

GRINCH Photon Detector Array Status Report

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Photon Detector Array

- Array of 9(8)x60 29-mm PMTs

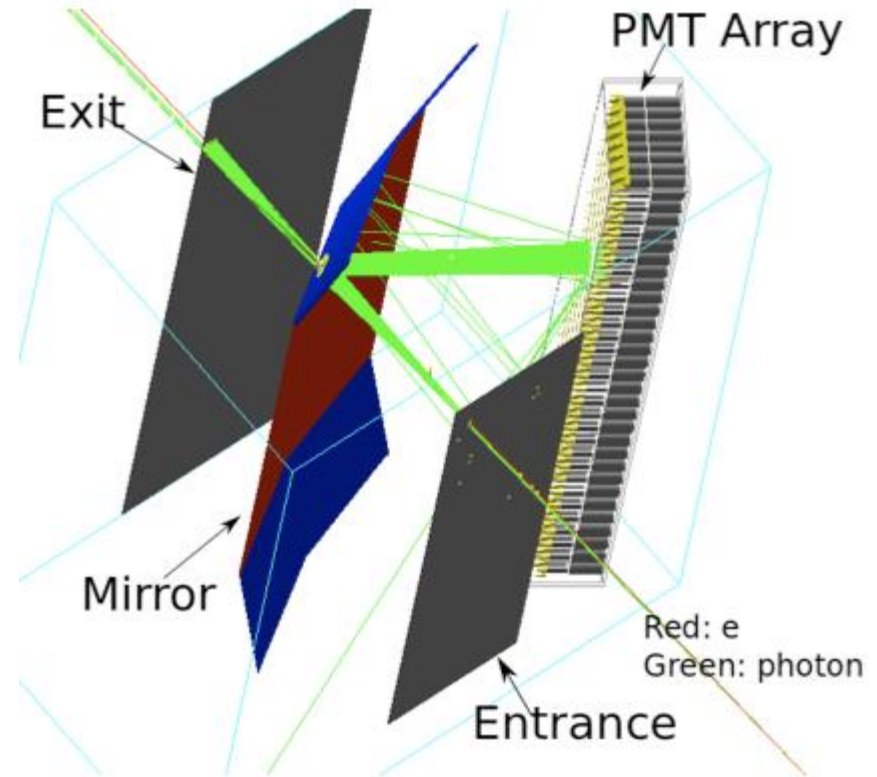
- ET: 29 mm photomultiplier

- 9125B from DIRC

- Housed in an iron magnetic shielding box. Steel 1008

- Each row is shielded at the front by two adj. 1-mm thick plates (μ -metal and iron)

- Mirror coated plastic cones for light collection (light catchers)



Photon Detector Array (cont.)

Built a prototype for the PDA

Prototype parts:

- a) magnetic shielding box
- b) 1 mm iron plates, steel-1008
- c) μ -metal shielding box
- d) Light catchers

Prototype: 4 rows of 9(8) PMTs + reflectors + Mag. Shield box

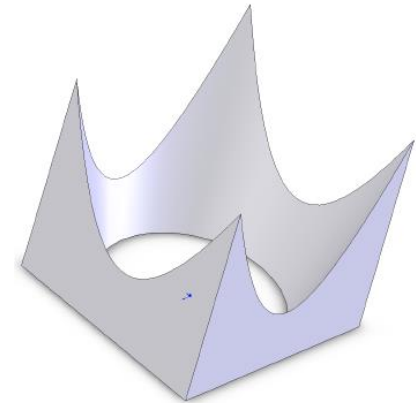
→ Prototype assembled and tested for magnetic shielding

Photon Detector Array - Prototyping

1. Light catcher cones

9 cones in a row

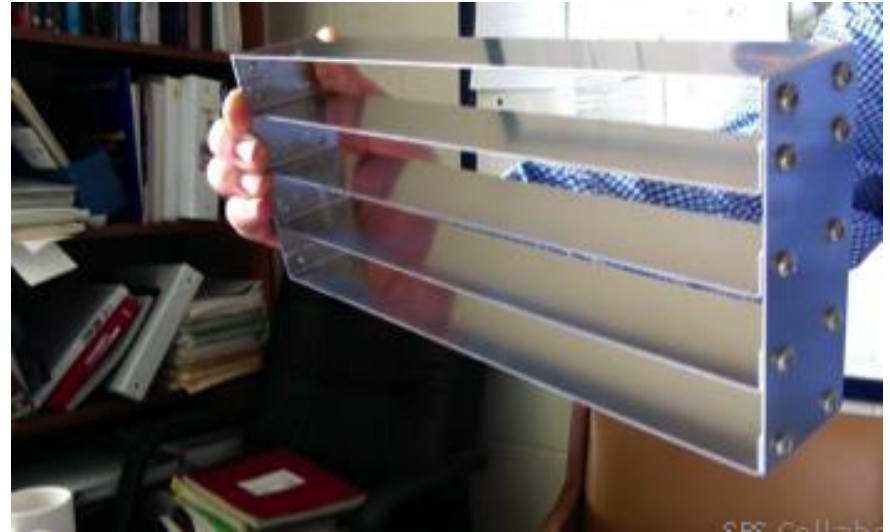
made of black resin grade PC-110



Photon Detector Array - Prototyping

mu-metal box

U-shaped 1 mm-thick mu-metal
plate 5 x 30 cm² (1.5-cm u)
1-mm thick iron plates



Magnetic box

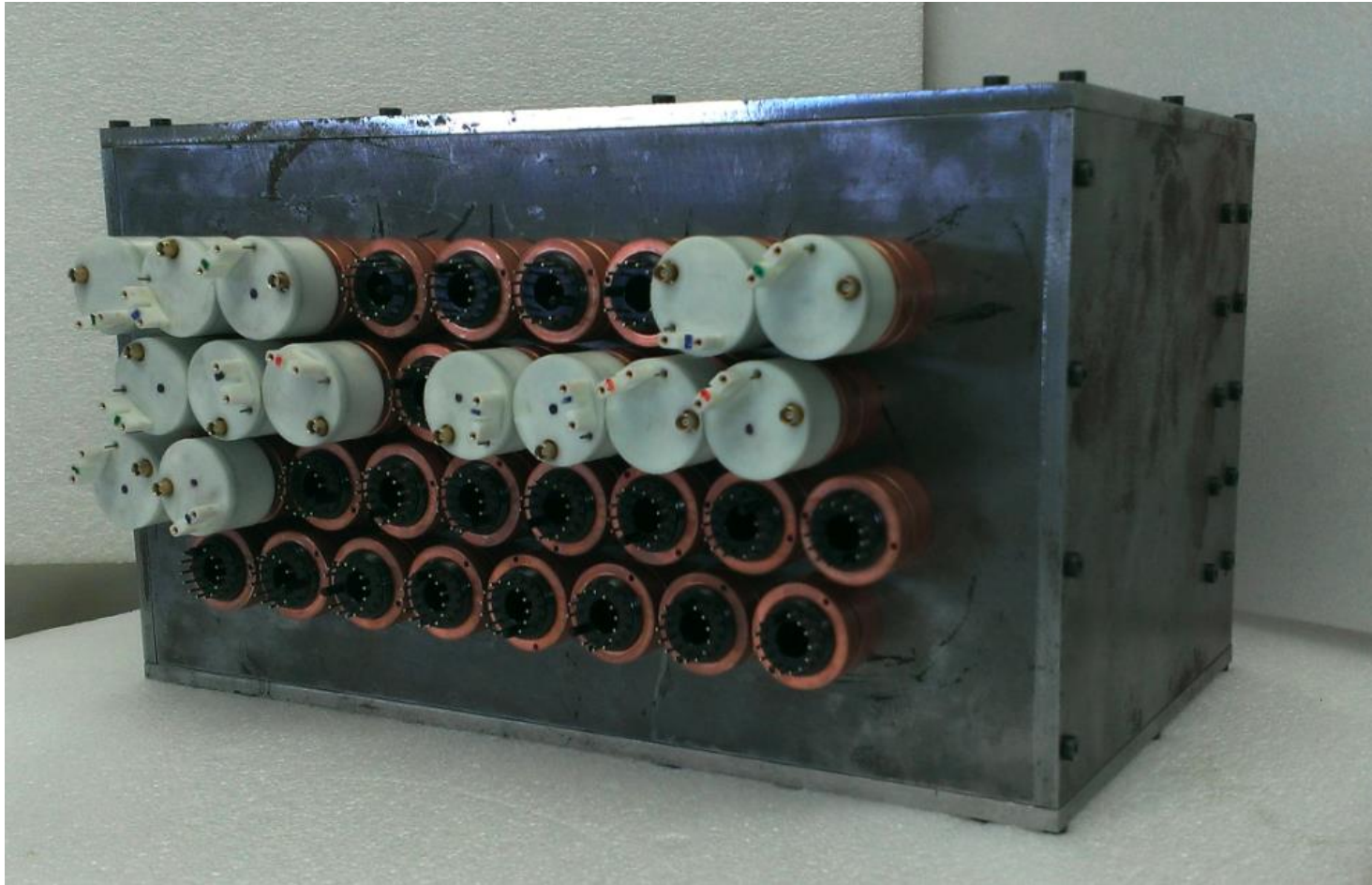
1/2-in thick back wall
1/4-in thick side walls

Photon Detector Array Prototyping (cont.)



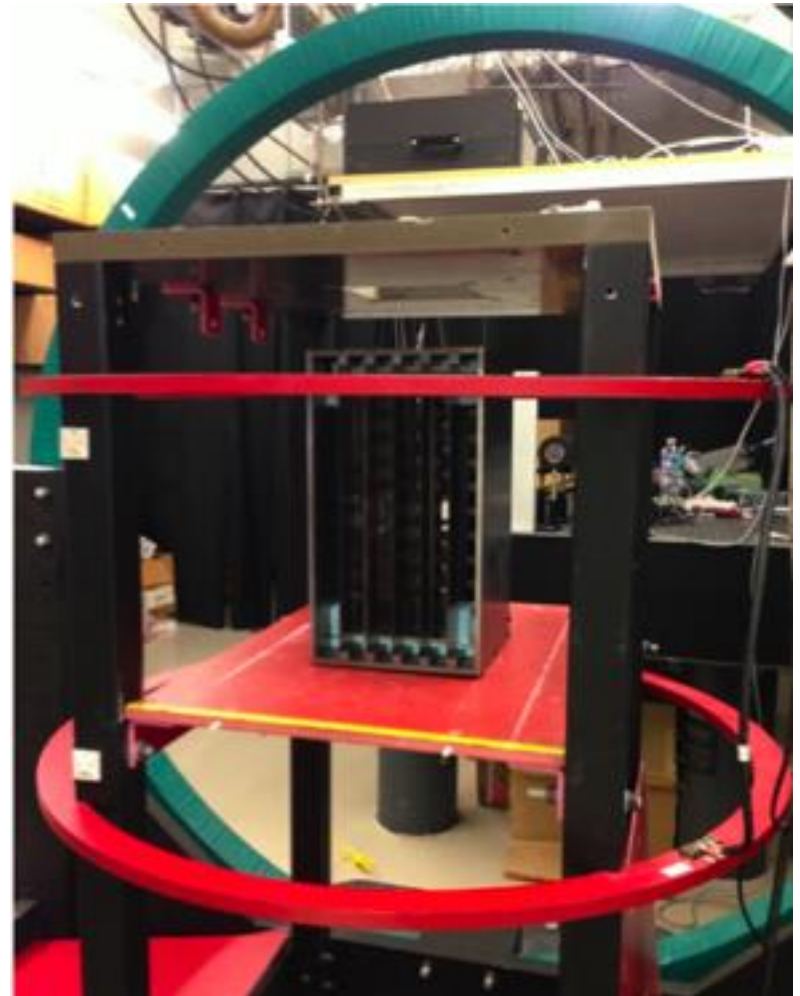
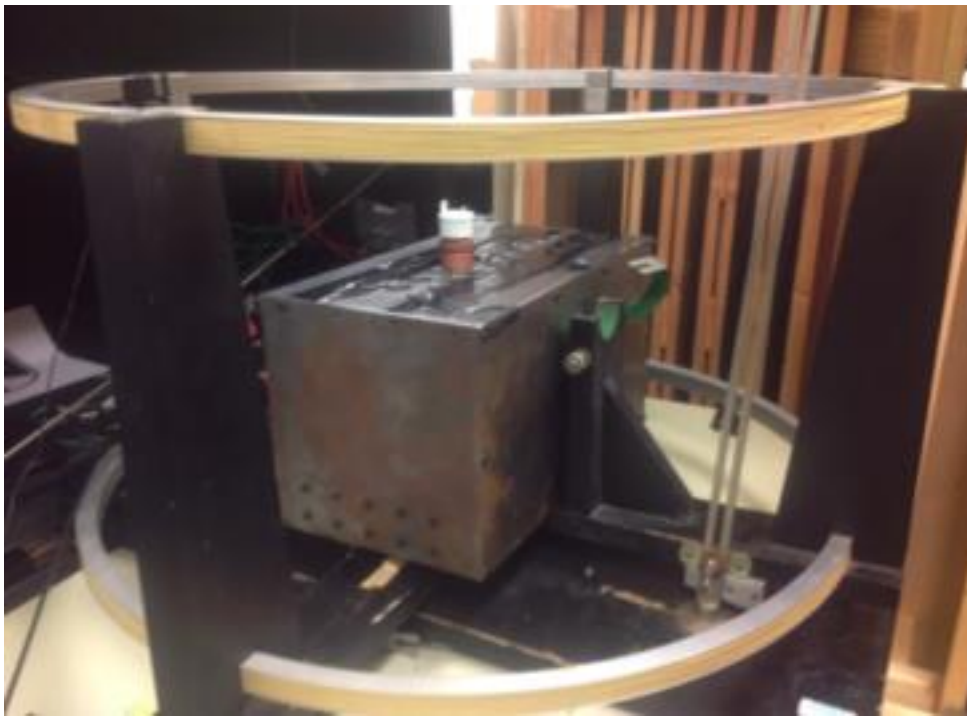
Photon Detector Array Prototyping (cont.)

Rear view



Prototype Testing

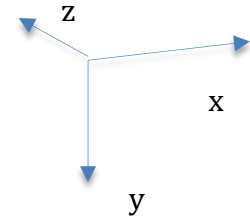
15-G and 30-G magnetic
field tests
3 Configurations a,b,c



Prototype Testing

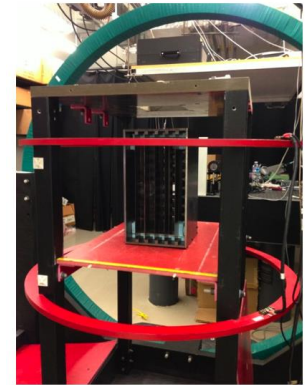
- Results of magnetic test at A&T

Configuration	$B_{x,y,z}$ w/o shielding box	$B_{x,y,z}$ at the ph-cathode (with shielding box)	Comments
a (plates are along XZ)	$B_{x0} = 0$ $B_{y0} = 0$ $B_{z0} = 15 \text{ G}$	$B_x = 0$ $B_y = 0$ $B_z = 3.5 \text{ G}$	(± 0.2)
b	$B_{x0} = 15 \text{ G}$ $B_{y0} = 0$ $B_{z0} = 0$	$B_x = 0$ $B_y = 1.6 \text{ G}$ $B_z = 0$	
c (field is along Y)	$B_{x0} = 0$ $B_{y0} = 15$ $B_{z0} = 0$	$B_x = 0$ $B_y = 0$ $B_z = 0$	

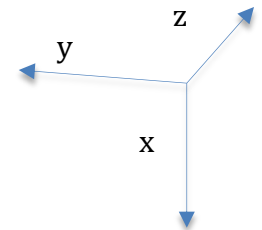


Prototype Testing (cont.)

- Results of magnetic test at W&M



Configuration	$B_{x,y,z}$ w/o shielding box	$B_{x,y,z}$ at the ph-cathode (with shielding box)	Comments
a (plates are along XZ)	$B_{x0} = 0$ $B_{y0} = 0$ $B_{z0} = 30.5 \text{ G}$	$B_x = 0.4$ $B_y = 0.9$ $B_z = 7 \text{ G}$	(± 0.2)
c (plates are along XY)	$B_{x0} = 0$ $B_{y0} = 0$ $B_{z0} = 30.5 \text{ G}$	$B_x = 2.0 \text{ G}$ $B_y = 0$ $B_z = 1.2 \text{ G}$	



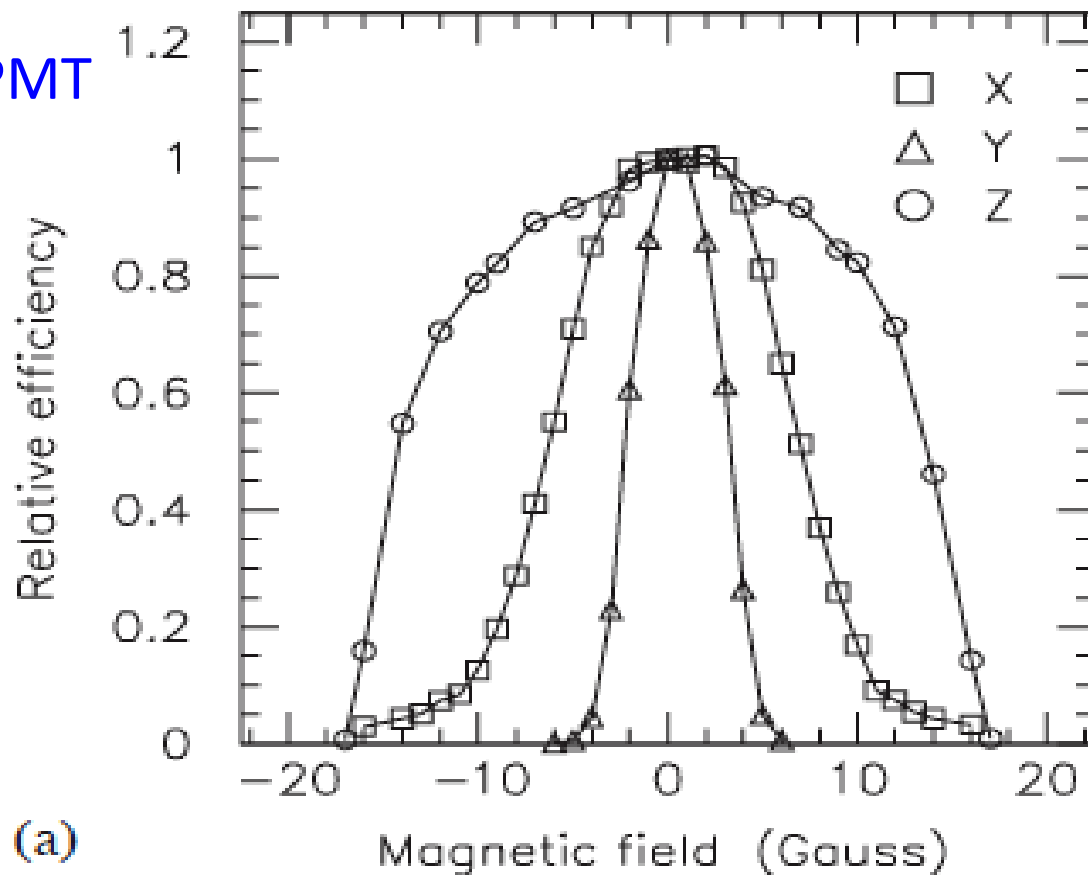
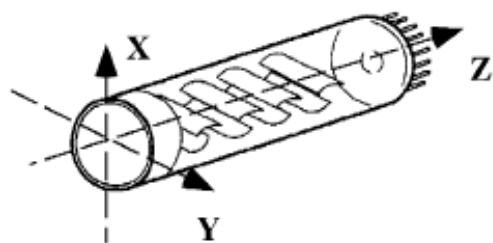
Prototype Testing (cont.)

The efficiency of the PMT
> 90%, if

B_z at ± 7 G.

B_x at ± 4 G,

B_y at ± 1.5 G



Schedule of tasks

- ✓ All cones shipped on **Sept.23**
- ✓ Cone sample sent to Evaporated Coatings, Inc.
- Design of the PDA, Suzane Esp, **to start soon**
- Mirror coating of light cones and iron plates, **Nov. 2013**
- Order mu-metal box
- + Order iron-plates
- + Order PDA magnetic box, **as soon as design is ready**