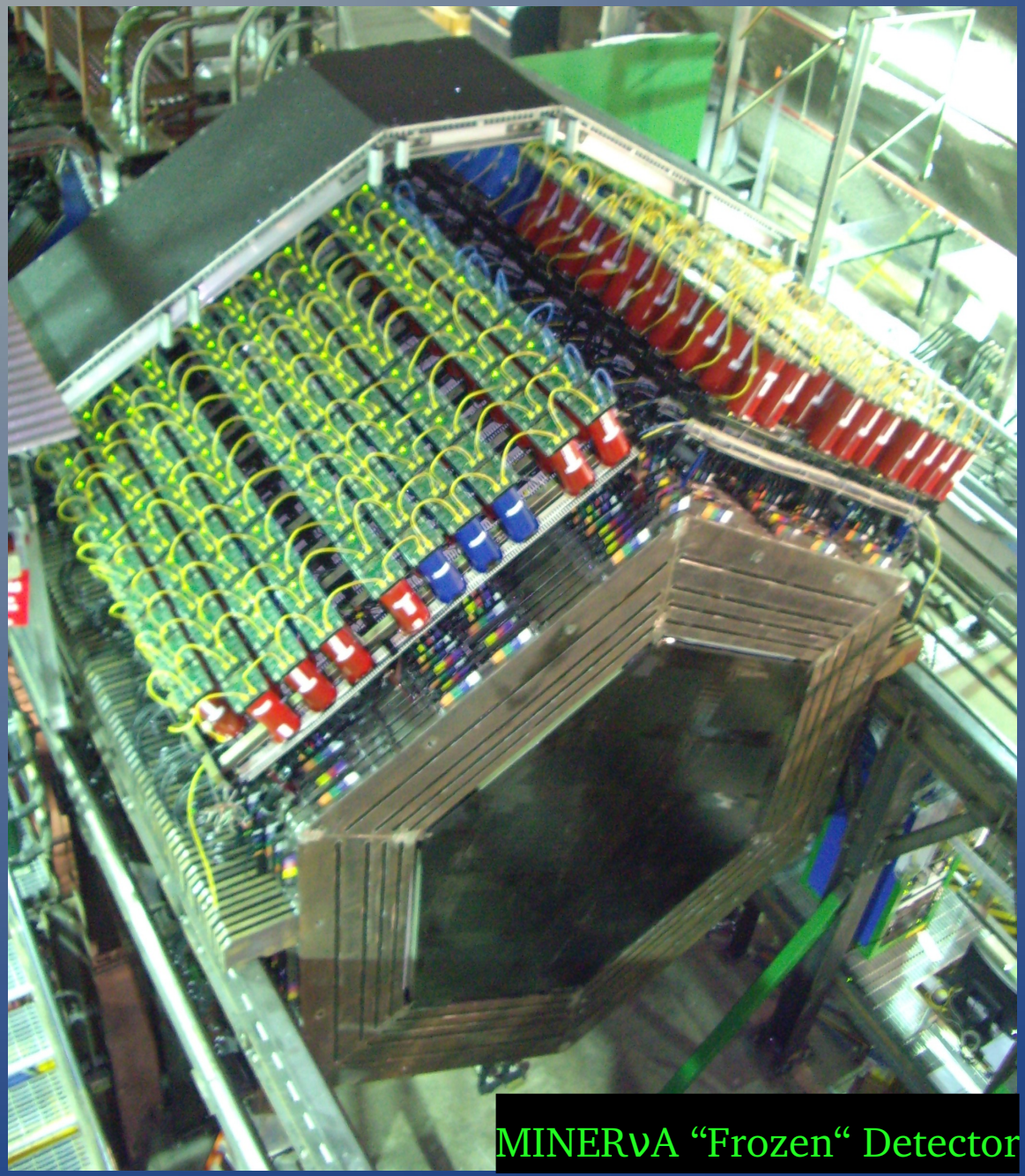


MINERνA "Frozen" Detector

MINERνA: Antineutrino run and Neutrino analysis

A new Triple Point!

César Castromonte

CBPF – Brazil

On behalf of MINERνA Collaboration

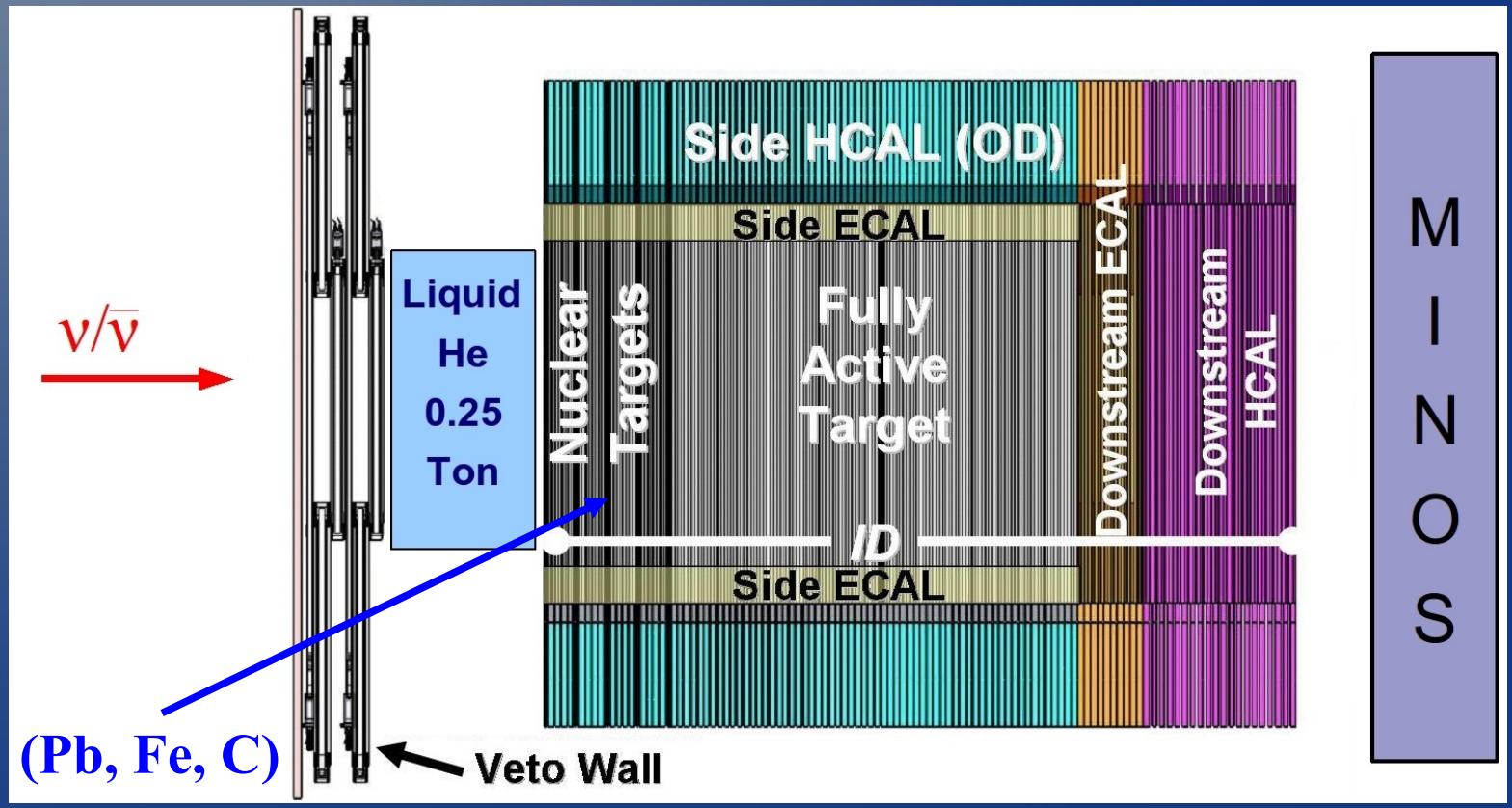
All Experimenter's Meeting, January 25, 2010

MINERvA Overview

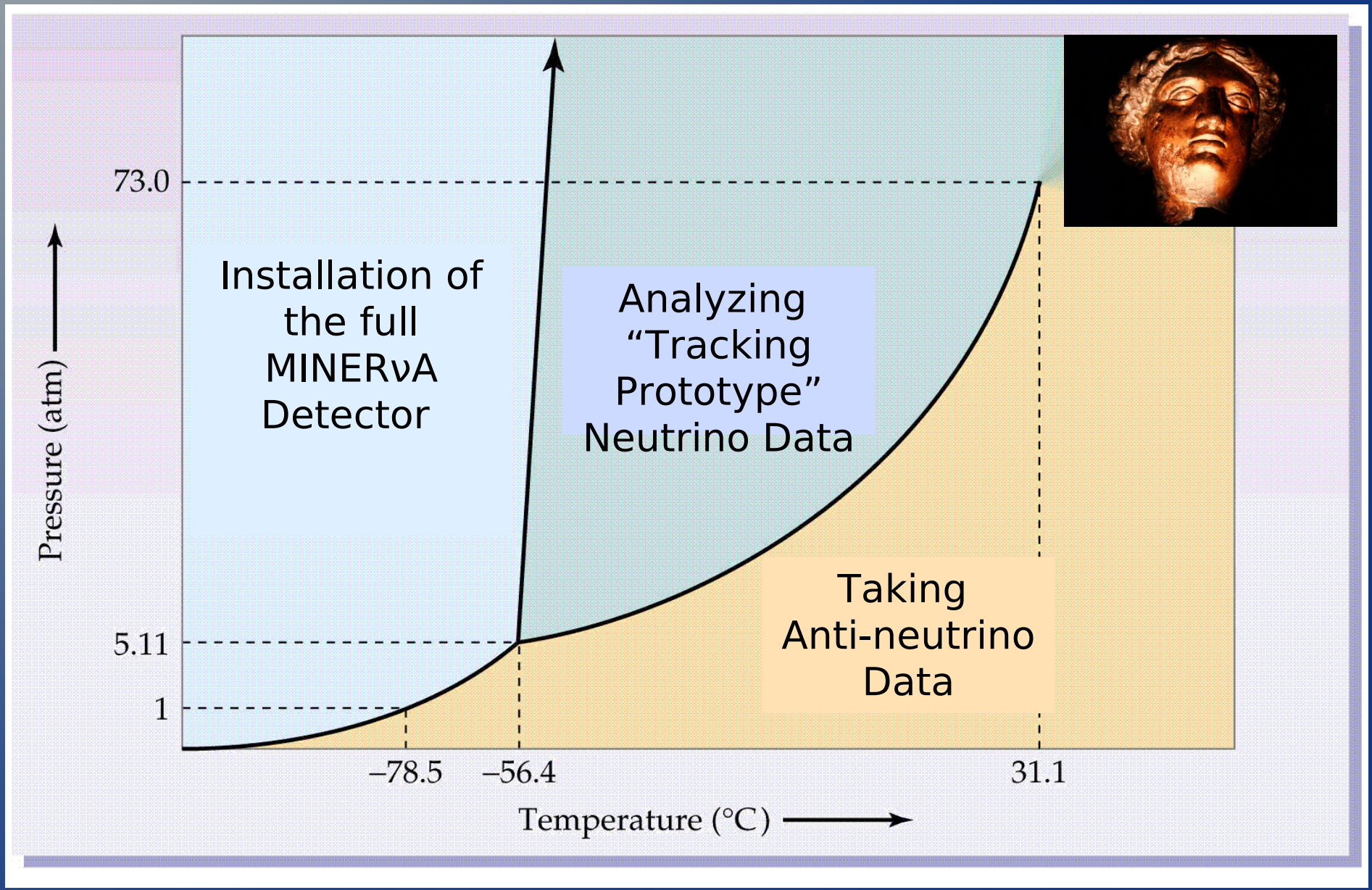
- MINERvA: A high precision neutrino-nucleus scattering experiment.
- 116 stacked modules detector. Finely segmented, fully active scintillator target region surrounded by ECAL and HCAL.

High intensity NuMI Beam @ FNAL.

Various nuclear targets.



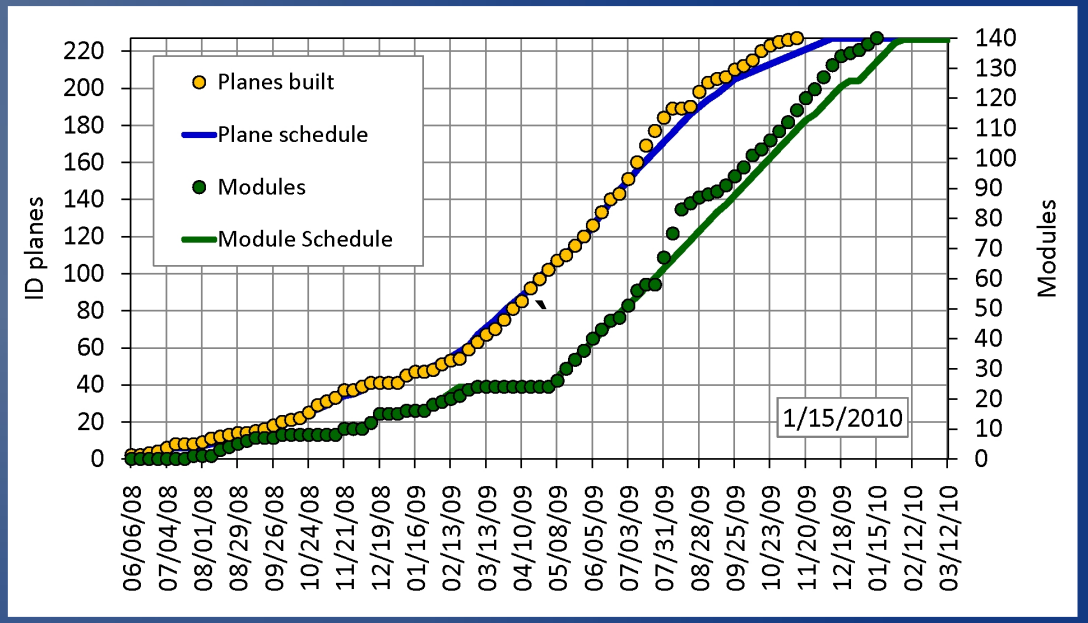
The current MINERνA "Phase Diagram"



Final Installation of the MINERvA Detector

Construction Status

- Scintillator Planes: Done.
- Assembled modules:
  - All tracker modules done.
  - All nuclear targets done
  - Spare outer detector frames with scintillator: late january.
- Outer Detector Towers:
  - All towers done.
- Clear Fiber Cables:
  - Deployed cable needs: done
  - Most spare cables: done
- Helium target scheduled to arrive by fall 2010.



Installation

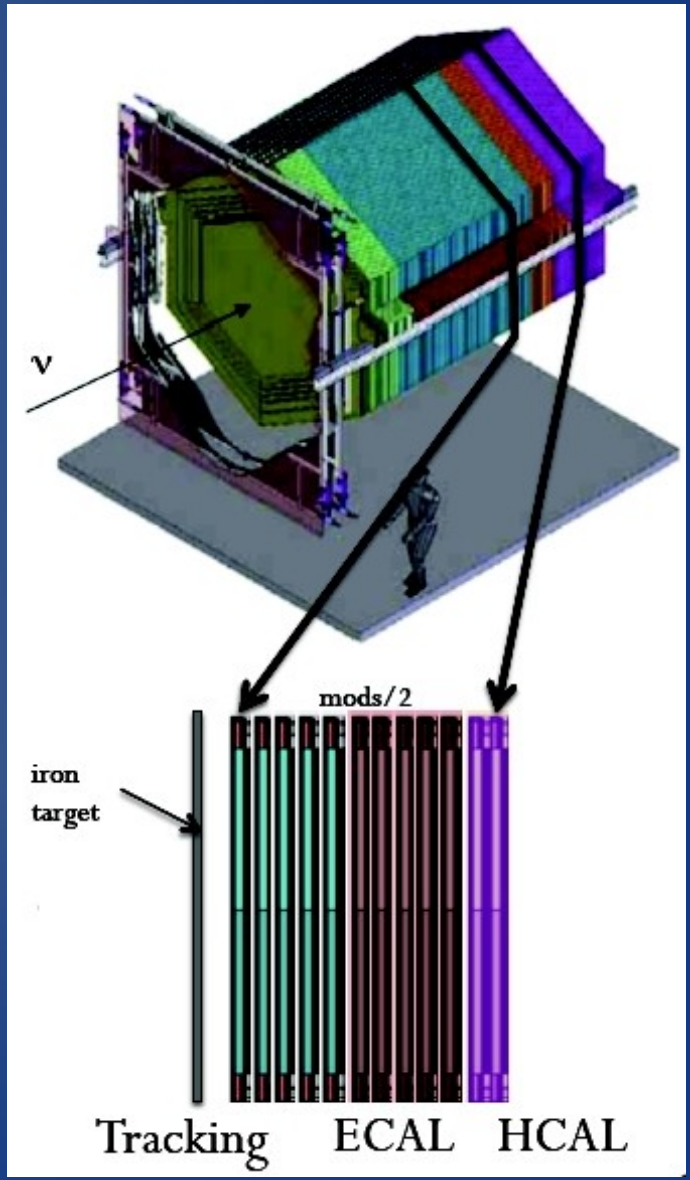
People working hard in order to meet the schedule.

- Final installation phase started on January 4, 2010.
- Scheduled to be finished by early March 2010.
- A new Linux DAQ system is being comissioned and will be used for new detector check-out.
- We intend to keep collecting beam data with the old DAQ system while the installation proceeds over the next ~7 weeks.

Tracking Prototype Data Analysis

Tracking Prototype Neutrino Run

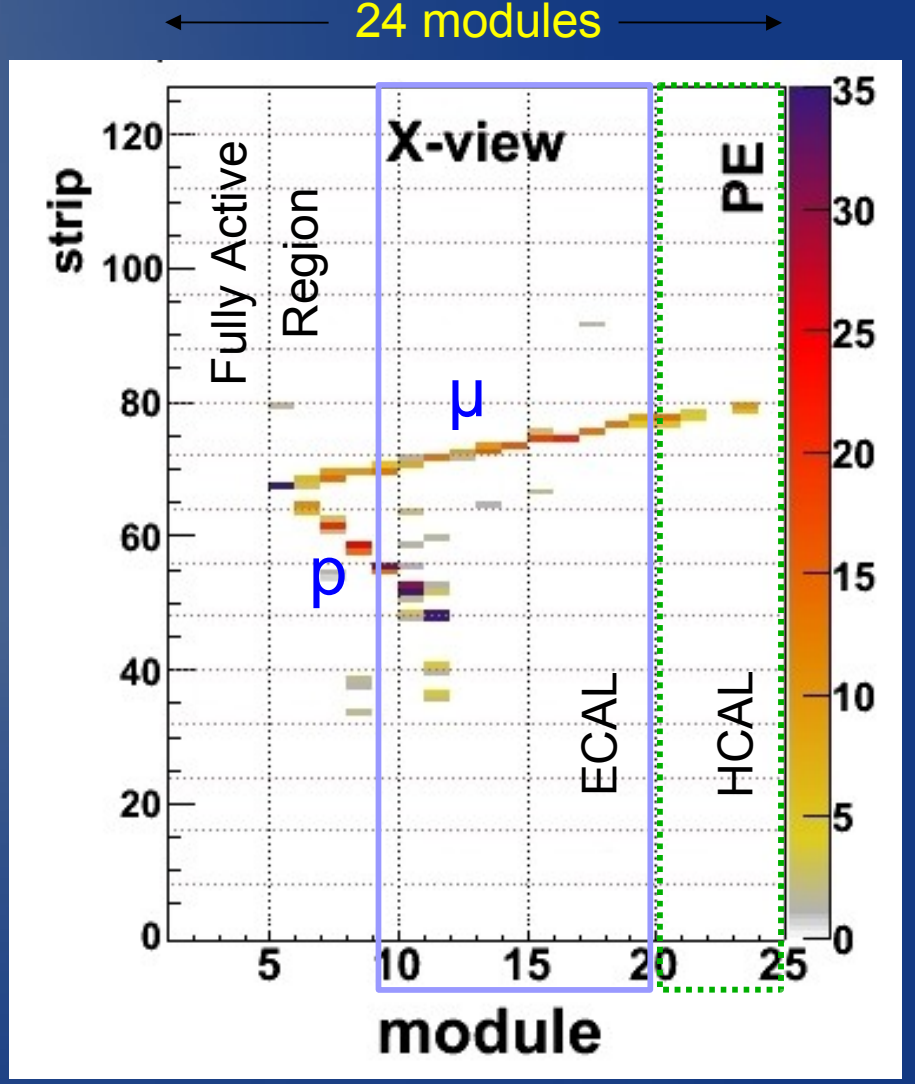
- TP: 24 modules installed (~20% of full detector) for a prototype run.
- Allow us testing the detector design and performance.
- Took ~4 x 10^{19} POT between April 15 – June 15.
- About 20k events, a lot of physics to be done (and publishable!).
- Thesis:
  - One Ms. Thesis complete (construction and installation).
  - Several Ph.D. Thesis under development.



"TP" Analysis

- TP data has been analyzed for past several months.
  - Develop calibrations techniques and software implementations.
  - Track reconstruction and neutrino event selection.
  - A large coordinated effort to scan "by eye" the neutrino candidates in tracking volume was performed.
- Real data event: quasi-elastic candidate.

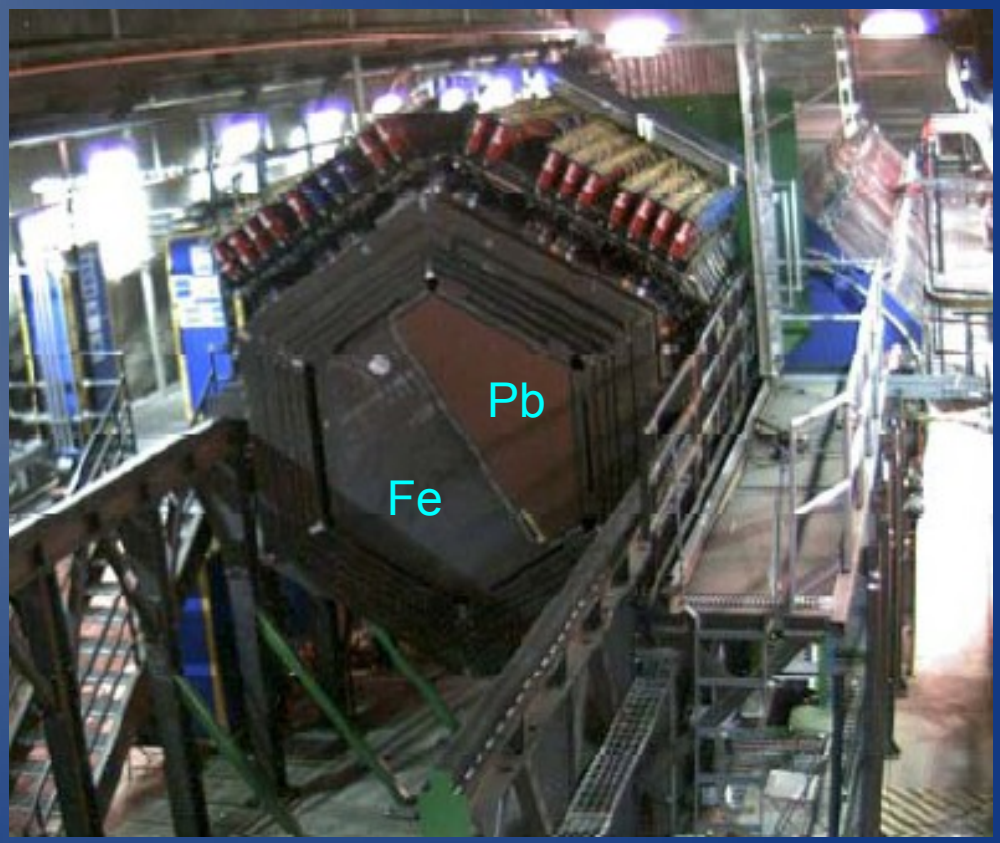
$$\nu_\mu + n \rightarrow \mu + p$$



Current Anti-neutrino Data Collection

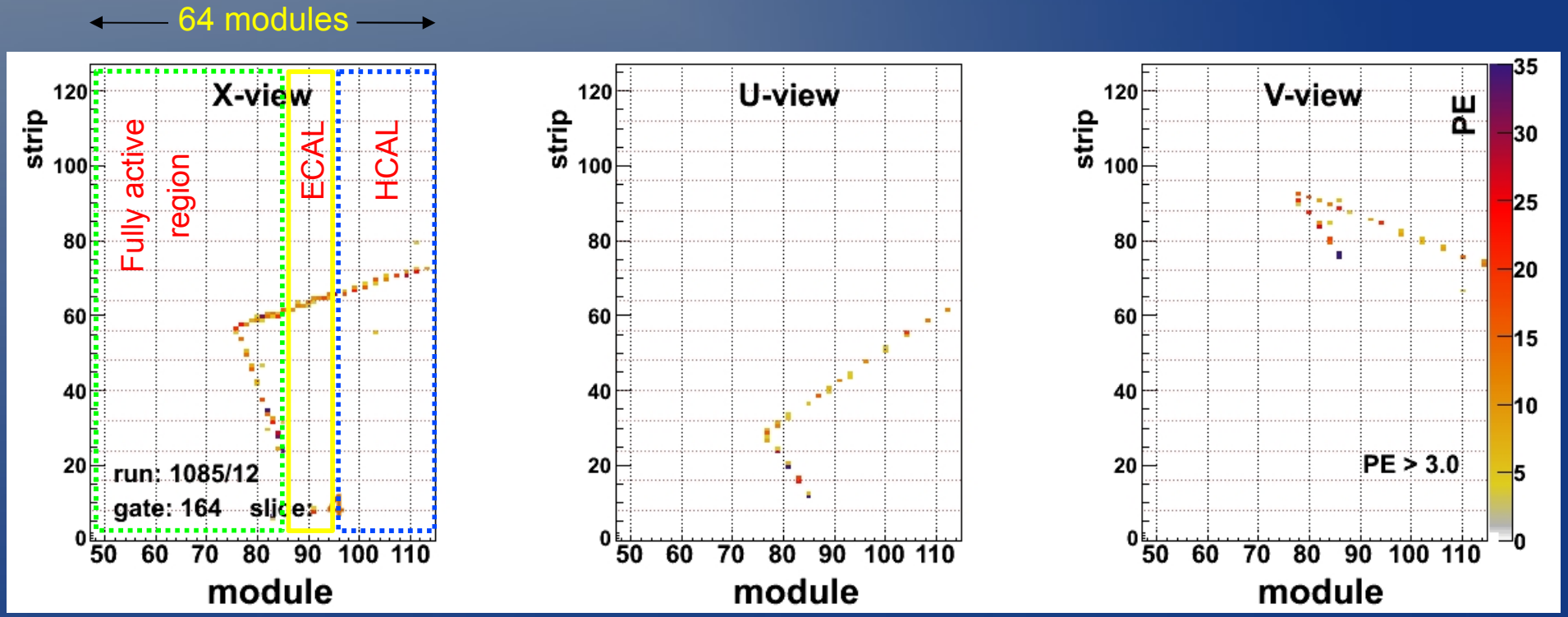
The "Frozen" Detector

- Paused installation November 12th, 2009 to take antineutrino data.
- 55% of the final detector fully instrumented.
- 64 detector modules: 34 tracking + 10 ECAL + 20 HCAL.
- 272 PMT's installed.
  - 272 x 64 = 17,408 channels.
- One nuclear target module (Fe, Pb) has been included in the installation.



Data collection

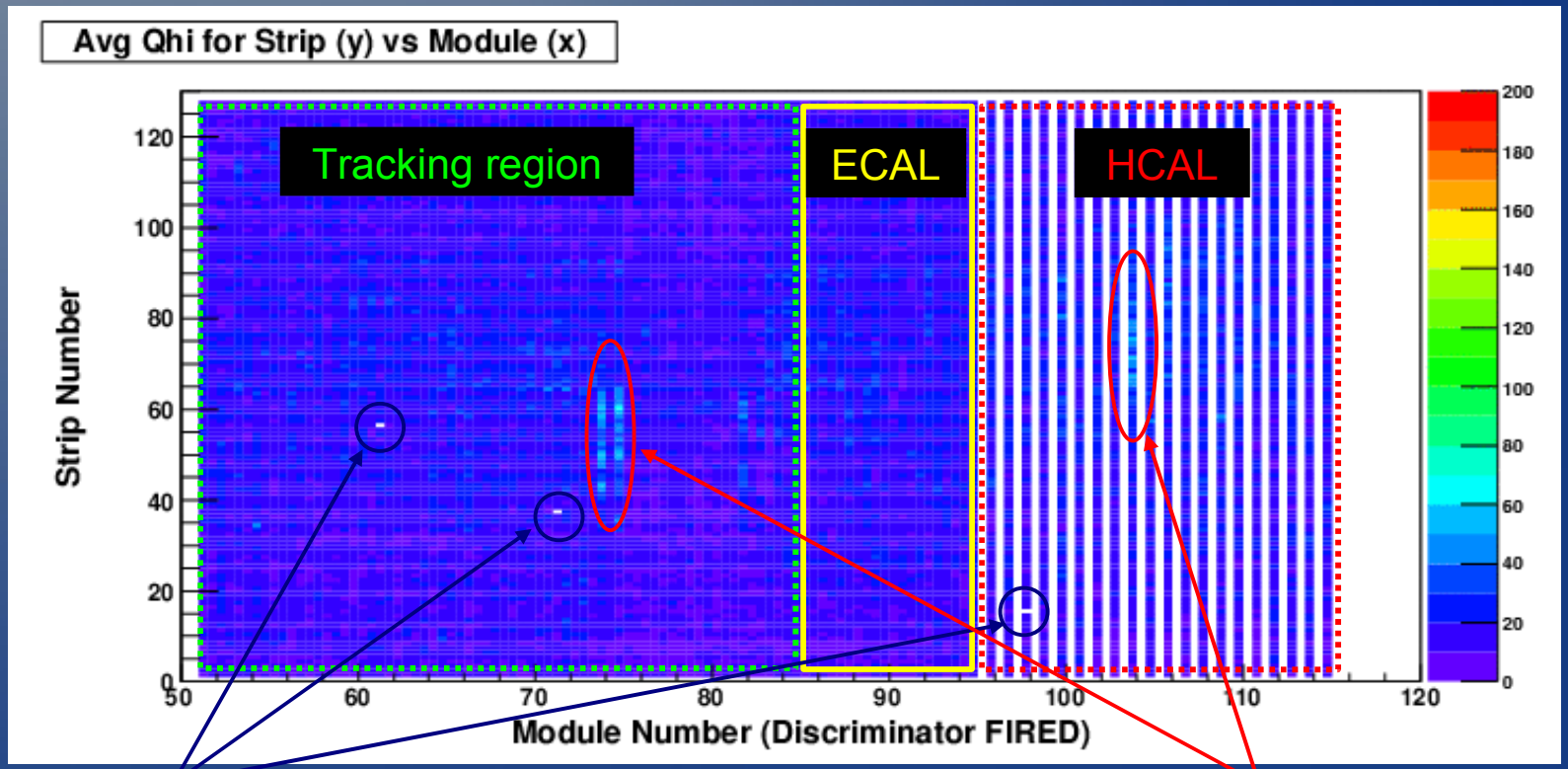
- The Frozen Detector has been running very smoothly, and currently is collecting data 24 hours a day, 7 days a week in the NuMI beam.
- We will continue taking antineutrino data during the final installation phase.



Data quality Checks

- Several monitoring tools have been improved (new diagnostic plots) and the knowledge about how to use them to track down the cause of problems.

Avg Qhi after pedestal suppression.



Only three dead channels

Needs HV tuning after PMT replacing

Summary

- Detector construction: complete!
- Started final installation phase of full MINERνA detector (schedu
- led to be finished by March, 2010).
- About 55% of full MINERνA detector is installed and currently taking 24 hours a day, 7 days a week of antineutrino data.
- Will keep collecting antineutrino data during the winter installation period.
- Data analysis efforts are growing and getting mature.
- The MINERνA experiment is on schedule, thanks to your support!