May 29, 2015

To: Dr. T. Gregory Guzik - HASP Project Director
From: Josiah DeLange – Team Lead
RE: HASP Monthly Status Report

1. Activities

Finalized 2015 structural fabrication. Expanded the cutout for the protruding Compact Flash memory card from the payload, and began designing a 3D-printed cover for this cutout.

Received the second of two custom front end PCBs (fabricated and assembled) for the gamma ray detector. Verified correct results from a negative-falling square wave input (to simulate an APD charge avalanche).

Continued board layout of the high-voltage power supply.

Completed layout of the GPS and IMU mounting board and verified existing software for interfacing and data logging.

Continued testing and development with the VL-EPM-16 single board computer. Verified the operation of the ISA bus (implemented over the PC/104 header) with a bit-banged code snippet and a 16-channel oscilloscope.

Prototyped ISA (PC/104) bus drivers to enable communications between this computer and the ATmega2560 microcontroller to be used for time stamping and buffering of photon data from the four detectors.

Completed optical prep of the scintillation detectors. This included APD affixation with optical grease, PTFE tape around the crystal (with APD) and an outer layer of electrical tape on the side faces.

Sealed up detector head. This consists of four scintillators (each surrounded by antistatic foam) in their own respective cavity. An opaque silicone gasket coats each cavity's upper edge, and a clamped-down carbon fiber window covers the top face of the detector head.

Continued testing the scintillators with front end electronics using an old Thorium gas mantle.

2. Issues Encountered

One minor issue when the fabricated structure came in from the UMN Research Shop was the Compact Flash cutout, which was on the wrong side. We fixed this by expanding the cutout manually.

When the custom CNC'd detector housing arrived in the lab, we were checking the dimensions and bottom screw holes for the PC/104 stack standoffs when one of the brass standoffs failed under torsion (leaving a threaded piece of brass in one of these screw holes). We fixed this with a 4-40 tap and a small amount of JB weld. The front end boards now are snugly situated below the detector housing. The PC/104 stack can be installed with no trouble.

3. Milestones Achieved

Completed detector instrument (including front end electronics).

4. Current Student Team

Name	Gender	Ethnicity	Race	Student Status	Responsibilities
Josiah DeLange	M	Non-hispanic	Caucasian	Undergraduate Senior	Team lead, detector system, flight computer
John Jackson	M	Non-hispanic	Caucasian	Undergraduate Senior	Flight computer, flight software
Aron Lindell	M	Non-hispanic	Caucasian	Undergraduate Senior	Physics directed research – photon simulations
Charles Denis	M	Non-hispanic	Caucasian	Undergraduate Senior	Flight software
Luke Granlund	M	Non-hispanic	Caucasian	Undergraduate Junior	Flight software
Justin Dietz	M	Non-hispanic	Caucasian	Undergraduate Junior	Flight software
Zicheng Li	M	Non-hispanic	Caucasian	Undergraduate Junior	Flight software and optical prep
Ilya Zubarev	M	Non-hispanic	Caucasian	Undergraduate Junior	Structural fabrication