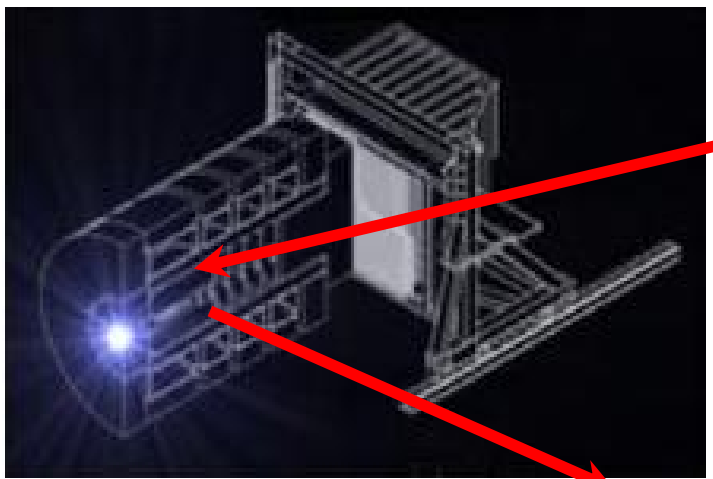
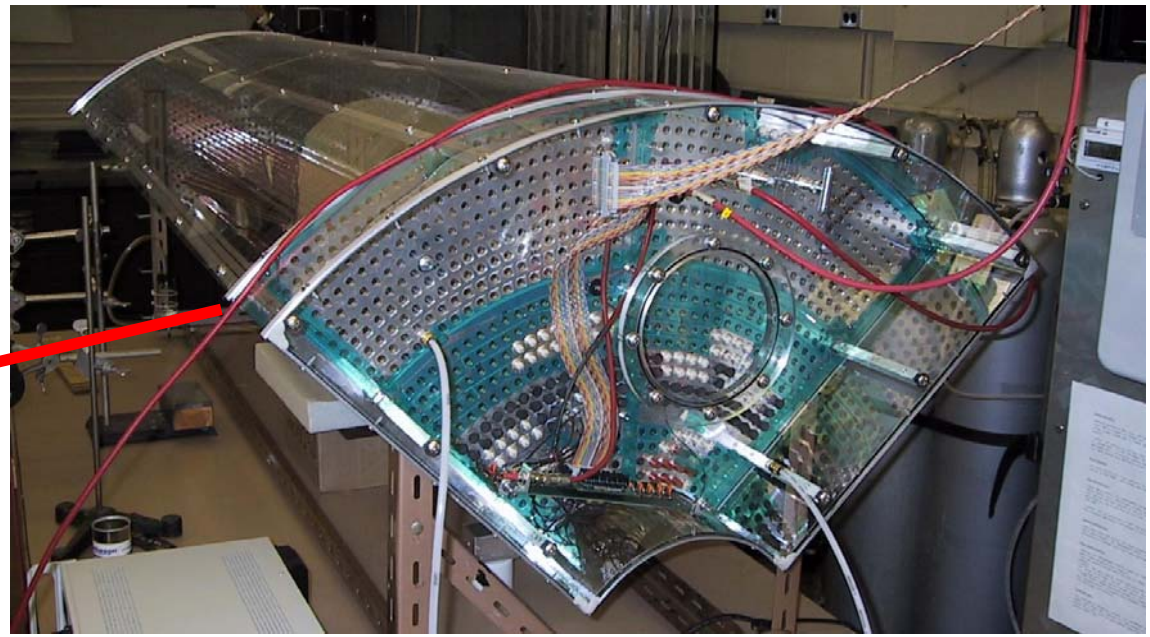
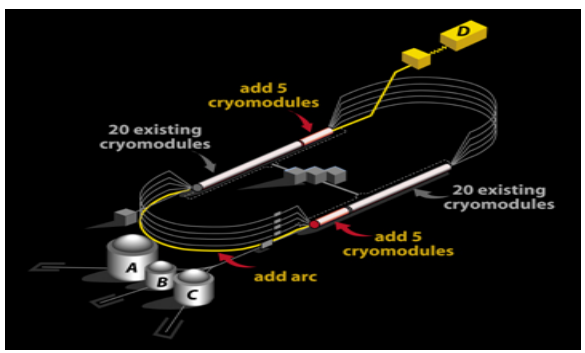
Update on the CDC

GlueX Collaboration Meeting
October 2006







How Bad is BAD?

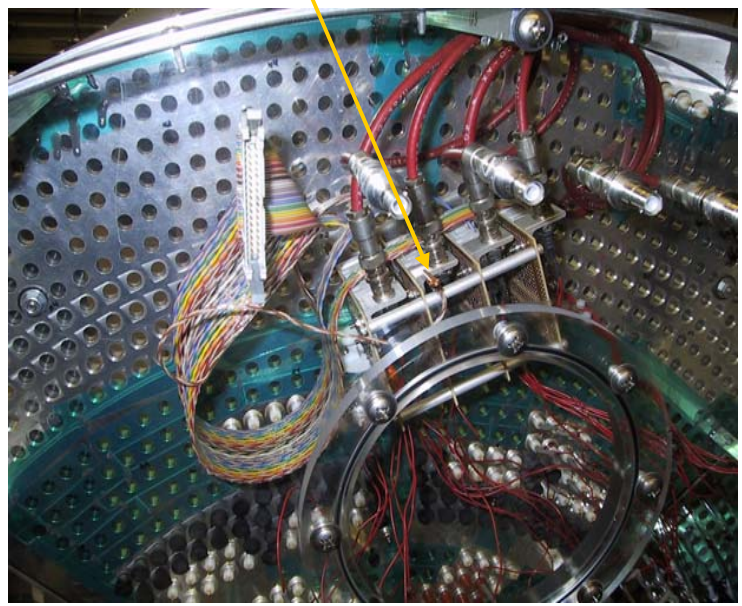
Why were they so bad?

- They were built on left-over PCB's from another project. They had no ground plane and made the component configuration very awkward.
- I tried to cram too many signals through the 34-pin connector in the plenum cover, thus eliminating the possibility of twisted pair cabling.
- Overall, I made many rookie mistakes.

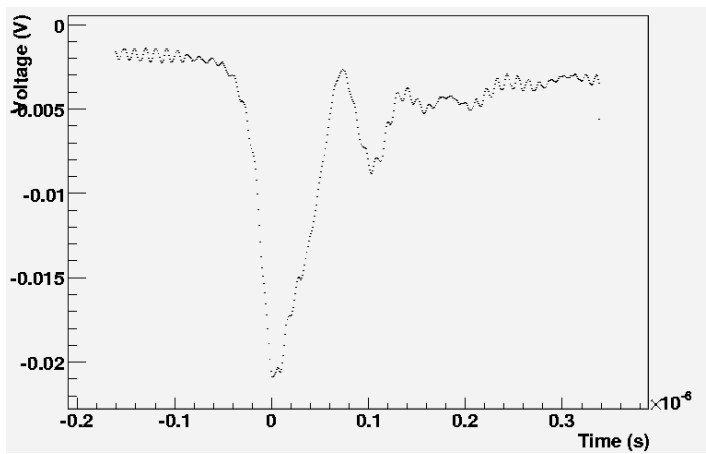
How bad is bad?

- There were horrible cross-talk and ringing problems in the signals. These boards were great antennae.
- They offered limited compatibility with JLAB's pre-amp boards. Connectivity would have been a nightmare.

Original Board



Poorly designed front-end board, or expertly designed antenna?



An average pulse, but can we trust it?

Outline

High Voltage Cards

Data Acquisition

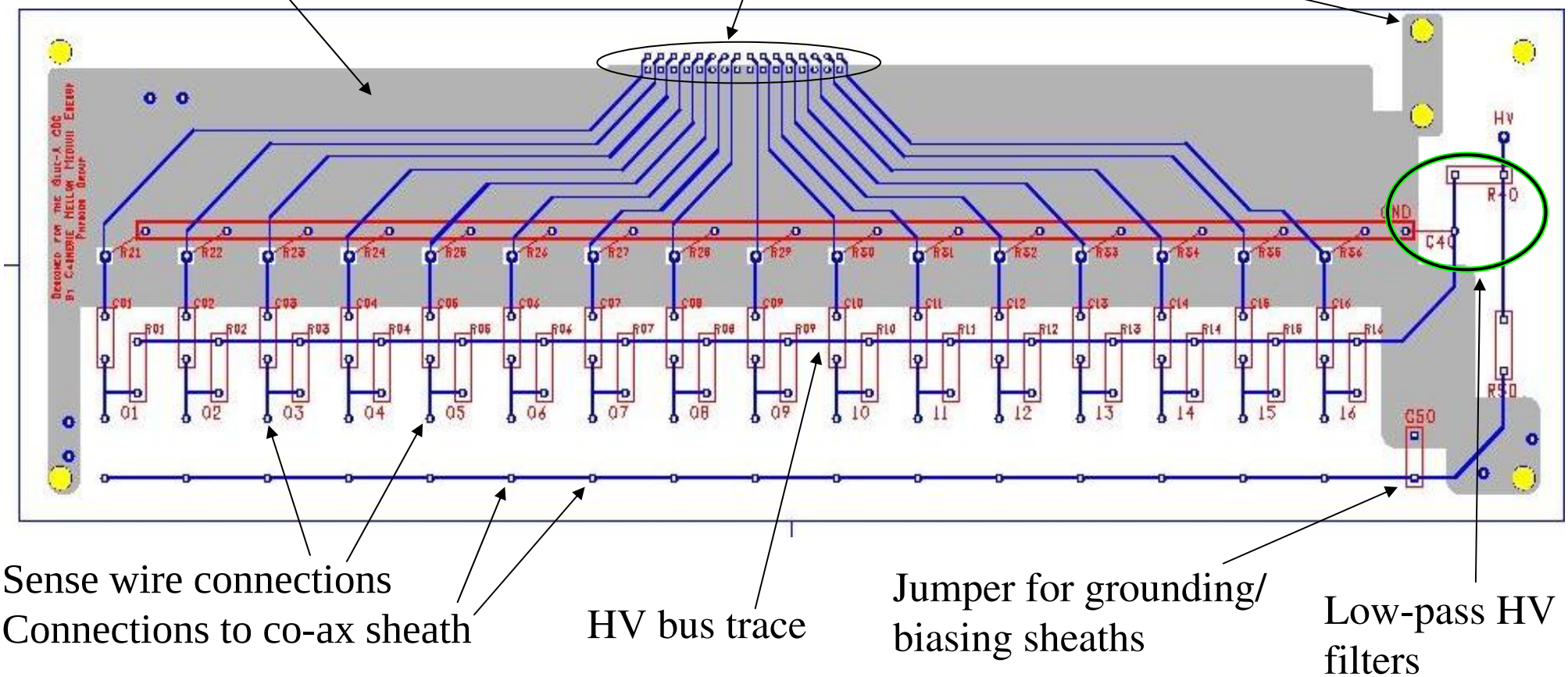
Data Analysis/Software

The New Boards

- Matt Shepherd showed us the CLEO DR3 boards. Our new design is very similar to these.
- A lot of input from both Gerard and Paul
- **Features of the new boards include:**
- More compact and sensible board architecture. R0-4003 to eliminate out-gassing.
- Large ground plane to provide more local and robust ground connection for paired output. This should help to control cross-talk and ringing.
- The sense wire connections are made with co-ax cabling with the sheath held at bias voltage.
- JLAB's FDC pre-amp boards will mate directly to the end of the distribution boards.
- These boards are much more compact without sacrificing the sense wire relocation we would like for this prototype.

CMU High-voltage Distribution Board

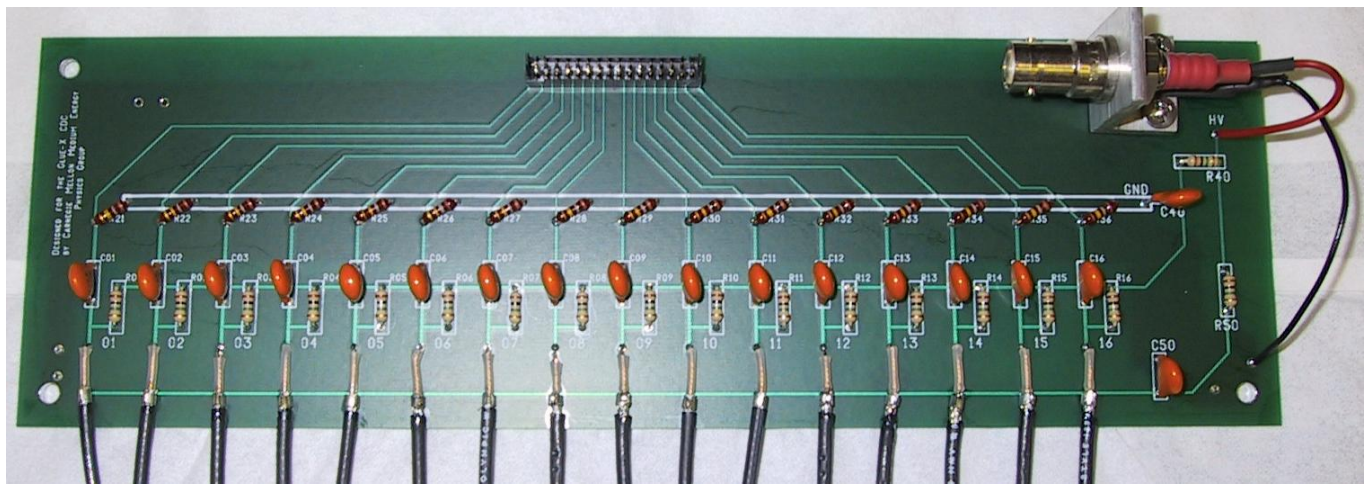
The new board is shown below. The groundplane is shown in grey, traces in blue, and a silkscreen layer is shown in red.



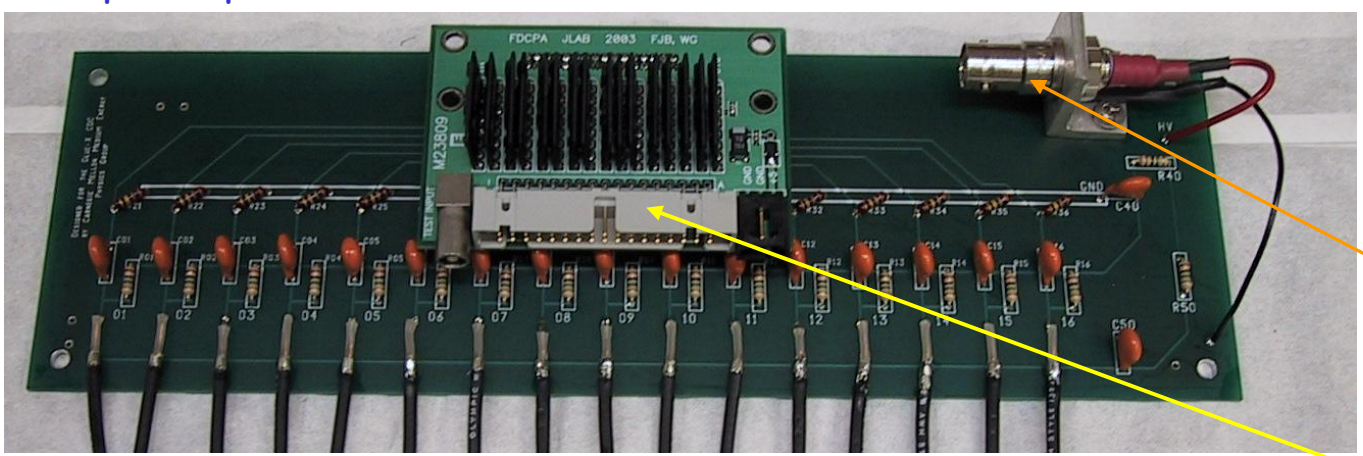
CMU High-voltage Distribution Boards

Five boards were purchased from from eFabPCB in April 2006.

Components were installed at



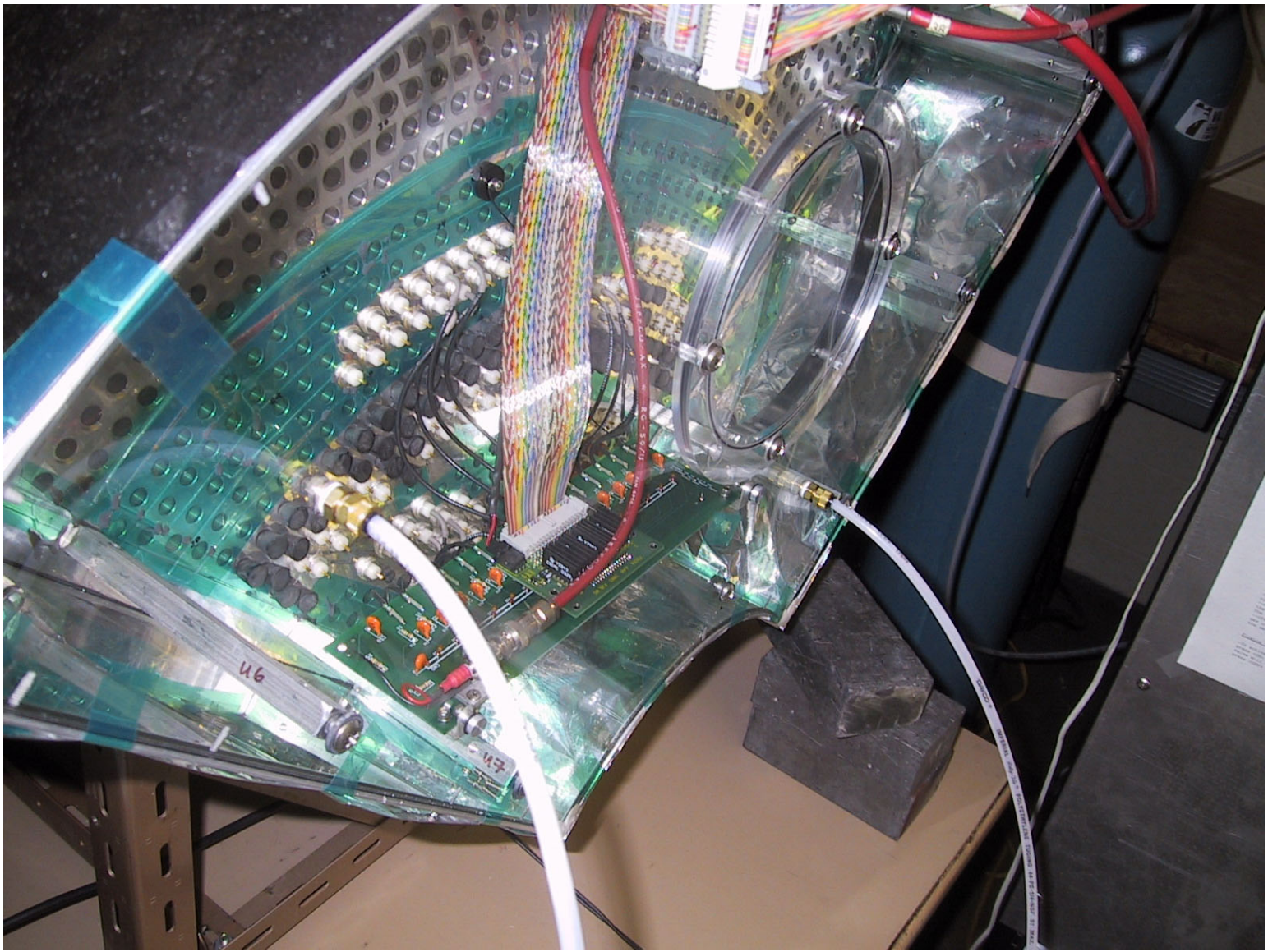
Below: HV board with JLAB FDC preamp board mated to it.



Above: a board with all components and sense wires installed.

High Voltage

To DAQ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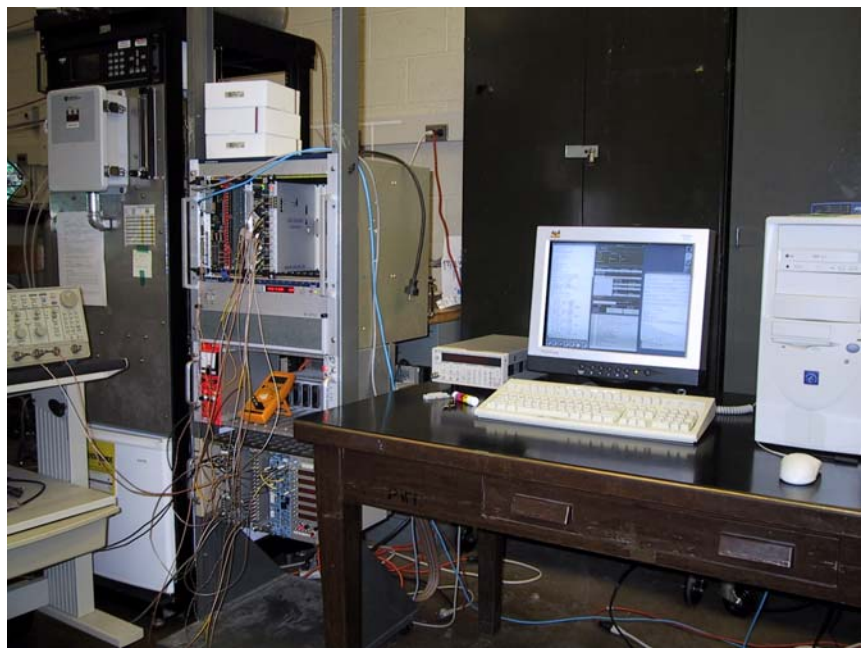
The Data Acquisition Saga

Getting CODA going at CMU has been a real challenge! We had a great deal of help from Dave Abbot, but being off the JLab site has its draw backs.



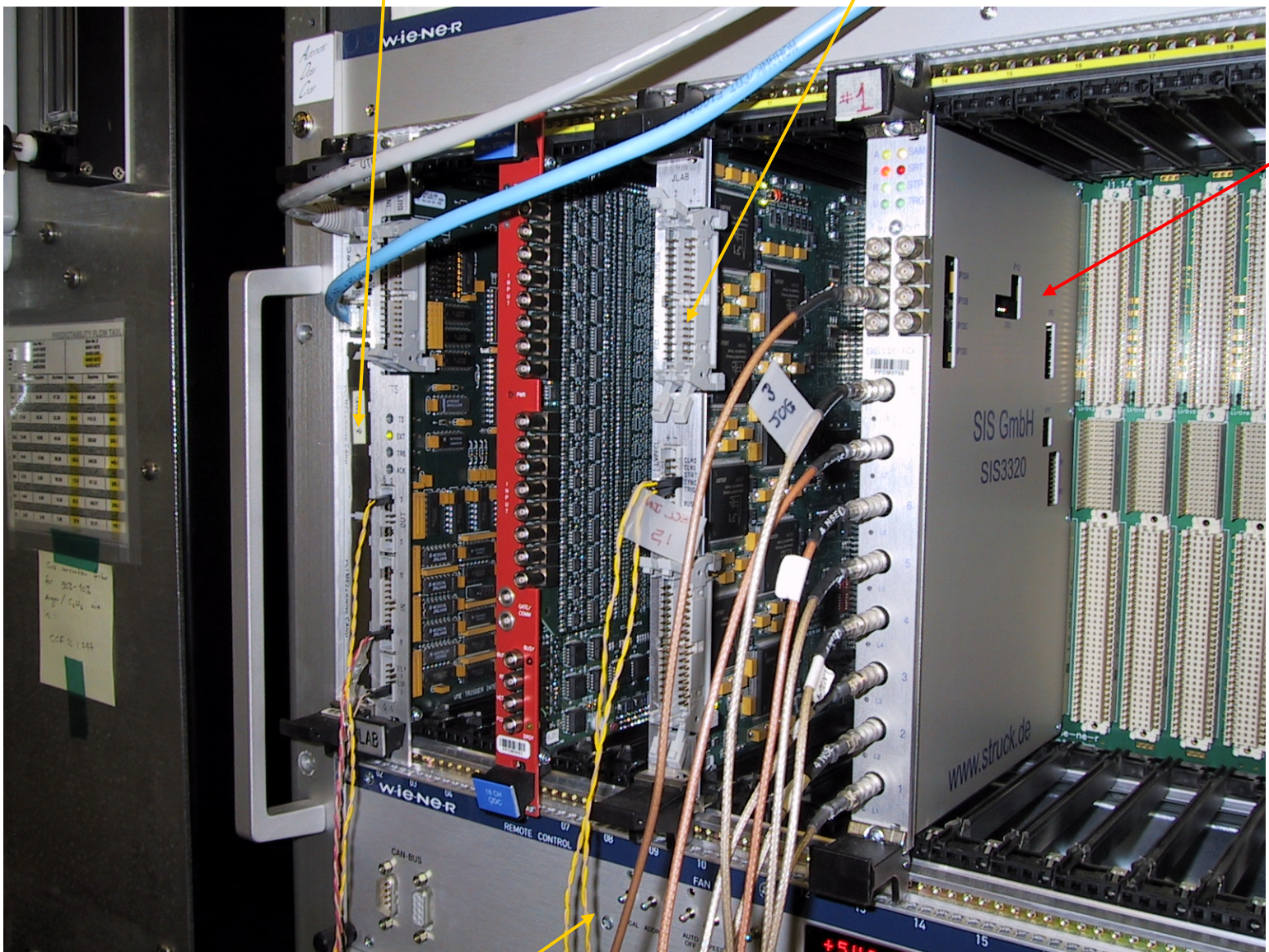
CMU: Purchased the VME Crate and the Linux Computer.

JLab: Loaned us a VXWorks CPU and Trigger Module

JLab: Purchased to 200MHz FADC modules, and ADC and and F1 TDC

JLAB Trigger Interface Board

MVME2600 Motorola PowerPC



SIS3320 FADC
(2 modules)

Wiener VME Crate

FADC's Arrived in Early May

Two 200 MHz FADC Modules arrived at CMU in early May.

After working with the DAQ, we realized that the existing CODA
libraries did not completely handle these.

In late May, a module was shipped to Dave Abbot. Through the summer, the library was written. The final working version became
available in mid September.

The module was then shipped back to CMU, but there are now issues with reading out more than one with our CPU.

Motorolla CPU

Originally had a 2600-1 Elliot replaced this as it was incompatible with some libraries.

New CPU was a 2305 This got things working well for us, but then ran into the 2 FADC problem.

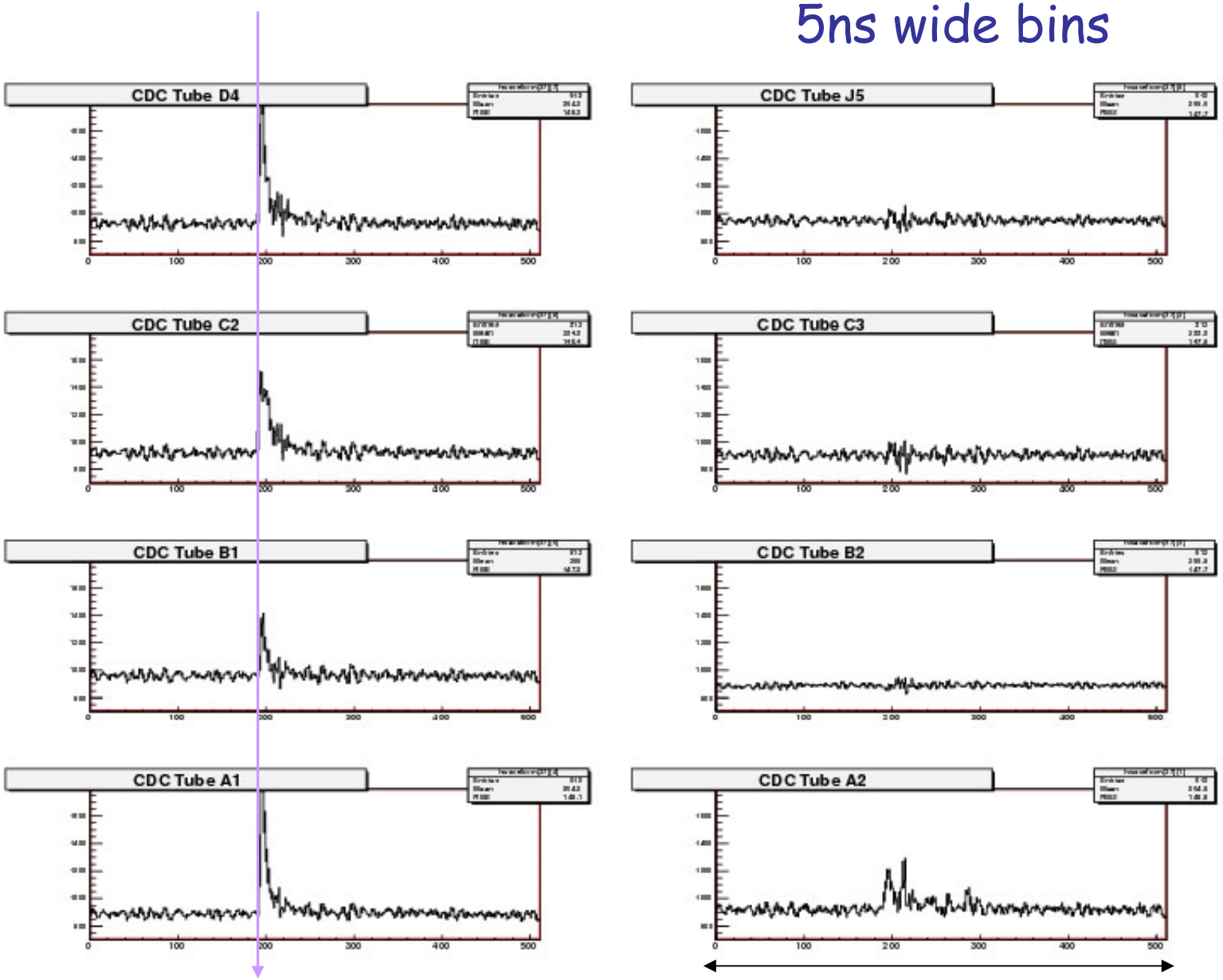
We need a CPU with additional memory to actually read out the FADCs

Either a 5100 or a 6100 is needed.

Cosmic Event

Read out one module

5ns wide bins



4-tube coincidence

2.56 μs

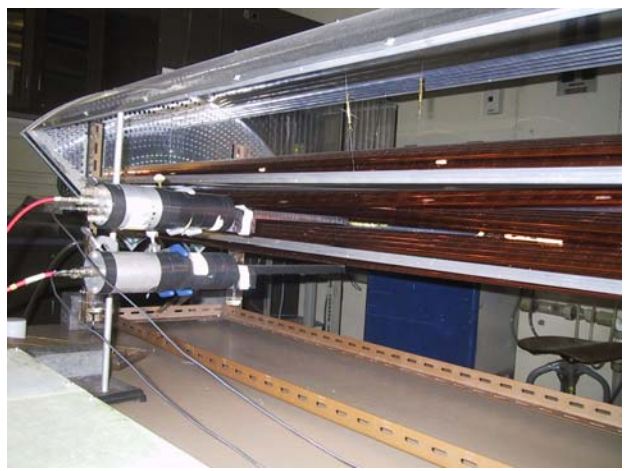
What happens next?

- When I return, I will begin taking signals from each level of the CDC output: HV dist. board, premps, postamps.
- F1 TDC should be becoming functional as we speak. Taking some data with it is a big priority.
- Zeb will be finishing code in the next two weeks that interprets all of the CODA output.
- Integrating the fADC when we get it...

Where are We Going?

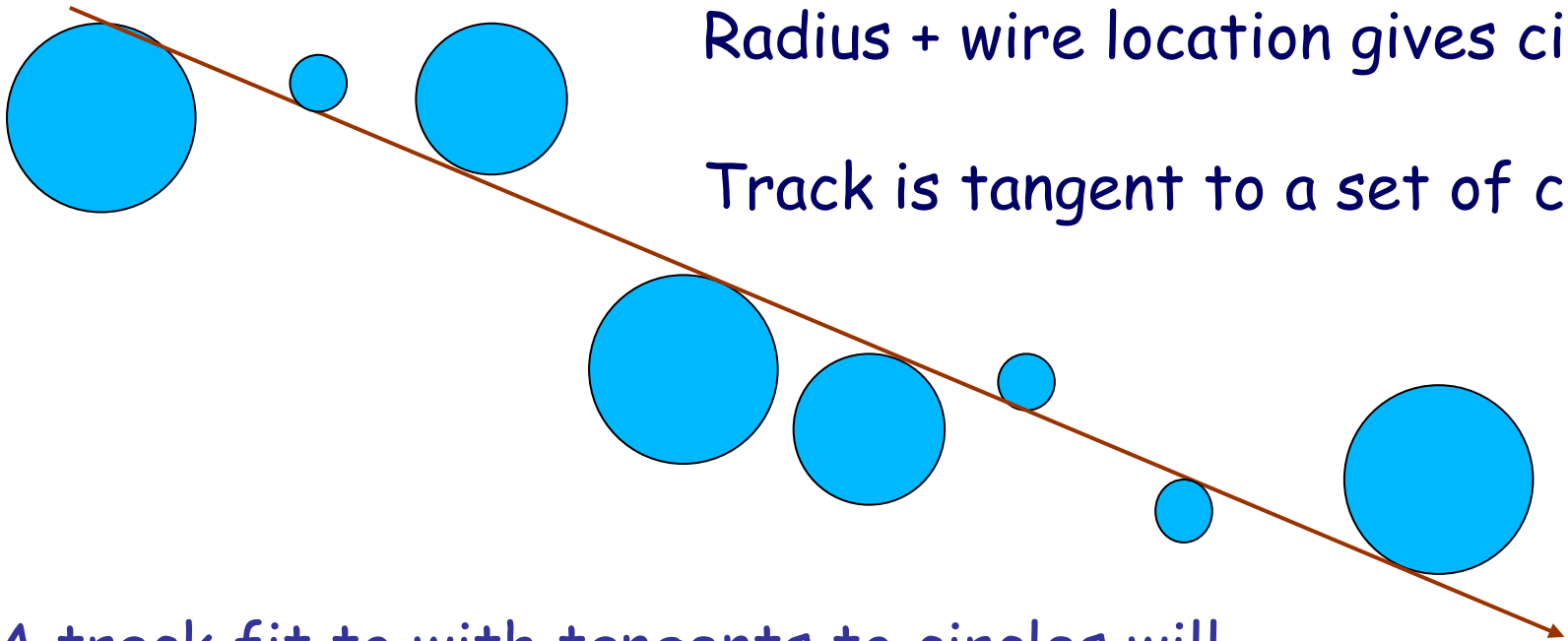
The chamber is set up to take cosmic data, and 16 tubes are instrumented with and connected into FADC modules. As soon as we can read out 2 modules, we can start to collect cosmic data (rates are about 1/minute)

We will be ready to start a fairly extensive program of testing the chamber under various conditions, but with the above rate, it will be 3-4 days of time per setting in collecting data.



Software Issues

We have not developed any software at this point in time.

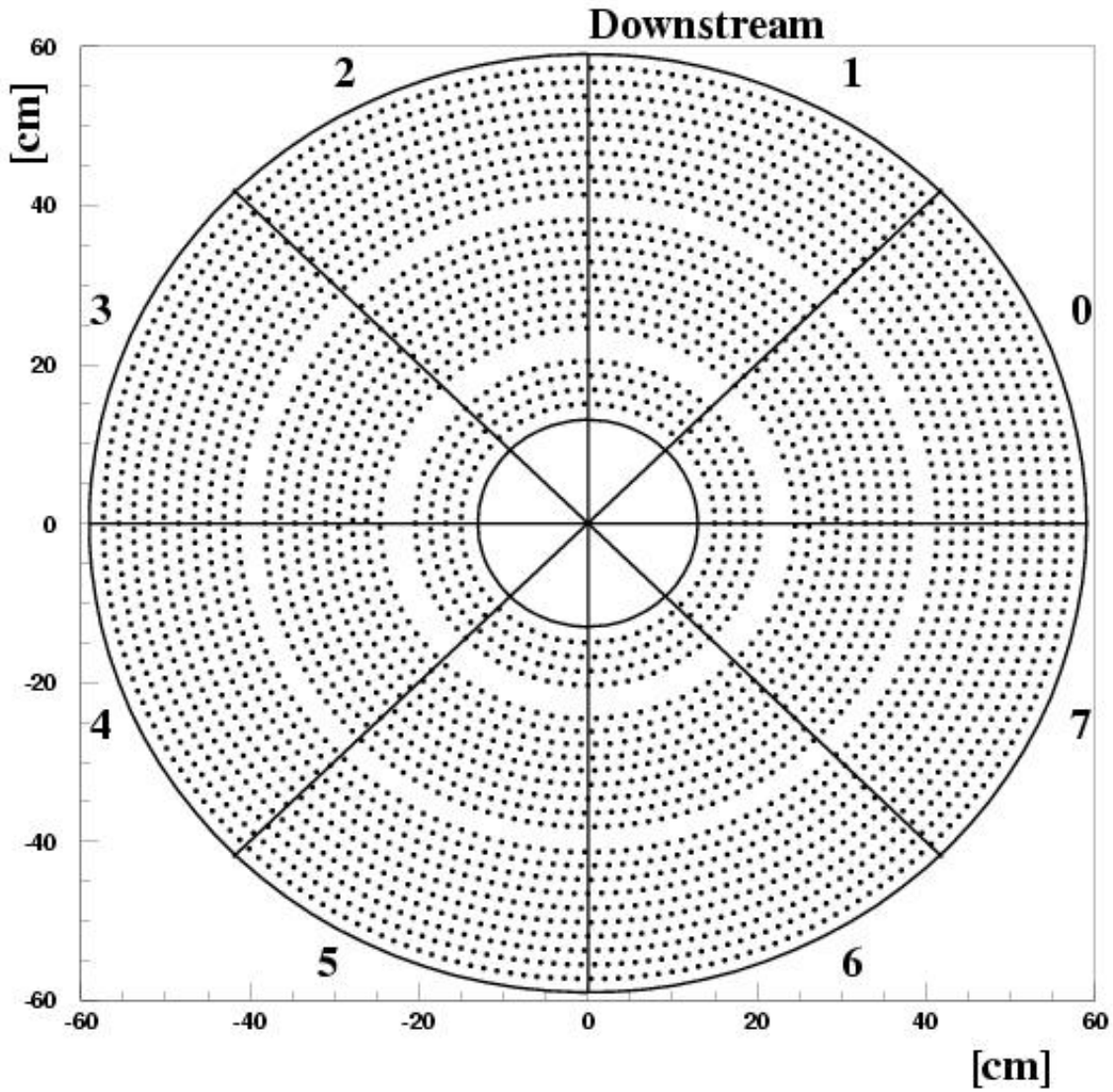


Drift-time gives radius
Radius + wire location gives circle

Track is tangent to a set of circles.

A track fit to with tangents to circles will yield both (x,y) points along track, and track parameters.

Chamber Geometry



Length = 175cm

Inner Radius depends on background levels.

Summary

Slow progress on the CDC, but it feels like we are ready to make some big steps forward once we can readout 2 FADCs

Hope to be able to present some very interesting results next spring.