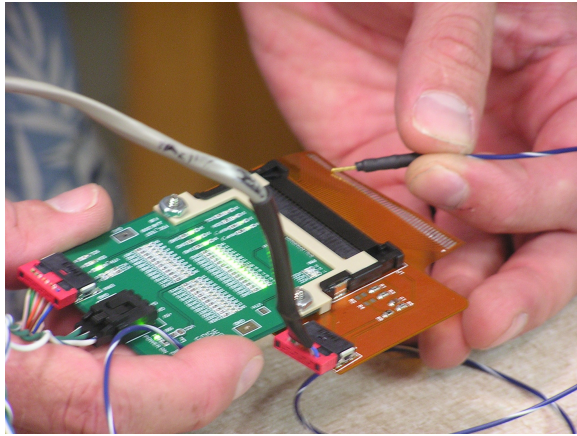


FDC Status

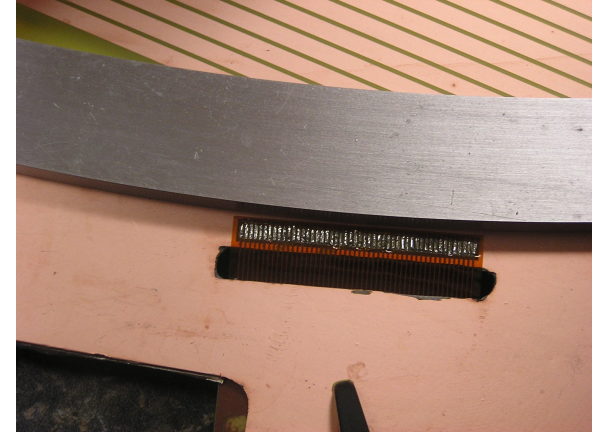
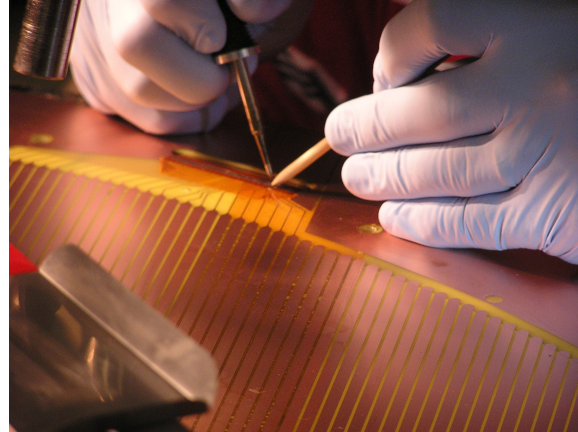
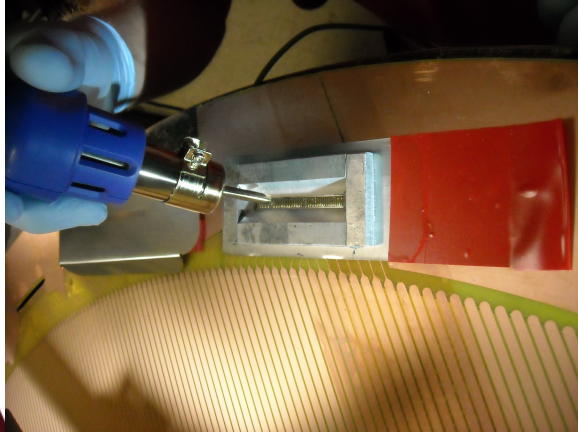
Simon Taylor / JLAB

- Construction of full-scale prototype
- Second version of preamplifier chip/card
- First results of readout of full-scale prototype
- Impact of proposed changes to support frame
- Further prototype studies
- Production schedule

Rigid-flex assemblies



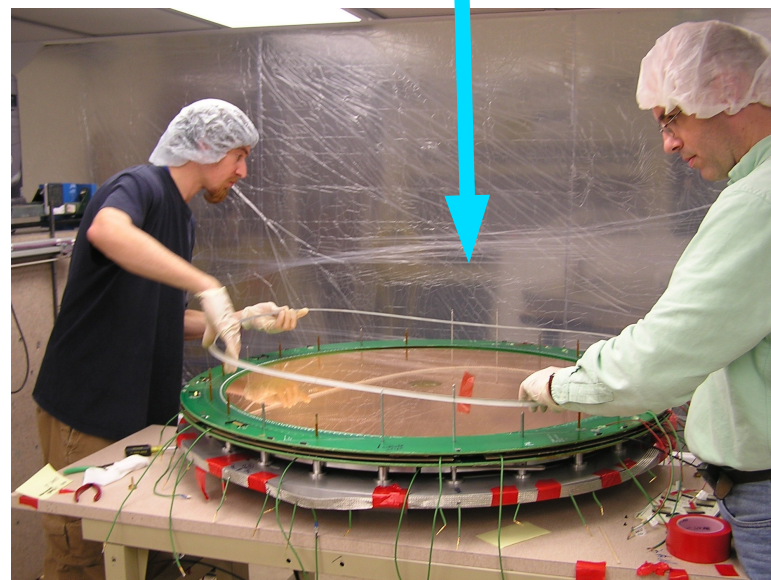
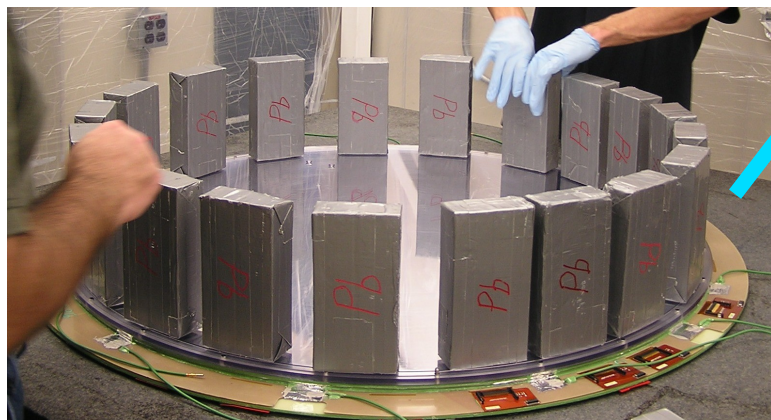
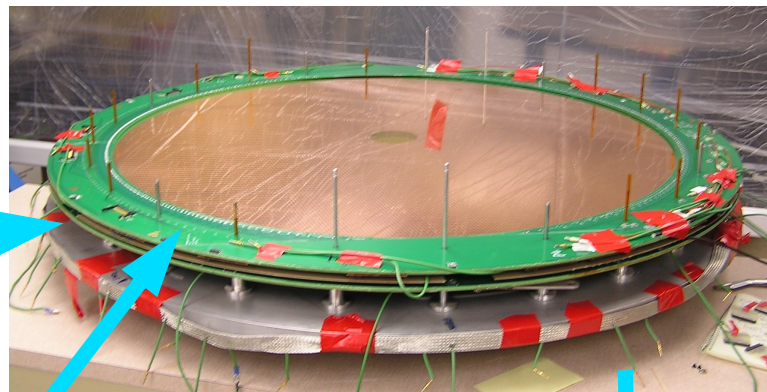
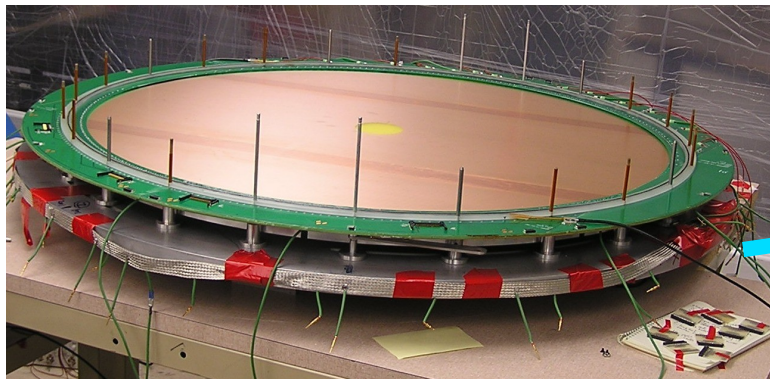
- Purpose is to connect the traces on the cathode boards to the readout daughter boards
- The rigid-flex assemblies have been tested electrically and soldered and glued onto all cathode boards



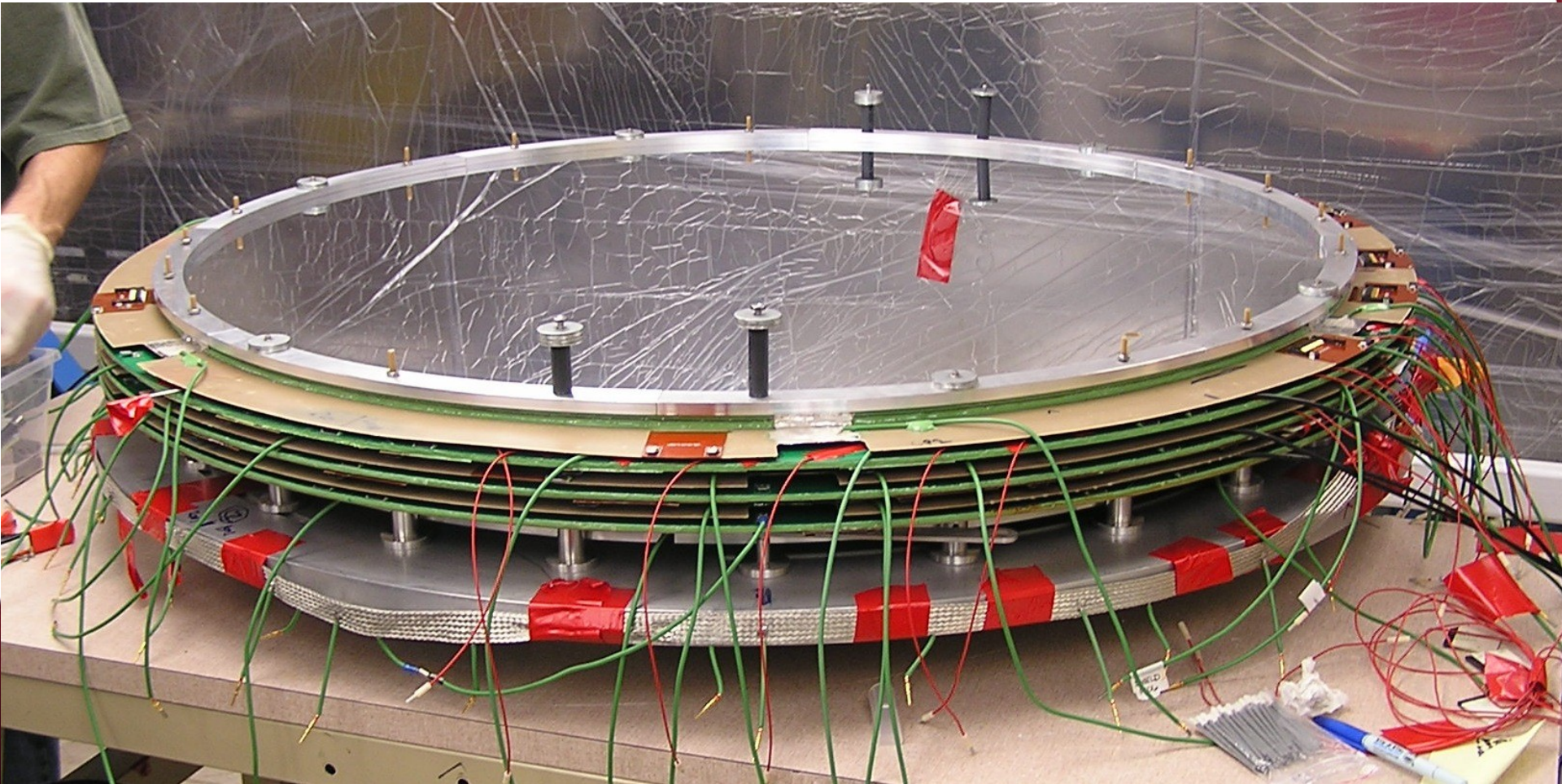
Experience has motivated some small design changes for final version...

→ Increase the pitch between traces to make soldering more reliable

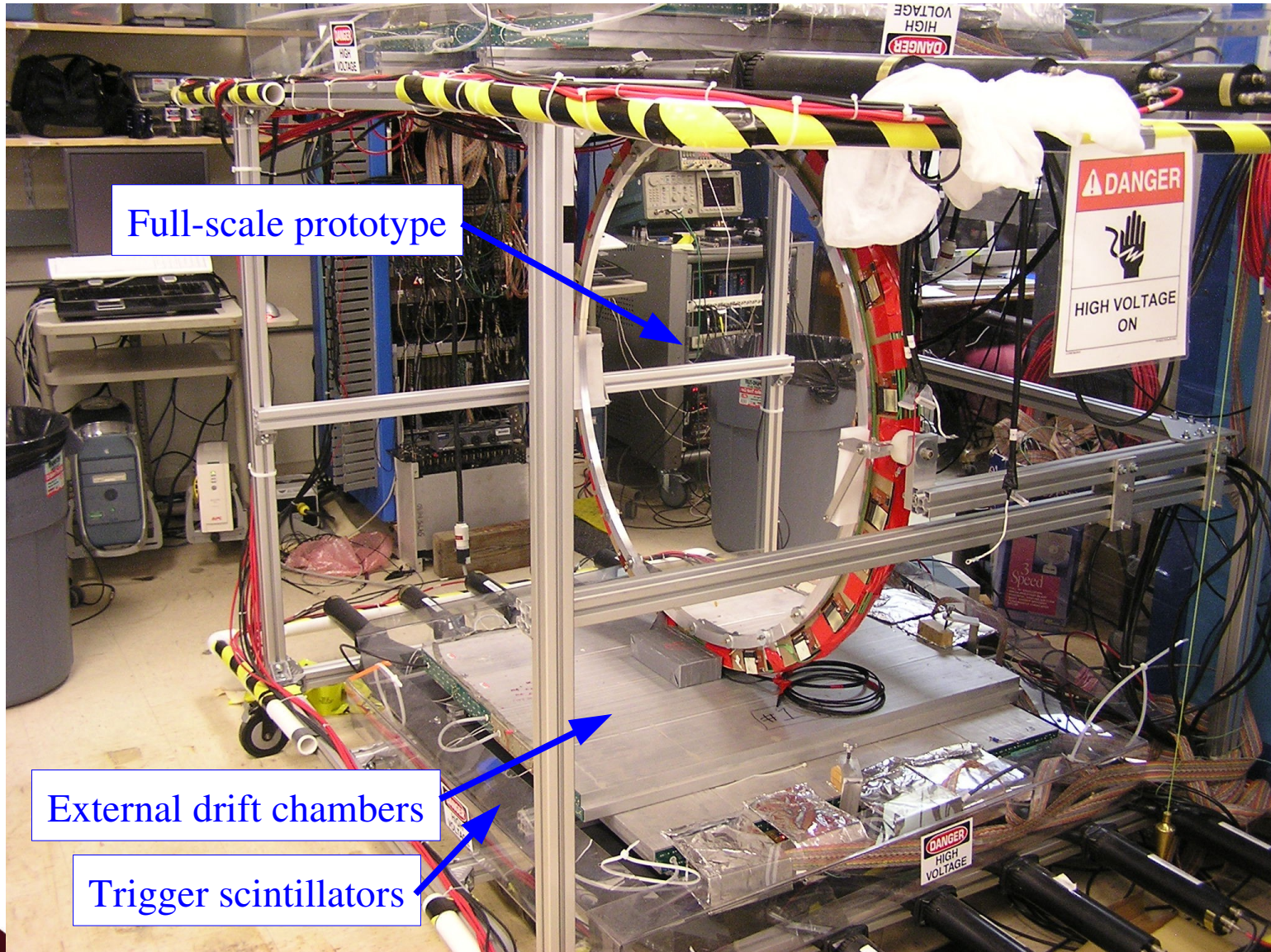
Assembling the Full-scale Prototype



Three-layer Full-Scale Prototype



Full-Scale Prototype in Test Stand

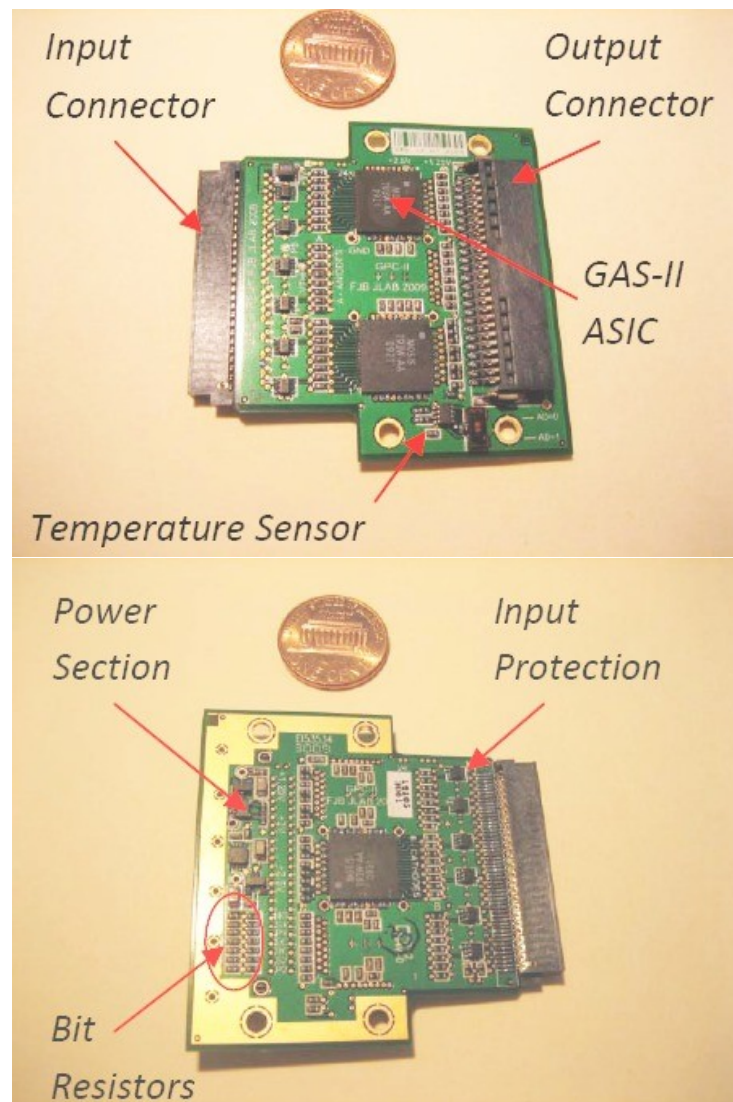


GAS-II/GPC-II Preamplifier

- Version 2 of ASIC = GAS-II
 - Two gain settings:
 - ~0.7 mV/fC (FDC anodes, CDC wires)
 - ~3.0 mV/fC (FDC cathodes)
 - Discriminator for FDC anode wires

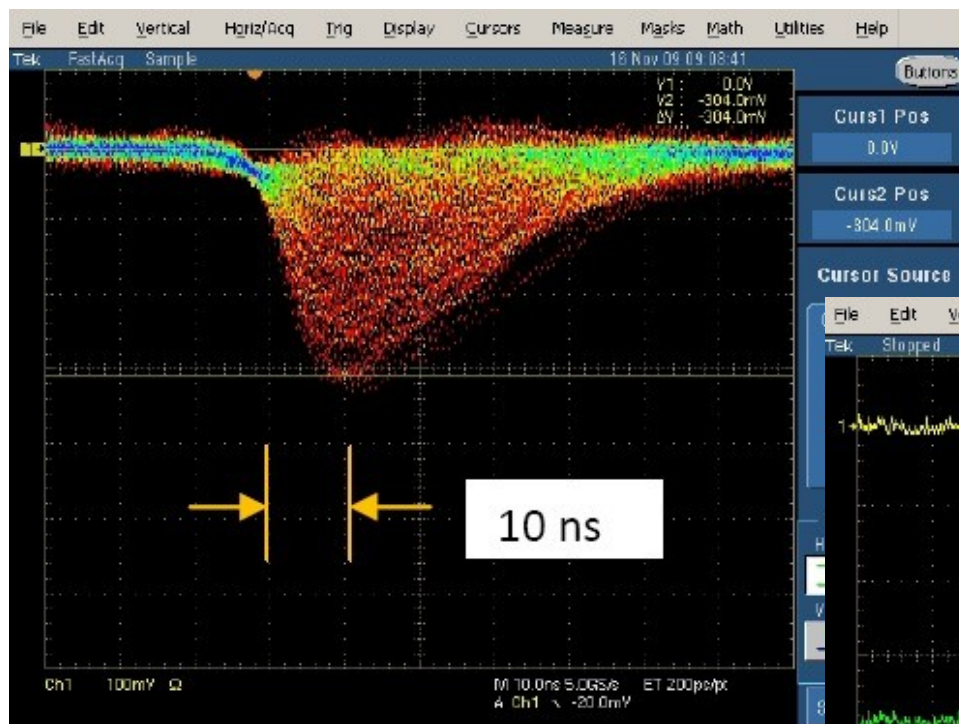


- Analog output for FDC cathodes and CDC wires
 - New version of daughter board (GPC-II), compatible with new chip

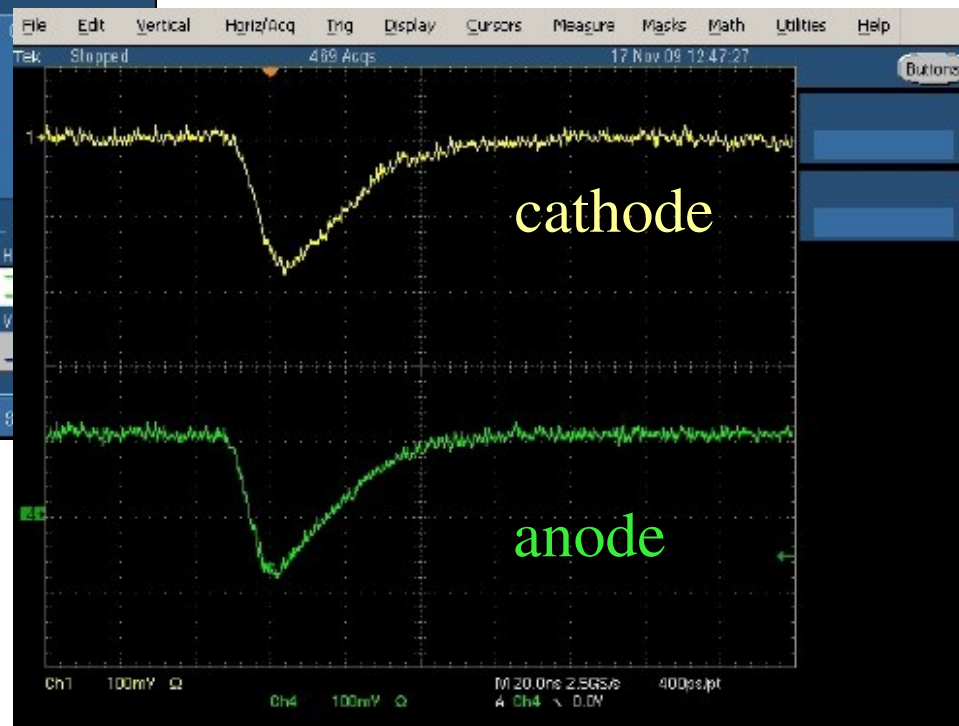


First Signals from Full-Scale Prototype

Cathode signals

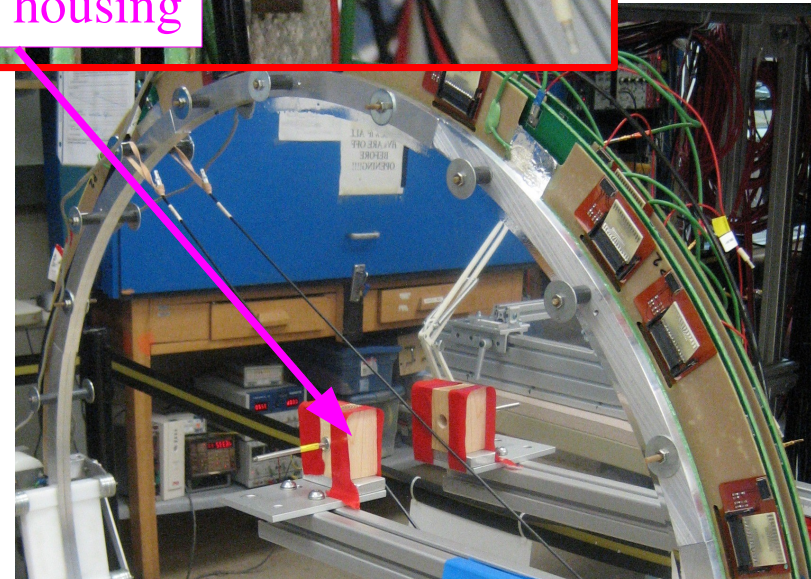
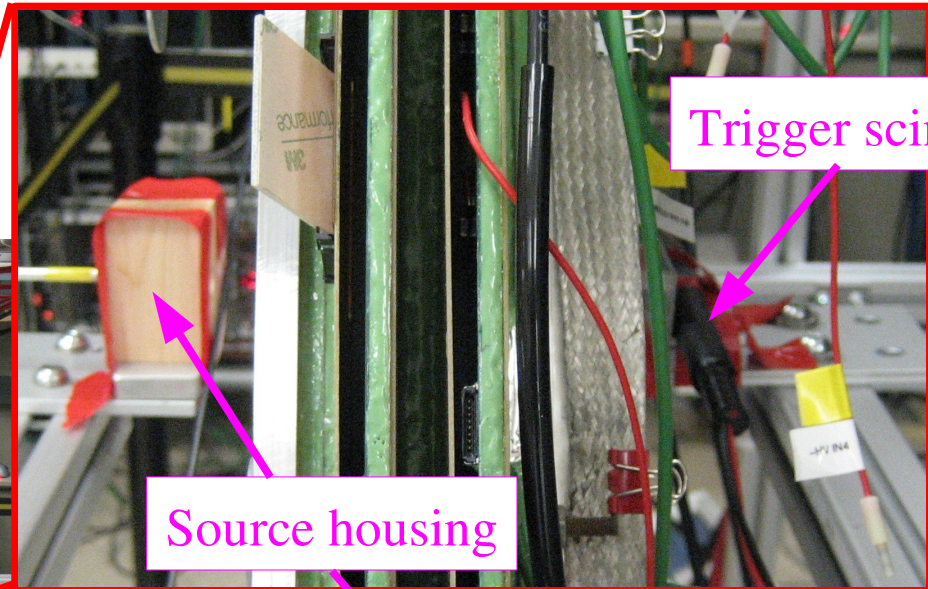
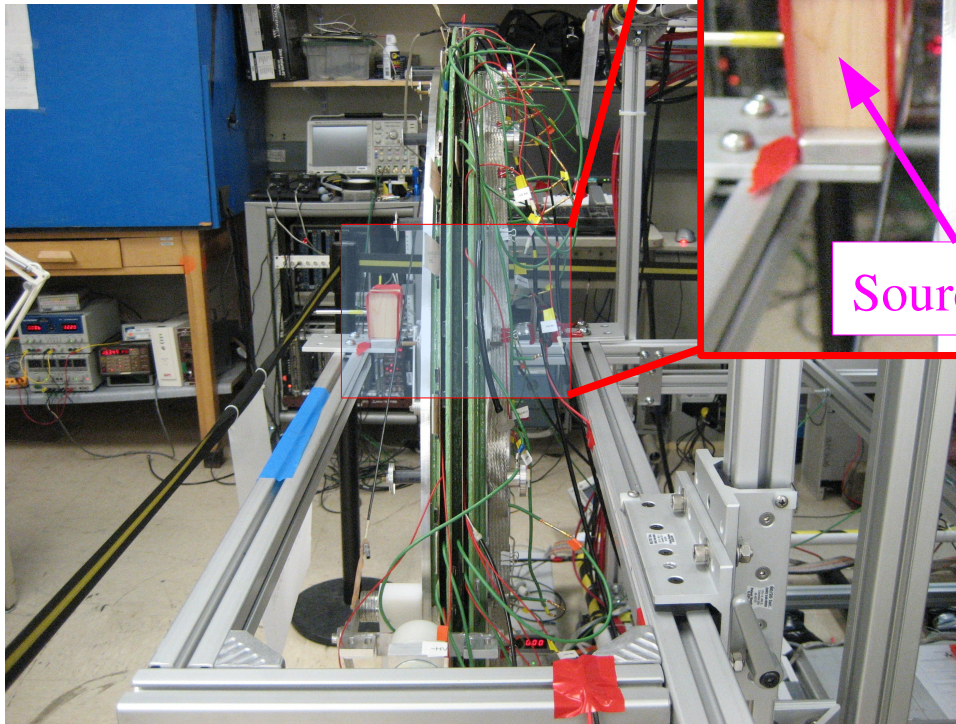


Cathode-anode coincidence



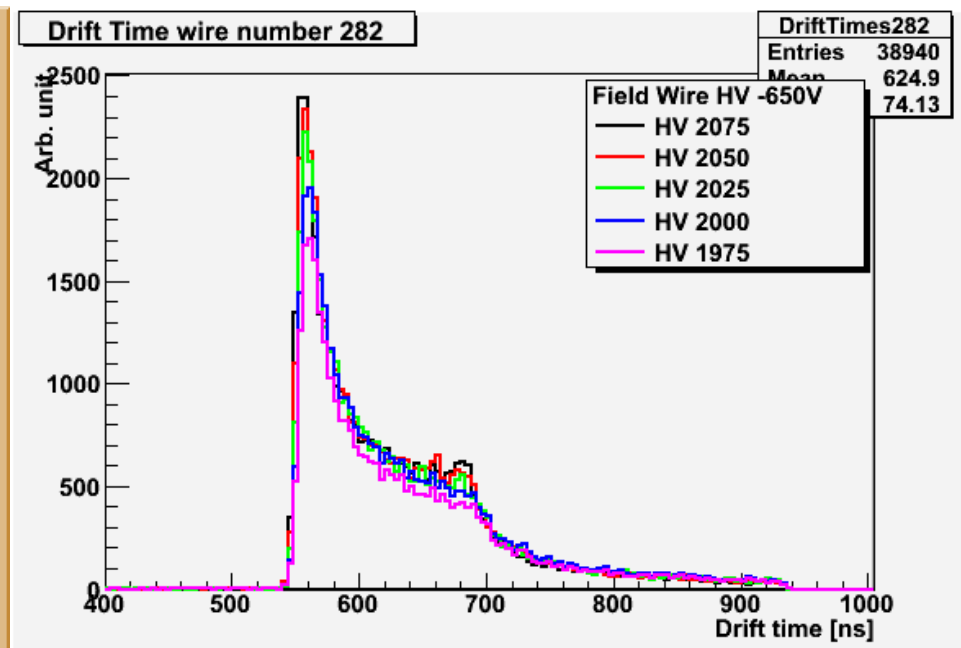
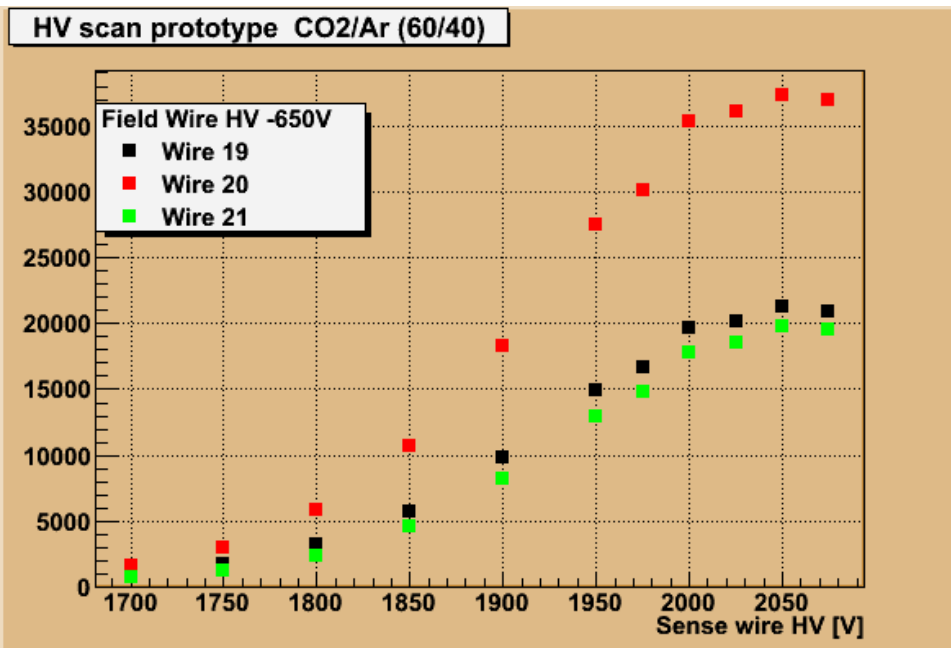
Tests of 2-layer prototype with sources

- Can move source in x and y



Plateau curves and drift time distributions

Sr-90 source

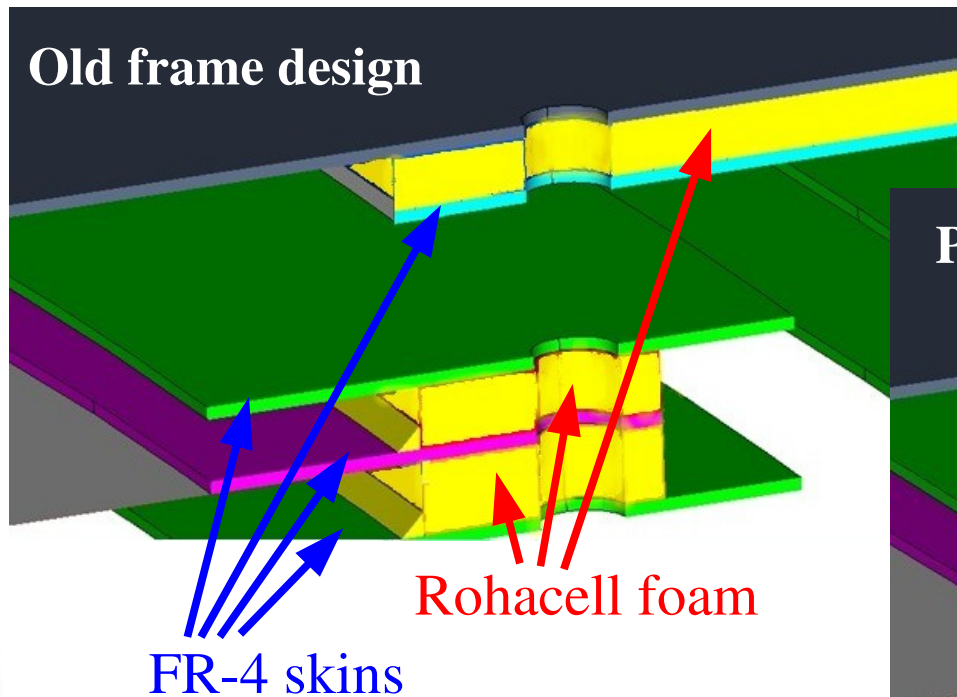


Gas-sealing issues with current design

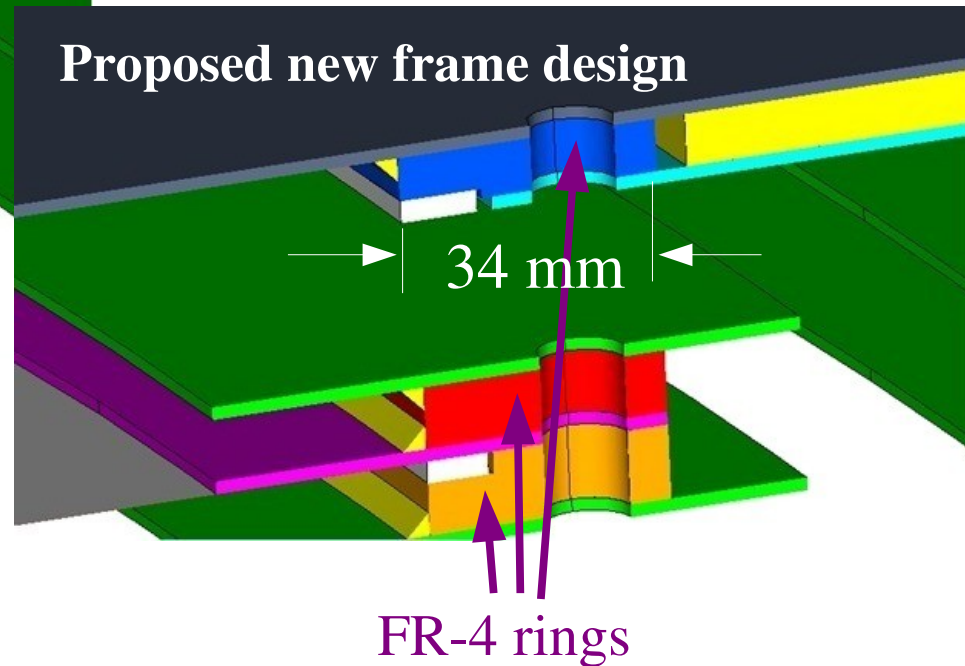
- We have been experiencing difficulties making sure that the prototype is gas-tight
- Problem areas have been identified:
 - Light-weight foam core crushed by over-torquing screws
 - Flaws in wire-board design leading to improper sealing surface for o-rings
 - Uneven surface and unfilled vias on front side
 - Bad placement of capacitors on back side
 - Flaws will be addressed in next (production) revision of boards

Modified Frame Design

- Problems with sealing gas volume → replace foam core under o-rings with FR-4 ... we plan to test this idea with a full-scale prototype



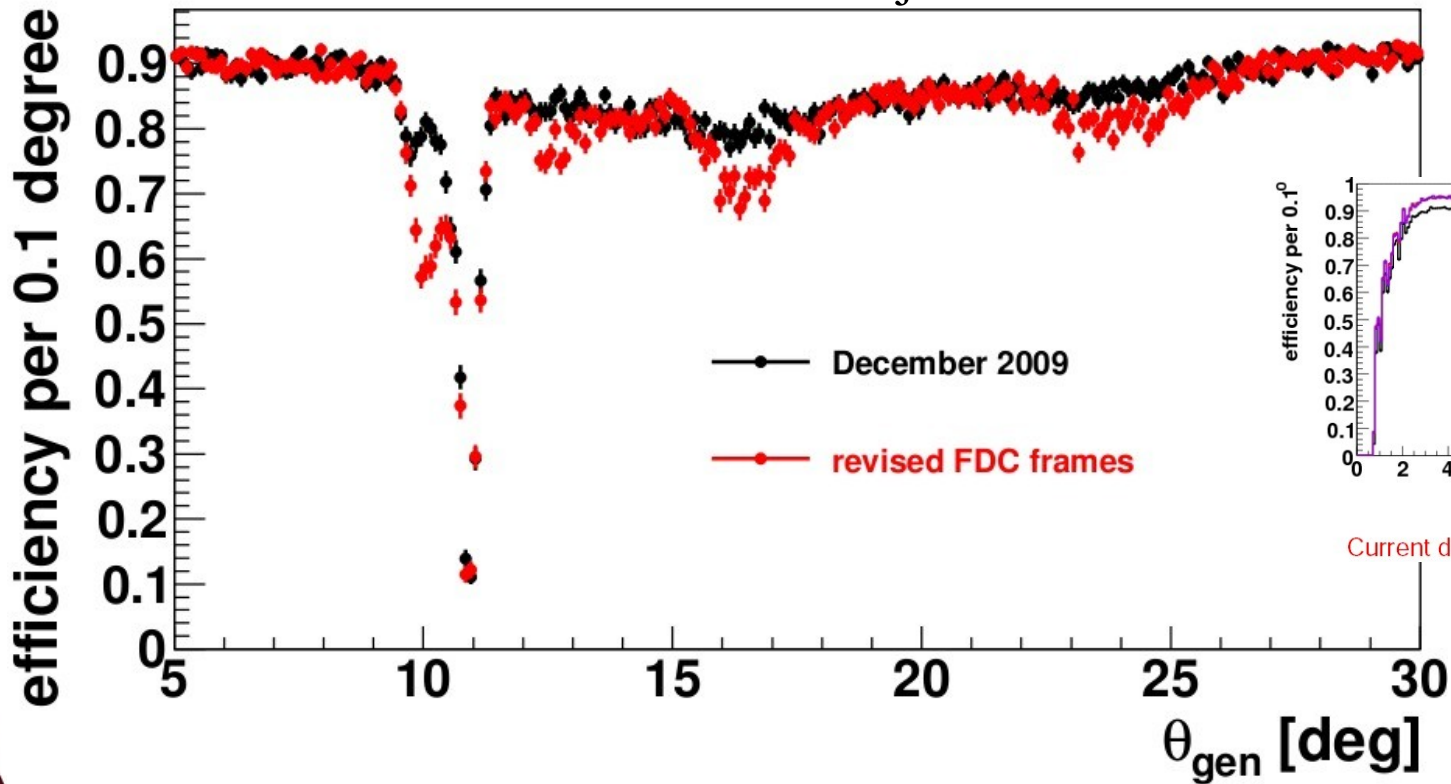
*Solid ring of support for
o-ring compression...*



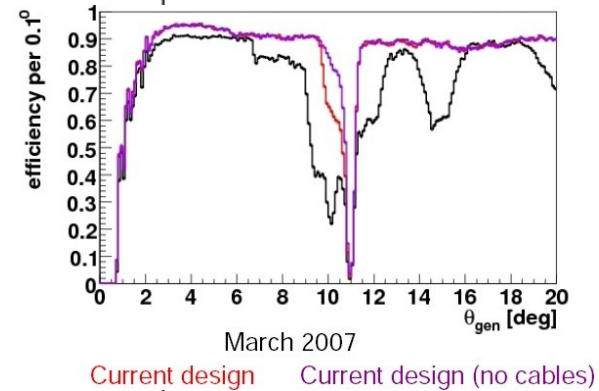
Impact of Modified Frame Design

Plot generated by
Mihajlo Kornicer

Photon reconstruction efficiency

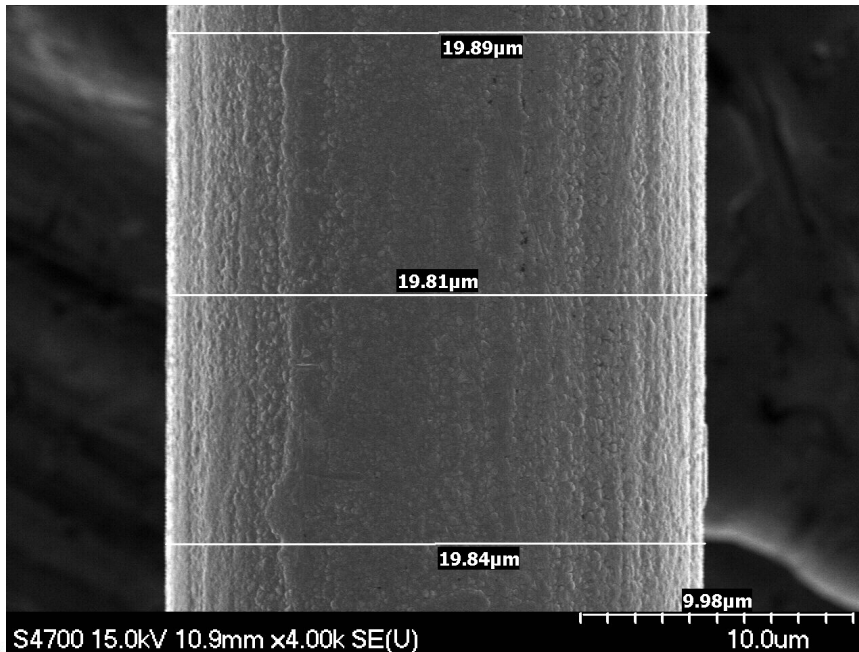


Plot from 2008



Wire Quality

- We have received the full amount of 20 μm W sense wire and 80 μm CuBe field wire for the full assembly
 - Gold coating looks good under optical microscope
 - Samples from each spool met the spec for tensile strength



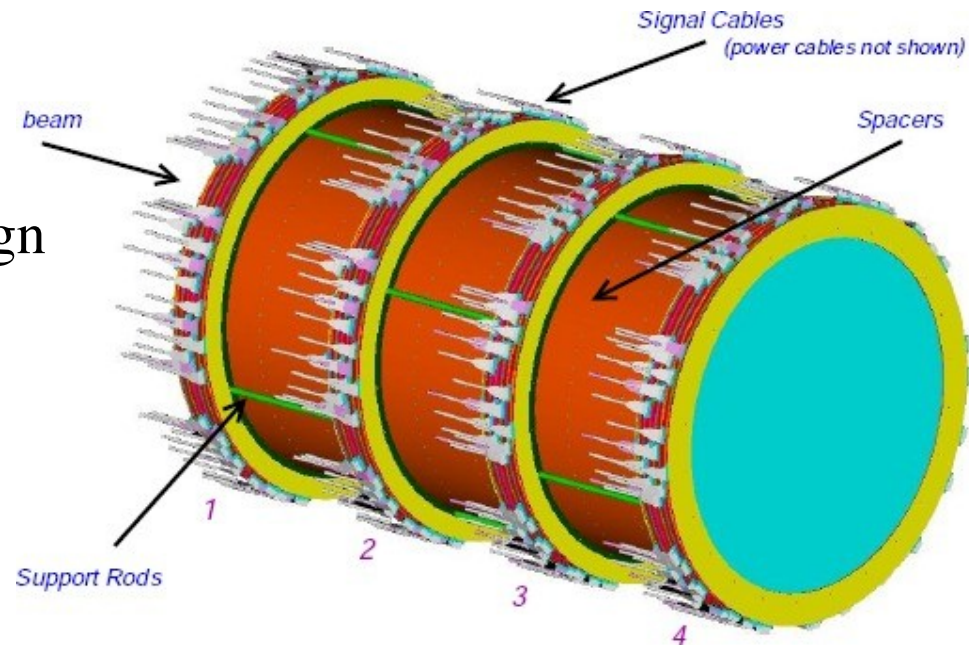
Sample SEM image of sense wire

Test plan for full-scale prototype

- Start out testing 2-layer configuration
 - Basic mechanical and electrical tests (checking for shorts, etc.)
 - Wire conditioning
 - Tests with Sr-90 and Fe-55 sources
 - HV plateau, obtain operating sense and field HV settings
 - Study responses of wires and strips with different lengths
 - Tests with cosmic rays
 - Map out performance as function of position (edge effects?)
- Three-layer configuration
 - Readout with 125Mz Flash-ADC

Further prototypes

- Work is underway to construct a cathode sandwich + new wire frame laminate → include in full scale prototype
- Mechanical prototype planned
 - Cable packing scheme
 - Cooling loops
 - HV distribution attachment
 - Exoskeleton (inter-package) design
 - Survey points
 - Installation schemes
 - ...



Steps toward a final product

- Final design of wire frame PCBs is now underway
- Planning is underway on final rigid-flex and cathode designs
- Cathode material has been delivered for production boards
- Procurement of wire frame PCBs and cathodes will take place in the spring (~April).
- Procurement of G10 for frames will begin in February.
- Plan to start production wire winding Oct. 1.
 - Winding will take place at IUCF (same facility as for prototype)
 - IUCF ready to work with us to prepare “Phase 3” contract and come up with budget estimate