

Ralph Marinaro

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Super BigBite Collaboration



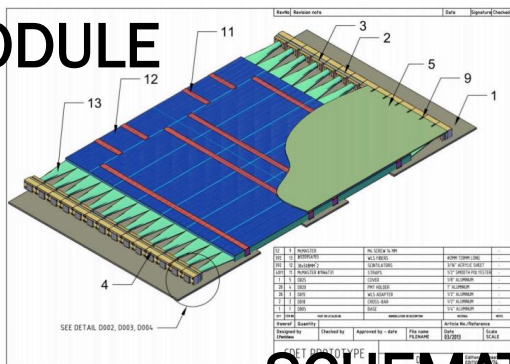
Christopher Newport University

OVERVIEW, PURPOSE & DESIGN

- **Presentation Overview:** Coordinate Detector (CDET) HV, TDC, LV & Hall A installation
- **CDET Purpose:** to precisely measure position and trajectory of particles within the electron arm of the Super BigBite Spectrometer (SBS), specifically for measurement of the electron (e') azimuthal scattering angle and ECAL cross-calibration
- **CDET Design:** double-layer scintillator detector with wavelength-shift (WLS) fibers used as light guides to 168 multi-anode (4x4) H8711-20 PMTs to 168 NINO ASIC amp./disc. cards to readout DAQ.
 - 2352 polyvinyl toluene (PVT) paddles ($4 \times 0.5 \times 51 \text{ cm}^3$) stacked in six modules with split (left/right) mirrors in the middles, 3 modules per layer
 - total active area $104 \times 294 \text{ cm}^2$ and $>3 \text{ m}$ height including frame
 - paddle angular spread $\pm 18^\circ$ up and down from center, 14 paddles grouped per bar, one bar per PMT per NINO, wrapped in reflective mylar

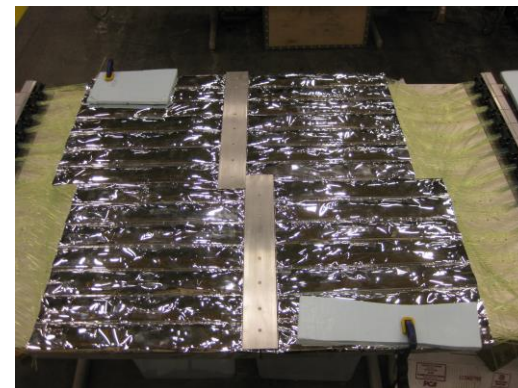
DIAGRAMS AND PHOTOS

MODULE

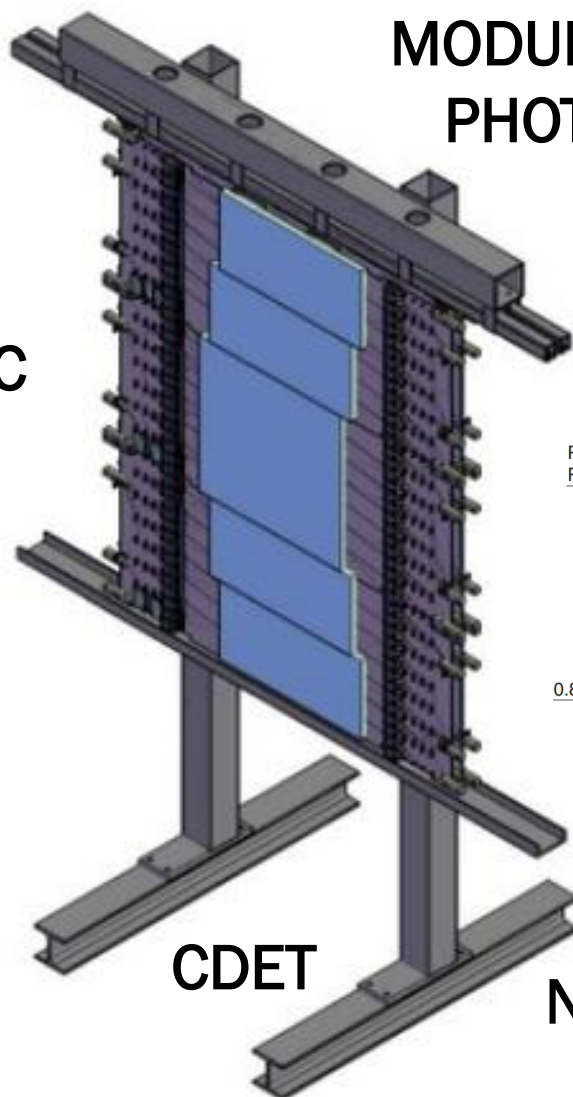


SCHEMATIC

MODULE PHOTO



DETECTOR FRAME

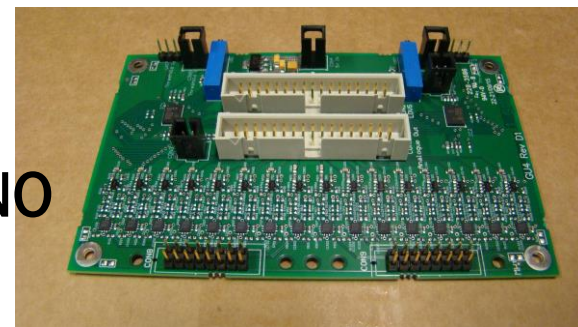
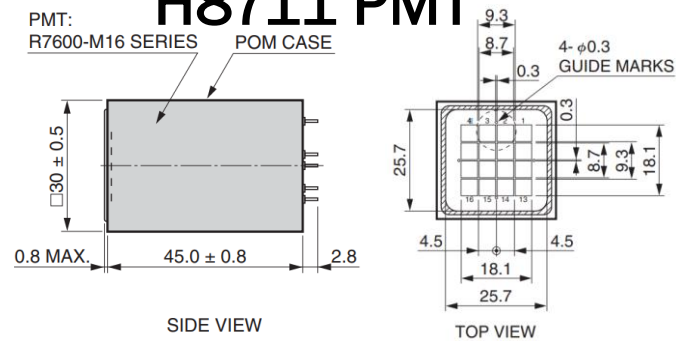


CDET

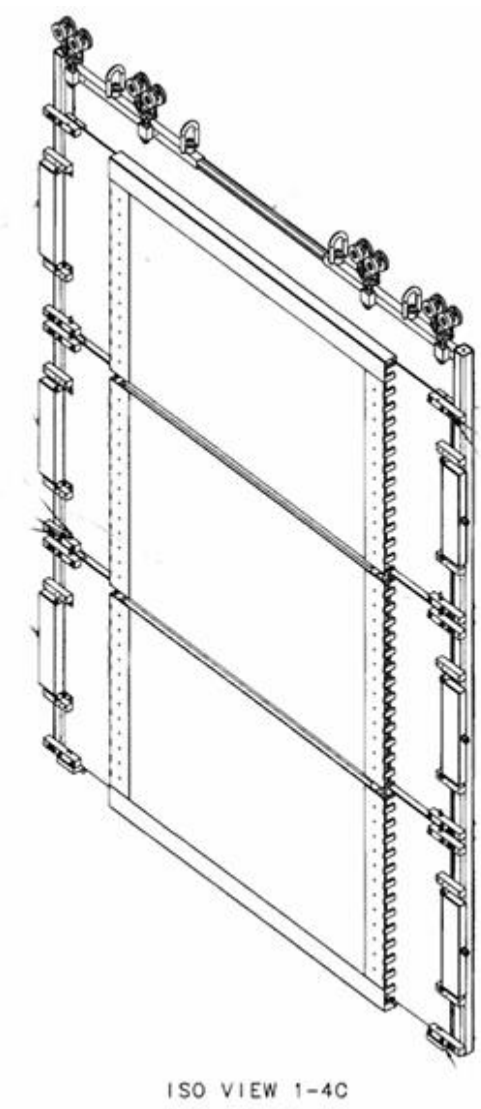
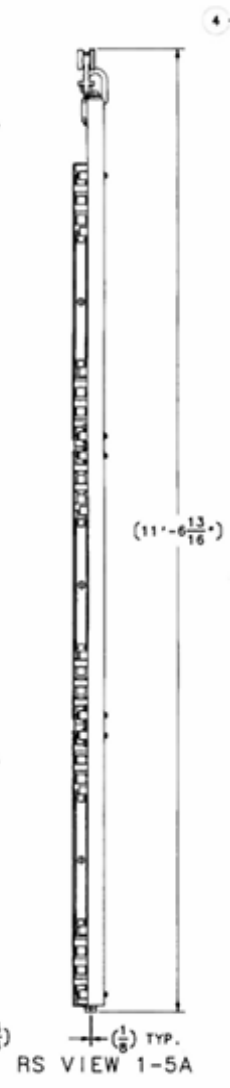
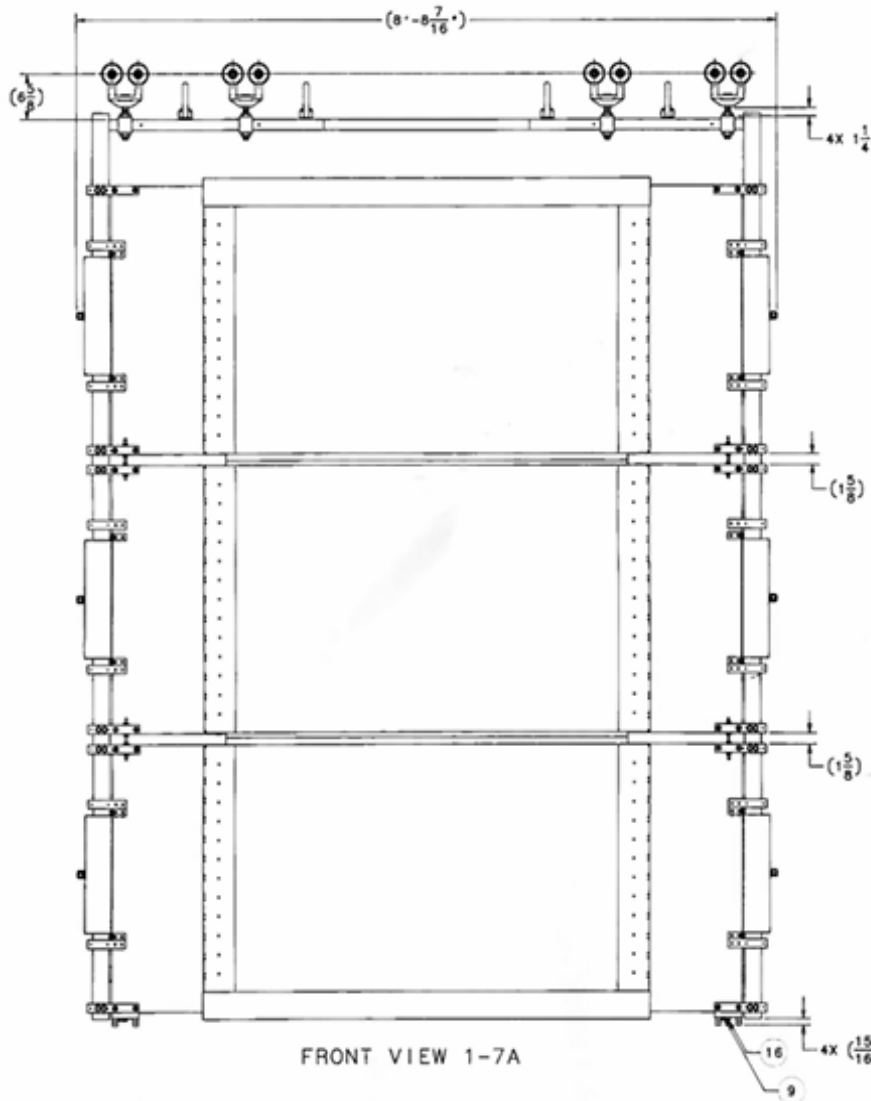
NINO

H8711 PMT

PMT: R7600-M16 SERIES POM CASE



DETECTOR SCHEMATICS



HV, LV & TDC – COMPONENTS & STATUS

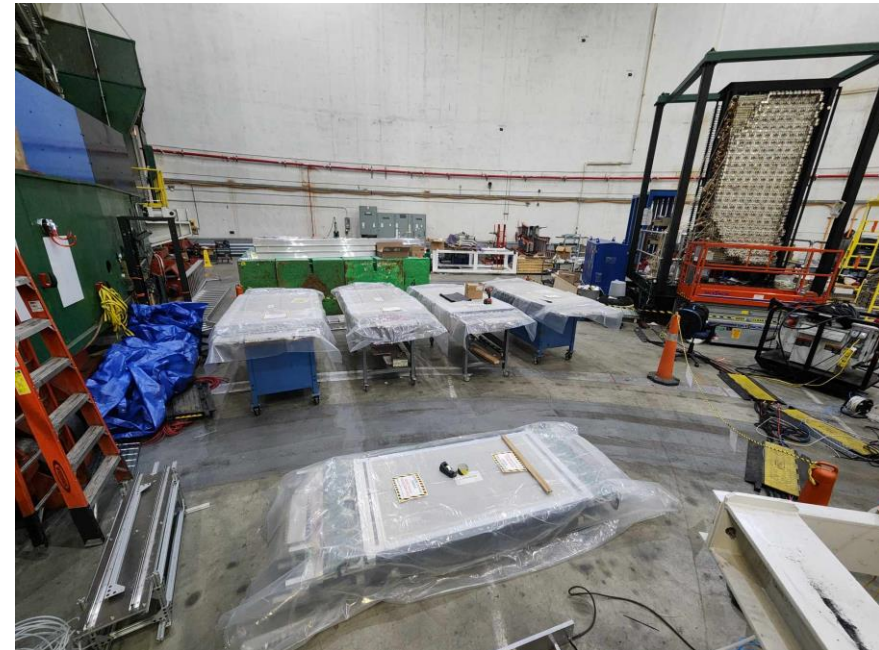
COMPLETE	CLOSE	STARTED	NOT STARTED
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MADE OR ACQUIRED	HV	LV	TDC	
	LECROY CRATE (1)	POWER SUPPLIES (3)	RESISTOR CARDS (336)	PATCH PANELS (12)
	1461N HV CARDS (16)	POWER CABLES (12)	TDC READOUT (15)	DAQ CRATE (1)
	LONG CABLES, 100' (168)	LV BOXES (6)	NUGENT CABLES (84)	SHORT CABLES, 25' (168)
	SHORT CABLES 8-25' (168)	LONG LV CABLES, 25' (24 x 7)	LONG CABLES DAQ-REP, 100' (168)	
	H8711 PMTs (168)	LV JOINTS (24)	LTR PANELS & CARDS (12)	LTR POWER SUPPLY (1)
	PATCH PANELS (3)	SHORT LV CABLES, 7-25" (84 x 2)	LONG CABLES REP-FRAME, 100' (168)	
	HV BOXES (12)	NINO Cards (168)	MINI-BUNKER RACK (1)	SMALL RACKS (4)

INSTALLED	HV	LV	TDC	
	LECROY CRATE (1)	POWER SUPPLIES (3)	RESISTOR CARDS (336)	PATCH PANELS (12)
	1461N HV CARDS (16)	POWER CABLES (12)	TDC READOUT (15)	DAQ CRATE (1)
	LONG CABLES, 100' (168)	LV BOXES (6)	NUGENT CABLES (84)	SHORT CABLES, 25' (168)
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CDET INSTALLATION STATUS

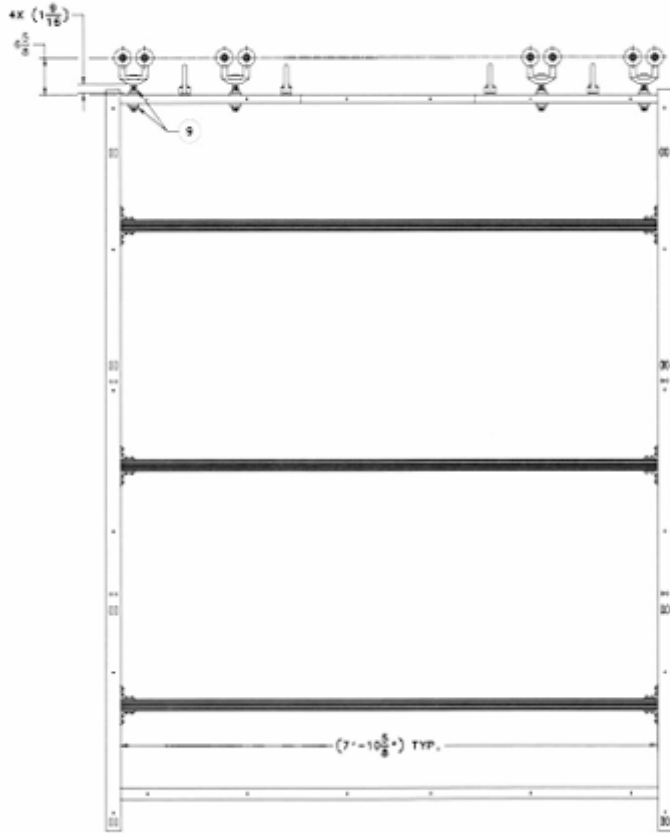
- **Modules 1-6:** finished retrofitting, light-tightness tests, currently installing internal cables going from detector to patch panels
- **Layers 1-2:** currently building layer frames and mounting layer 2 (modules 4-6)
- **CDET:** large frame cut down to fit through Hall A ramp, not moved to hall yet due to available space, access and ability to stabilize the frame
- **Testing:** likely going to test and troubleshoot channels layer by layer in flat orientation after mounting the modules, need HV and LV control asap to begin testing channels
- **Commissioning:** test lab commissioning complete (June 2024), hall commissioning will take cosmics in either flat or upright position depending on progress



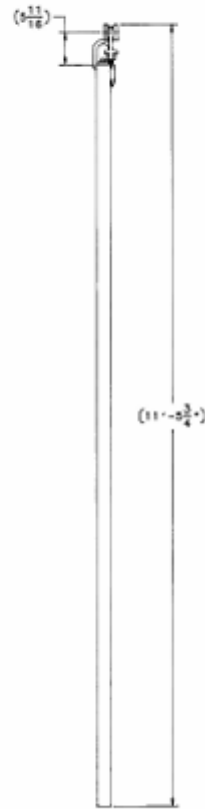
MOUNTING FRAMES IN HALL A



TOP VIEW

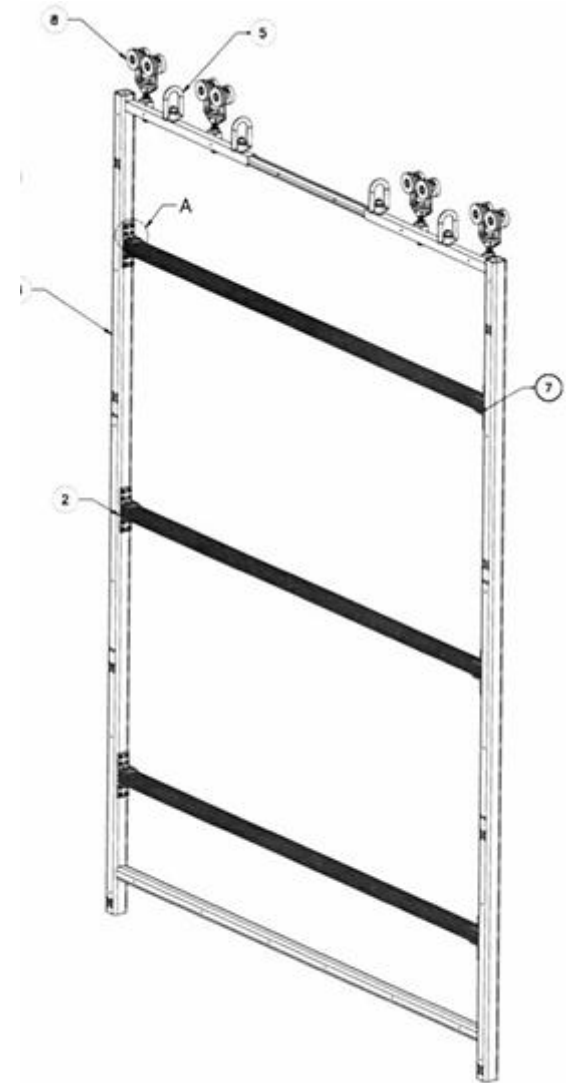


FRONT VIEW



RS VIEW

SCALE 1:1



ISO VIEW

MOUNTING FRAMES IN HALL A



EVERYTHING ELSE STATUS

➤ Data Acquisition In-progress:

- HV and LV remote control
- CODA config(s) for raw data
- Trigger external & coincidence
- TDC signal gate setup
- TDC reference channel
- Mapping TDC and HV channels

➤ Software In-progress:

- Database files and CDET replay
- Update CDET sim in G4SBS
- Finalize analysis data structure
- Develop online/offline scripts
- Develop calibration macros
- Confirm TDC calibration values
- Combine with GEP-5 replay
- Start CDET performance analysis

PERSONNEL SUMMARY

- Peter Monaghan (CNU) project supervisor, Ralph Marinaro (CNU Postdoc) day-to-day management, Ed Brash (CNU) software support
- Students:
 - Ben Spaude (W&M PhD) – supervisor: Todd Averett
 - CNU undergraduates: Jacob Bird, May Degilio, Gabriel Womelsdorf, Noah Cooper, John Kiechlin
- JLab Staff:
 - Mark Jones, Bogdan Wojtsekhowski, Alexander Camsonne, Lawrence Hurt, Zak Remele, Robin Wines
 - Hall A techs, Eng. & Design staff, physics electronics staff, thank you!!!