



# HASP Monthly Status Report

**Report Month:** April 2023  
**Submitted by:** Benjamin Dyer  
**Submit Date:** 04 / 28 / 2023  
**Institution:** McMaster University  
**Payload Number:** 2023-11  
**Payload Name:** Electron Spectrometer Telescope

## I) Activities During Previous Month:

### Mechanical

All mechanical drawings have been completed and are under final review before being sent for fabrication. The Collimator Shutter Module (CSM) using a DC motor and clutch mechanism has been tested and appears to work well. More testing at high and low temperatures will be needed before we fully switch to this design over using a stepper motor. We also tested the magnetic field strength of the electro-holding magnet and found it to be 0.86 Gauss at 5cm.

### Electrical

The power distribution module (PDM) has completed the PCB layout and is awaiting final review before being sent for fabrication. Firmware for the PDM has continued to progress and is expected to be finished near the end of June. Development of the CSM driver (CSMD) has begun and schematics are nearly completed.

### Instrument - Hardware

The data acquisition module (DAM) has been going through manufacturing this month. The boards are expected to ship in the next 2 weeks. The front-end module (FEM) has been completed and was sent for fabrication (PCB only) we will populate the board in-house. During physical testing we determined that the 140um thick silicon detector has too high a noise floor to reliably detect electrons. We plan to drop the 140um thick detector and fly a detector with two 1500um thick detectors instead. This should not have any meaningful impact on the mission.

### Instrument - Firmware

We have a preliminary firmware and are now working on the HDL code to get data out of the ADC. Due to only having one DAM to test on (DAM REV C from the previous mission) development has been slow. To combat this we have hired 3 full-time students to work on the firmware over the summer and will be onboarding another student to help with work on the HDL.

## II) Issues Encountered:

Things are going smoothly no issues this month!

## III) Milestones Achieved:

- PDM design completed and ready for fabrication
- FAM design completed and sent for fabrication
- CSMD schematics completed
- Mechanical designs completed

#### **IV) Plans for Coming Month:**

##### Mechanical

Since the drawings are completed, fabrication of the payload will begin. We aim to have all parts fabricated by the beginning of June to allow time for assembly and testing.

##### Electrical

We expect the PDM to finish manufacturing by mid-May, leaving two weeks for in-house fabrication. Time allowing the PDM will also be put through its functional acceptance tests. If all goes well with functional acceptance testing the hardware development will be finished and focus will shift to PDM firmware. The CSMD will have its schematics and board layout reviewed. We aim to have the CSMD sent for fabrication by the end of May.

##### Instrument – Hardware

The DAM and FEM are expected to arrive this month. The FEM will be populated with components on arrival. Once both boards are fabricated, they will be put through their functional acceptance tests before being deemed ready for use. The boards will then be hooked up to the rest of the detector so work can begin on testing the full detector system.

##### Instrument - Firmware

Once the DAM boards arrive and pass their functional acceptance tests firmware development should accelerate. By the end of May we aim to develop the firmware to the point that a trace of the signal from each detector can be printed to a computer. We will use this to ensure the instrument is operating correctly.

#### **V) Other Comments or Questions for HASP Management:**

N/A

#### **VI) Team Composition and Organization:**

<b>Name <sup>(i)</sup></b>	<b>Start Date</b>	<b>End Date</b>	<b>Role</b>	<b>Student Status</b>	<b>Race <sup>(ii)</sup></b>	<b>Ethnicity <sup>(iii)</sup></b>	<b>Gender <sup>(i)</sup></b>	<b>Disabled</b>
Benjamin Dyer	01/10/22	Present	Student Leader	Graduate	Asian	Non-Hispanic	Male	No
Andrei Hanu	01/10/22	Present	Faculty Advisor	Faculty	White	Non-Hispanic	Male	No
Graham Power	01/10/22	Present	Firmware Lead	Graduate	White	Non-Hispanic	Male	No
Connor Chandran	01/10/22	Present	Electrical Lead	Undergrad	White	Non-Hispanic	Male	No
Patrick Chin	01/10/22	Present	Mechanical Co-Lead	Graduate	Asian	Non-Hispanic	Male	No
Angela Tolis	01/10/22	Present	Mechanical Co-Lead	Undergrad	White	Non-Hispanic	Female	No
Jonathan Wang	01/10/22	Present	Mechanical	Undergrad	Asian	Non-Hispanic	Male	No
Michael Altali	01/10/22	Present	Mechanical	Graduate	Asian	Non-Hispanic	Male	No
Kosta Gianicos	01/10/22	Present	Electrical	Undergrad	White	Non-Hispanic	Male	No
Elijah Menna	01/10/22	Present	Electrical	Undergrad	White	Non-Hispanic	Male	No
Felix Yuan	01/10/22	Present	Electrical	Undergrad	Asian	Non-Hispanic	Male	No
Austin Liu	01/10/22	Present	Firmware	Undergrad	Asian	Non-Hispanic	Male	No
Connor O'Reilly Juarez	01/10/22	03/23/23	Instrument Mechanical	Undergrad	White	Hispanic	Male	No
Xingzhi Cheng	01/10/22	Present	Instrument	Graduate	Asian	Non-Hispanic	Male	No
Larysa Duda	01/10/22	Present	Instrument	Undergrad	White	Non-Hispanic	Female	No
Kristen Di Loreto	01/04/23	Present	Instrument Mechanical	Undergrad	White	Hispanic	Female	No

- i. Current NASA guidance requires information from up to date legal documentation (for instance, Driver's License, Passport)
- ii. Accepted options include African-American/Black, Asian, American Indian/Alaskan Native, Native Hawaiian, Pacific Islander, White
- iii. Accepted options are Hispanic on Non-Hispanic.