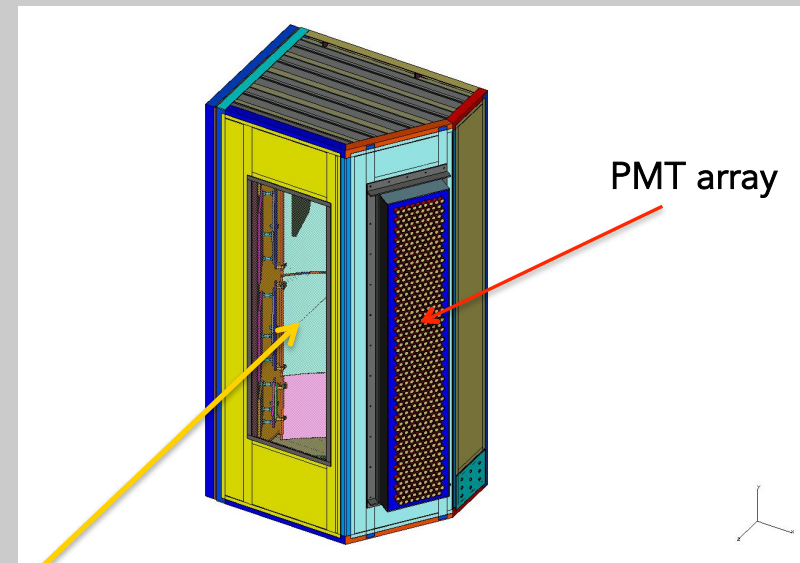


# UPDATE ON THE Gas RING Imaging Cherenkov “GRINCH” Detector

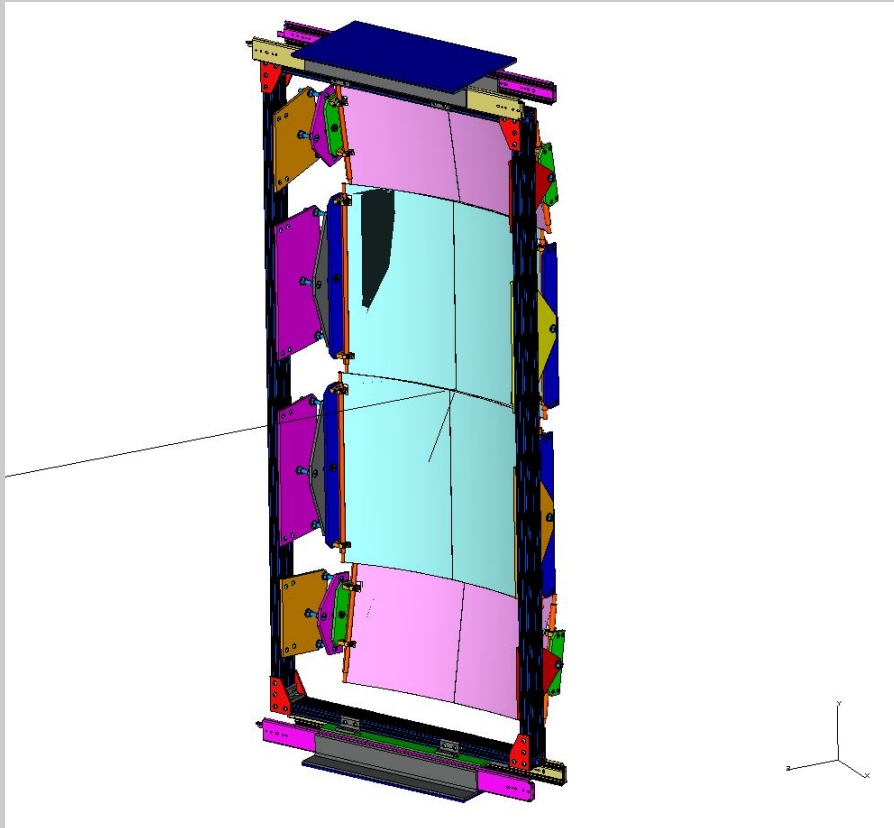
Todd Averett, *College of William and Mary*

*Carlos Ayerbo Gayoso, Scott Barcus, Tyler Blankenship  
Abdellah Amidouch, Sam Danagoulian, Bashar  
Bogdan Wojtsekhowski, Will Henninger (W&M shop)  
Hall A staff*

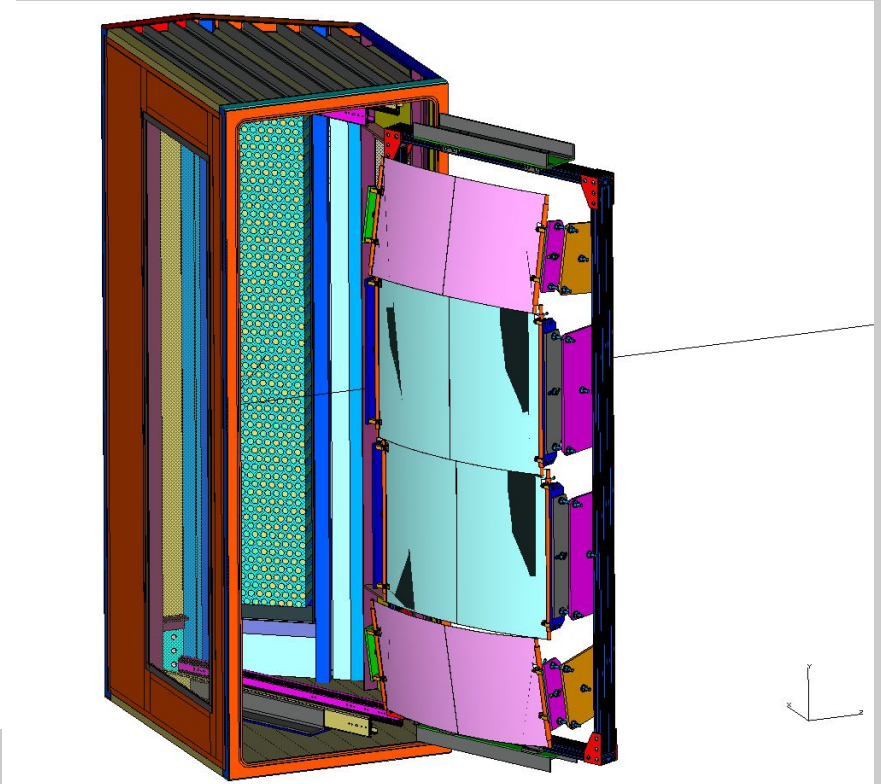
- BigBite spectrometer for  $A_1^n$ , SBS
- Gas Cherenkov threshold detector.
- Cylindrical mirrors; 510 PMT array
- Timing used to find clusters
- Fast, less sensitive to background
- Online trigger?



$e^-, \pi^-$

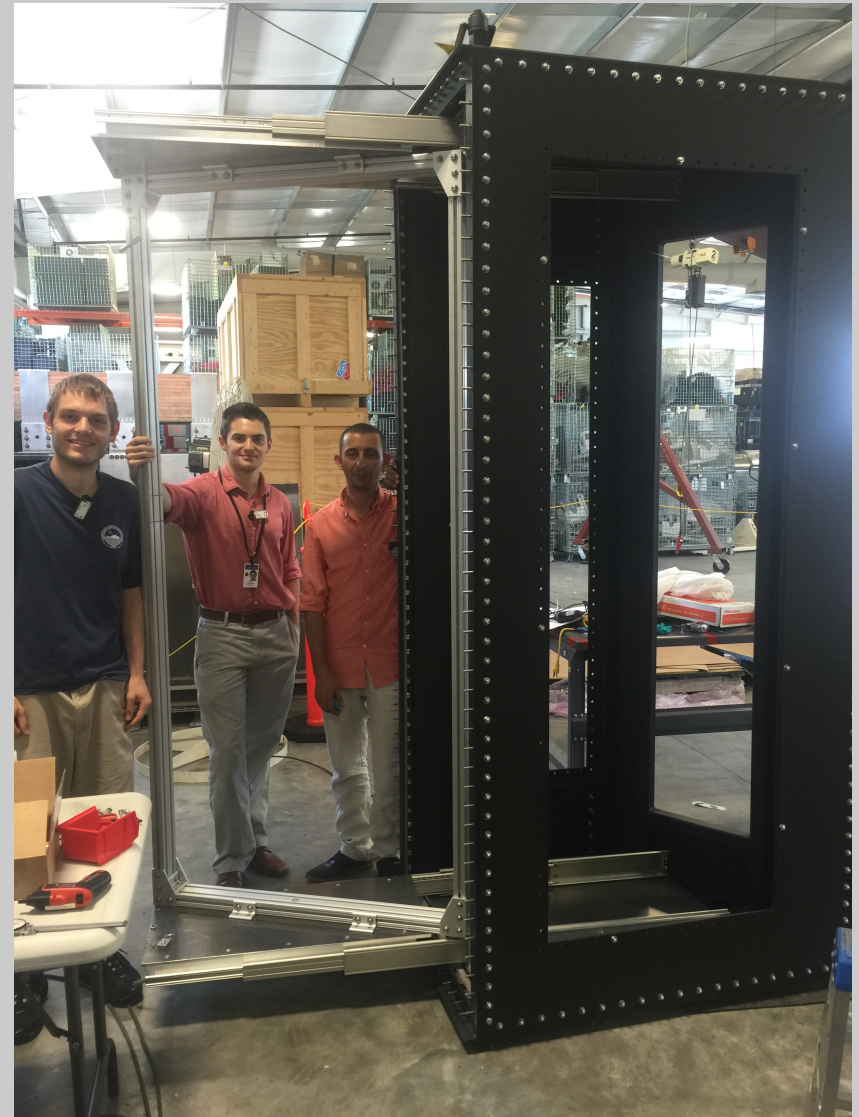


Mirrors and Frame  
Front View—Completed.  
Ready for final alignment  
and installation



Mirrors Out of Vessel  
Rear View

# GRINCH in the ESB




- SUMMER GOAL: Mechanical Assembly of the full detector using spare PMTs.
- PROGRESS:
  - Vessel—All side panels are attached and sealed with epoxy
    - Door is complete.
    - Windows are ready for installation when needed.
    - Rail system for mirror frame installed.
  - Mirror--
    - Mirror frame final assembly and alignment beginning.
    - Production mirrors ordered.
  - DAQ—
    - FastBus TDC system tested with GRINCH prototype detector.
    - Currently testing VETROC with prototype. Looks promising. Online cluster finding and trigger possible.
    - NINO—Front end cards are being used successfully for prototype studies.
  - PMT array—Magnetic shielding tests completed (NCAT).
    - Fully assembly of the array is underway with spare PMTs.
    - Shielding box is sealed with epoxy.
    - Question: reflectivity of iron shielding plates.

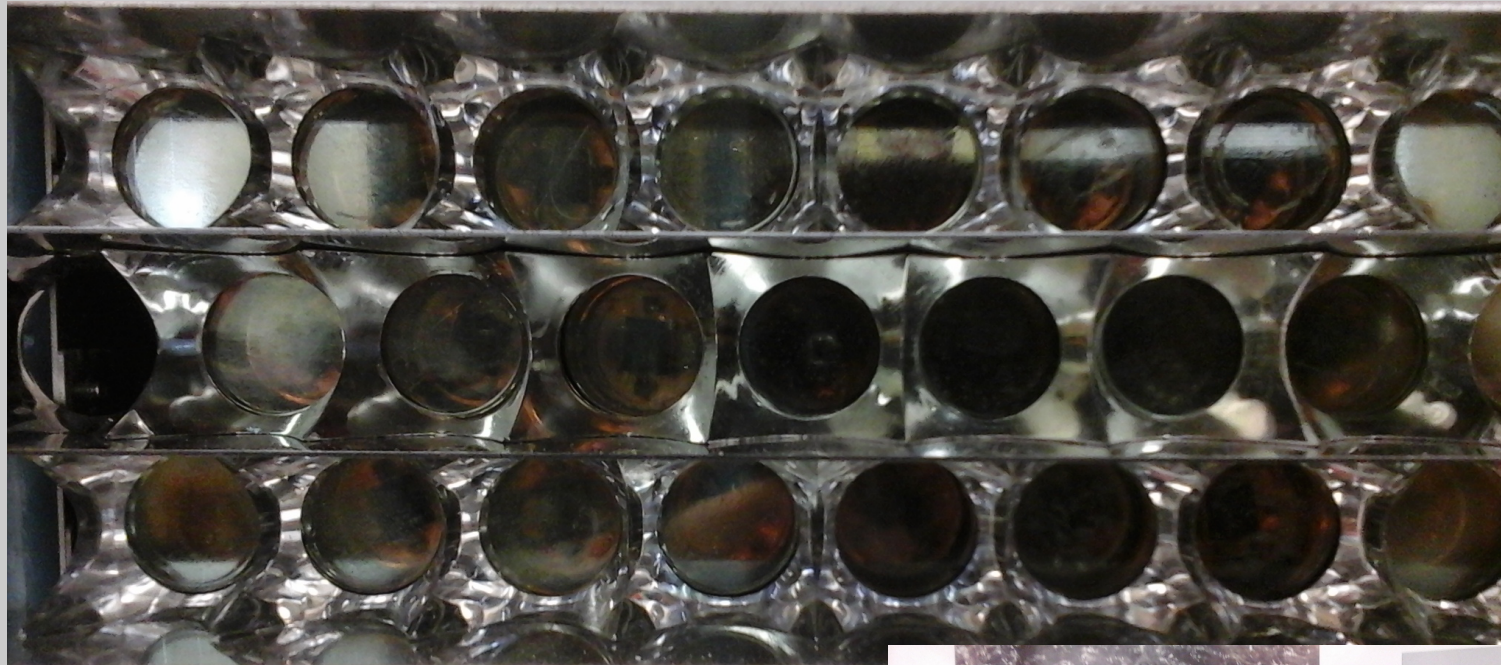




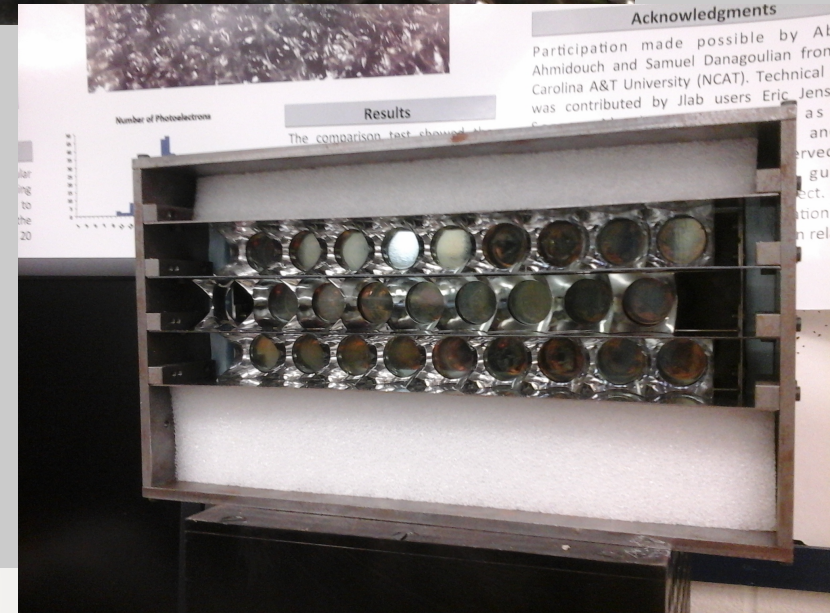
- Install PMT array box onto GRINCH.
- Install mirror frame with dummy mirrors. Check alignment.
- Install windows, when? Not with epoxy
- Install NINO, HV, PMT and all cables.
- Ongoing:
  - PMTs are ready to install but coating not decided
  - Wavelength shifting paint studies for our PMTs a success
    - Can we do better?
- DAQ Ongoing:
  - Full test of electronics and software using prototype detector.
  - Decision on VETROC/FASTBUS system
  - Begin construction of full DAQ system

- If we needed to be ready to run by the end of 2016 we could do it, with sufficient manpower. No show stoppers.
  
- The vessel assembly, including mirrors could be ready in 2 months if needed.
  
- PMT array requires the most attention to be completed. Lots to do. Many pieces, surface reflectivities.
  - Progress on WLS paint studies has slowed. Backburner.
  
- We are not pushing to have a completed DAQ system quickly.
  - In hopes of providing an online trigger with VETROC
  -  Thia—warning !





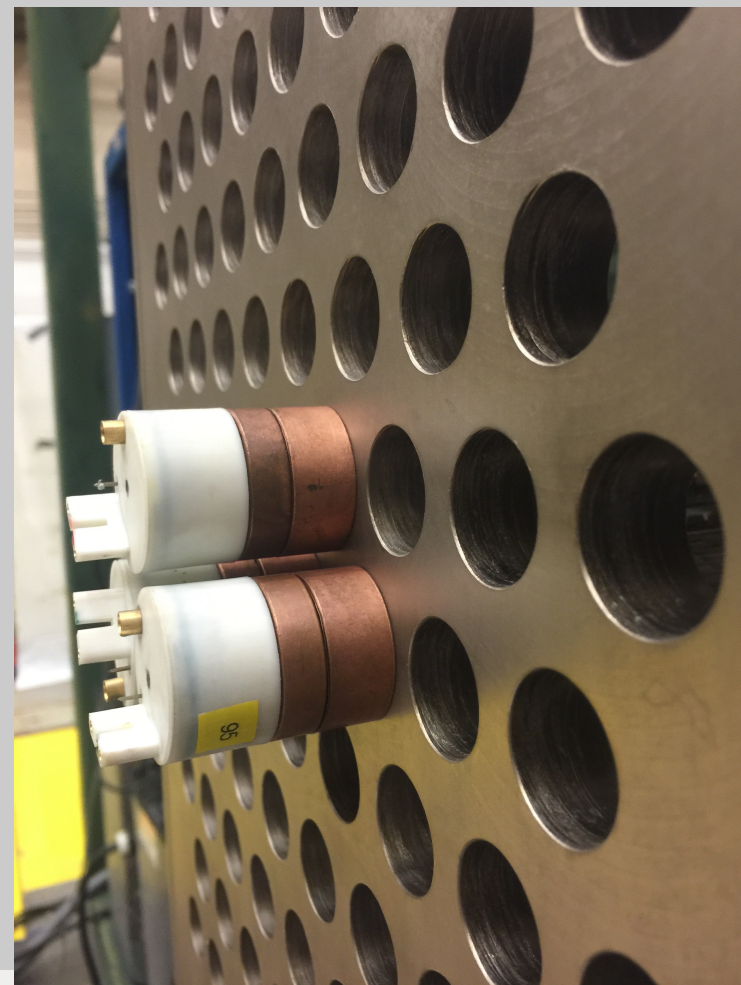
- The prototype with three rows, which include light catchers. The central light catcher (the whole row) is mirror coated, while two others – not.
- The mirror coating has been done by Evaporated Coatings, Inc. 2365 Maryland Road Willow Grove, PA 19090 USA

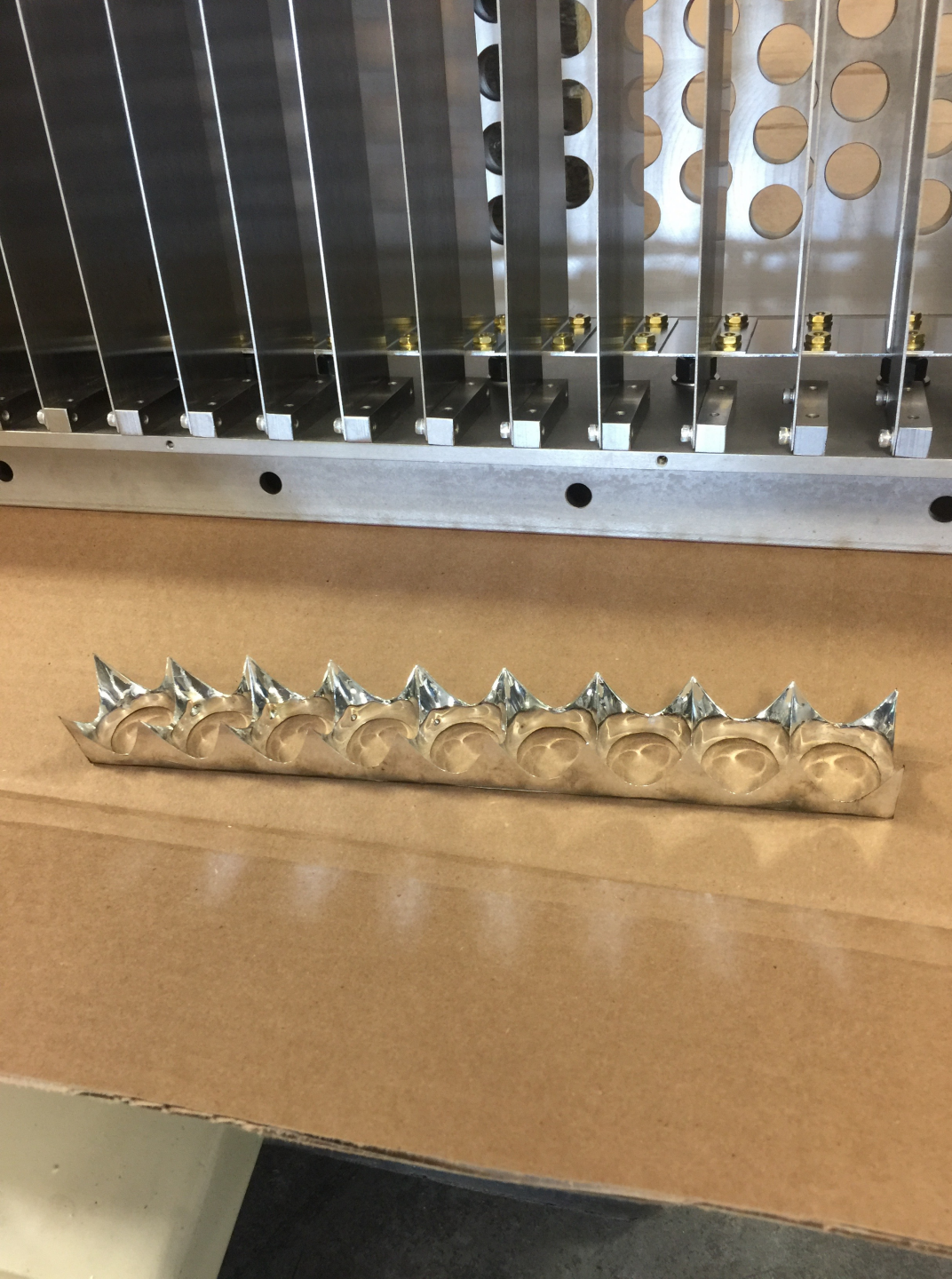


NC A&T



Rear View of 3 PMTs and  
bases installed in the  
shielding assembly

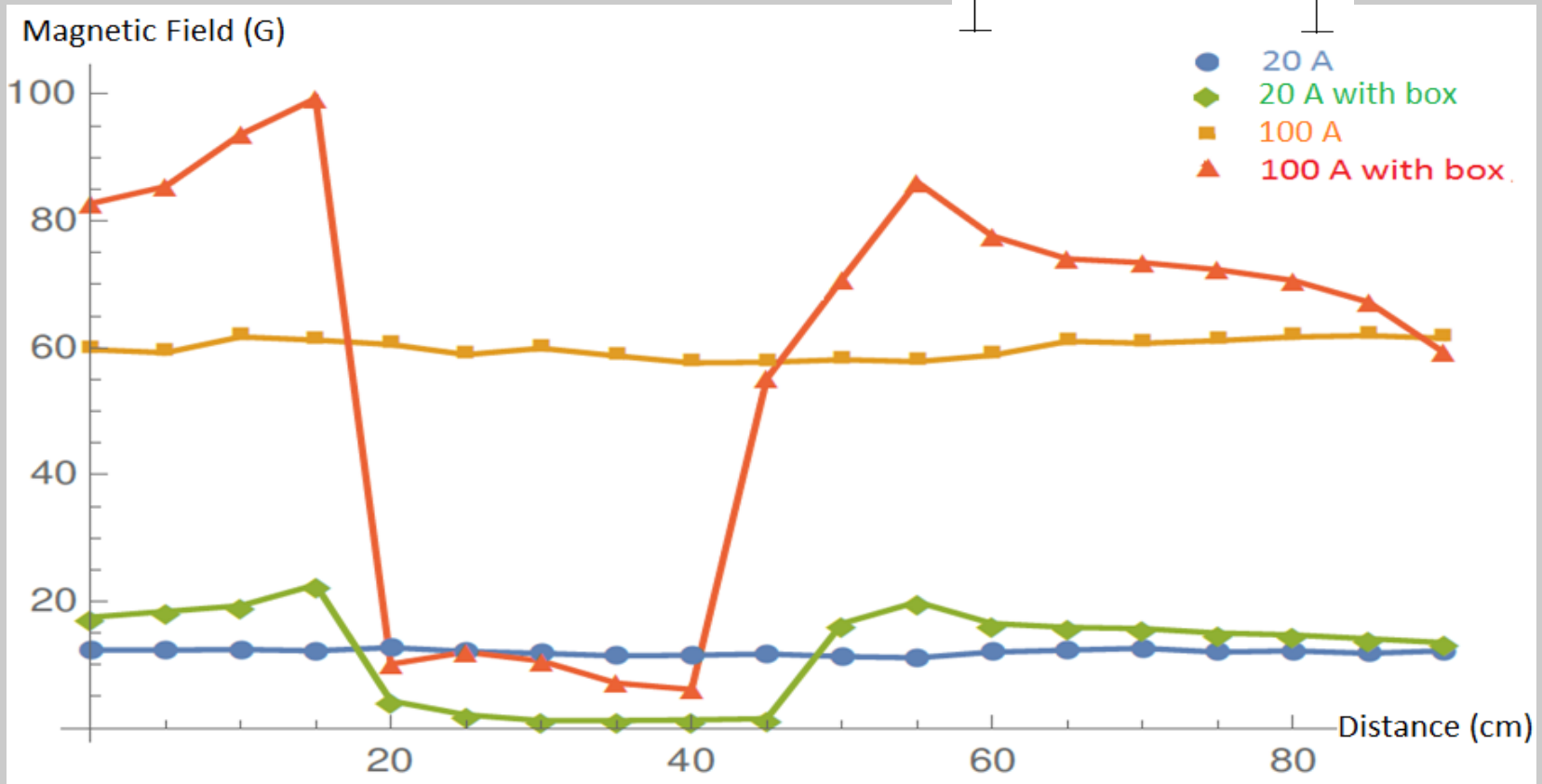
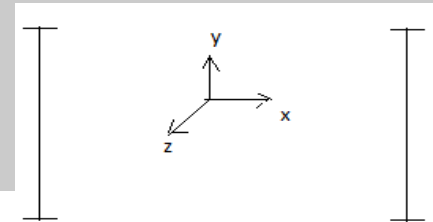




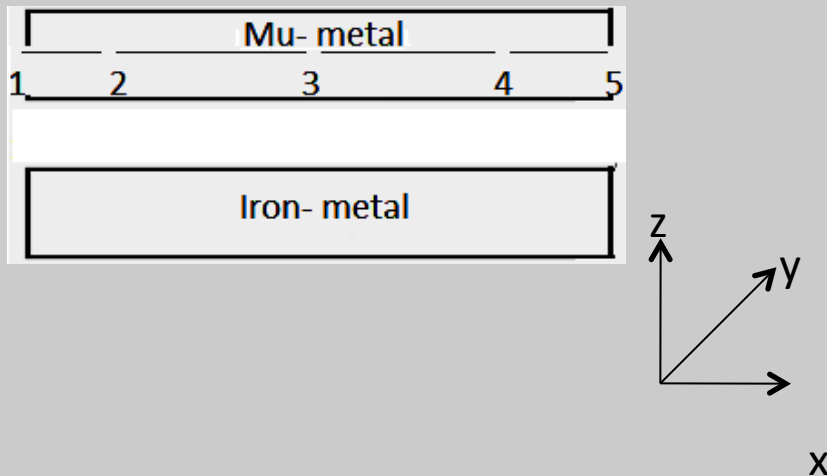
PMT Shielding assembly  
(on its side). Light catchers  
with reflective coating

NCA&T

- Magnetic Field along x-axis

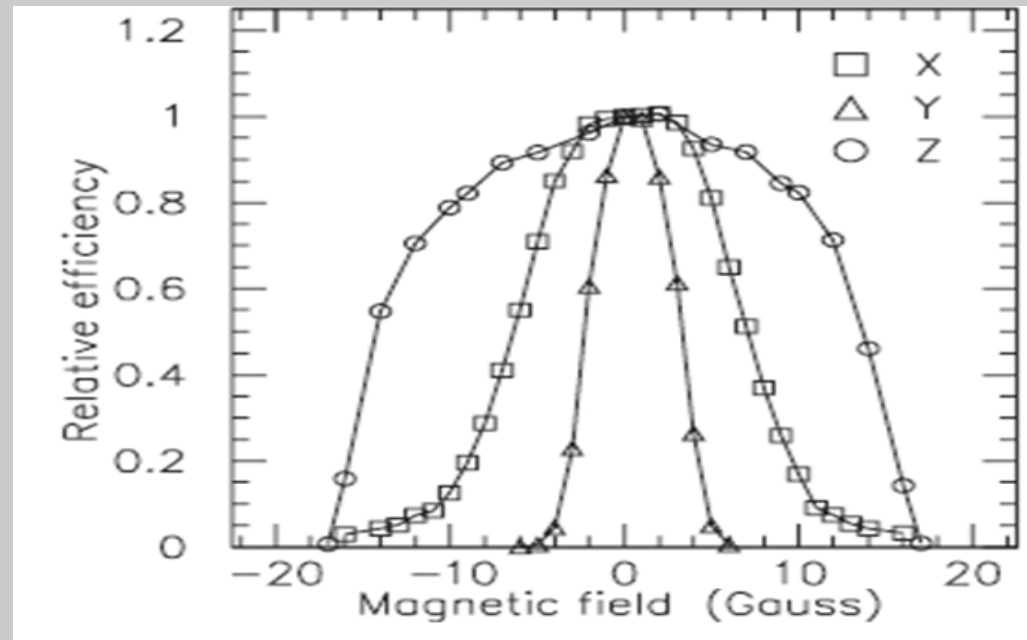
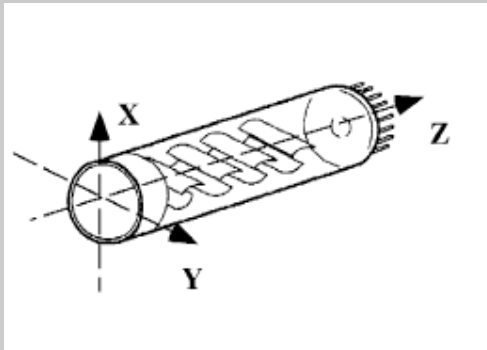


- The Magnetic Field along x,y and z - axis with 100A



Position	$B_x$	$B_y$	$B_z$
1	2.56	-0.91	0.0
2	-0.03	-0.99	-1.1
3	-0.33	-0.72	-0.9
4	-0.45	-0.41	-0.8
5	0.32	-0.52	-0.5

The efficiency of the  
PMT > 90%, if  
 $B_z$  at  $\pm 7.0$  G  
 $B_x$  at  $\pm 4.0$  G  
 $B_y$  at  $\pm 1.5$  G



➤ Proper orientation of tubes required