



HASP 2018 Monthly Status Report

Report Month: February 2018
Submitted by: Stacey Burrows
Submit Date: 02 / 23 / 2018
Institution: American River College
Payload Number: 2018-BACKUP
Payload Name: Stratospheric Spectropolarimeter Gamma-X (SSGX)

I. February Activities

- Stacey updated schematic files to reflect removal of linear regulators in high current situations as well as drew diagrams for the revised proposal.
- Justin updated the communication plan to account for the data transition scheme as required by HASP. He further updated circuit diagrams to reflect the aforementioned removal of linear regulators.
- Neeraj has continued developing visualization functionality for software (ASTER).
- Yolanda obtained a quote for payload housing materials. Purchasing will be discussed at a meeting set for Monday, February 26.
- Jessica is working with Justin to review components and prepare a bill of manufacturing.

II. Issues Encountered

Through joint discussion among the faculty advisors regarding the details of the detector's geometry and shielding, Faculty Coordinator Paulo Afonso acknowledged an error concerning the number of pixels of the CdTe wafers. The SSGX detection unit has a 4x2 (previously reported as a 4x4) pixel matrix, with the two wafers oriented parallel to each other in a Planar Transverse Field (PTF) irradiation configuration.

It may be useful to clarify that though the measurements of background double and multiple X-ray and gamma-ray events are inherent to polarimetry (the consequences having been discussed in the proposal), the measurements themselves are not inherently polarimetric. In theory, the CdTe 4x2 pixel matrix can function as a polarimeter, however this is dependent on balloon total time of flight, directional orientation, and expected fluxes which thus make direct polarimetric measurements less probable. Referring to our prototype as merely a spectrometer, however, does not express its main functionalities for the purposes of this mission since the detector also takes coincidence measurements

and provides position sensitivity on its 8 pixels. These features are necessary for detecting double events, despite already measuring spectra.

In summary, despite these corrections, we reinforce that our main goal remains the same as stated in the abstract and elsewhere in the proposal: to measure the flux and energies of background single, double, and multiple events capable of deteriorating a γ -ray polarimeter response in space.

III. Milestones Achieved

Justin conducted a test run of the DAISI electronics prototype using an 8 GB SD card, achieving an uninterrupted runtime of 5.6 hours with all 8 ADC channels sampling. Further testing utilizing larger storage capacities is currently underway.

IV. March Goals

- Assemble and validate all PCB subsections
- Develop automatic ADC calibration within software (ASTER)
- Detector calibration

V. Other Comments

As a result of the combined efforts of the undergraduate group and the overall international team, the revised proposal was submitted on Friday, February 16. In response to reviewer feedback, theoretical background was expanded, the communication plan was modified, schematics for regulators were updated, and several sections were further detailed.

During the month of February, the following students progressed the project.

Name	Start Date	End Date	Role	Student Status	Race	Ethnicity	Gender	Disabled
Stacey Burrows	03/2017	Present	Project Lead	Undergrad	<i>Homo sapiens sapiens</i>	White	Non-Binary	No
Justin Forrester	03/2017	Present	Electronics Lead	Grad / Undergrad	<i>Homo sapiens sapiens</i>	White	Male	No
Neeraj Menon	03/2017	Present	Software Developer	Undergrad	<i>Homo sapiens sapiens</i>	Indian	Male	No
Yolanda Reyes	03/2017	Present	Technical Illustrator	Undergrad	<i>Homo sapiens sapiens</i>	Yaqui / Mexican American	Two-Spirit	Yes
Jessica Shults	03/2017	Present	Assembly Technician	Undergrad	<i>Homo sapiens sapiens</i>	Tohono O'odham	Female	No