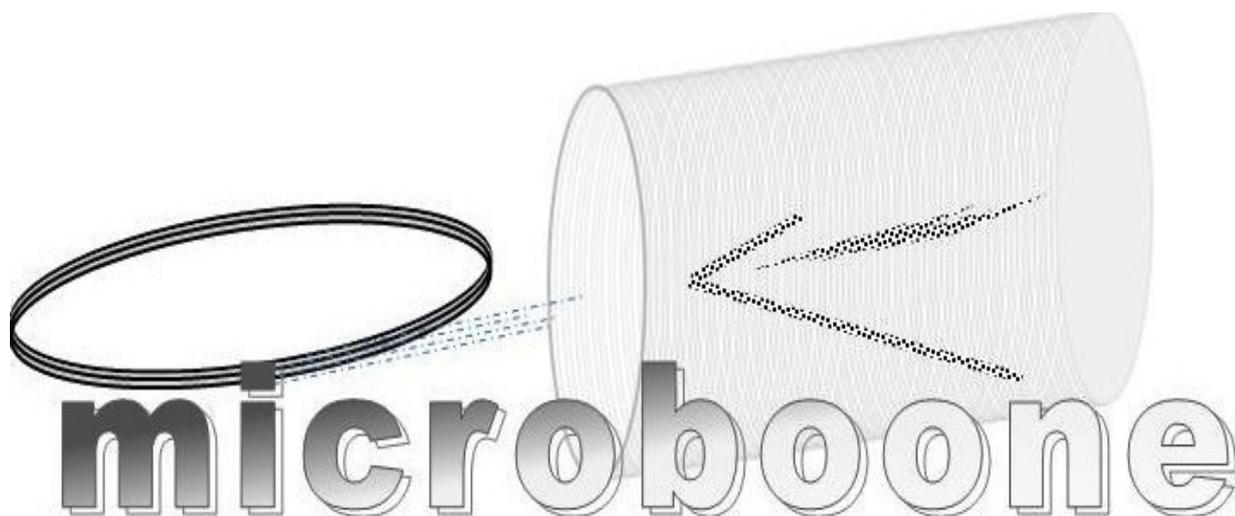


MicroBooNE status



Sowjanya Gollapinni
Kansas State University
(On behalf of the MicroBooNE collaboration)

Fermilab All Experimenters' meeting
Nov. 11, 2013

Outline

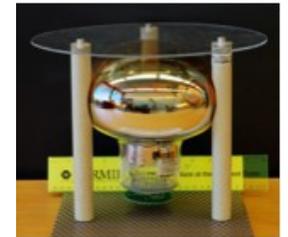
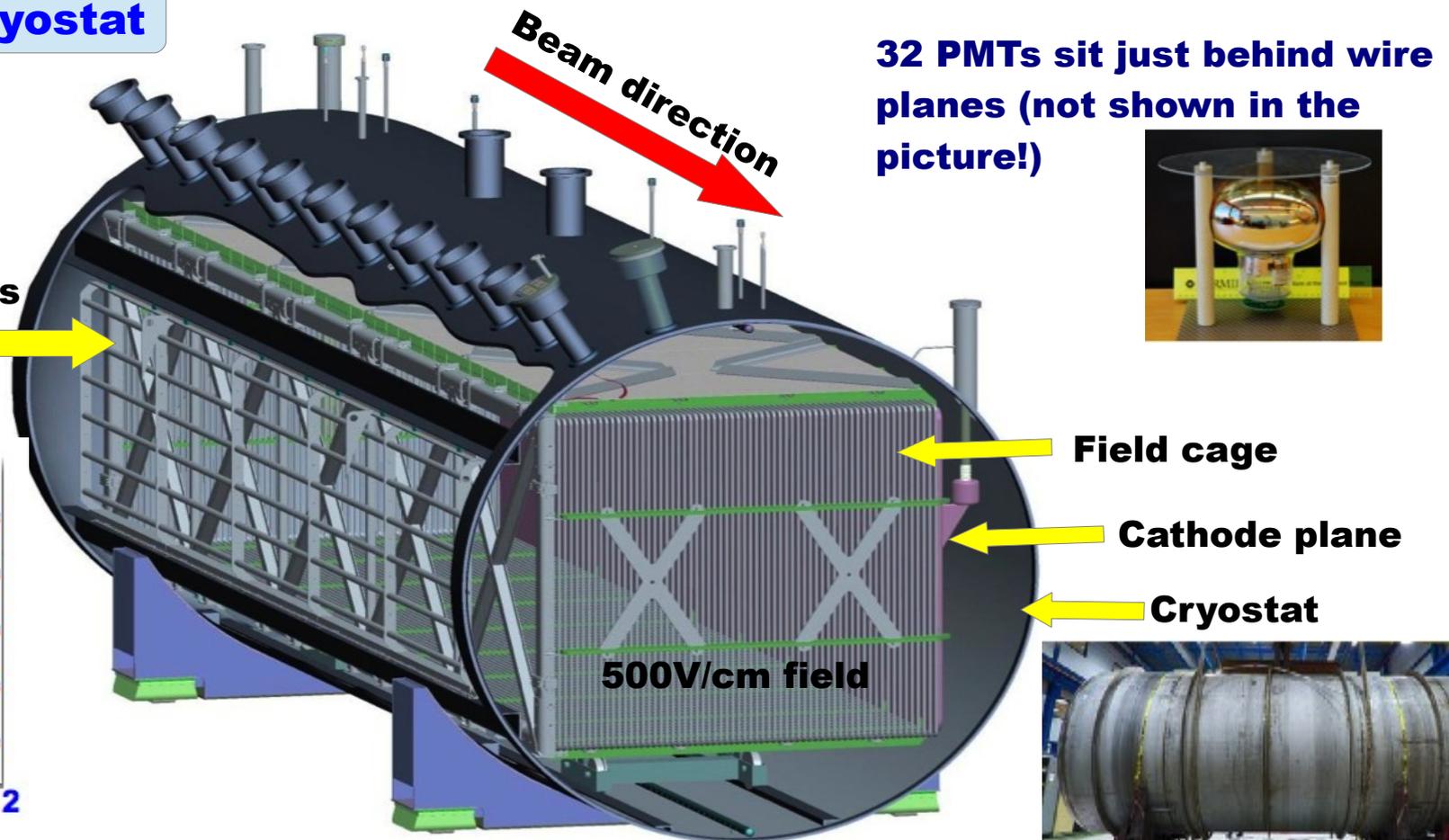
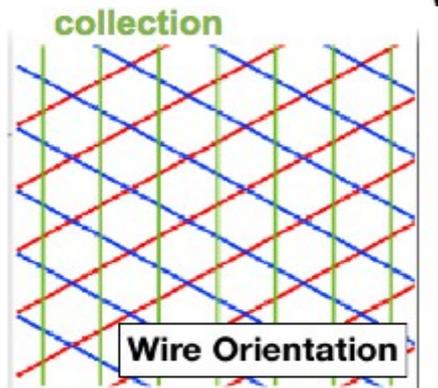
- MicroBooNE experiment (at a glance)
- Assembly activity at two places
 - Cryogenics at LArTF
 - TPC assembly at D0 assembly building (DAB)
- Monitoring system
- What's next?

MicroBooNE (at a glance)

- Will be the largest Liquid Argon Time Projection Chamber (LArTPC) in America to study neutrino interactions (170 tons LAr; ~87 tons active volume)
- **TPC dimensions:**
Height = 2.3 m; Width = 2.56 m (drift direction); Length = 10.37m (beam direction)
- HV (-128kV) on the cathode drifts electrons towards the anode wires

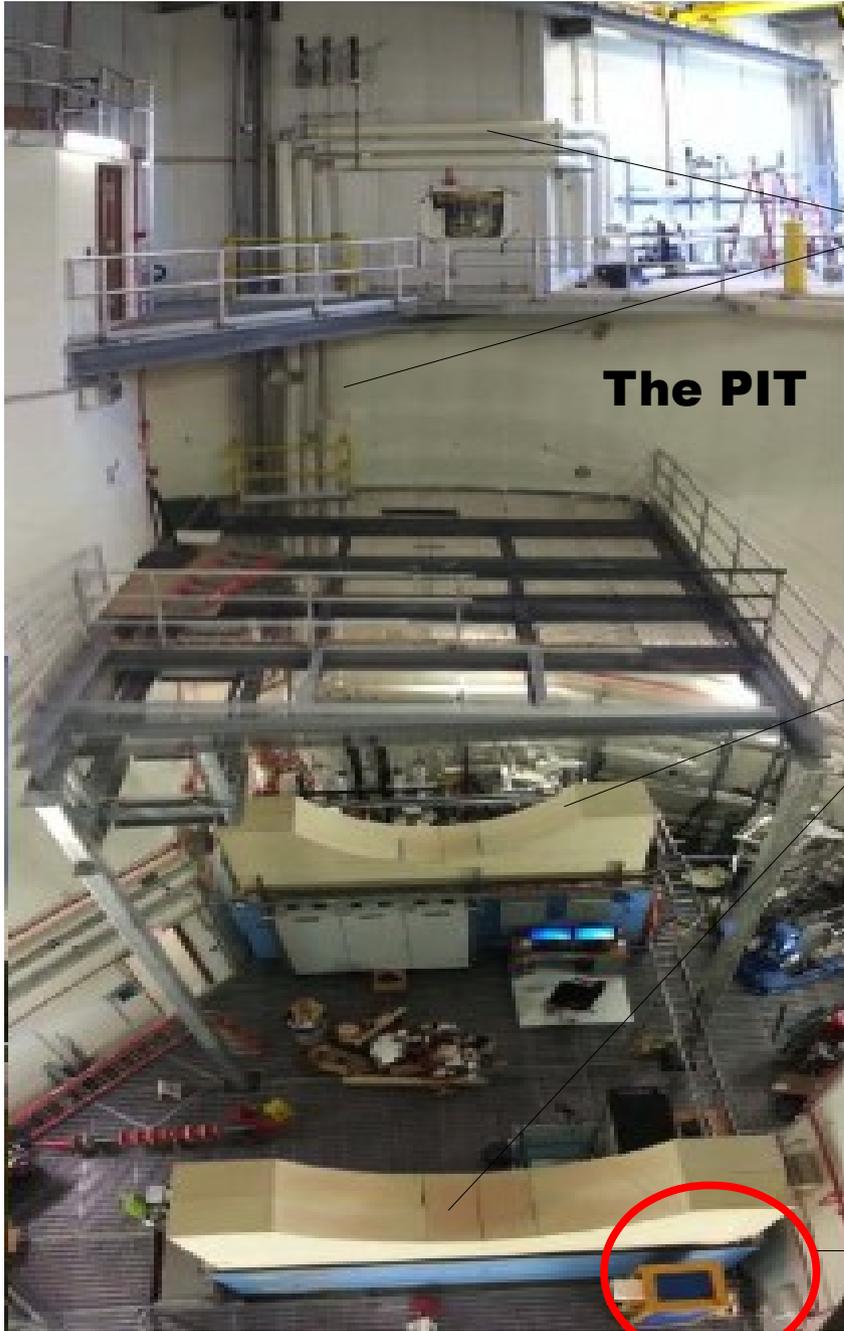
TPC in the Cryostat

8256 Anode wires
3mm pitch
3 orientations



Activity at LArTF

**Tremendous amount of work
towards cryogenics installation**



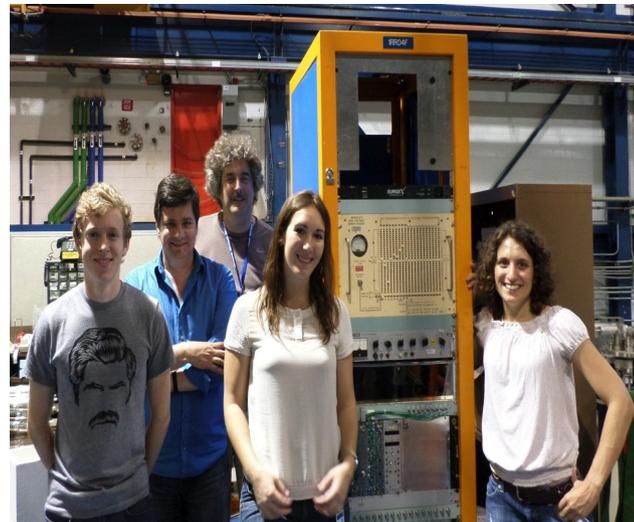
The PIT

**Cryogenic piping
leading into the
experimental
cavern done!**

**Foam Saddles
await the arrival
of the cryostat**



**LAr and LN2 dewars
sitting outside LArTF**



**NMSU cosmic ray
test stand**

**Already taking
cosmic data at
LArTF!**

Cryogenics installation

- Final step of Foaming and insulation of all pipes done
- All pressure and leak tests finished
- Purging pipes with Ar gas to push out the air is underway

More details in the previous AEM talk

The Cryogenics installation Team



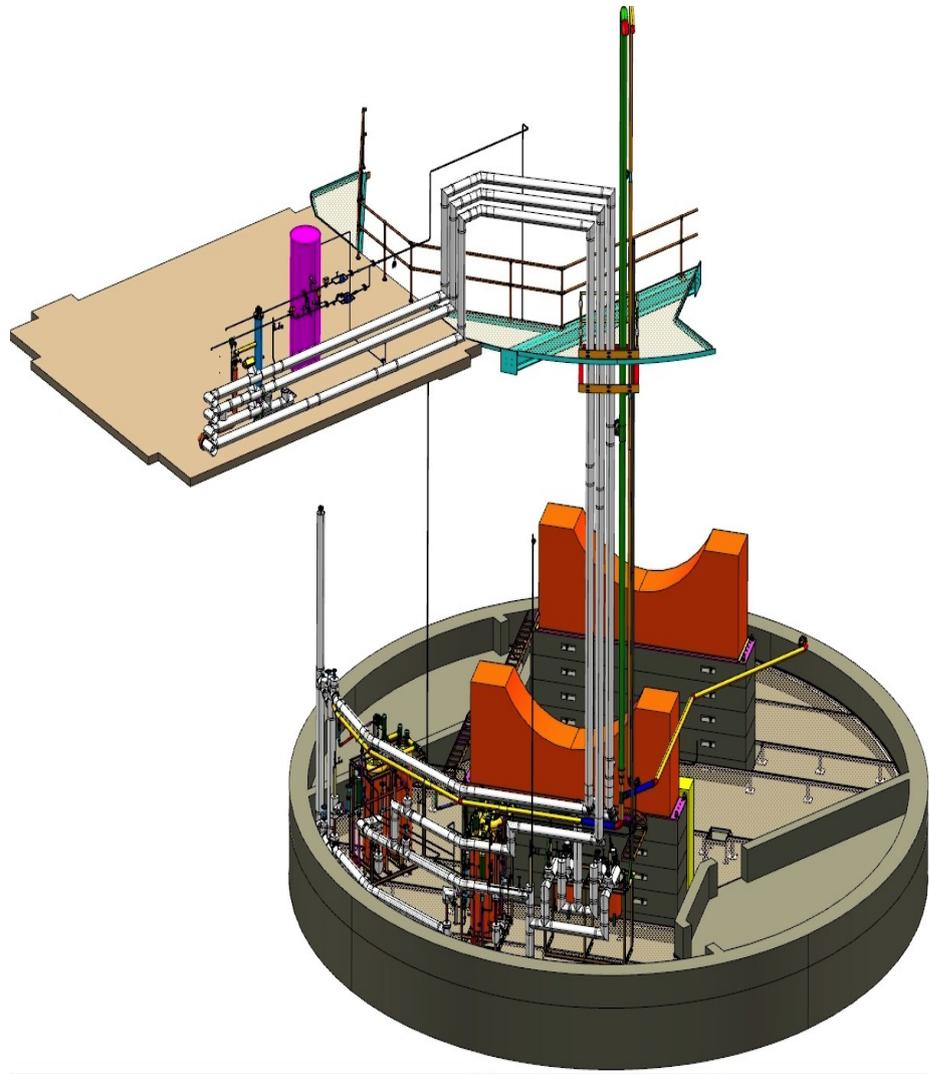
Purity Monitor
arrived at
LArTF

A pressure test
underway!

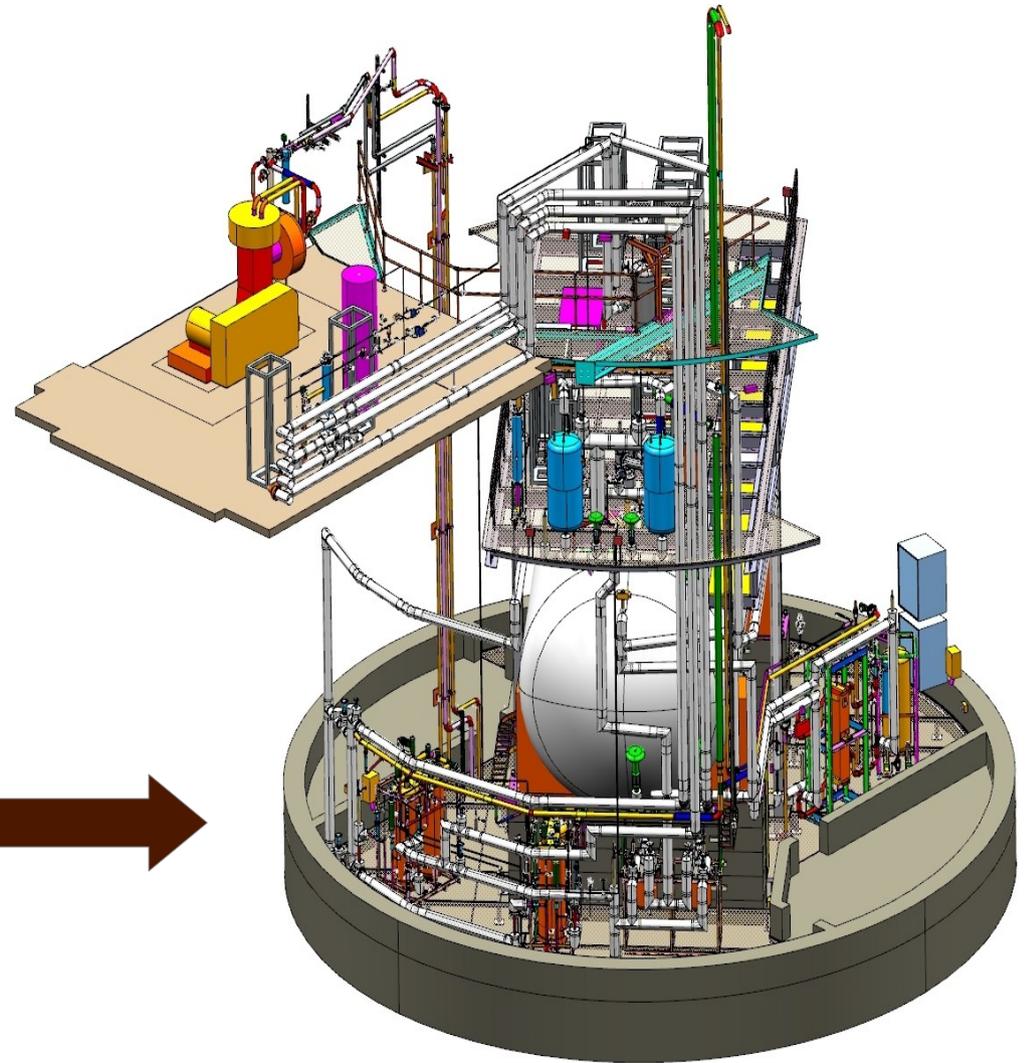
Foamed insulated
pipes

Thanks to all Fermilab technicians!

Cryogenics is a complicated system...

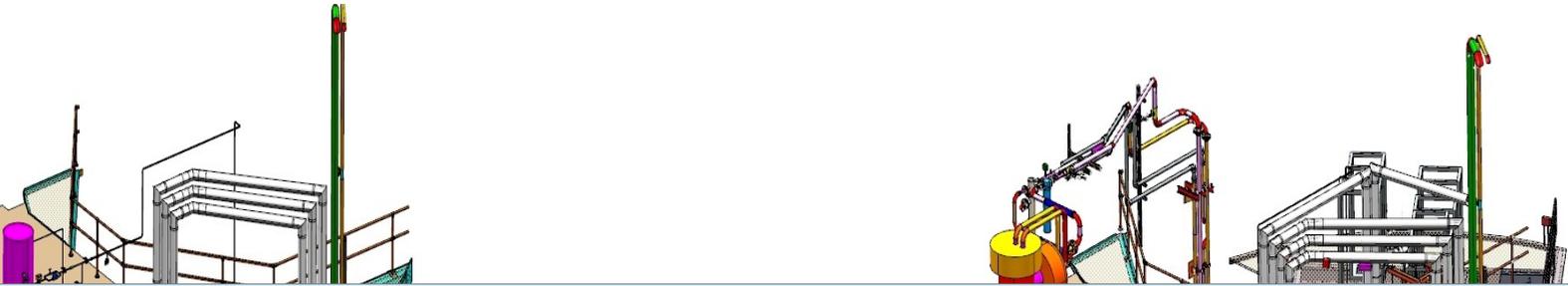


This is done

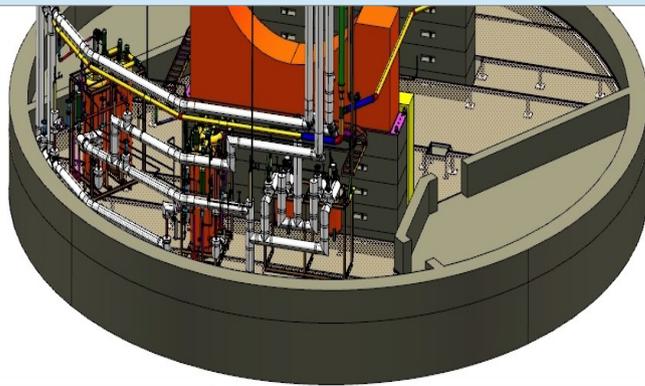


This needs to be done⁶

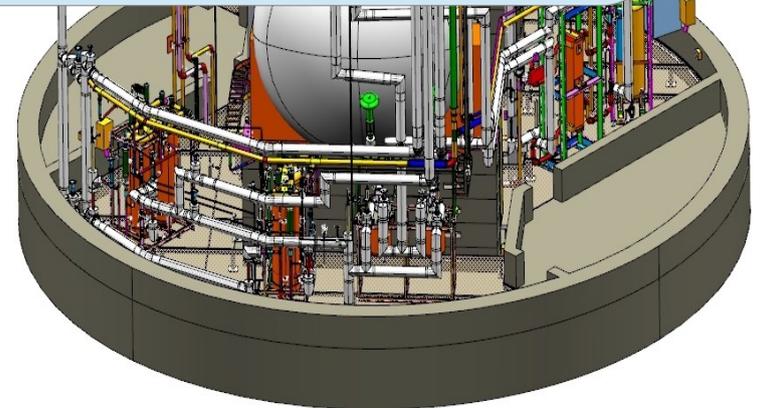
Cryogenics is a complicated system...



And, we have finished **Phase-I cryogenics Installation at LArTF**, which allows us to do a test run of the system without the cryostat



This is done



Needs to be done

Meanwhile at DAB....

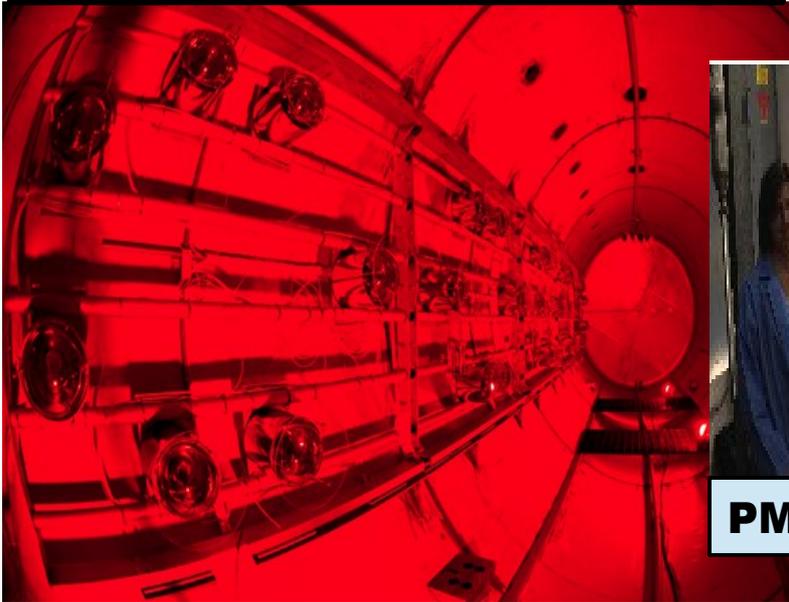


**After a successful
test fit of the TPC
into the cryostat...**

**Wire installation
and other things
kick-started!!**

Cryostat and TPC (at DAB)

PMTs are the first subsystem installed in the cryostat



Lot of work done and lots more going on!!

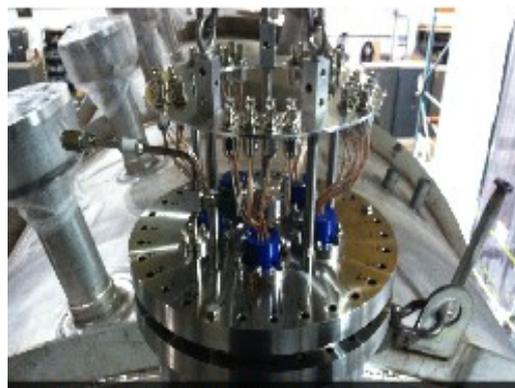
All wires in place!



PMT installation crew



plates will be coated with TPB (wave-length shifting) just prior to TPC insertion



PMT flange and cables installed on the Cryostat

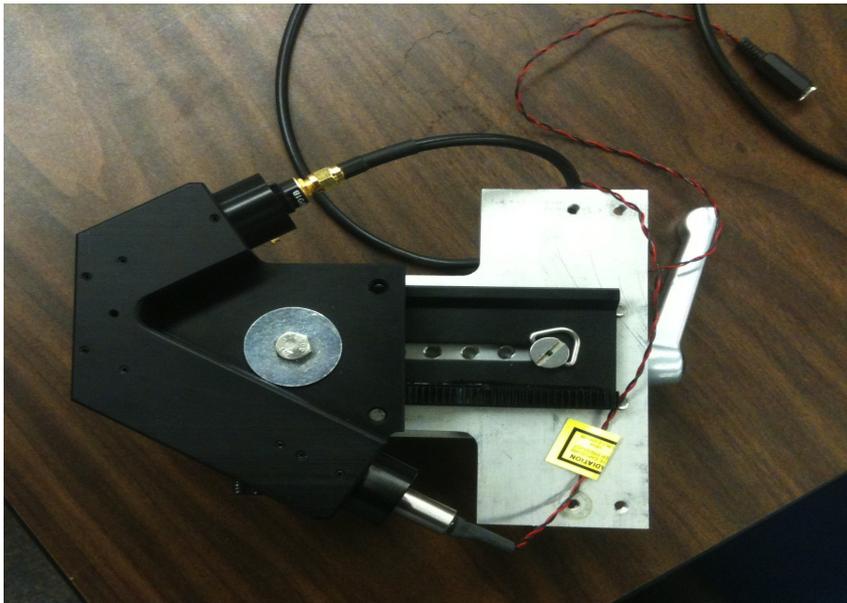


Wire installation crew

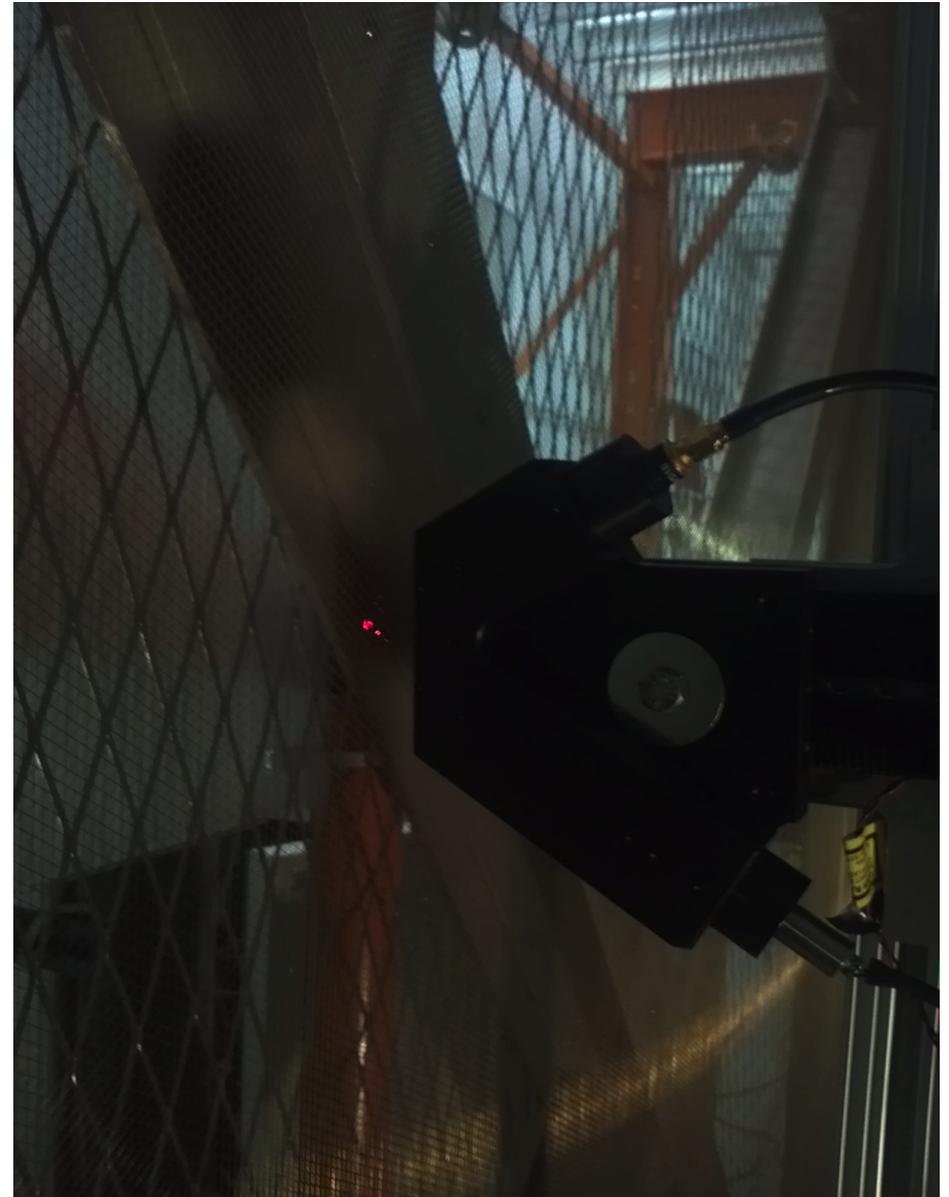
Wire tension measurements in full swing...

Laser Tensometer – Wire tension device from UW, Madison

- Laser illuminates a wire, photo diode catches the reflection
- Frequency is readout when the wire vibrates and is then fed into a spectrum analyzer
- Very tedious work – single wire read out at a time and there are 8256 wires!



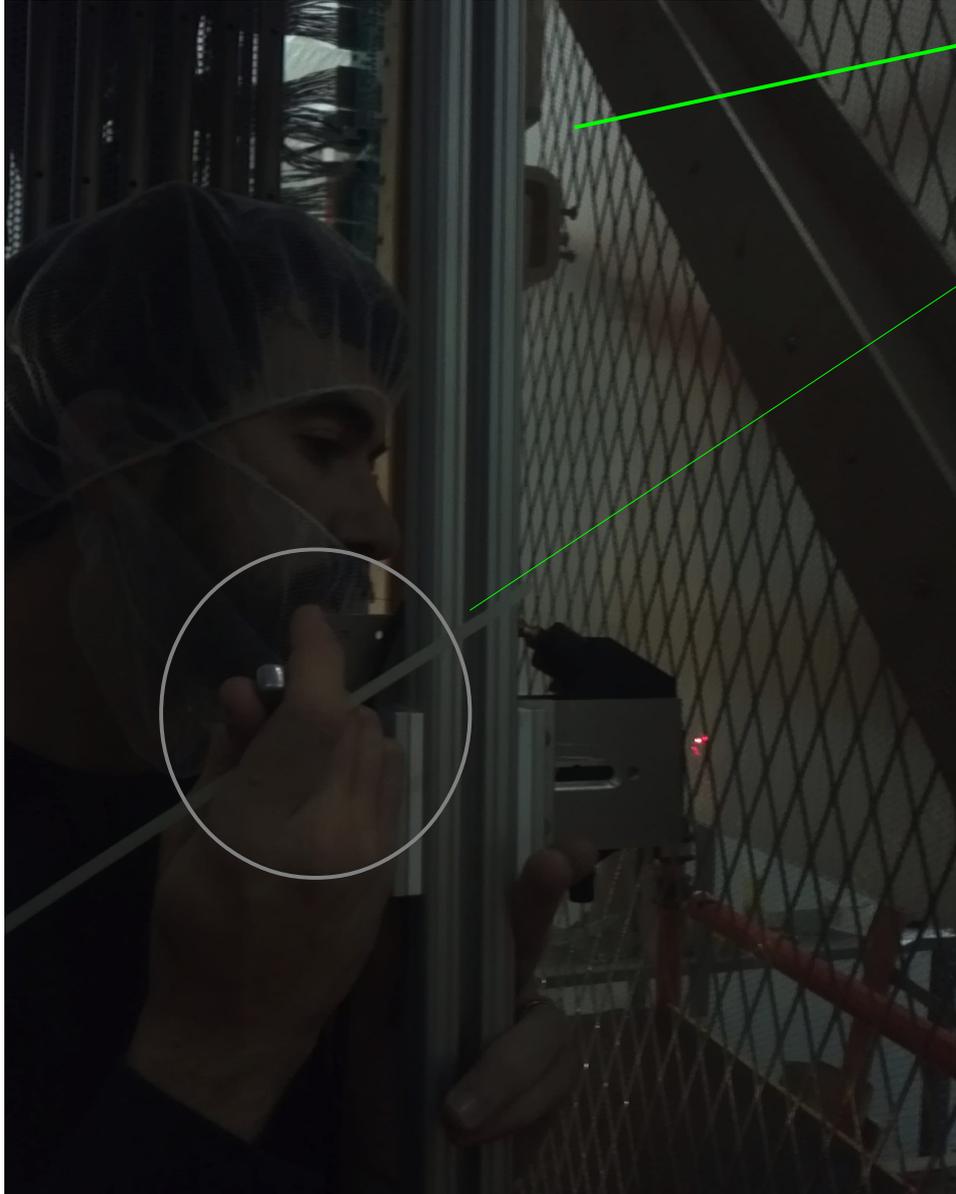
Tensometer mounted to sliding base with hand break



Closer view of the Tensometer focussed on to a wire

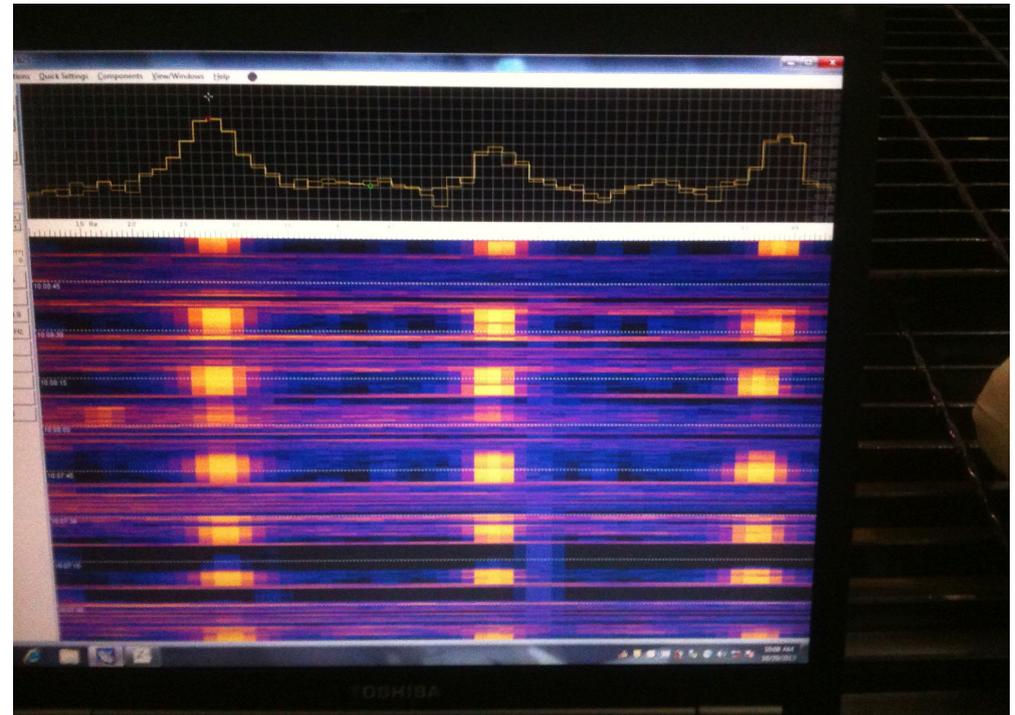
Tension measurements

Wire Tension measuring crew member adjusting the position of the Tensometer



Vertical rail to move the tensometer along the height of the detector

Hand-held break to adjust/lock the position of the tensometer



Spectrum analyzer showing uniform results on each of the wires

Tension measurements

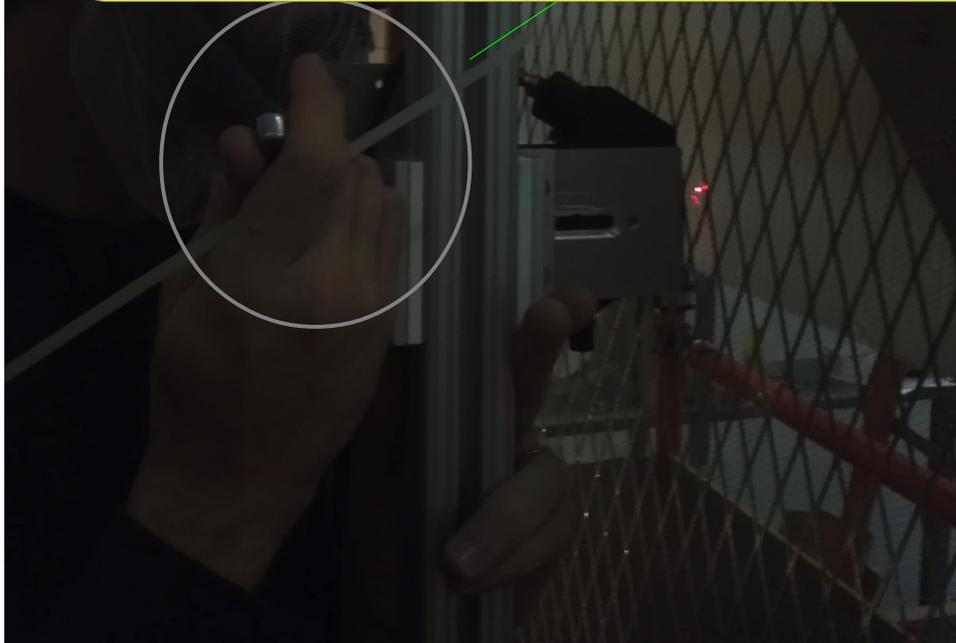
Wire Tension measuring crew member adjusting the position of the Tensometer



Vertical rail to move the tensometer along the height of the detector

Hand-held break to adjust/lock the position of the tensometer

**As of last week, wire tension measurements are all done!
A BIG thanks to the wire tension measurement crew for their great effort, and finishing this tedious job in just under 10 days!!**



Spectrum analyzer showing uniform results on each of the wires

Monitoring system very crucial for any experiment!



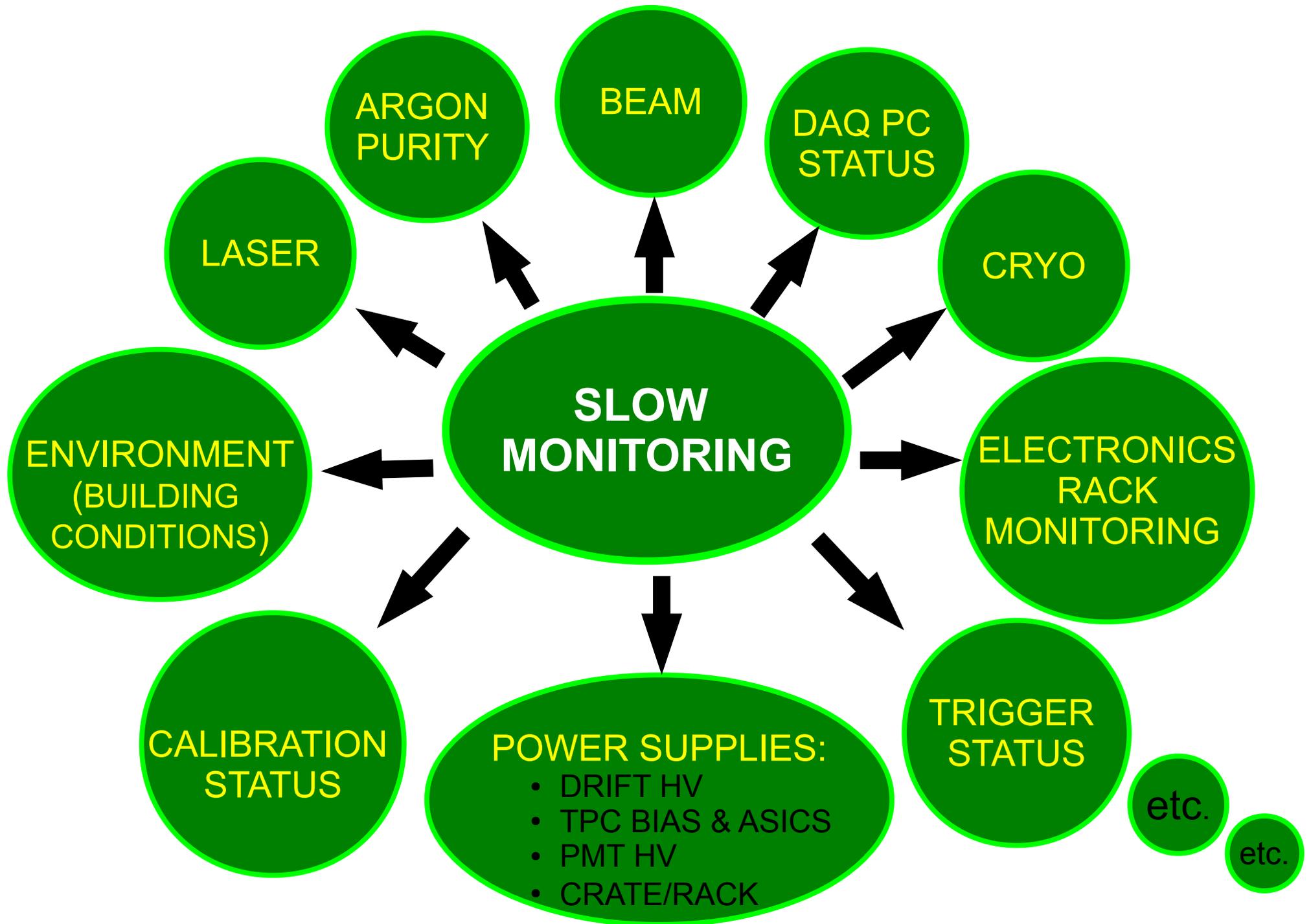
MicroBooNE will soon be sealed..

- Only “eye” that can see the inside of the detector is “monitoring”**
- Readiness of monitoring tools essential for successful operation and commissioning of the experiment**

MicroBooNE slow controls and monitoring is in pretty mature state

- Almost all of the subsystems can be controlled/monitored at this point!**

What is monitored? – (almost) everything!



Example display: LV power supply GUI

The screenshot shows a GUI for an LV power supply. At the top, there are two tabs: 'Wiener_RW.opi' and 'Wiener_MPOD_RW.opi'. The main interface is divided into two sections: 'Shifter level display' and 'Expert level display'. The 'Shifter level display' includes a 'Main Switch' (ON), 'Power Supply Status' (ON), and a 'mainOn(0)' button. Below this are four channels: CH 01 (+5 V), CH 02 (+12 V), CH 03 (+3.3), and CH 04 (-5 V). Each channel has a 'Channel Switch set' (ON), a 'Channel Status' (outputOn(0)), a 'Target Voltage (V)', a 'Measured Voltage', and a 'Measured Current'. The 'Expert level display' includes a warning box: 'Make sure the system is OFF before you change the paramters below!'. Below the warning are five rows of control parameters: 'Min. voltage (V)', 'Max. voltage (V)', 'OVP (V)', 'Max. current (A)', and 'Const. curr. mode (A)'. Each row has four input fields corresponding to the channels.

	CH 01 (+5 V)	CH 02 (+12 V)	CH 03 (+3.3)	CH 04 (-5 V)
Channel Switch set	ON	ON	ON	ON
Channel Status	outputOn(0)	outputOn(0)	outputOn(0)	outputOn(0)
Target Voltage (V)	4.760	11.700	3.130	4.760
Measured Voltage	4.760	11.740	3.130	4.750
Measured Current	0.000	0.140	0.120	0.030

Expert Control Parameters	CH 01 (+5 V)	CH 02 (+12 V)	CH 03 (+3.3)	CH 04 (-5 V)
Min. voltage (V)	4.750	11.700	3.130	4.750
Max. voltage (V)	5.250	12.600	3.470	5.250
OVP (V)	6.250	15.000	4.500	6.250
Max. current (A)	7.000	12.000	50.000	7.000
Const. curr. mode (A)	3.000	0.000	0.000	0.000

Shifter level display

Expert level display

What to expect over the next few weeks?

- Cryogenics

- Prepping for safety-approval for Phase I, will soon be able to commission the system!
- Phase II (operation of Cryogenics with Cryostat) elements are arriving at LArTF

- Cryostat & TPC

- Full read-out test of the PMTs installed in the cryostat will soon take place
- DAQ read-out tests to measure gain, cross-talk etc. is underway
- Finally TPC will be pushed into the cryostat, sealed up and ported to LArTF!

MicroBooNE will be ready for beam early next year!

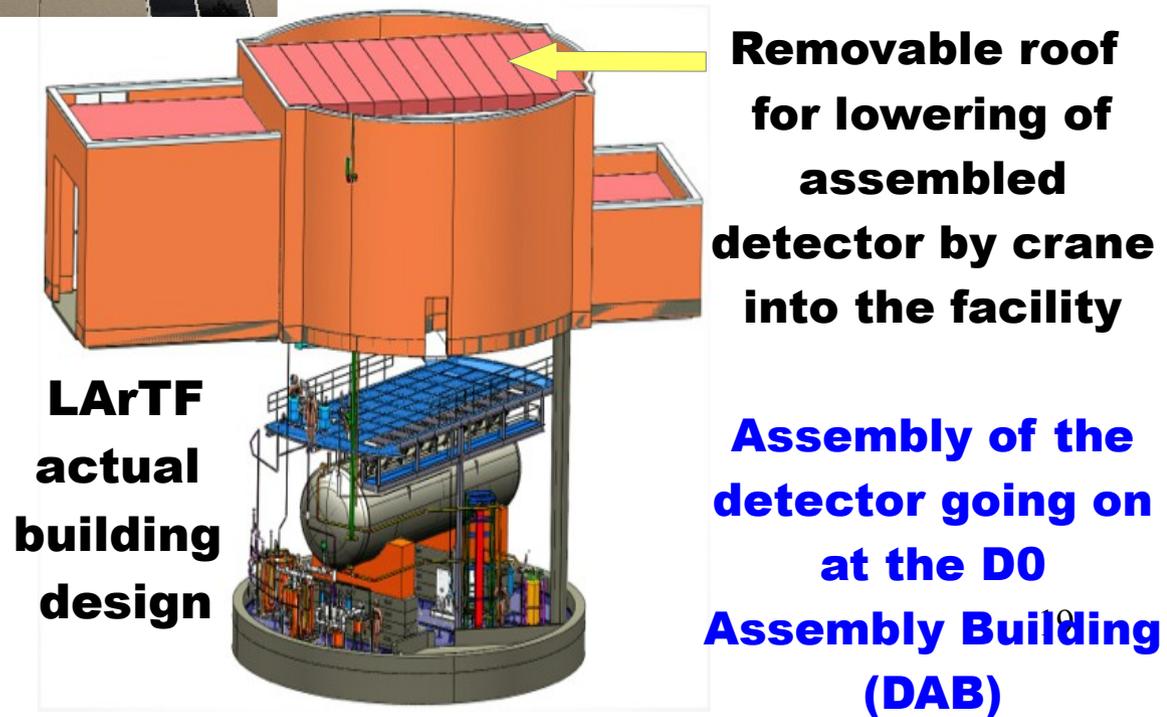
Everything coming together...stay tuned!



Thanks very much for your attention!

BACKUP

Liquid Argon Testing Facility (LArTF)



TPC current status

- **Cable tray installed** on the TPC to house and route the cold cables
- **TPC going through final scrutiny** – very minor modifications to TPC to remove any possible sharp edges



Cable tray (upstream view)

Cable tray with cold cables installed



New screws and rotated field cage tubes



Welded and smoothed joints on the cathode frame