NPS Calorimeter Prototype update:

(Status 13 February 2014)

1. **Status of ordered crystals and PMTs:**

Even though we started the purchase requisition process to order 10 crystals on December, 11 2013, the final purchase order is still outstanding. The Christmas Shutdown caused a delay, plus the fact that the award is for a foreign country (China), requiring additional documentation for procurement. With documentation completed, the order was placed recently. SICCAS came back with the statement that they cannot make the technical requirement of light yield loss under irradiation limited to 10% at 1 Mrad, so we are iterating. The R4125 phototube order has been placed.

2. **Several LEDs have been ordered and delivered:**

- 10 Blue LEDs ➔ SLA580BCT3F (Rohm Semiconductor), Intensity 900-2500 mcd, dominant WL~470 nm, power 120 mW, diameter 5.6 mm, material InGaN, **($1.70-$0.56/each**).
- 10 IR LEDs ➔ OSRAM SFH4233, Emission wave-length 940±35 nm, half angle $\varphi=\pm 60^{o}$, I_f = 1000 mA,, power 1800 mW, dimensions of active chip area L×W=1×1 mm^2, support plate 7.7×4.25 mm^2, radiant intensity 170 mW/sr. **(~$20.0**).
- IR LED ➔ OSRAM LD274-3, diameter 5 mm, wavelength 950 nm, radiant intensity 800mW/sr, power rating 165 mW, viewing angle 10 deg, I_f=100 mA, V_f=1.5 V. **(~$0.30**)

3. **Need to order other samples of Blue and IR LEDs**:

- We remain looking to find other (the best) sets of LEDs

4. **Need to order Photodiodes:**

- Received quote for Hamamatsu Photodiodes S9219, for Blue light in 380-780 nm wave length range **($1088)**
- Received quote for Hamamatsu S2281, for IR light over wide range: 190-1100 nm **($272.0)**

  These are both with BNC connectors, with an effective area of 11.3 mm2.

5. **Progress with LED drivers**: No progress to report.

6. **Status of R4125 PMT dividers:**

Vladimir Popov (RadCon group) and Hamlet made a small modification to the active divider, and a new drawing of the HV divider board has been sent to the company. We received a quotation for 10 boards. (~$300.0), and are now looking for electronic components. The expected total cost for 10 active dividers (boards and components) is ~$600 (assembly not included). .

7. Possible collaboration with Carl Zorn:

On January 31, I (Hamlet) had detailed discussion with Carl Zorn about the NPS calorimeter and the proposed prototype studies. We also discussed some details and technical tools necessary to perform these studies. I gave Carl a hard copy of our draft "work plan with the prototype", the document discussed during our last (January 30) NPS meeting. Carl showed me the various equipment owned by the Radiation Detector and Imaging Group in their ARC lab that could be used for the spectrometric studies of LEDs and crystals. These can be very beneficial for our future prototype studies. Of course, we will need to order some components (like the photodiodes), but many important and expensive parts exist. In addition, Carl himself is one of the best (if not the best) experts at JLab in this area. Carl has tremendous experience, and showed (important for us) large interest in our proposed studies. There would only be benefits for Carl to join to our planned activities, in my view. If you agree with my point of view, it would be good to officially ask Carl to join our NPS collaboration.

8. PbWO sample for radiation tests:

- I managed to obtain one PbWO crystal with a frontal dimension of 1.50 × 1.50 cm^2 and a length of 16.0 cm (No questions asked!). The plan is to cut this into two pieces or find a second crystal for our planned radiation tests.
- I had a discussion with David Hamlette of the RadCon group about a possible irradiation of these two (pieces of) crystals up to ~10-20 krad doses. They can do this if the crystals will fit in their radiation box with a window of ~2.0 inch diameter. This dimension is compatible with our crystal samples. RadCon will then use a gamma source, Cs. Open question is how soon we can get the crystals back from RadCon after such a radiation test. It likely depends on the level of crystal activation.
- First, we plan to measure the transmission of the crystals, then irradiate and measure again. Finally, we will try to cure a crystal with the Blue and IR LEDs and measure again.