

Photon Detector Summer 2011 Status Update

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Summer 2011 Photon Detector Projects:

- LED pulser for testing detector linearity
- Revamp PbWO_4 Photon Detector
- Develop beam/signal profiler for the photon detector
 - I won't be talking about this now

I am working on a version developed by Megan Friend for Hall A.
The main idea:

- A pulsing LED will be flashed onto the photon detector
- Increase the intensity of the LED to test the linearity
- In order to prevent having to normalize LED output have a 2nd non pulsing LED that is at a fixed intensity δ
- Then what we measure is $y(x) = f(x + \delta) - f(x)$ where:
 - $f(x)$ is the integrated yield over a given intensity x
 - if $y(x)$ remains constant indicates linear PMT
 - if $y(x)$ varies, shows non-linearity of the PMT
- Pulse amplitudes are controlled by a DAC

LED Pulser II

Timing is driven by an external clock.

Synchronization bit is to notify DAQ when both LEDs are on again

Synchronization Bit



Variable LED Enable Bit



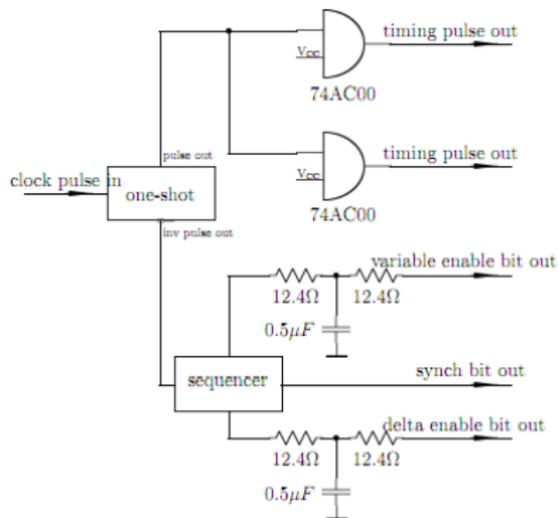
Delta LED Enable Bit



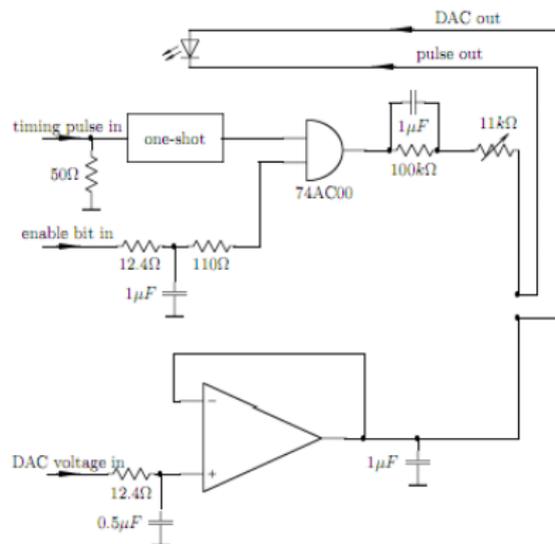
Timing Pulse

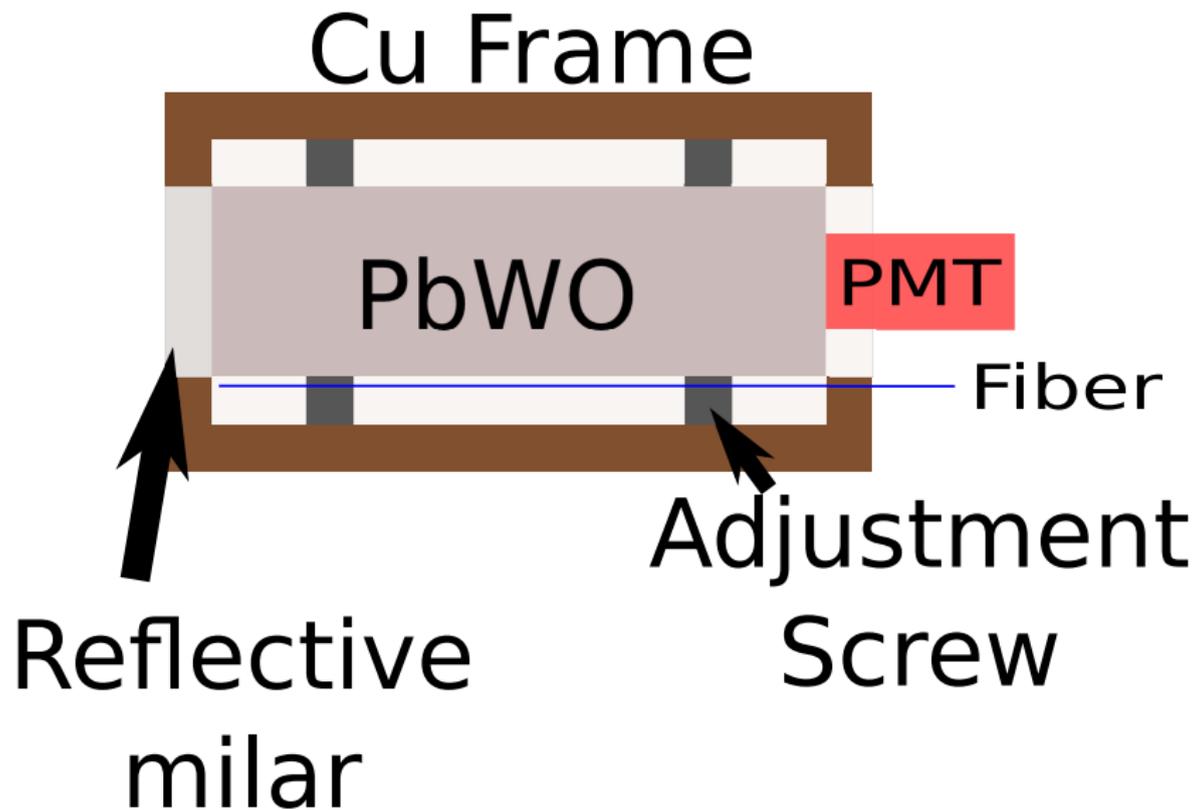


One-shot = Monostable Multivibrator



LED Pulser IV



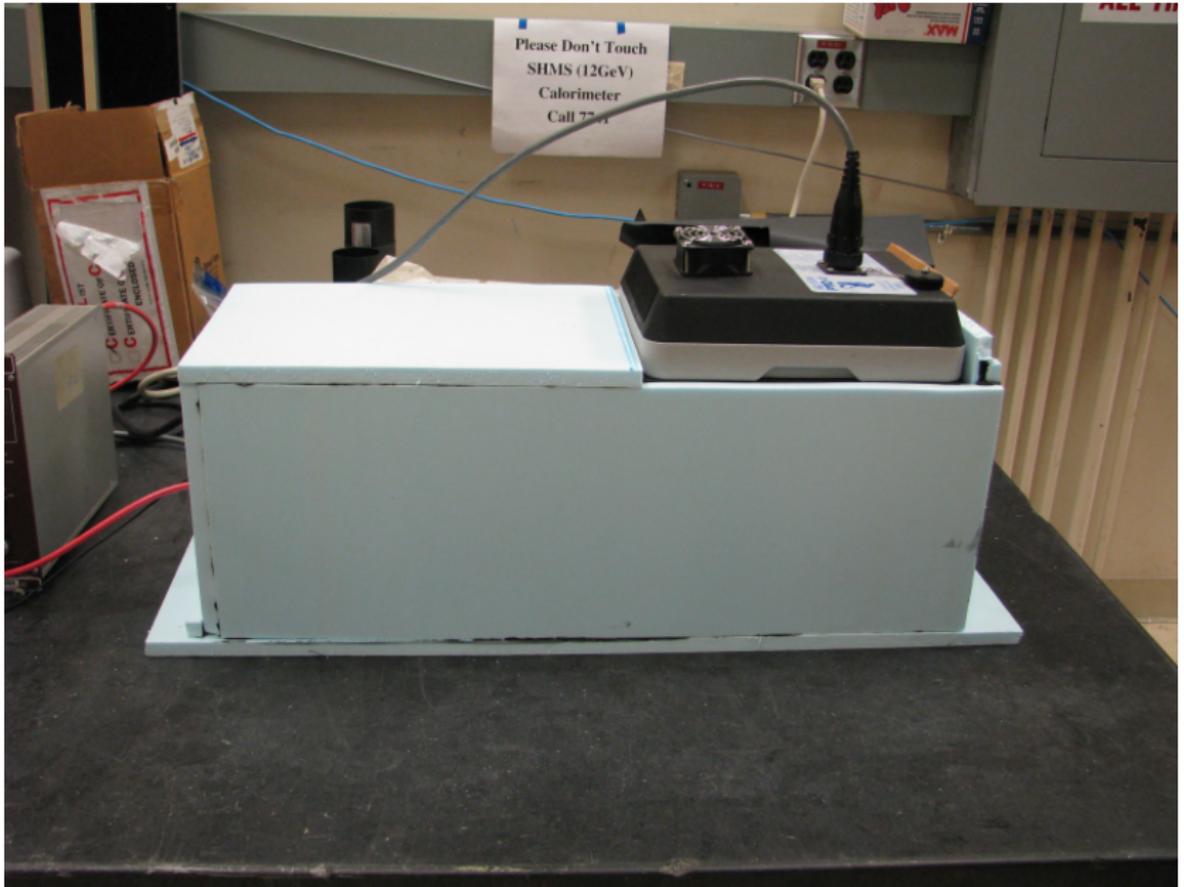


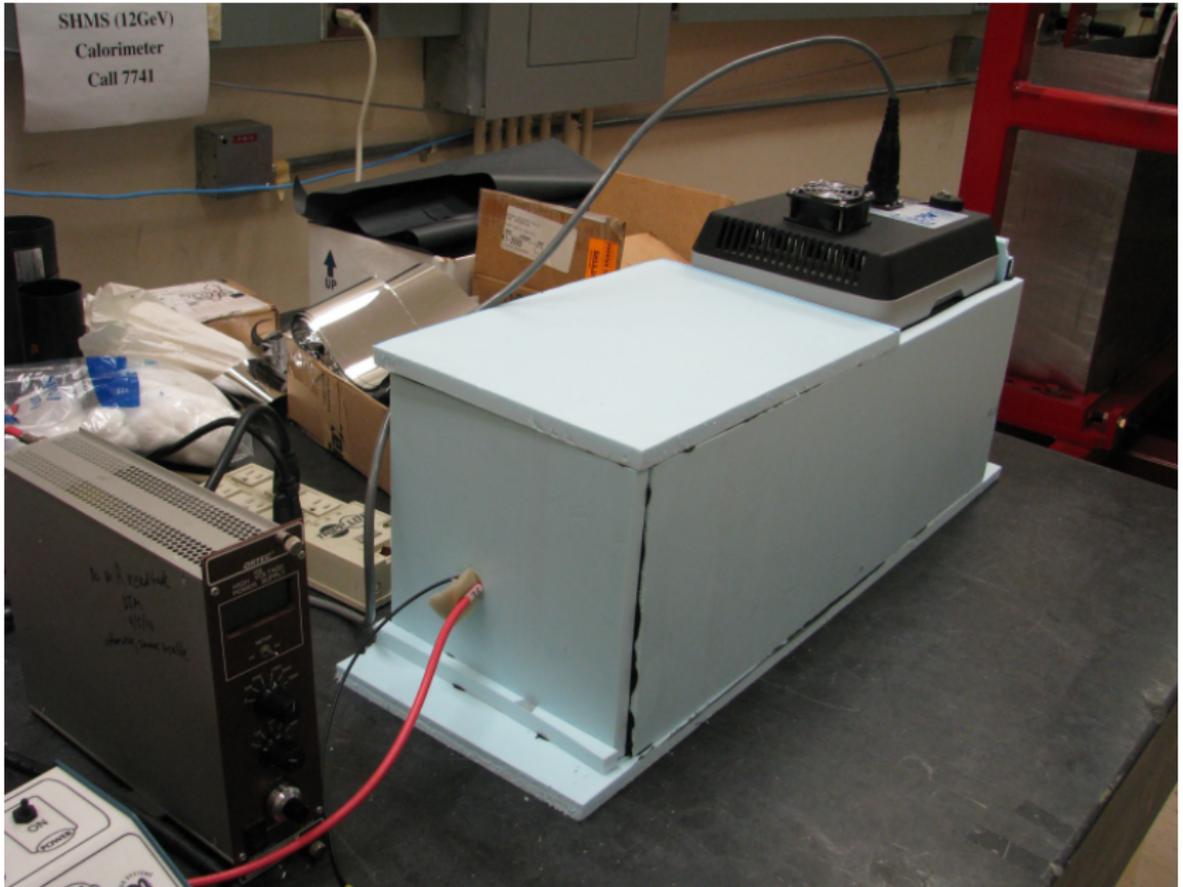
PbWO₄ Photon Detector State

- PbWO photon detector being revamped by Yerevan group
- Goals:
 - Produce a temperature stable system
 - Increase light yield of PbWO detector
 - Expect to gain about 2% per degree

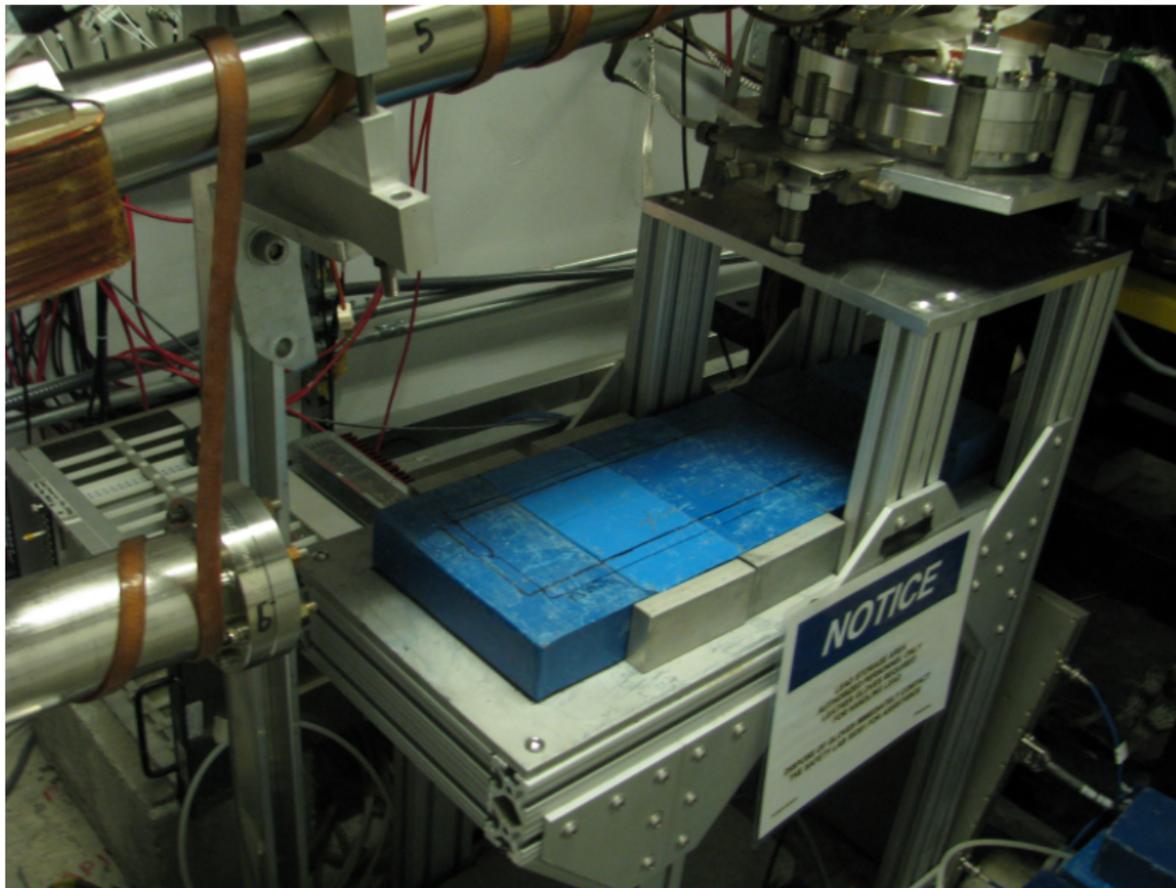
PbWO₄ Photon Detector State

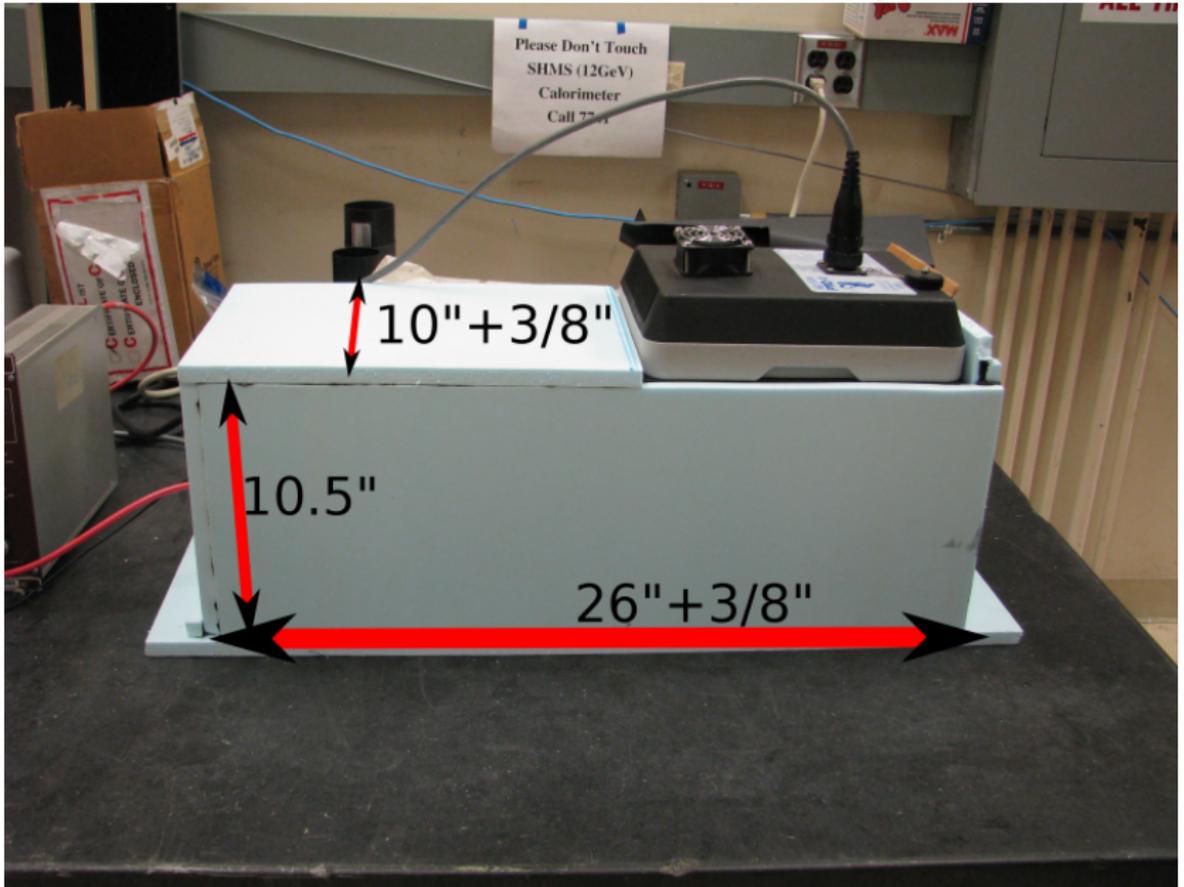
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- Progress so far:
 - Encased entire detector in a styrofoam box with thickness of about 5/8"
 - Achieved a stable temperature at 13°
 - Pushing it further to 11° produces a discrepancy between set temperature and measured
 - Have not checked for improvements in light yield. Focused on temperature stabilization.

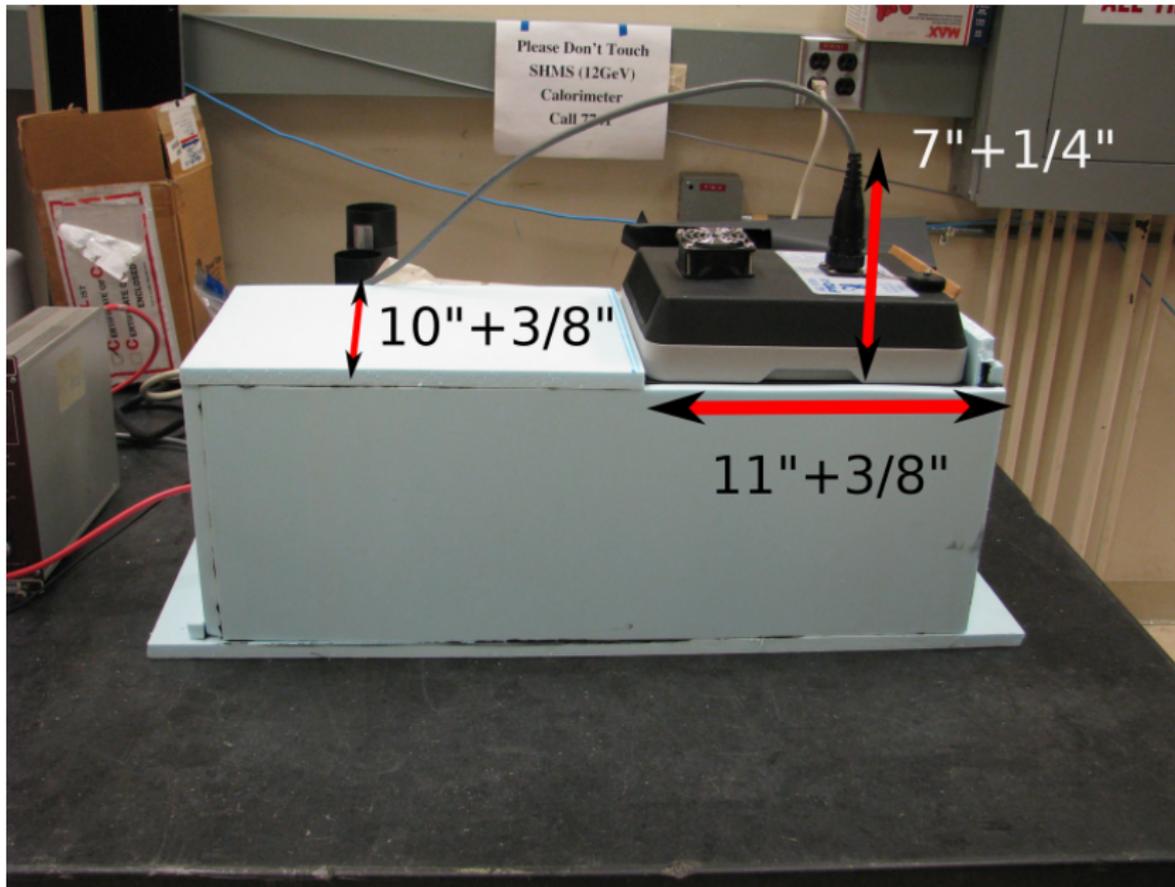


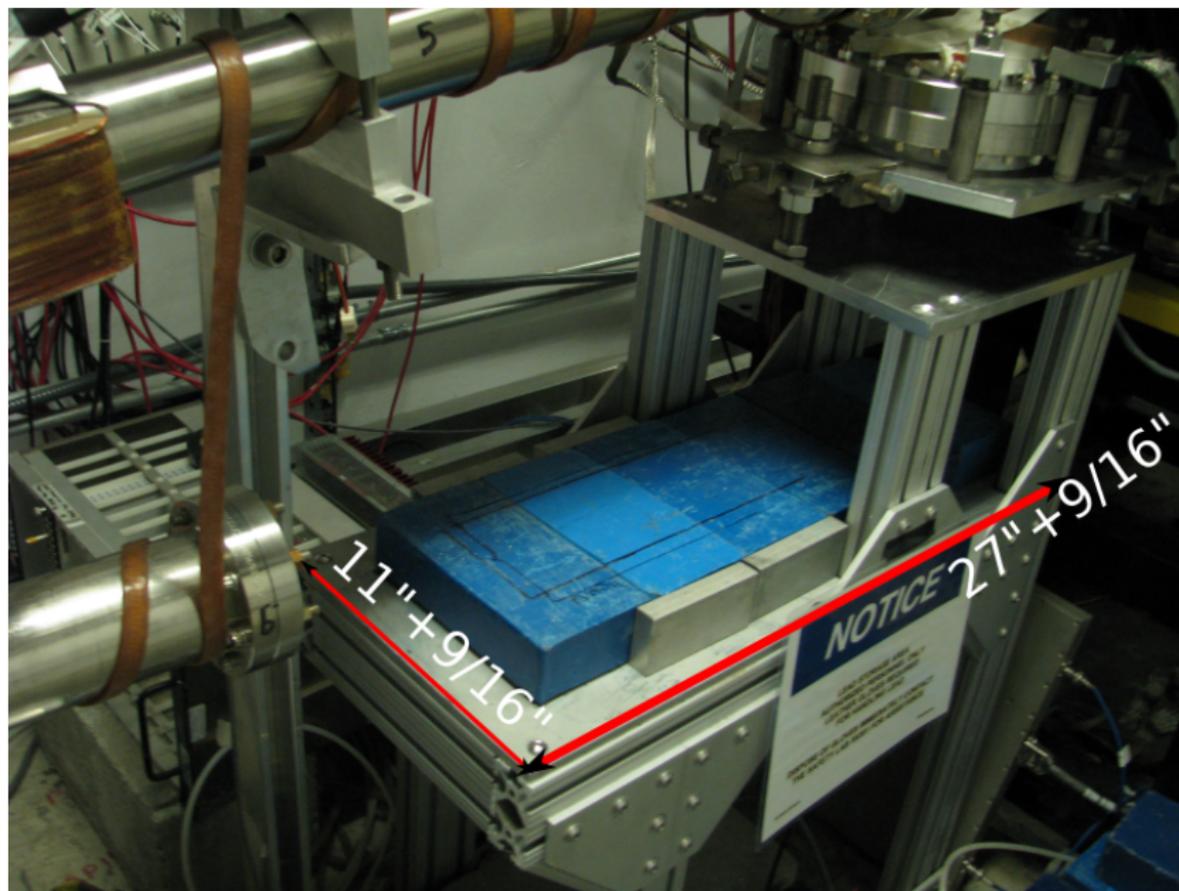


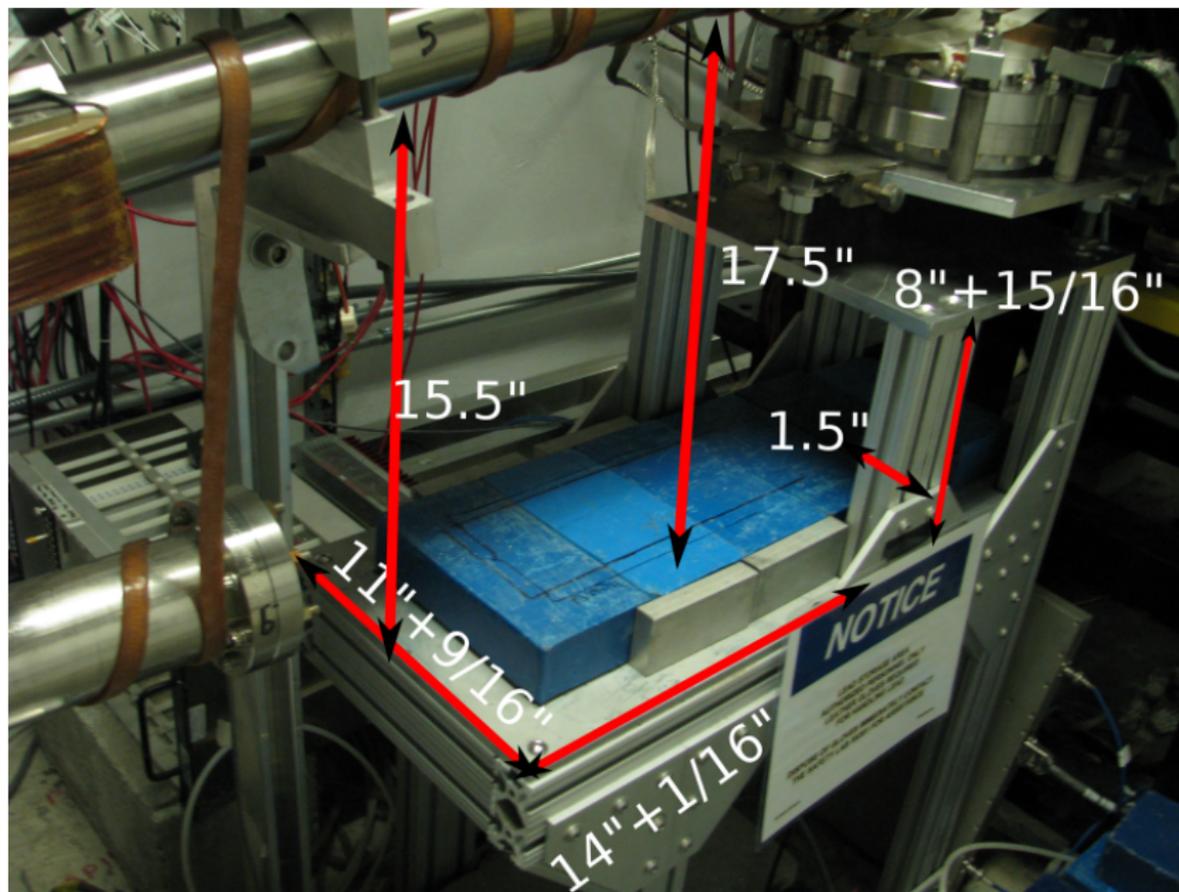












As it stands, the box is too large to fit into the table. Possible fixes:

- Reduce frame around PMT. Leaving only photon detector encased.
- Removing all insulation from PMT.
- Building a new table (yikes!!)
- Remove lead blocks around detector. Stack them starting at the floor.
 - May still not have enough to put on top of detector.
- Others???