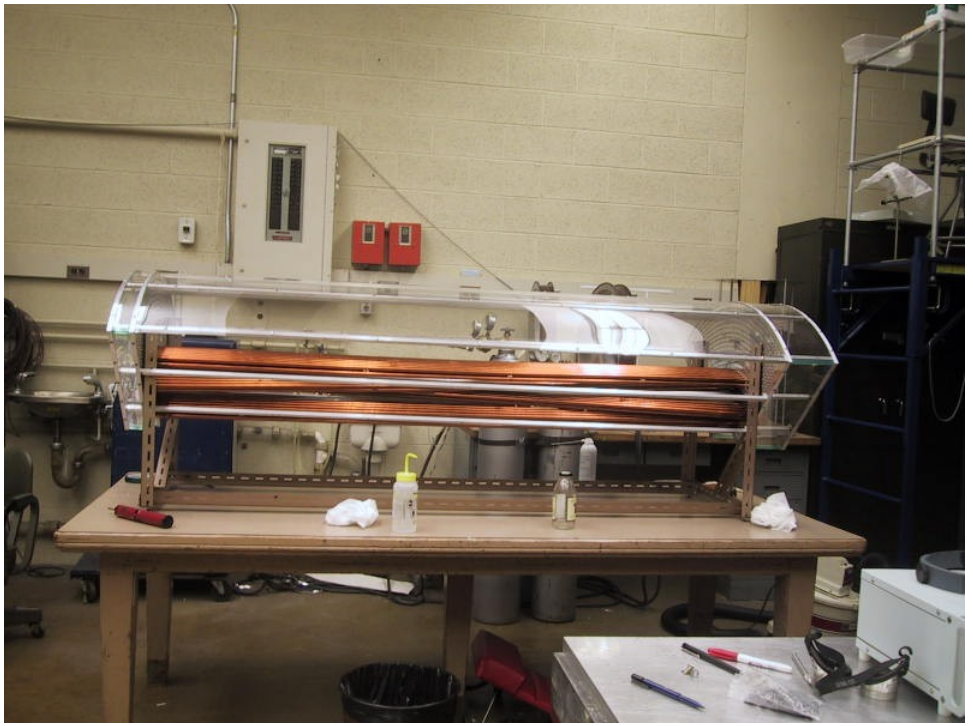
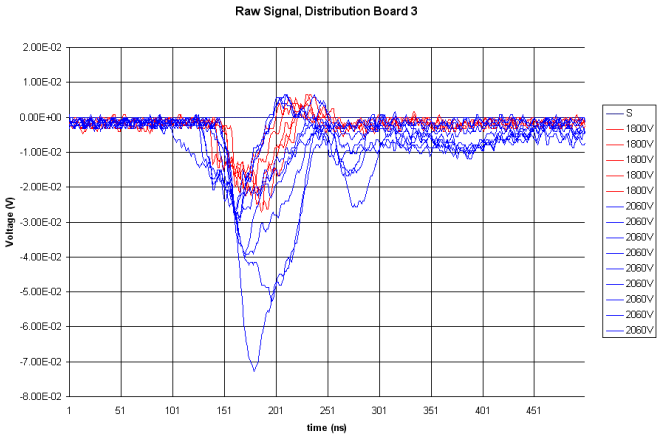
The GlueX Straw Tube Chamber

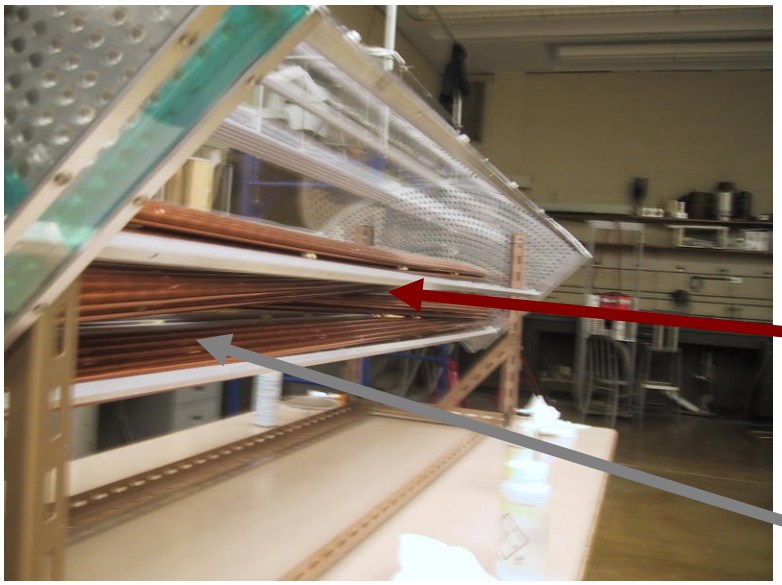
Curtis A. Meyer and Mike McCracken





Status Report

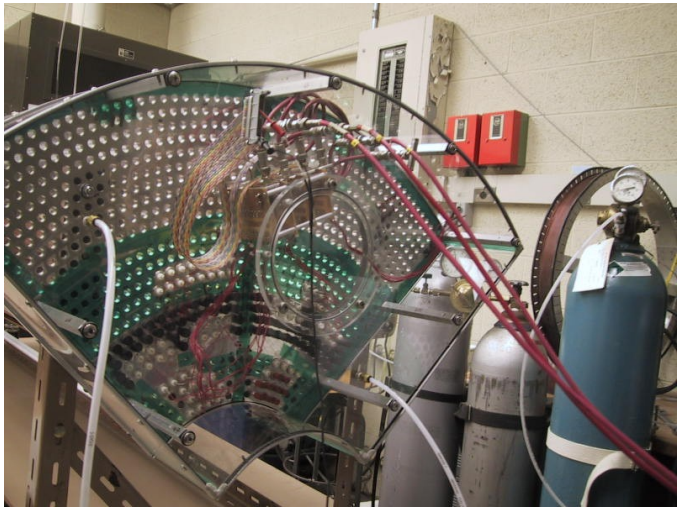
In February, we got Kapton tubes from Stone Industrial.

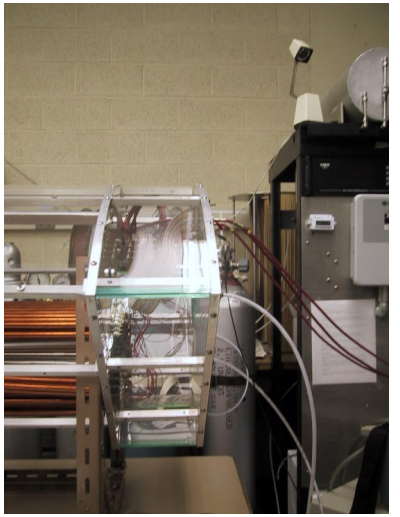


We installed an equal number to the mylar tubes that were already in place.

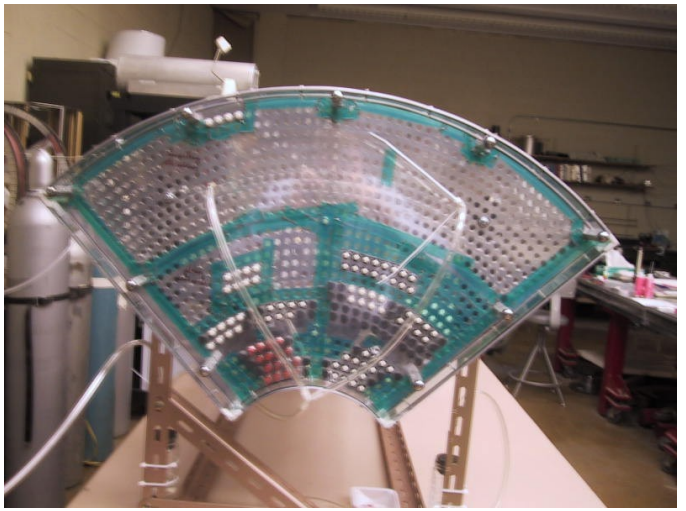
Status Report

Design and Installation of the Gas Flanges



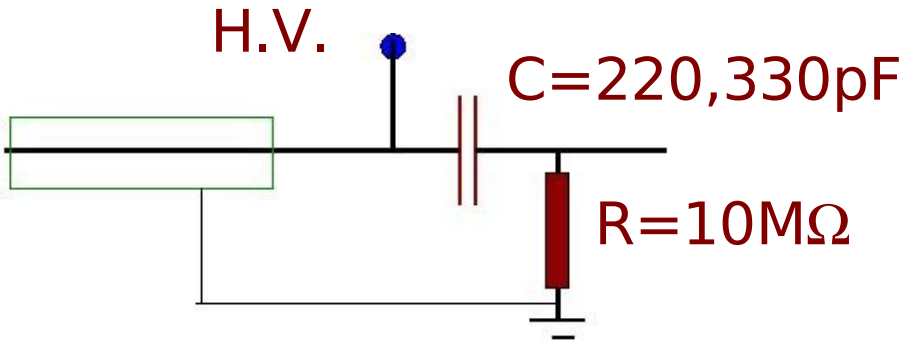


There were a number of gas leaks to track down and repair. We also found some leaks around the very first tubes that were installed.



It is very hard to make these chambers leak tight!

Status Report



High Voltage on the chamber

Boards individually went to 3000 Volts, but on the chamber, one of them failed at 800 Volts.

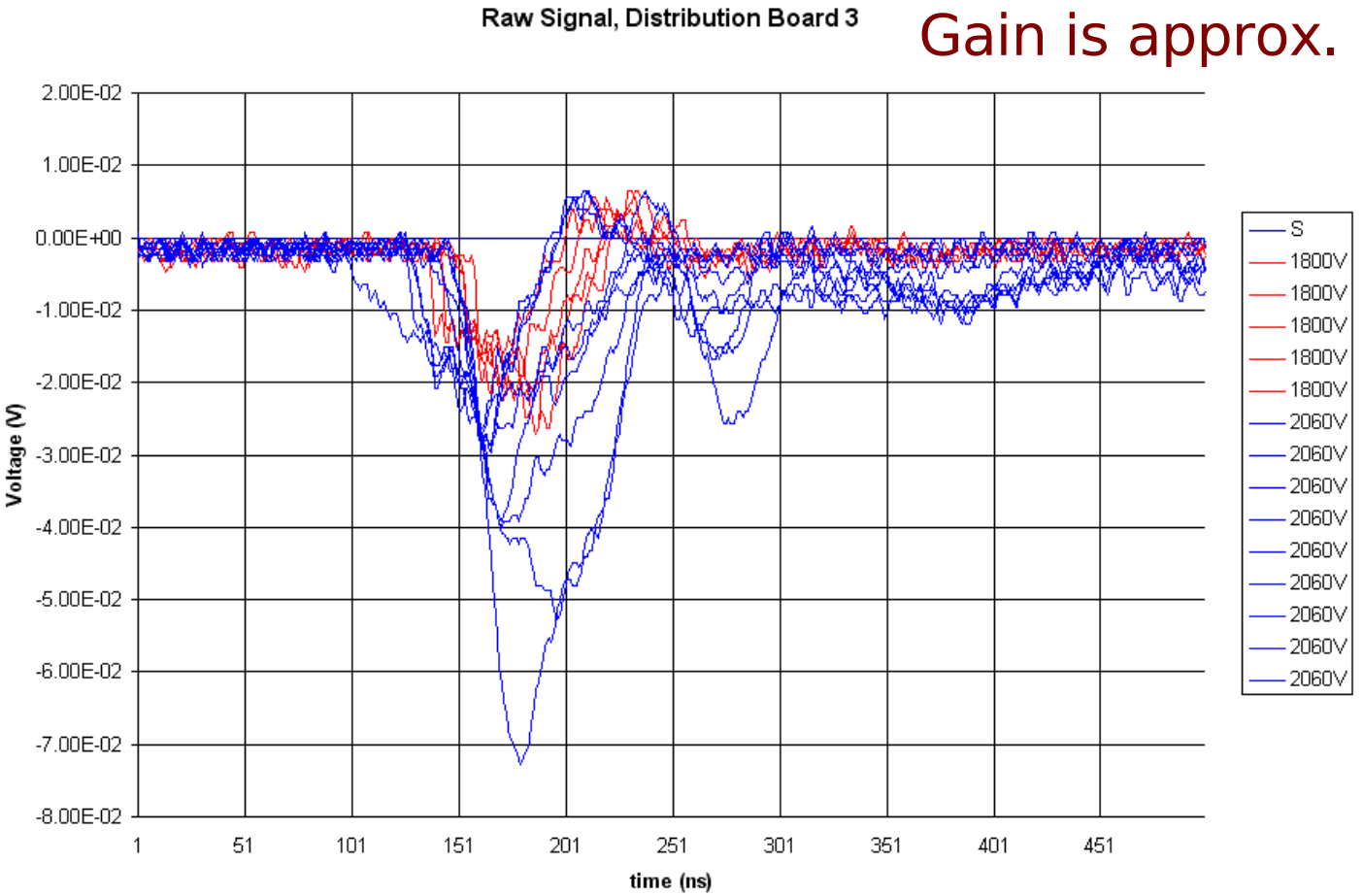
Some visibly bent tubes were limited in voltage to 500V.

A number of other tubes broke down (suddenly) between 1500V an 1900V.

Currently we have 24 Tubes on Voltage up to about 2100 Volts in an 90-10 Ar CO2 mixture.

Status Report

Signal Readout directly from the chamber:

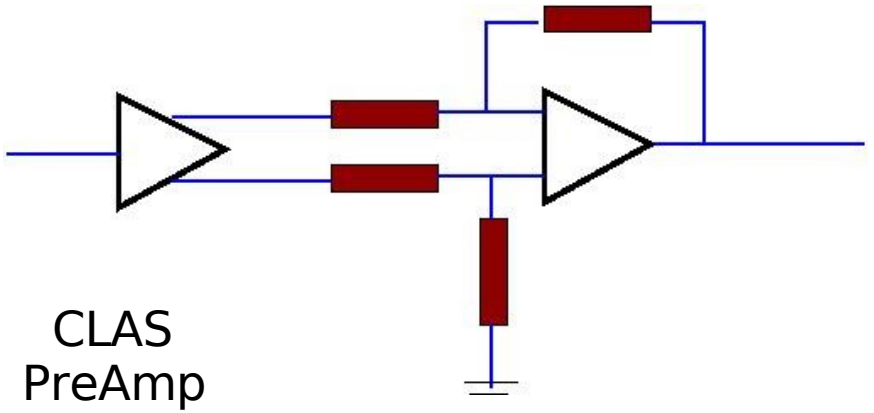


Gain is approx. 1×10^4 to 7×10^4

Status Report

Preamplifiers from CLAS (same as the FDC is using).

Differential output, so we needed to build a receiver circuit.



CLAS
PreAmp

Differential Receiver
Emitter Follower

Status Report

Currently we can readout four channels using a Tek Digital Scope and a GPIB connected to a computer.

Same setup that we used before.

We also have a VME system with an ADC and TDC interfaced to a linux computer running CODA.

The current overhead in getting this VME system going precludes going directly to it.

Future Plans

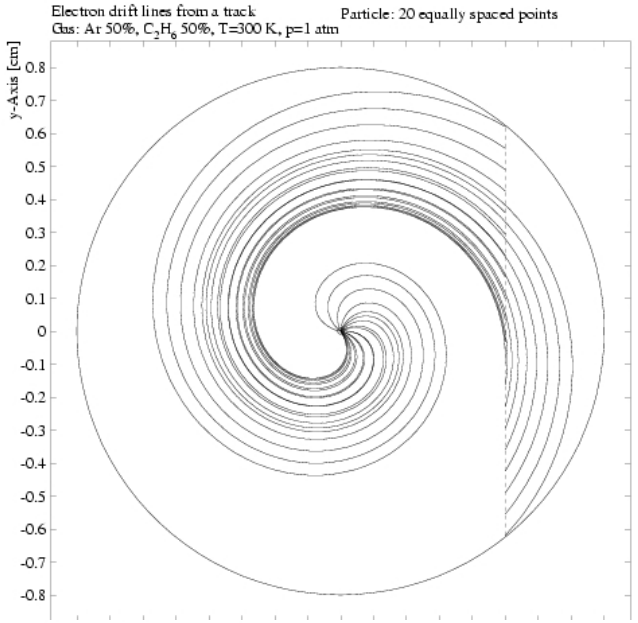
Clearly we will continue using the digital scope until we have all elements in the readout chain. At that point, we will switch over to a to the VME based DAQ with a 100MHz Flash ADC (JLab R&D money).

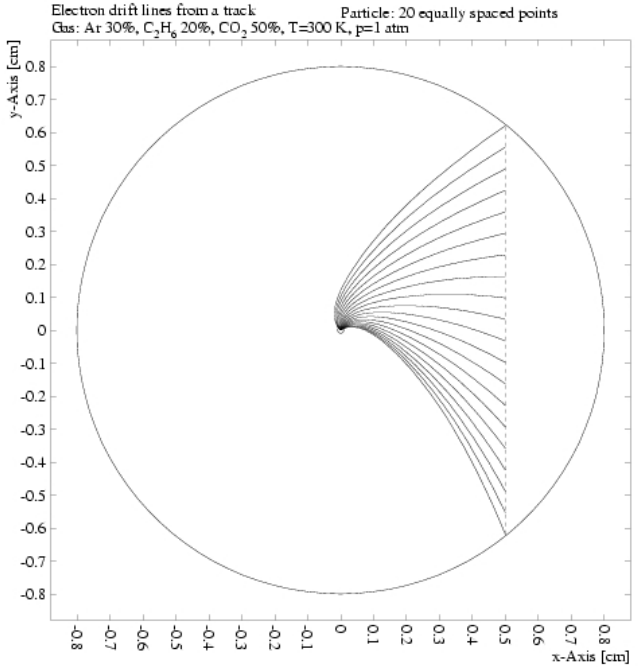
Anticipate that we will need to build some receiver preamplifier boards in order to keep the noise pickup as small as possible. These should mount directly on the gas flange.

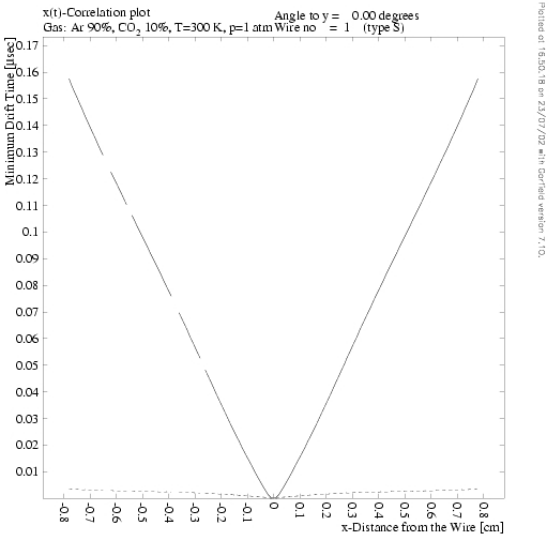
Goals of Near-term Studies

This phase of the R&D should fully define the pulse characteristics of the chamber and define the operating points for various gas mixtures. It will also allow us to make decisions on the feasibility of doing charge division in the chamber and decide the best straw material for the final chamber. We also hope to understand the origin of a number of construction issues that will affect the final chamber design and construction.

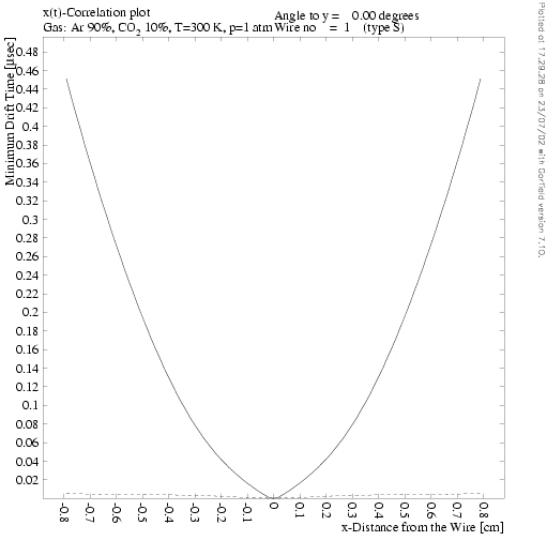
Magnetic Field Tests







170ns



500ns

Magnetic Field has a Large Impact

Operation of some straw-tube chamber in the 2.2T field is important to understanding what we hope to be able to get out of the chamber.

Operation of the prototype is a beam test is a desirable goal, but I am not 100% sure if we have enough tubes in place to do this yet. Such a test may well require additional tubes to be strung to yield useful results.

The most important outcome of such a test is the integration with other components.

Milestones

1) Completion of the current work with the digital scope and getting electronics working.

2) Implementation of the CODA-based DAQ and the readout of cosmics from the chamber. This will yields some track fitting and resolution numbers from the chamber. It will require reading out about 20-30 channels.

3) Magnet and beam tests when possible.