

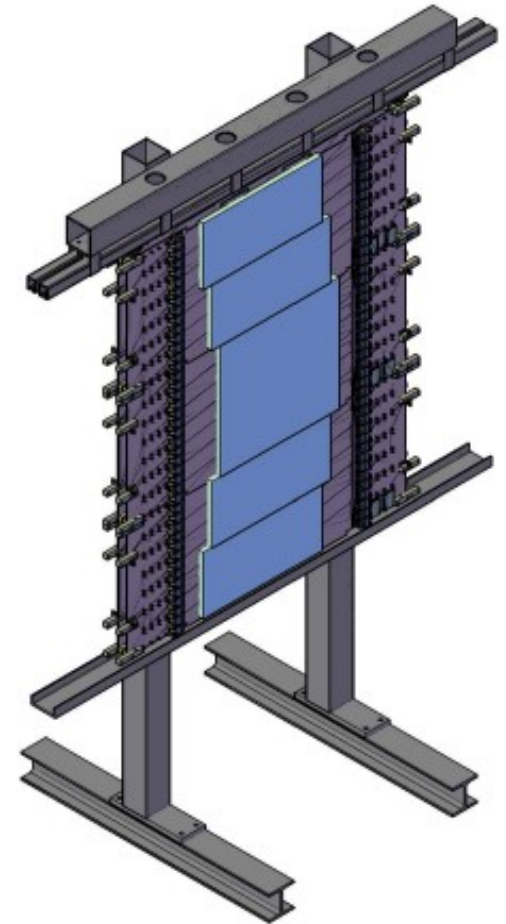
Coordinate Detector

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SBS G_M^n Experiment Readiness Review
15th June 2017

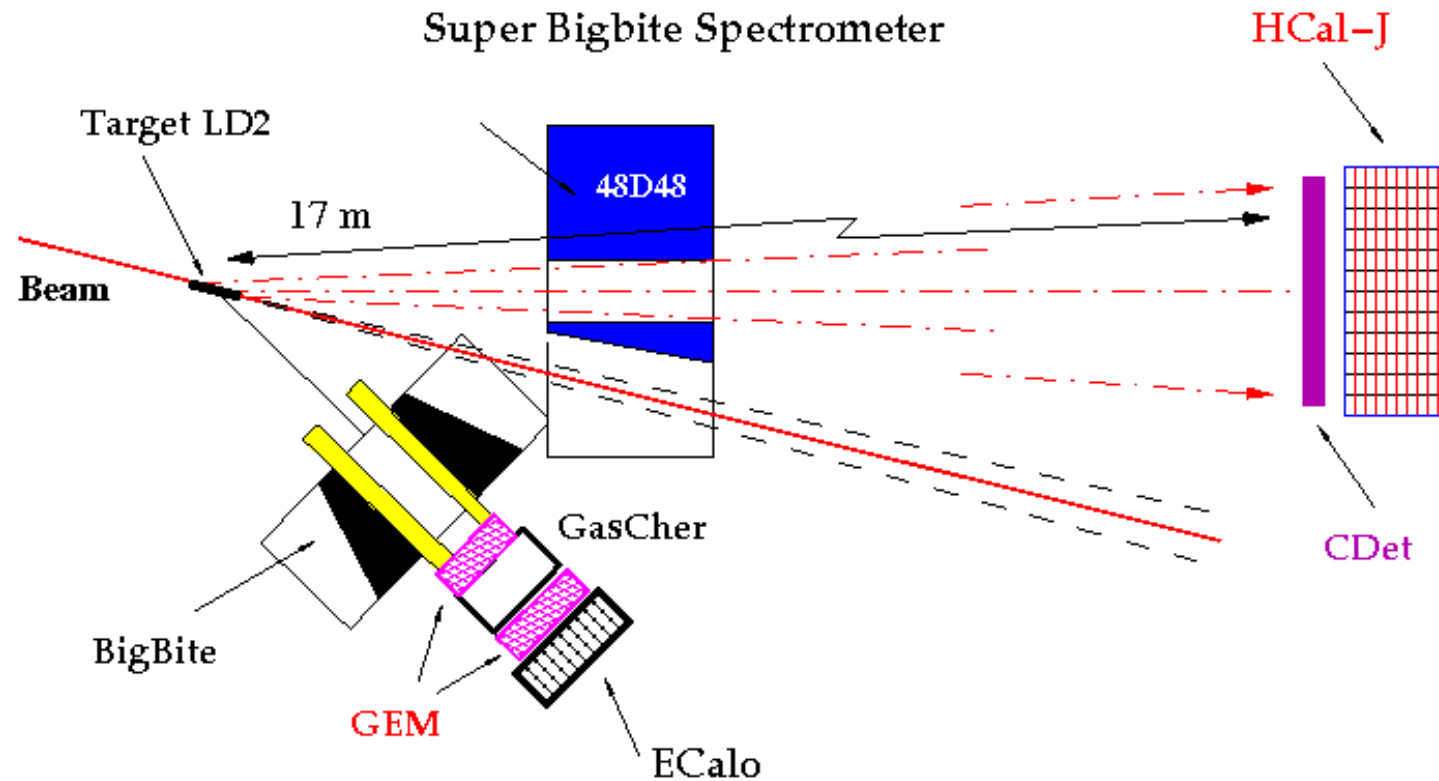
Coordinate Detector (CDet)

- A scintillator detector for charged particle detection.
- **GEn/GMn**: placed in front of hadron calorimeter (HCAL) to tag protons.



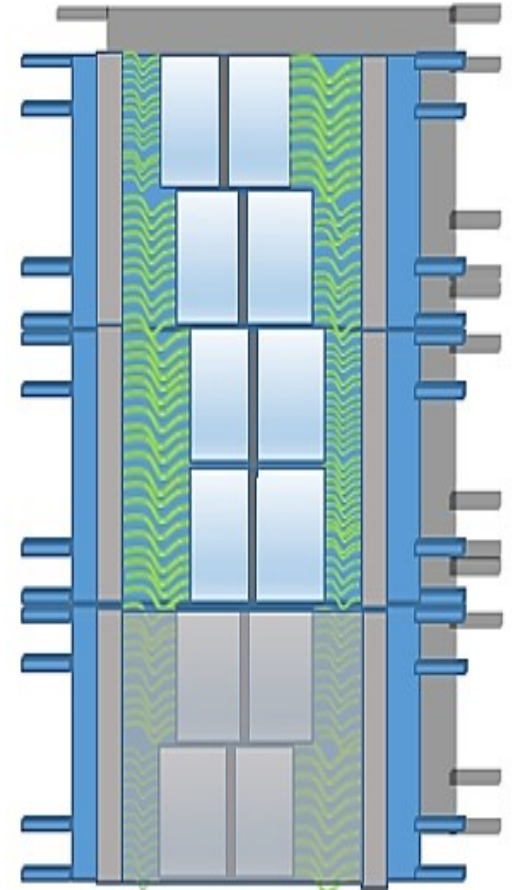
Experiment Layout

Neutron experiment: GMn/GMp E12-09-019

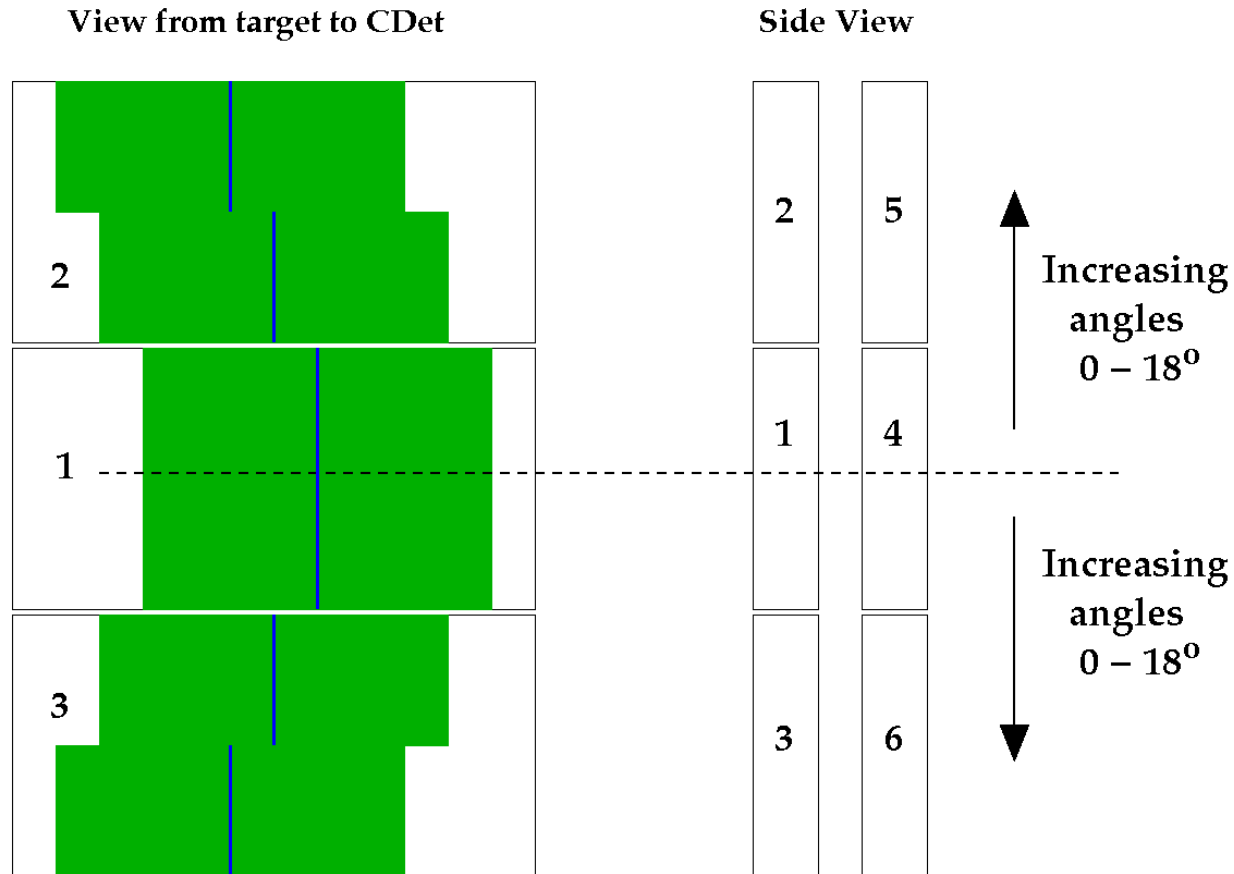


Coordinate Detector Configuration

- Detector has two planes each with an active area of $(102 \times 294) \text{ cm}^2$
- 6 modules; 3 per plane; 28 scintillator **groups** in each module.
- Each group consists of 14 scintillator **paddles**.
- Total of 2352 channels.
- Each paddle has a **wavelength shifting fiber** (WLS) along its center for light collection.
- Each group of WLS connected to 16-channel **maPMT**

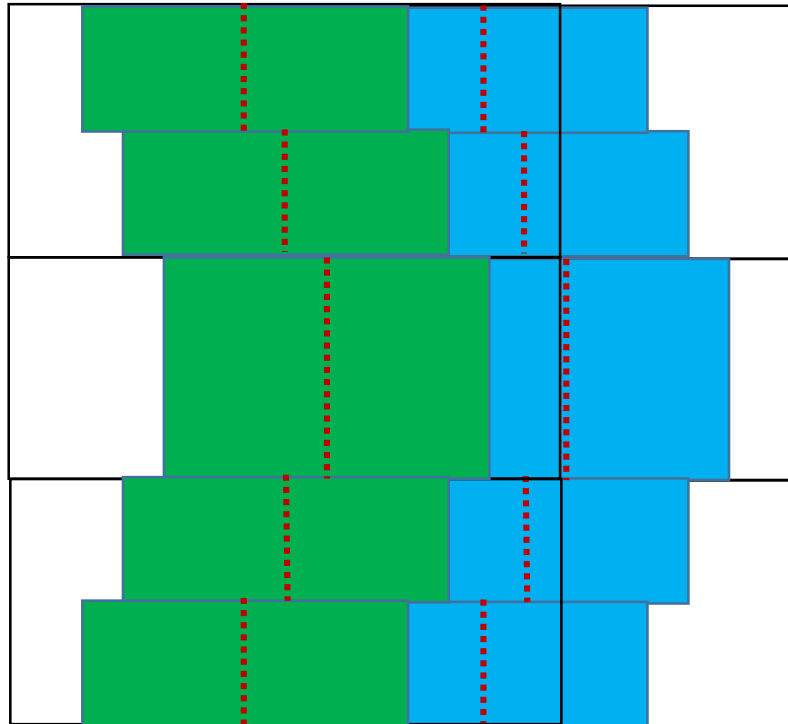


CDet Module Layout



- Center mirror for left/right divide
- Allows cone acceptance matching
- Scintillator paddles angled to point shortest side directly at the target.

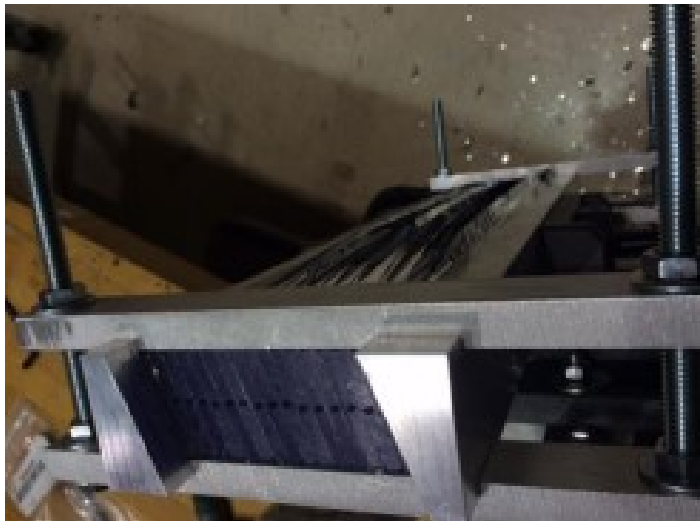
Acceptance Coverage



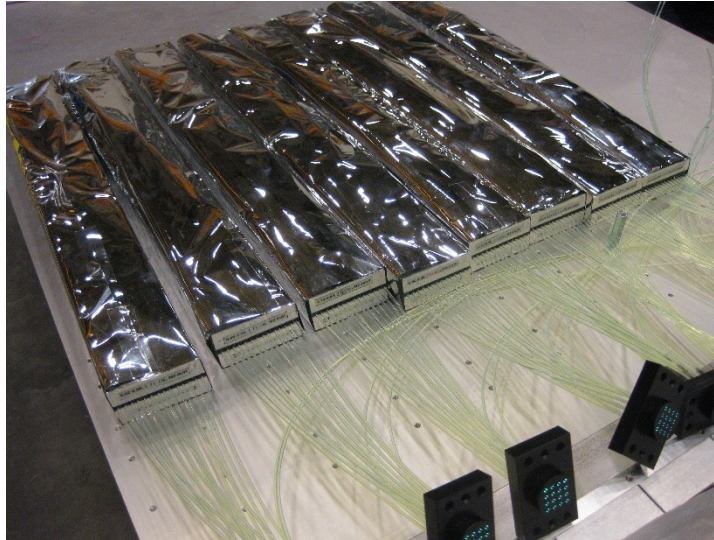
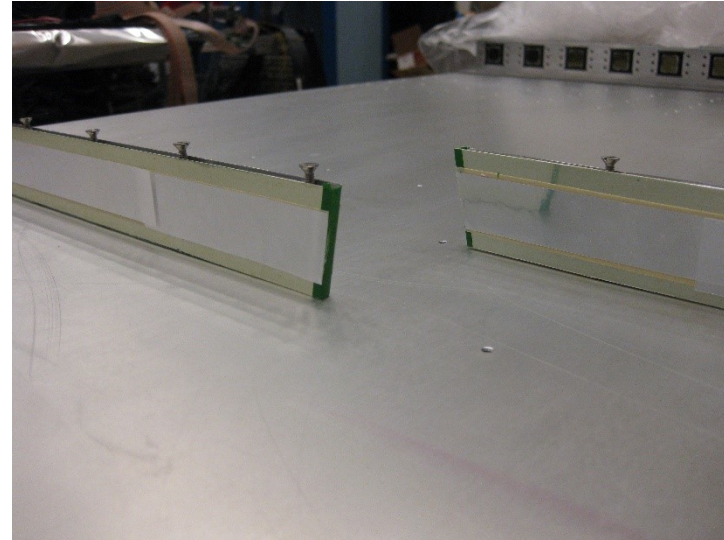
- Offset planes to cover Hcal acceptance

Group Construction

- Each scintillator paddle individually wrapped in aluminized mylar.
- Fourteen paddles combined in each group.
- Used custom jig to assemble each group with the correct angular spread (0.86°)

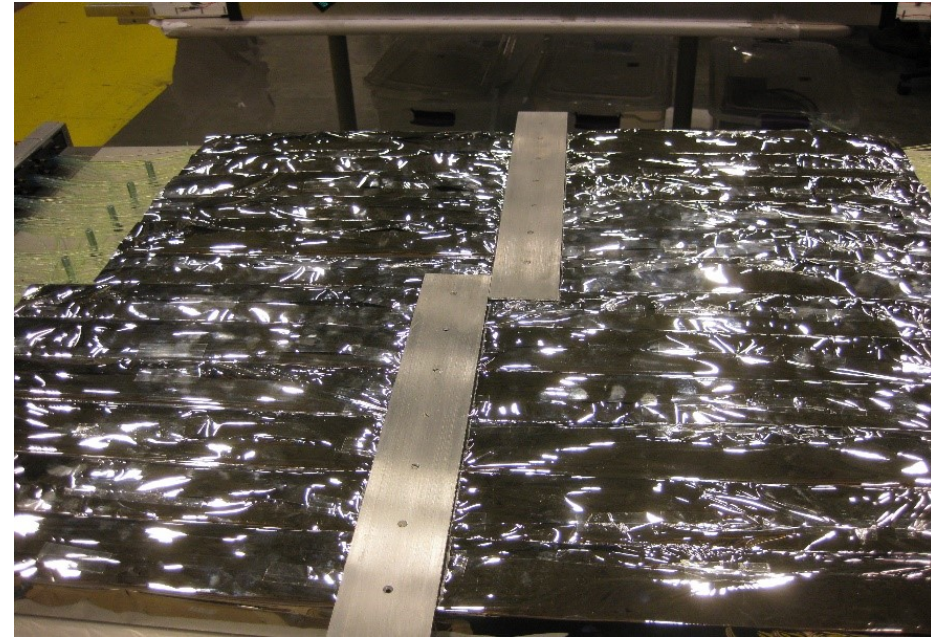
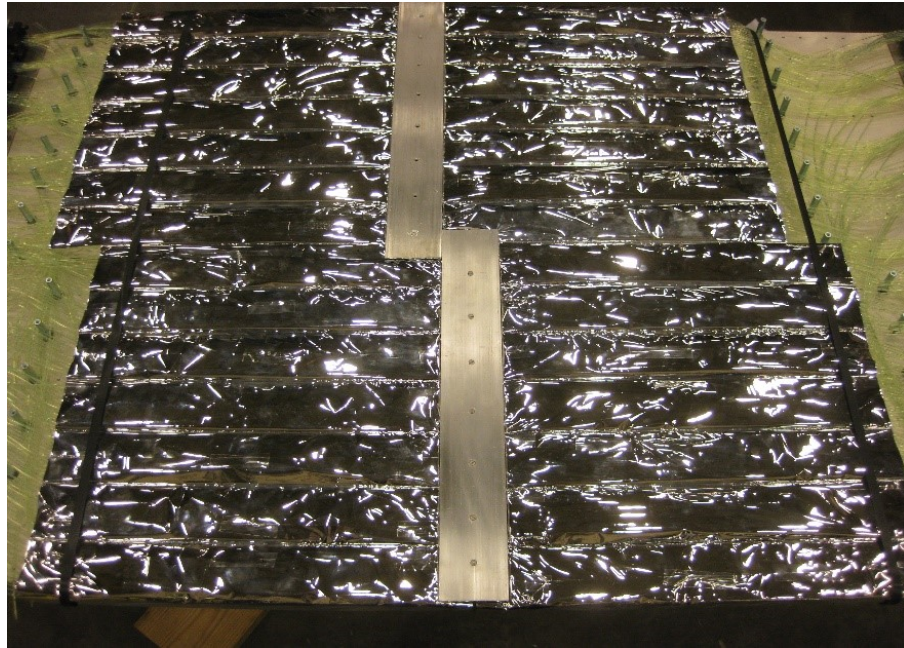


Module Assembly



Module Assembly

- Note the staggered mirrors
 - required new set of clamping plates made



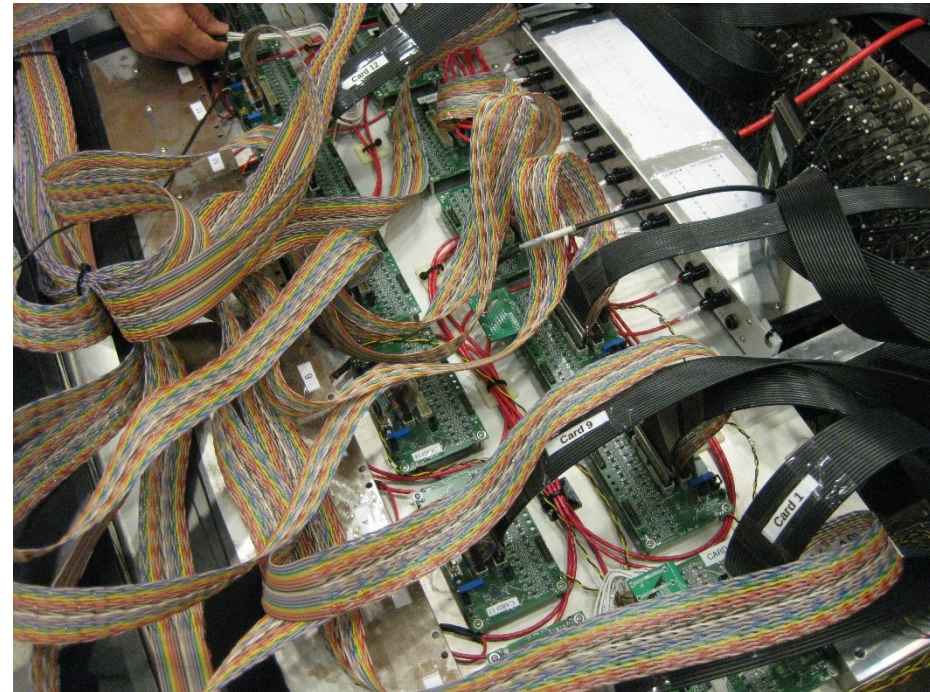
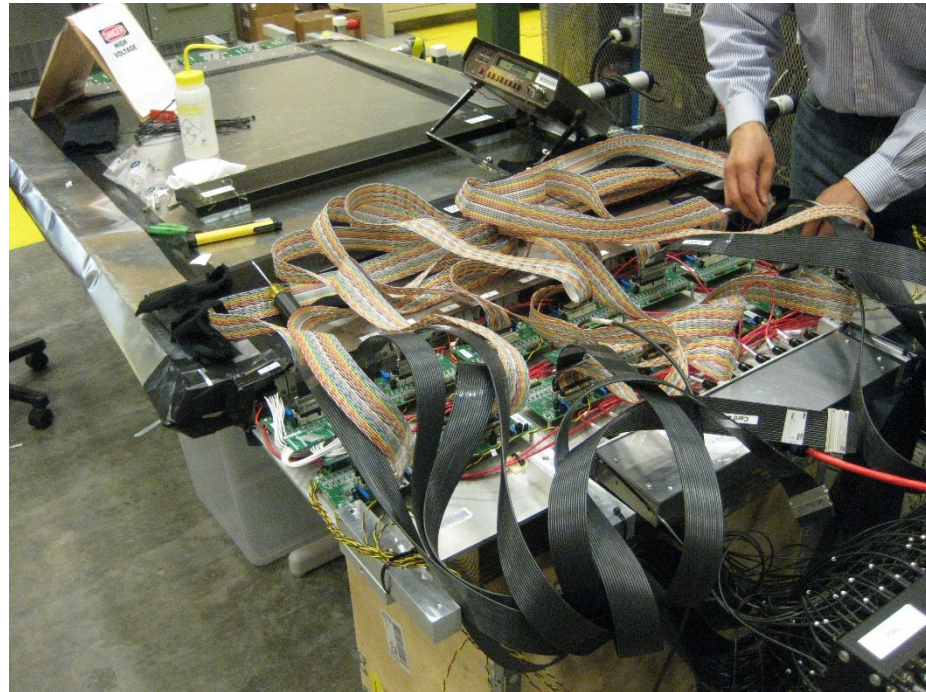
Module Assembly Completed!

- All six modules assembled; awaiting testing.



Module 1

- One half fully instrumented – ADC & TDC
- All NINO cards installed.
- Commissioning in progress.



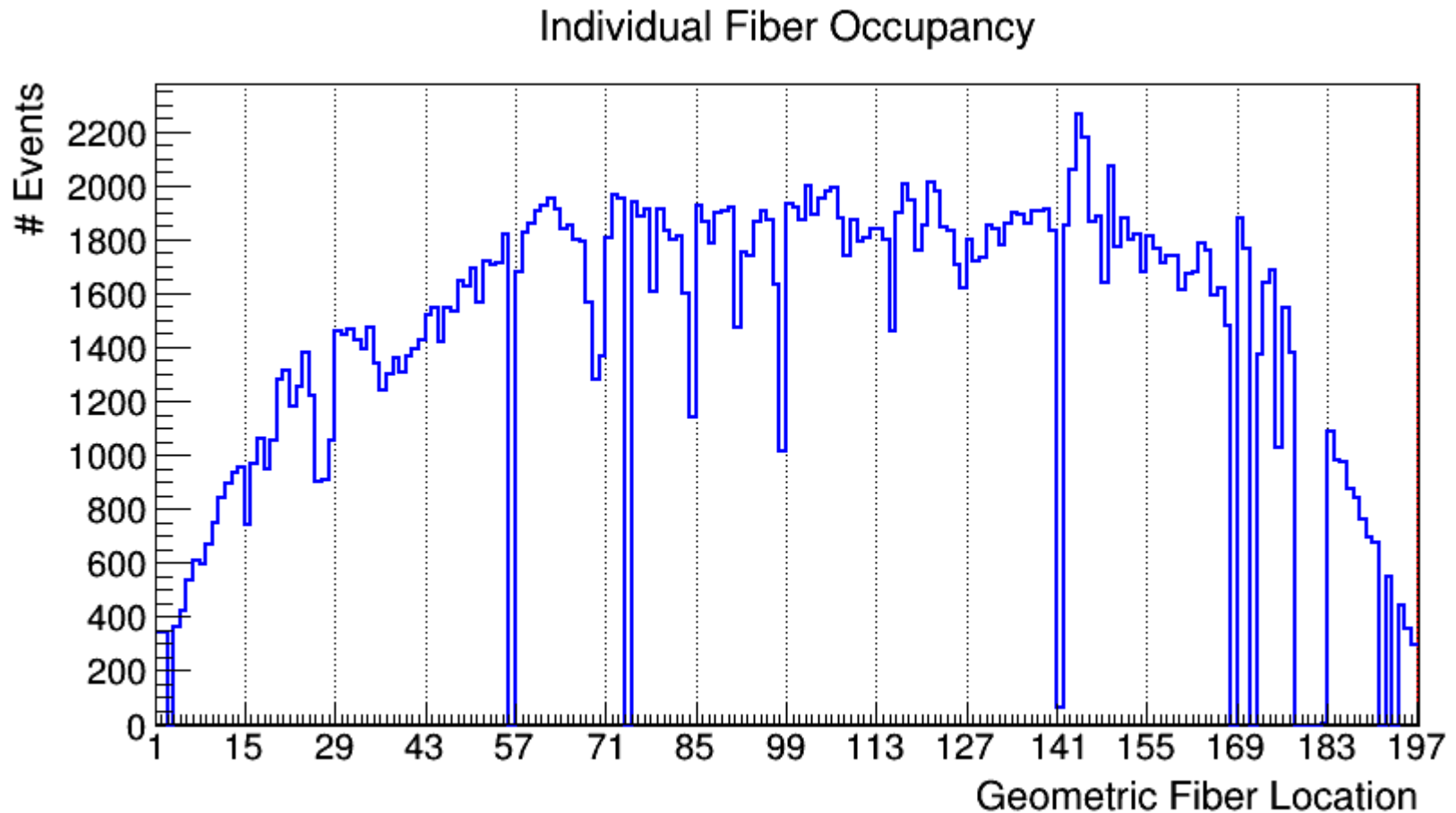
Equipment Status

HV control and modules	Using existing
HV cables	WBS 2.1 purchased
9 Fastbus crates	Using existing
9 SFI Fastbus	Using existing
9 VME CPU	WBS 2.1 purchased
9 JLab TI	WBS 2.1 purchased
1877 TDCs	Using existing
Multi-Anode PMTs & bases	Using existing
WLS Fibers	WBS 2.1 purchased
Scintillators	WBS 2.1 purchased
Module Frames	WBS 2.1 purchased
NINO amplifier/discriminator cards	Glasgow Univ. purchased
Cables (ribbon, PMT-NINO)	INFN-Catania purchased
CDet Frame	WBS 2.1 purchased
CDet Absorber	WBS 2.1 purchased

Software Development

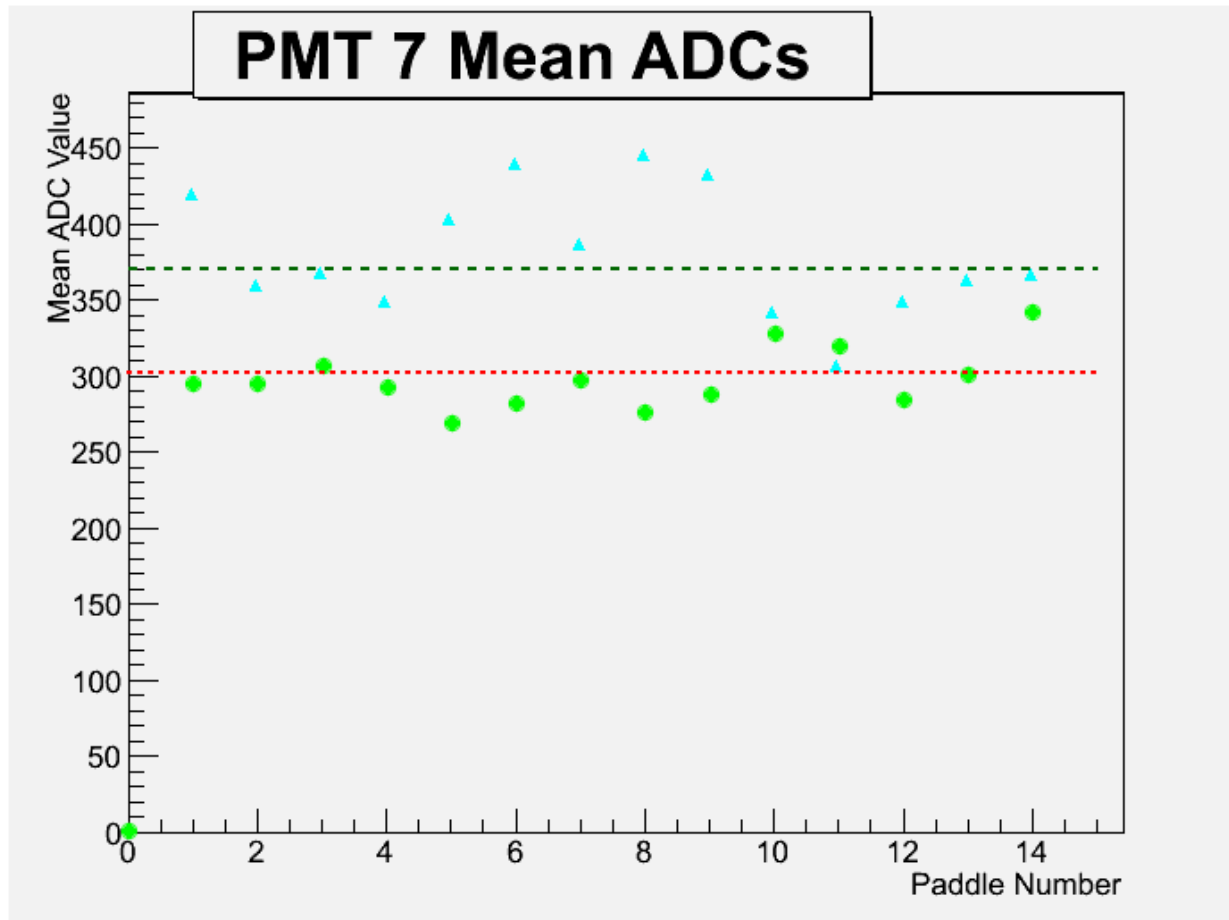
- Software decoder for DAQ being updated
 - following Hall-A analyzer design.
- Established software repository on GitHub
 - CNU undergraduate students starting to develop/understand software.
- DAQ has been established for complete half of first module.
- Developing analysis and diagnosis software
 - Software being written with a view towards the experimental running
- CNU has committed faculty and students to this effort.

Check of All Fibers



- Check occupancy of all fibers – highlight problematic channels

Charge Equalisation



▲ original
● after adjustment

- Mean ADC for single paddle cosmic events.

Summary

- Commissioning in progress.
- Software databases, tools, analysis scripts being updated and developed.
- Working to determine the required resistances for charge-equalization of each pixel/fiber.
- Continue to systematically test all six modules.