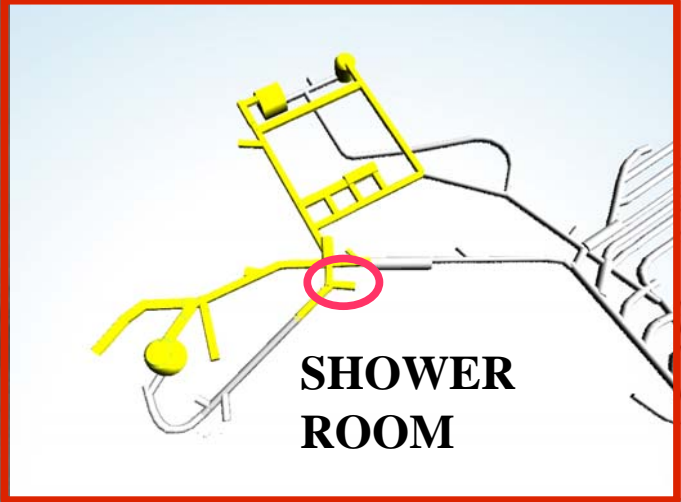


- Blasting for Phase I Excavation complete.
- Shotcrete walls complete
- Concrete floors almost finished.





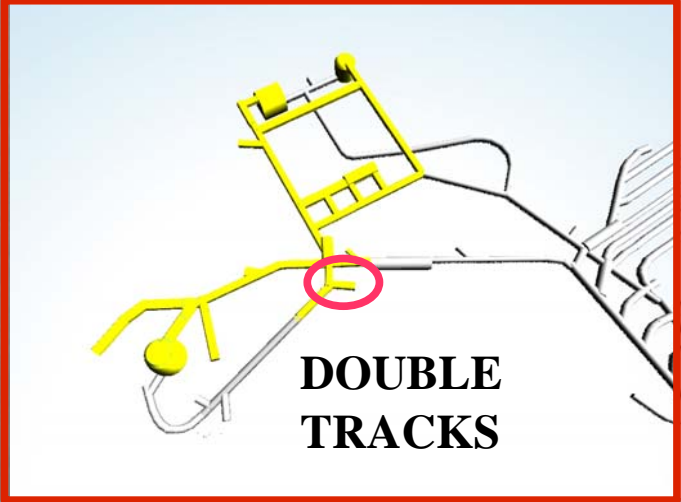
**BLADDER
ROOM**

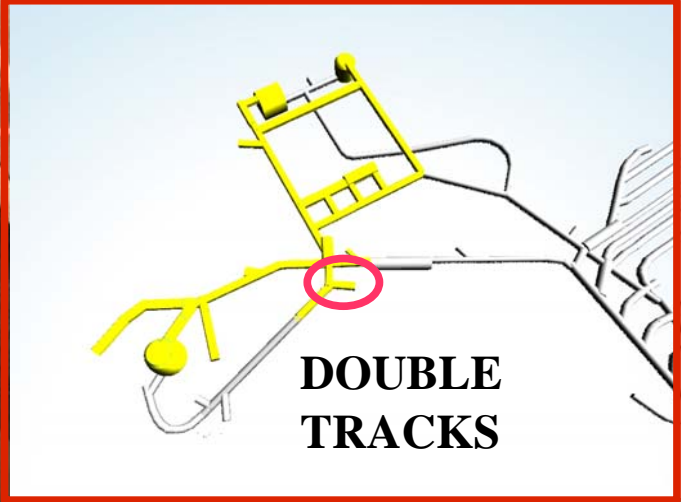


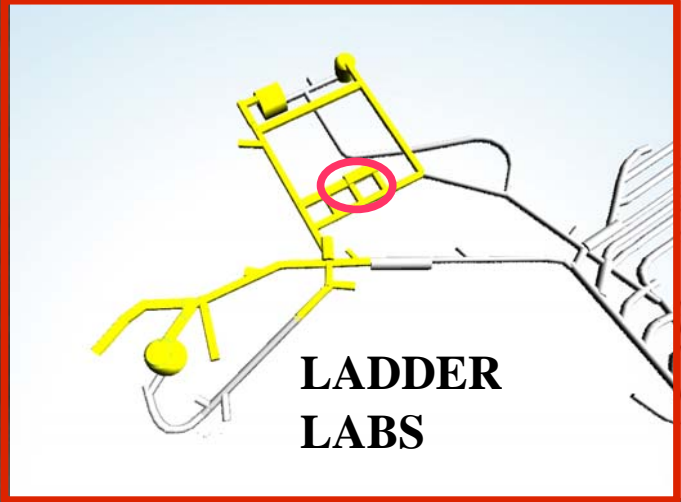
**SHOWER
ROOM**



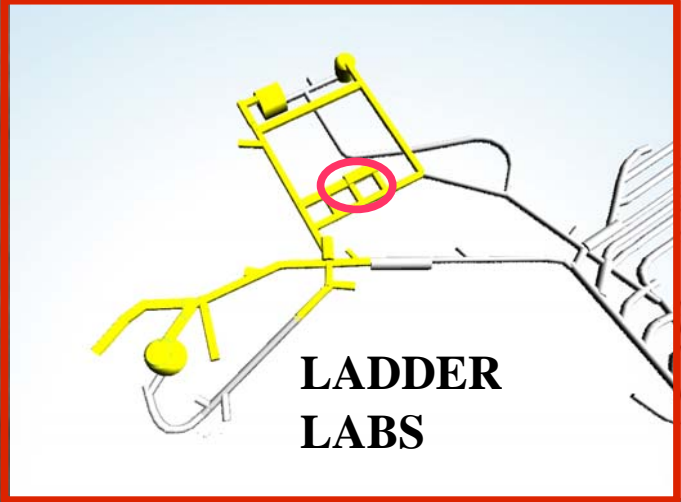
**SHOWER
ROOM**



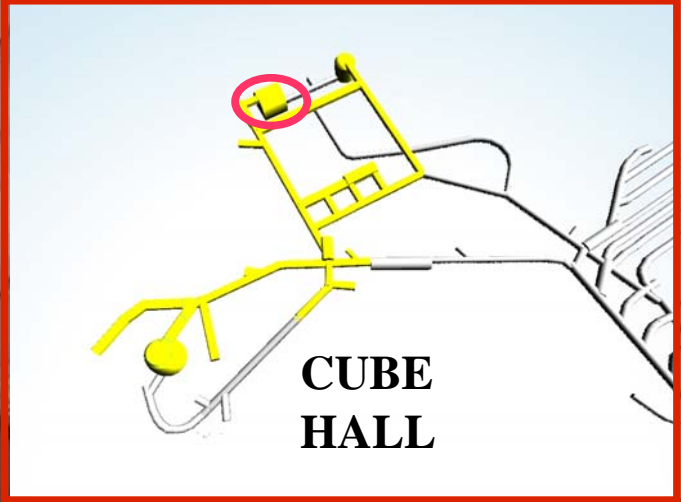


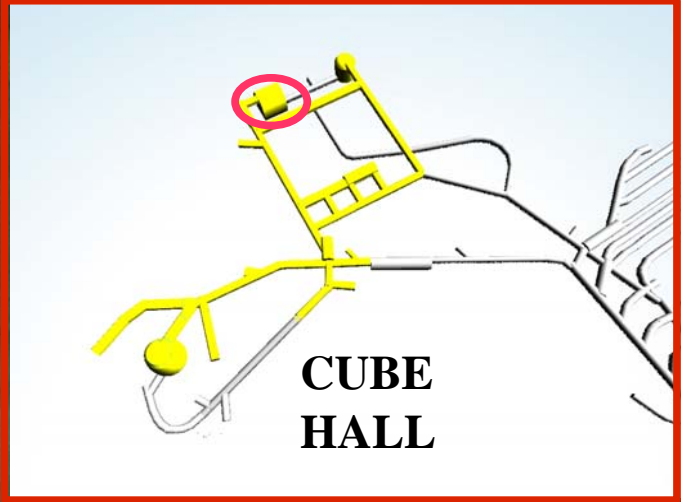
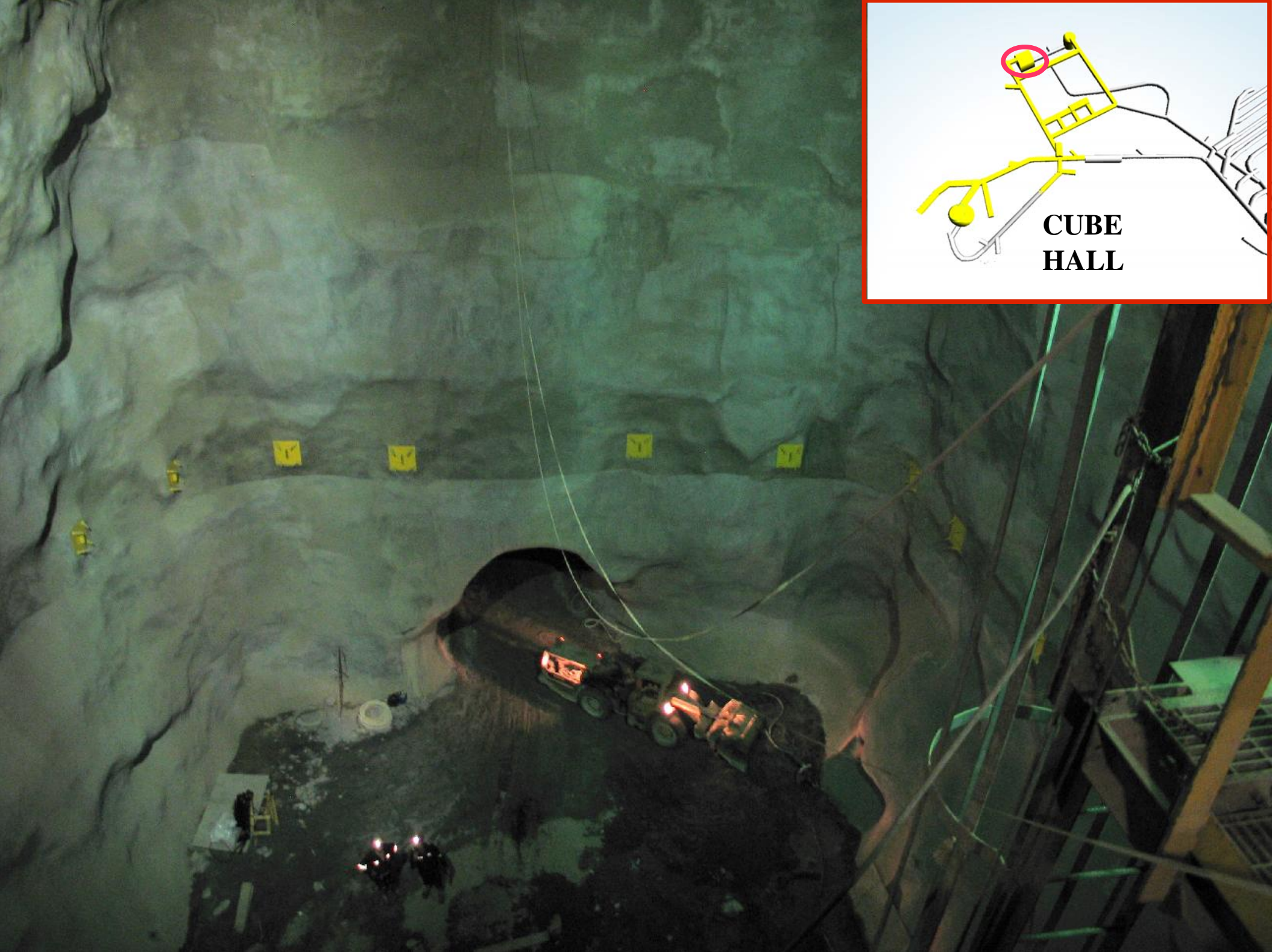


**LADDER
LABS**



**LADDER
LABS**

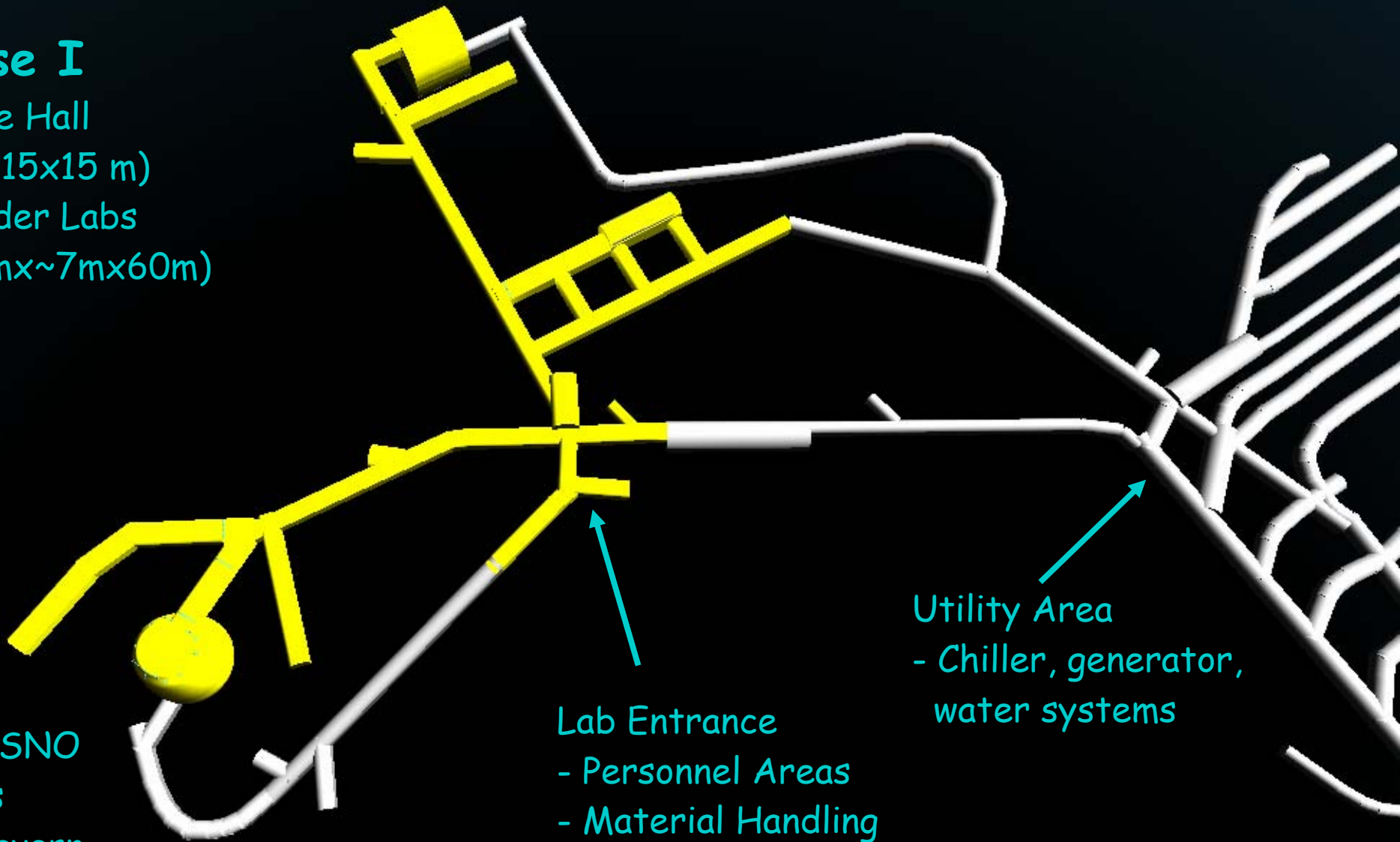




**CUBE
HALL**

Phase I

- Cube Hall
(18x15x15 m)
- Ladder Labs
(~7m x ~7m x 60m)



Existing SNO Facilities

- SNO Cavern
(30m x 22m dia)
- Utility & Control Rms

- Lab Entrance
- Personnel Areas
 - Material Handling

- Utility Area
- Chiller, generator, water systems

Phase I

- Cube Hall
(18x15x15 m)
- Ladder Labs
(~7m x ~7m x 60m)

Phase II

- Cryopit
(15m x 15m dia)

Existing SNO Facilities

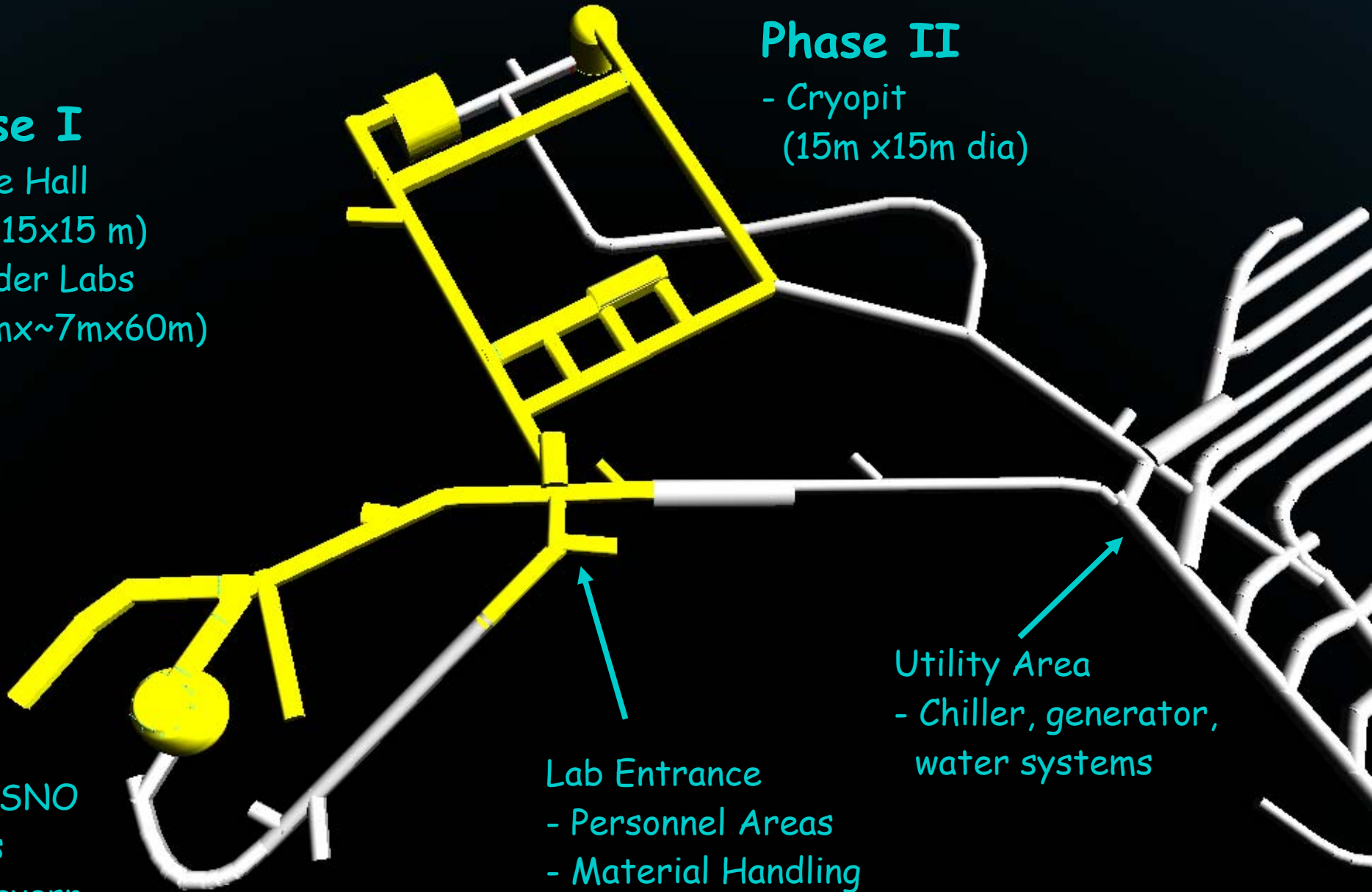
- SNO Cavern
(30m x 22m dia)
- Utility & Control Rms

Lab Entrance

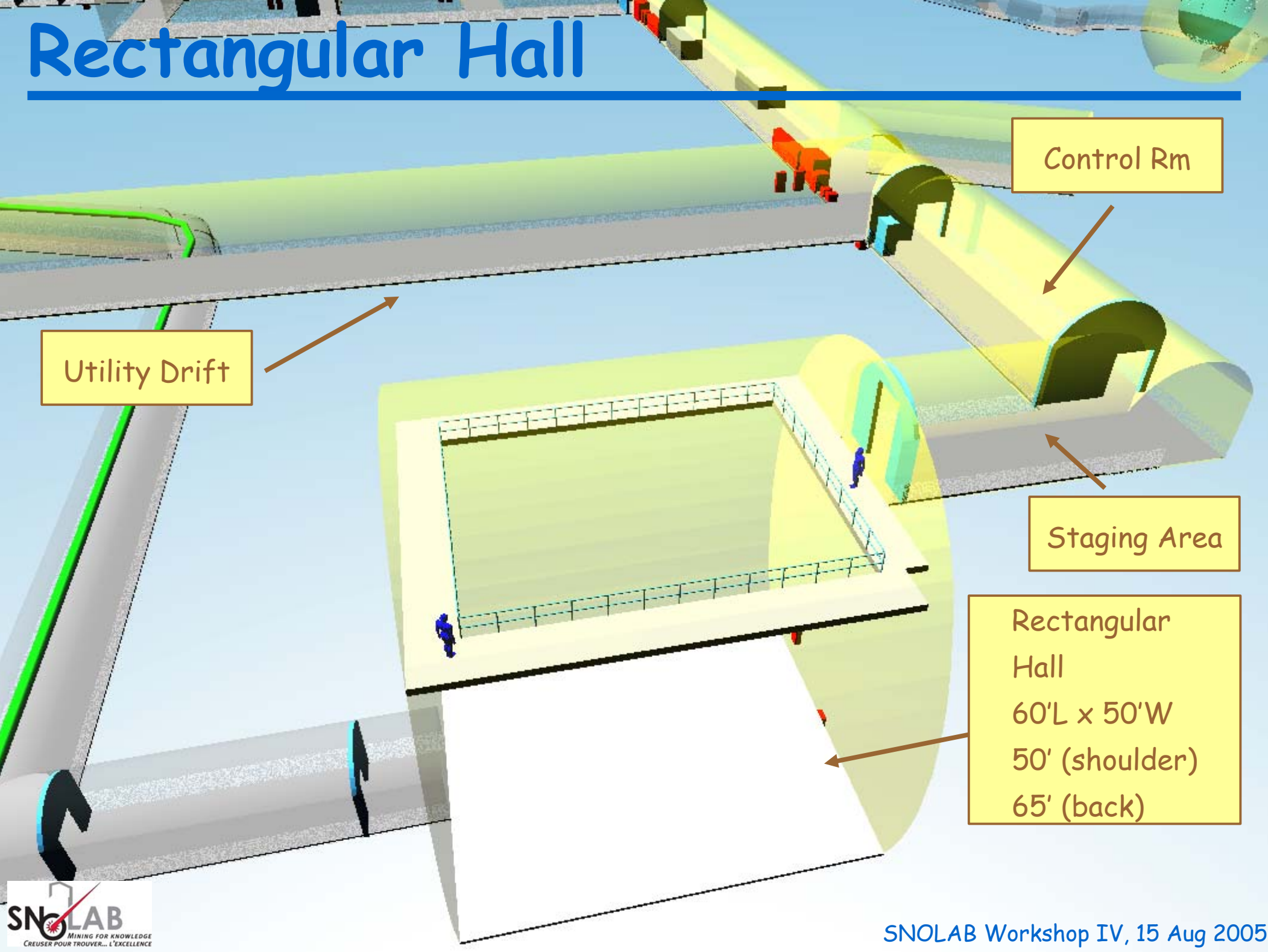
- Personnel Areas
- Material Handling

Utility Area

- Chiller, generator,
water systems



Rectangular Hall



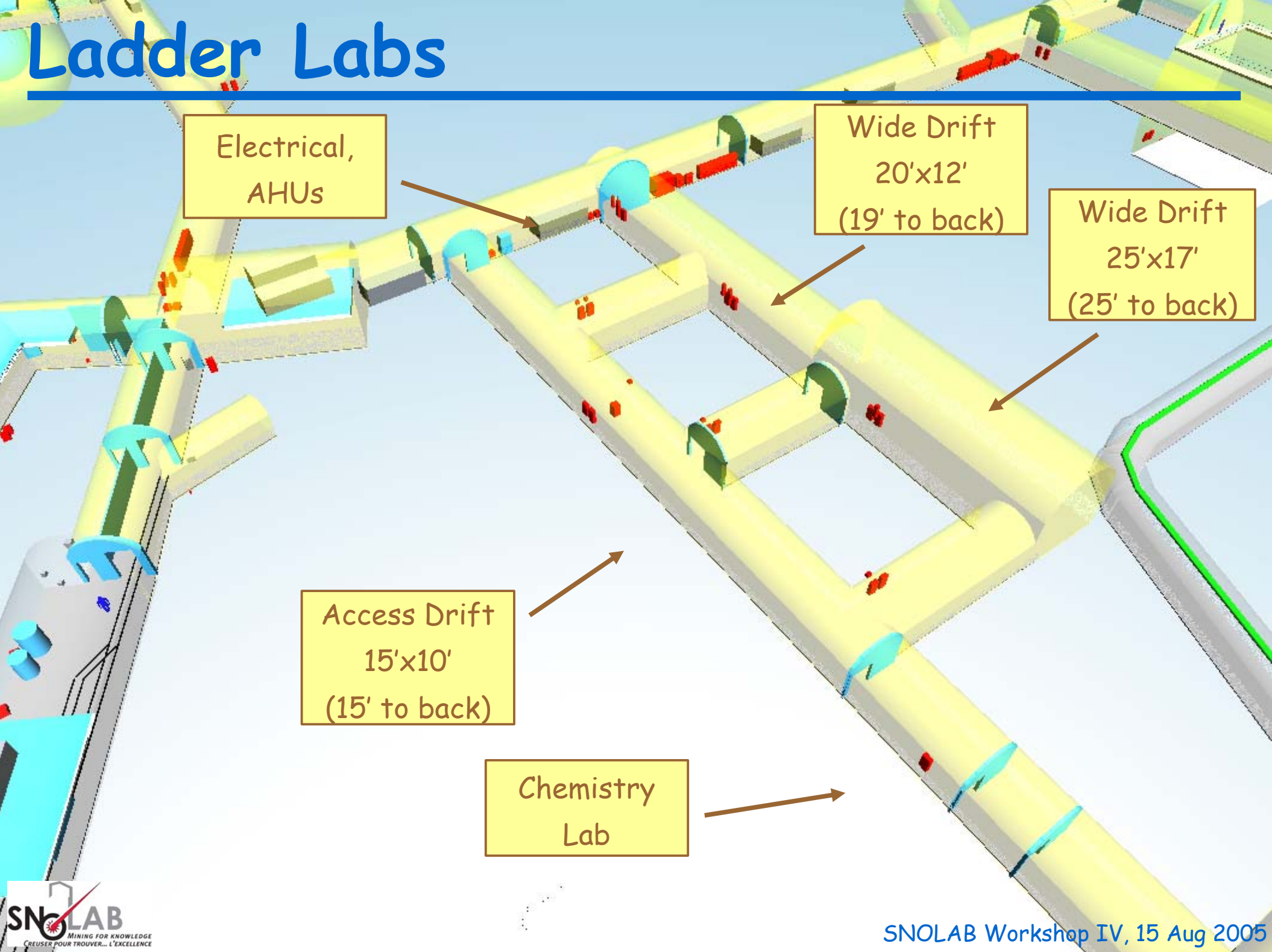
Utility Drift

Control Rm

Staging Area

Rectangular
Hall
60'L x 50'W
50' (shoulder)
65' (back)

Ladder Labs



Electrical,
AHUs

Wide Drift
20'x12'
(19' to back)

Wide Drift
25'x17'
(25' to back)

Access Drift
15'x10'
(15' to back)

Chemistry
Lab



- Some 20 projects submitted Letters of Interest in locating at SNOLAB. Of these, 10 have been encouraged by the Experiment Advisory Committee as being both scientifically important and particularly suited to the SNOLAB location.
- The experimental physics program includes
 - **Neutrinos:** Low energy solar neutrinos, geo-neutrinos, reactor neutrinos, supernova neutrino detection
 - Tests of neutrino properties, precision measurements of solar neutrinos, radiogenic heat generation in the earth, stellar evolution. [SNO+, HALO]
 - **Neutrinoless Double Beta Decay:**
 - Determine the nature of the neutrino and absolute neutrino mass. [SNO+, EXO, Majorana]
 - **Dark Matter Searches:**
 - Direct dark matter detection. [PICASSO, DEAP/CLEAN, CDMS, LUX]
- Several of these experiments are also being proposed for other laboratories.

Initial Suite of Experiments



Experiments requesting space at SNOLAB

Experiment	Physics	Target	Location	Funding	Start
SNO	Solar nu		SNO Cavern		Decommissioning
SNO+	Solar nu, OnuBB, Geo nu	1kT LS	SNO Cavern	partial	2008
PICASSO -IB, II	DM	2-4kg F	SNO Area	funded	Running (2kg Phase)
PICASSO -IIB		25kg F	Ladder Labs	request in 07	2008
PICASSO-III		100kg F	Cube Hall		2009
DEAP-1	DM	7kg LAr	SNO Area	funded	2007
DEAP/CLEAN	DM	1T LAr	Cube Hall or Cryopit	partial	2008
EXO-200 Gas	OnuBB	200kg Gas Xe	Ladder Labs	partial	2009
SuperCDMS	DM	25kg Ge	Ladder Labs	requested	2010?
HALO	Supernova nu	80T Pb	SNO Area	request in 07	2008
PUPS	Seismology		Several locations	funded	Running

Experiments that have not yet selected a site

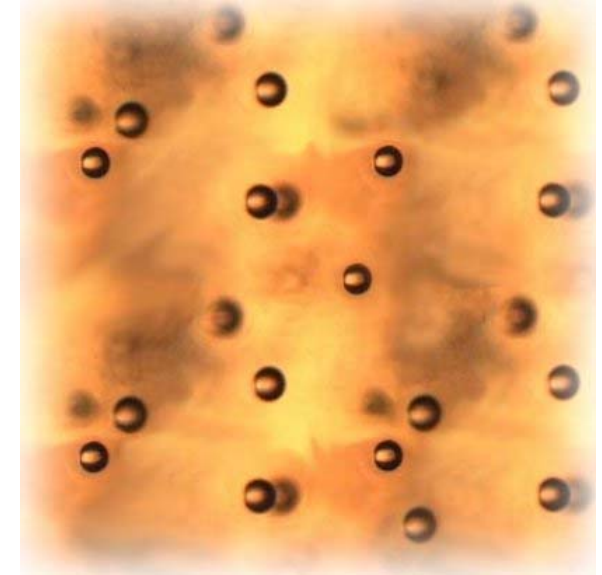
Majorana	OnuBB	120kg Ge	Ladder Labs	requested	2009
LUX	DM	200kg LXe	Cube Hall or Cryopit	requested	2009

Future experiments that have expressed interest in SNOLAB

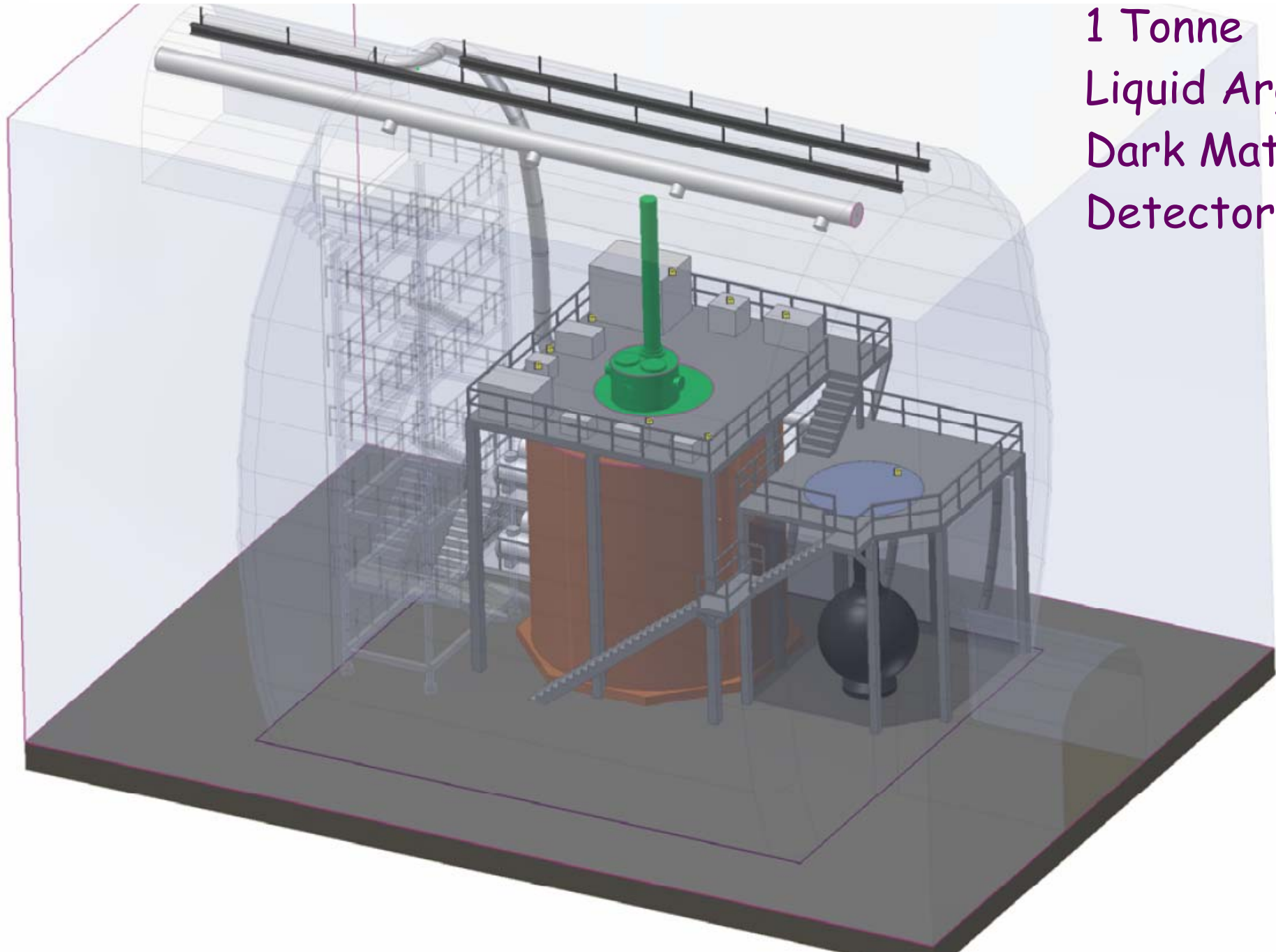
COUPP	DM	CF ₃ I BC			
COBRA	OnuBB	Cd, Te Crystals			

PICASSO (Dark Matter)

- Search for Spin Dependent Dark Matter Interactions using superheated droplets of freon in a gel matrix. International collaboration of Canada and US (SNOLAB Participation: Laurentian, Montreal, Queen's).
- **Phase IB, II:** Currently operational in the 60T tank area with 4 litre detector modules. Expand to 32 x 4 litre modules. Upgrade later to 8 x 30 litre modules. Assembly of detector modules may be done in the SNOLAB surface facility.
- **Phase IIB:** Upgrade to 32-64 x 30 litre modules in Ladder Labs
- **Phase III:** 100 kg deployment possibly in the Cube Hall.



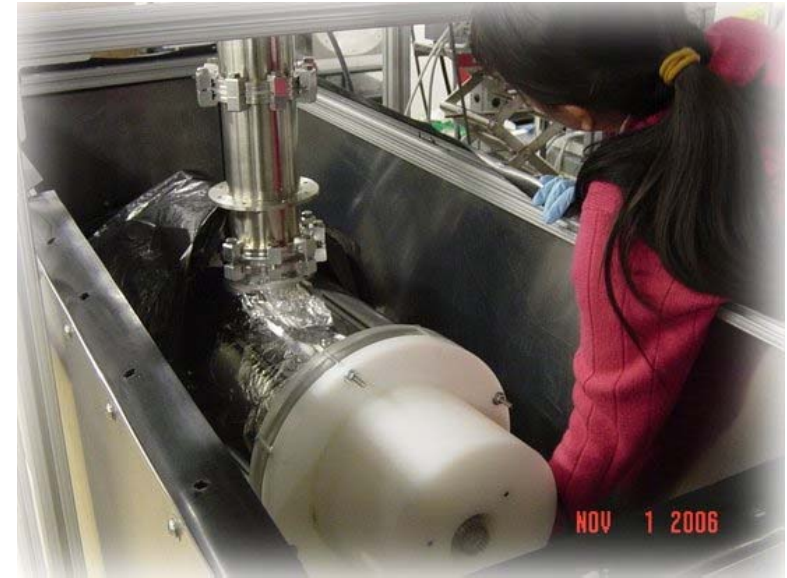
DEAP/CLEAN



1 Tonne
Liquid Argon
Dark Matter
Detector

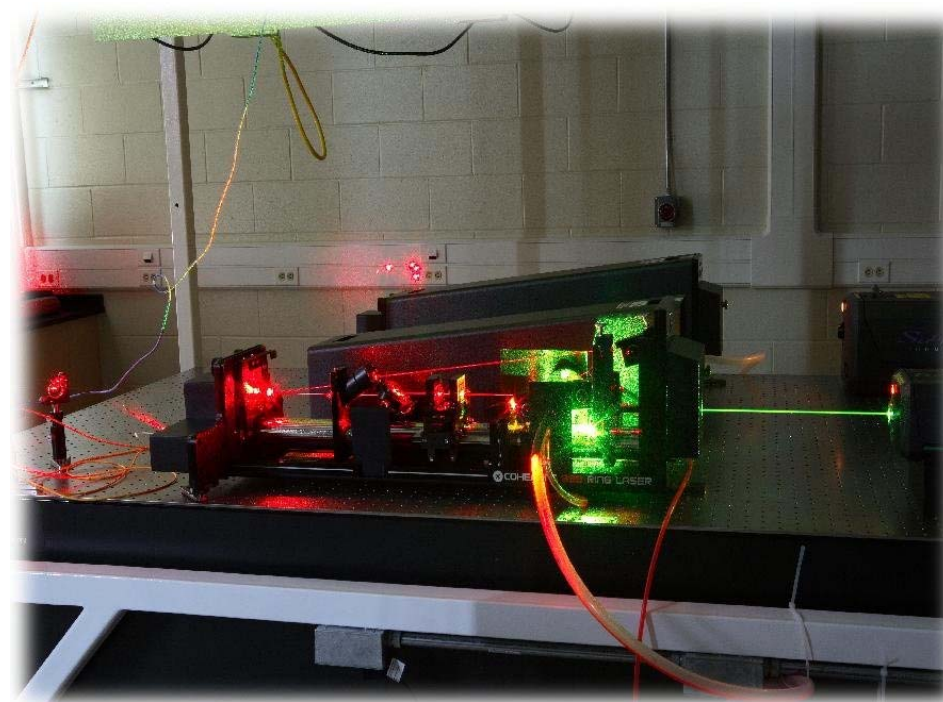
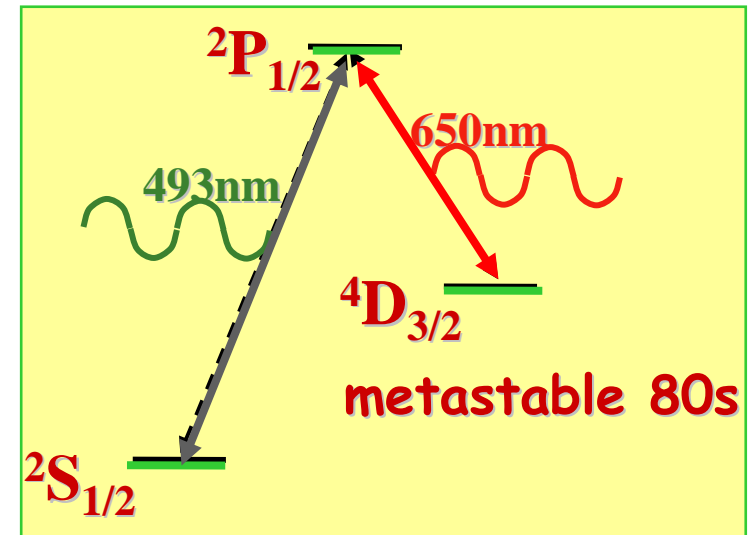
DEAP (Dark Matter)

- Search for Dark Matter by looking for interactions of WIMPS (Weakly Interacting Massive Particles) with Liquid Argon. Can distinguish WIMP signal from backgrounds by the scintillation light signal.
- Collaboration consists of Canadian and US institutions with ~40 physicists (SNOLAB Participation by Carleton, Queen's, Site).
- **DEAP-1**
 - Setting up for research and development activities in the SNOLAB surface facility.
 - 7kg detector currently taking data at Queen's University.
 - To be deployed in the old SNO control room in August.
- **DEAP/CLEAN**
 - a 1 Tonne fiducial volume detector to be deployed in the Cube Hall beginning in 2008 or 2009.



EXO (Double Beta Decay)

- Search for neutrinoless double beta decay in Xenon (^{136}Xe). Greatly reduce backgrounds by looking for the daughter nucleus ^{136}Ba using laser fluorescence tagging. US and Canadian Collaboration (SNOLAB Participation by Carleton and Laurentian).
- Research on the laser tagging presently being carried out in the SNOLAB surface facility.
- Two detector concepts are being considered:
 - Cryogenic liquid detector (to be deployed at WIPP in the US).
 - A gaseous detector to be deployed in the SNOLAB Ladder Labs.



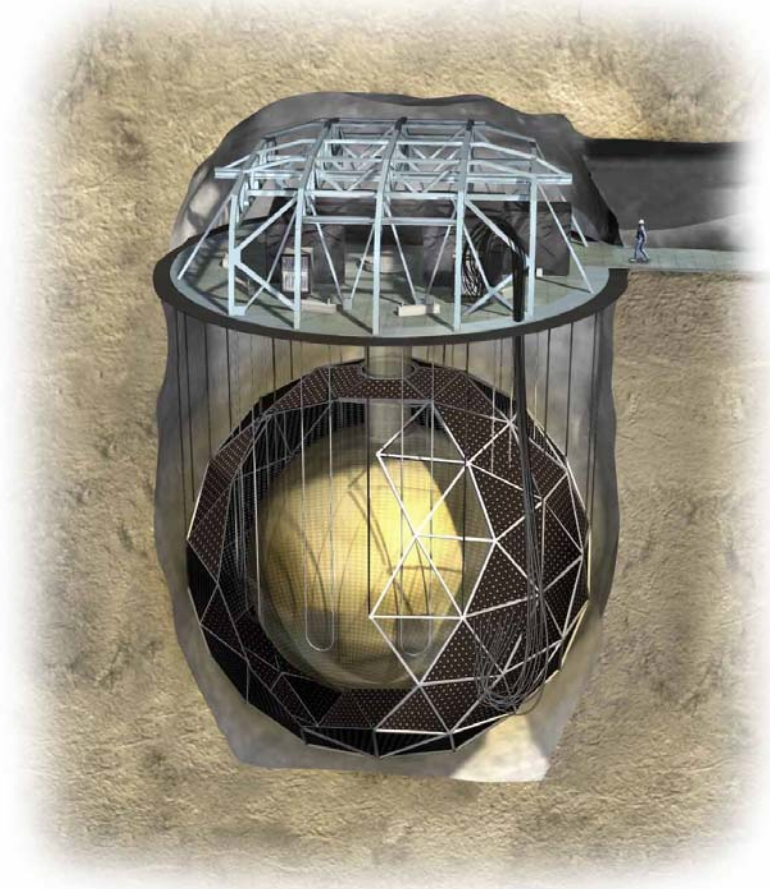
SNO+ (solar ν , $0\nu\beta\beta$, geo ν)



- Solar Neutrinos, Neutrinoless Double Beta Decay, Geo-neutrinos, Supernova Neutrinos and Reactor Neutrinos.
 - Reuse the SNO detector replacing the D_2O with liquid scintillator.

Collaboration 36 Faculty, RAs, students, Canada, USA, Portugal, UK, Germany (SNOLAB participation by Carleton, Laurentian, Queen's, Site).

- Partial funding in place to be used for
 - Design of AV hold down and process systems. Prepare the detector for conversion to scintillator operations
- Research and development of scintillator purification and neodymium purification in SNOLAB surface facility fall 2007.
- Conversion of AV and SNO Cavity spring/summer 2008. Fill with scintillator in 2009.

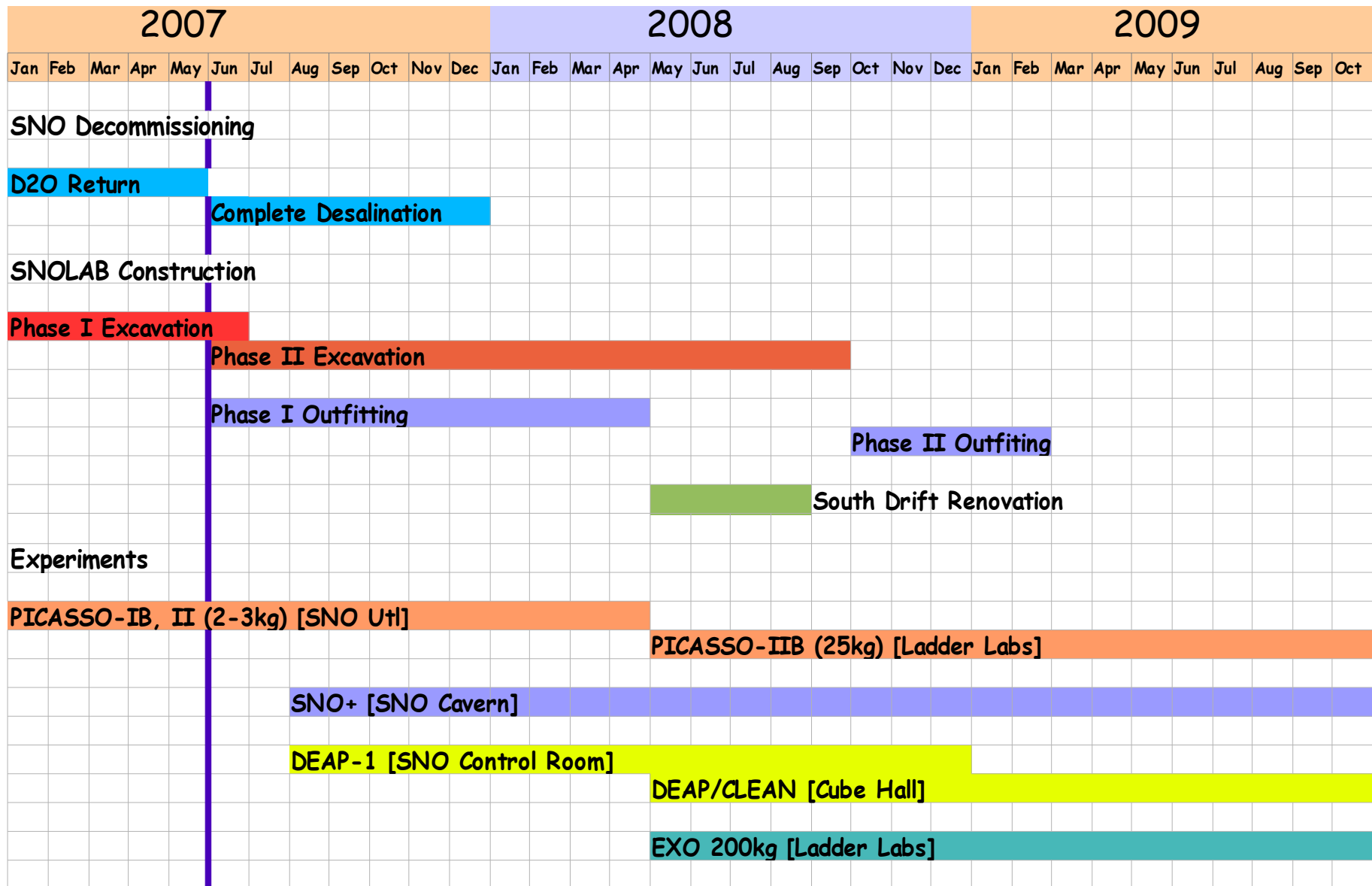


Outfitting

- C2 Outfitting Contractor, Comstock
 - Mobilizing over the last few weeks
 - Full activities have begun.
 - Proceeds in parallel with the Phase II excavation.
 - Completion of Phase I end of March 2008
 - Return for Phase II Outfitting after excavation complete
 - Cryopit
 - New Chillers
- SNOLAB
 - Cleaning, painting, cabling, chilled water systems over hall, renovating old SNO Personnel Drift.



Schedule



- Phase I excavation (Ladder Labs, Cube Hall) almost complete.
- Phase I outfitting beginning.
- Optimistic for Phase II funding and beginning excavation with bridging funds.
- **This Summer:** Arrival of DEAP-1 and ramp up of R&D at site (EXO, SNO+, DEAP, PICASSO).
- **This Fall:** begin conversion of SNO infrastructure to SNO+.
- **Spring 2008:** SNOLAB Phase I ready for occupancy. Relocate personnel facilities to new laboratory entrance. Conversion of existing SNO personnel space to laboratory space. Begin construction activities for incoming experiments in Ladder Labs and Cube Hall.
- **Mid 2009:** SNOLAB Phase II ready for occupancy.

SNOLAB 2007 Workshop

[Workshop Home](#) [Motivation](#) [Programme](#) [Participants](#) [Committees](#) [Travel](#)

[Register for workshop](#) [Register for an underground tour](#)

AUGUST 21-23, 2007

Welcome to the SNOLAB2007 Website

We look forward to welcoming many scientists to discuss the opportunities for underground science at SNOLAB. Please find detailed information in the links above and an online registration form. These pages will expand as we approach August and plans are made final.

Tuesday, August 21: One or two tours depending on demand.

Wednesday, August 22: Workshop and dinner.

Thursday, August 23: Workshop.

