High Altitude Student Platform

Call for Payloads 2025

Issued August 26, 2024, by

HASP Management Team
Department of Physics & Astronomy
Louisiana State University
Baton Rouge, LA 70803-4001

and

Balloon Program Office
NASA Wallops Flight Facility
Wallops Island, VA

Q&A Teleconference: September 27, 2024
Notice of Intent: October 11, 2024
Application Development Teleconference: October 18, 2024
Application Due: November 04, 2024

HASP Call for Payloads 2025
August 26, 2024

I. Introduction

The High Altitude Student Platform (HASP) was originally conceived to provide students with flight opportunities that are intermediate between those available with small latex-sounding balloons and Earth-orbiting satellites. HASP is a support vehicle developed with flight-proven hardware and software designs that uses an 11 million cubic foot, thin film polyethylene, helium-filled balloon to carry multiple student-built payloads to altitudes of ~120,000 feet (~36km) for durations up to 20 hours. The HASP platform is designed to support multiple student payloads. A standard interface is provided for each student payload that includes power, serial telemetry, discrete commands, and analog output. HASP will archive student payload data onboard and telemeter the stream to the ground for real-time access. **See the HASP website (https://laspace.lsu.edu/hasp/) for further information.** In August 2024, an upgraded version of the HASP system will complete its engineering flight, planning to replace the old equipment for the HASP 2025 flight season. The upgraded HASP platform will support up to sixteen (16) small (~3 kg total weight) and eight (8) large (~20 kg total weight) payload seats for a total of 24 payloads.

Construction of the new HASP flight system was supported by the Astrophysics Division of the NASA Science Mission Directorate. The NASA Astrophysics Division of the Science Mission Directorate, the NASA Balloon Program Office, Wallops Flight Facility, and the HASP Management team have committed to supporting one HASP flight per year through 2025 with additional years planned.

This Call for Payloads (CFP), jointly issued by the HASP Management team and the NASA Balloon Program Office (BPO), solicits student groups to apply for a "seat" on the 2025 HASP flight. To apply, student groups will need to develop a proposal describing their payload, including science justification, principle of operation, team structure and management, as well as full payload specifications of weight, size, power consumption, mechanical interface, data requirements, orientation preference, and initial design drawings. This application is solely for a seat on the HASP platform and not for financial support for student teams, hardware development and testing, travel to Palestine, TX, and/or Fort Sumner, NM, for interface verification and flight operations, or any other student payload or team expenses (see section XII).

This application must be submitted on or before November 04, 2024. A Notice of Intent form will be due on October 11, 2024, for all groups considering a proposal for HASP 2025. A teleconference will be held to answer general questions about the HASP program and application process on September 27, 2024. A second teleconference on October 18, 2024, has been added to assist participants and answer any questions they may have while completing their applications. Preference will be given to payloads clearly demonstrated to be designed, built, and operated by students and focused on addressing a science or engineering problem. Notification of selection will occur in early December 2024. The remainder of this document describes the HASP system, student payload interface, anticipated program schedule, and how to prepare and submit your application.

II. Call for Payloads Summary

Q & A Teleconference:	**September 27, 2024**
Notice of Intent:	**October 11, 2024**
Notice of Intent Link:	https://lsu.formstack.com/forms/hasp_notice_of_intent
Application Development Teleconference:	**October 18, 2024**
Application due date:	**November 04, 2024**
Application Submission Link:	https://lsu.formstack.com/forms/hasp_application
Application contents:	See Section X

III. The HASP Website

The website for the HASP program can be found at https://laspace.lsu.edu/hasp/. This website contains details about the overall program, brief descriptions of payloads that have flown on previous missions, news announcements, a calendar of events, document templates, and technical documents. During a flight, the website provides access to real-time imaging, positional tracking of HASP, housekeeping status information, and datasets downlinked from the student payloads. It is recommended that you review the information on the HASP website as you develop your flight application.

IV. HASP Description

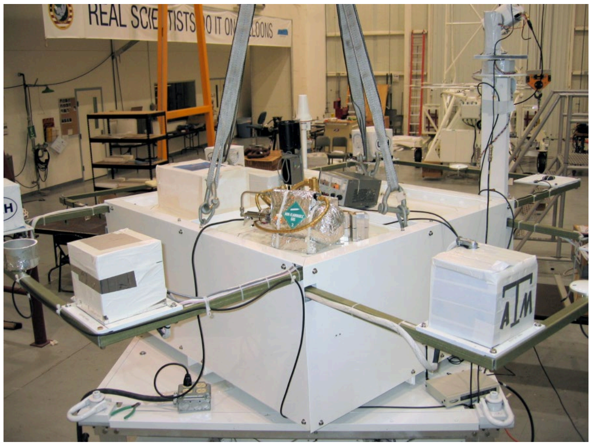

Figure 1: The HASP configuration

Figure 1 shows an image of HASP before the 2006 launch with student payloads integrated. The four large payload positions are on the top of the central structure, while the eight small payloads are mounted on fiberglass outrigger booms. For the updated version of HASP there are an additional eight small payload seats on booms positioned below those shown in Figure 1. The small payloads may be mounted for nadir pointing. For flight, HASP is attached to the Columbia Scientific Balloon Facility (CSBF) Frame (see Figure 2), which supports the CSBF vehicle control equipment, support structure for an additional four large payloads and attach points for suspension cables, crush pads, and the ballast hopper. Suspension cables run from each of the four corners of the CSBF frame to a pin plate that attaches to the flight train. The CSBF control equipment controls the balloon systems and supports command uplinks to HASP and downlink telemetry from HASP.

The composite material braces that support the small payloads extend about 55 cm from the aluminum frame. These braces minimize interference between the metal frame and any student payloads that may exercise data transmitters during flight and maximize the unobstructed payload field of view (FOV). Mounting plates for four large student payloads are on the top of the HASP aluminum frame structure and, if needed, additional large payload seats are located within the CSBF frame. Specific details about the payload mounting plates and the student payload interface are provided in the next section.

The HASP **command and control subsystem** provides the means for receiving and processing uplinked commands, acquiring and archiving the payload data, downlinking status information, and controlling the student payloads. The downlinked data is made available through the HASP website during a flight. In addition, the onboard recording of these same data to the on-board archive is a backup in case the Line-of-Sight (LOS) link is lost for any reason.

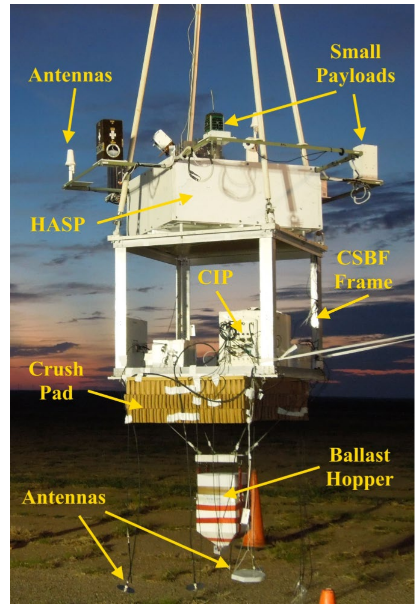

Figure 2: The HASP flight configuration

The primary **power source** for HASP will be a 50AH builder battery pack, six of which will supply ~28 Volts for ~300 Ahr @ +20° C. **Previous HASP teams please take note, this is a new battery system being used and the voltage range is different.** The new battery packs are a nominal 28V, but teams should design their power system to accommodate a bus voltage 26-30V. The voltage supplied to payloads will vary with total battery loading and battery temperatures.

HASP is flown, with the support of the Columbia Scientific Balloon Facility (CSBF), from the ConUS launch site in Ft. Sumner, New Mexico, once a year in late summer. The launch will be scheduled by the NASA Balloon Program Office at Wallops Flight Facility for early morning (i.e., dawn) when surface winds are calm. The balloon will be inflated so the ascent rate will be about 1000 feet per minute. Thus, ascent to the float altitude of about 120,000 feet will take roughly 2 hours. The time at float will then directly depend upon the strength and direction of the high-altitude winds. Typically, the vehicle can stay at altitude for 5 to 15 hours, possibly longer under certain situations, before

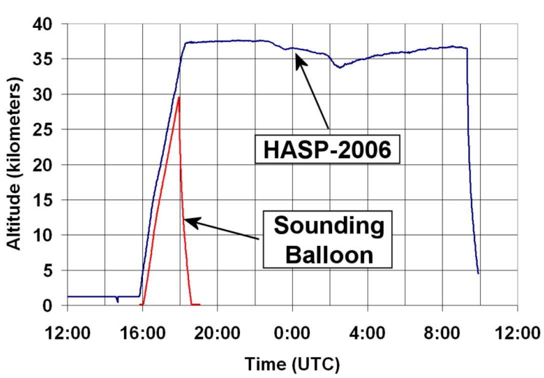

Figure 3:The HASP Flight Profile

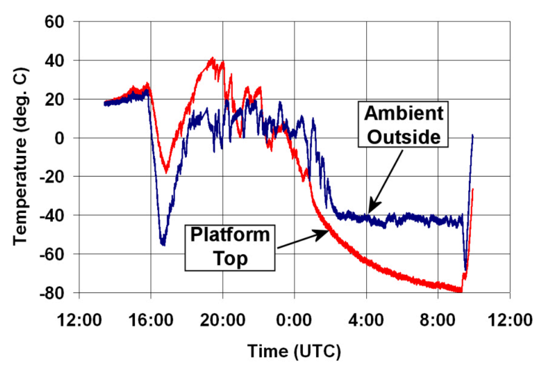

Figure 4: Typical temperatures during flight.

the flight must be terminated to parachute HASP into a safe landing zone. Recovery of the complete vehicle usually takes less than one day. The actual flight profile (altitude vs. time) for the 2006 HASP flight is shown in Figure 3 (blue curve) compared with the profile for a typical short-duration latex, sounding balloon flight. Temperatures encountered during the HASP 2006 flight are shown in Figure 4. The red curve is from a sensor placed in the location of a large payload, and the blue curve shows the temperature at a small payload. The dip in both curves at about 17:00 UTC is due to passage through the tropopause, but the temperature will warm once float altitude is reached. After sunset, at about 2:00 UTC in the plot, temperatures dip to very low values again. Further, the ambient pressure is 5 – 10 millibars at float altitude. Payloads must be designed to survive and operate under these conditions.

During the flight, the HASP ground system will receive and display the downlinked housekeeping status information and archive the student payload serial data into disk files. Files with UTC time-stamped GPS position and altitude information will also be generated. Student teams can download these files from the HASP website to monitor their payload status in near real-time. In addition, HASP will fly at least 1 video camera system that provides real-time views of the student payloads, the balloon, and the Earth during launch, flight, and termination (see Figure 5). If your payload undergoes a visible configuration change (i.e., you have moving parts or external indicator lights), an onboard video camera can be used to monitor these changes throughout the flight. Student payloads will also have limited commanding capability during flight. This will include a limited number of discrete commands plus 2-byte serial commands (defined as desired). Before the flight, the student team will provide HASP operations with a listing of all commands, which will be issued upon request by HASP flight support personnel. Following recovery, copies of all the flight datasets will be made and distributed to each group for their science data analysis.

V. Student Payload Interface

Specifications for the mechanical, electrical, and data interfaces between HASP and a student payload are provided in the latest version of the document “HASP – Student Payload Interface Manual,” which can be obtained from the Participant Information page (https://laspace.lsu.edu/hasp/Participantinfo.php) of the HASP website.

Note: For 2025 HASP Flight the HASP interfaces have been updated, EDAC pin and payload plate dimension are not the same as in previous years.

It is highly recommended that you download and review this document before developing your payload application. A brief summary of the payload constraints and interface is provided in Table 1 and below. ***Note that the HASP Interface Manual is updated periodically. In the event of conflicting information between this “Call for Payloads” and the “Interface Manual,” the most recent document should be used.***

Figure 5: Live video camera view during the HASP 2019 flight

Mechanical: HASP supports two classes of student payloads. **Small** payloads have a maximum weight of 3 kg and are located on the HASP “outrigger” braces. **Large** payloads can weigh up to 20 kg and are located either on the top of the HASP aluminum frame or in a new area on the CSBF Frame. Your payload application must indicate whether your payload class is small or large. **The**

total weight of all components associated with your payload must not exceed the class mass limits. Payload groups requesting the placement of payload components anywhere other than on a designated payload seat must submit a special request included as a part of the application and receive a waiver granting approval from LSU HASP Management, CSBF, and BPO. This approval may include additional paperwork, including flight safety documentation and analysis. See section VIII for more information regarding special requests.

If your application is accepted for flight, your team will be sent the payload mounting plate appropriate for your class. These plates, shown in Figure 6, are constructed from ¼" thick PVC, include wiring for the electrical / data connections and are marked to indicate the allowable footprint for your payload. Student teams cannot alter anything outside the payload plate footprint, including the EDAC and DB9 connectors. The plate can be modified within the allowed region for payload support structure and, if needed, downward-pointing apertures. [Note that the HASP thermal and EM insulation plates will be located immediately below each large payload on top of HASP, so downward pointing apertures would not be appropriate.] Any intrusion into the "KEEP OUT AREA" might result in your payload being disqualified from flight. All components attached to the mounting plate by the student team (e.g., payload, support structure, bolts, DC converters, antennas, etc.) must be included in the weight budget and total less than the maximum allowed for the payload class. The size of the allowed footprint and payload height are given in Table 1 on the following page.

Note that the payload must be secured to remain intact and attached to the mounting plate under a 10 g vertical and 5 g horizontal shock. It is advised that appropriate analyses and/or test data be collected to provide evidence that your payload and mounting will satisfy this requirement.

Electrical: A twenty-pin EDAC 516 (manufacture number 516-020-000-301) will interface with HASP system power and analog downlink channels. Power is supplied as +26 VDC with a maximum current draw for small payloads limited to 0.5 amps and for large payloads to 2.5 amps at all times. **Note that the power supply to your payload is fused, and exceeding the abovementioned current limit could result in a blown fuse. Blowing your HASP power supply fuse at any time may disqualify your payload for flight. Additionally, if a fuse is blown during flight, restoring power to that payload will be impossible.** The payload will be responsible for internally converting the +26 VDC to whatever voltages are required. In addition, one (1) 0 to 5 VDC analog channels will be accessible through the EDAC 516 connector. The HASP environmental monitoring system will sample and transmit these channels approximately once a minute to provide real-time monitoring of one key payload parameter. Payloads may have access to

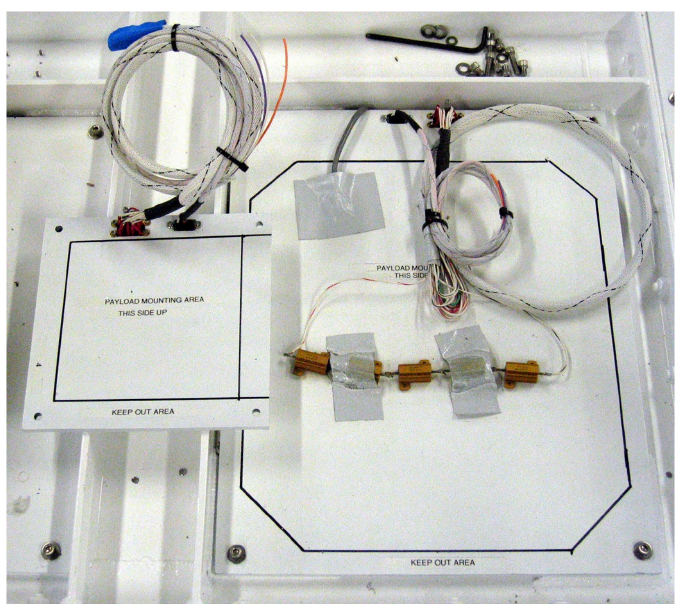

Figure 6: The small (left) and large (right) student payload mounting plates.

a discrete command line on their EDAC connector. This discrete command comes in the form of an open collector, active low signal pulse. Teams desiring to use the discrete command should indicate that on their payload application.

Data: Serial communications use a DB9 connector with pins 2 (receive/transmit), 3 (transmit/receive), and 5 (signal ground) connected. The protocol is RS232 and the port setup is 8 data bits, no parity, 1 stop bit, and no flow control. The serial port is set to 1200 baud for small payloads and 4800 baud for large payloads. HASP will collect data from the student payload as a bit stream: listening for and receiving data until the internal buffers fill, then packaging this buffer as a record for on-board archiving and telemetry to the ground system. The HASP ground station will publish the received byte to the HASP website for student team access without alteration or error checking. Therefore, the payload is strongly advised to adopt a record structure that includes a unique header identification, record byte count, and checksum. The "HASP – Student Payload Interface Manual" provides a suggested record format.

Table 1: Payload Interface Specifications (v2024)

Small Student Payloads:

Total number of positions available:	up to 16
Maximum Total Payload weight (sum of **ALL** payload components):	3 kg (6.6 lbs)
Maximum footprint (must include mounting structure):	15 cm x 15 cm (~6" x 6")
Maximum height (may need to be negotiated with neighbor payloads):	30 cm (~12")
Supplied voltage:	26 - 30 VDC
Available current:	0.5 Amps
Maximum serial downlink (bit stream):	<1200 bps
Serial uplink:	2 bytes per command
Serial interface:	1200 baud, RS232 protocol, DB9 connector
Analog downlink:	1 ADC Input 0 to 5 VDC
Discrete commands:	Up To 1 Active Low Open Collector Digital Command
Power, Analog, & discrete interface:	EDAC 516-020

Large Student Payloads:

Total number of positions available:	up to 8
Maximum Total Payload weight (sum of **ALL** payload components):	20 kg (44 lbs)
Maximum footprint (must include mounting structure):	38 cm x 30 cm (~15" x 12")
Maximum height (may need to be negotiated with neighbor payloads):	30 cm (~12")
Supplied voltage:	26 - 30 VDC
Available current:	2.5 Amps
Maximum serial downlink (bit stream):	<4800 bps
Serial uplink:	2 bytes per command
Serial interface:	4800 baud, RS232 protocol, DB9 connector
Analog downlink:	1 ADC Input 0 to 5 VDC
Discrete commands:	Up To 1 Active Low Open Collector Digital Command
Power, Analog, & discrete interface:	EDAC 516-020

It will also be feasible to uplink a two-byte serial command to your payload. Any number of two-byte commands can be defined, but each command will need to be entered into the ground system and uplinked separately by a HASP operator. As the same serial port will be used for both downlink and uplink, the payload will need to periodically check the port to determine if any commands are being uploaded from the HASP Flight Computer. When a team requests a 2-byte command, the HASP operator will manually send the requested bytes without checking whether or not that is a valid command for that payload. Therefore, it is the payload's responsibility to determine the serial command's validity and contents. Uplink commanding can be unreliable, and you should minimize the number of commands you plan to use during flight. Also, the command string received by the payload will contain bytes of header and footer information in addition to the two (2) command bytes. The payload will be responsible for properly parsing and extracting the command bytes from this string. The format of the command string sent to a student payload and suggestions on improving commanding reliability are provided in the "HASP – Student Payload Interface Manual."

Many student teams have a common problem with interfacing controllers such as the Arduino Mega or Raspberry Pi with the HASP serial interface. This is often because the controller uses TTL levels while the serial interface uses RS232 levels. Thus, you must "level shift" the signals between the payload controller and HASP (e.g., SparkFun Transceiver Breakout – MAX3232, BOB-11189).

Integration and Flight Commanding: An interactive Google Sheets document handles individual payload commanding during integration and flight. Each payload is given a unique account coded to allow that group to send command requests and other comments to the HASP Management. The HASP management team can then send the commands and update the payload group's command status. The system is color-coded and numerically keyed to ensure all parties know the status of payload commanding.

Thermal: The HASP platform provides **no** thermal control to the student payloads. The payload developers are responsible for ensuring their experiment remains within acceptable temperature limits. **Note:** payloads are prone to overheating at float in sunlight and freezing in darkness due to high heat input from direct sunlight and the inefficiency of convection and conduction heat transfer mechanisms in a vacuum environment.

Vacuum: During flight, your payload must operate at very low ambient pressures of 5 to 10 mbar. In such a vacuum, convection is inefficient in transferring heat loads. Without adequate protection, high voltage systems can discharge and arc, which could lead to electronics damage or blowing the fuse on the HASP power supply for the payload. The payload developers are responsible for ensuring their experiment will operate correctly in a low-pressure environment.

Hazards: The NASA Balloon Program Office (BPO) and the Columbia Scientific Balloon Facility (CSBF) list items hazardous to personnel and/or the flight systems. All potential hazards need to be clearly identified in the HASP application. If the payload is accepted for flight, the student team must provide all documentation, testing, and risk mitigation plans required by the BPO and CSBF before integration with HASP. **NOTE: Several hazards are explicitly <u>banned</u> from flight on HASP and will result in the application and payload being disqualified if used. Table 2 lists all potentially hazardous materials and identifies them as banned or requiring additional documentation and review before approval. The details of the additional documentation can be found in Appendix B.** The list is not exhaustive. Any hazard not explicitly disallowed may require extensive documentation provided to NASA safety before that hazard will be allowed to fly. Further, student team leaders and faculty advisors should know that providing the documentation, certification, and plans required by BPO and/or CSBF to assess any identified hazards could consume considerable resources. Therefore, we advise that student teams consider this and only incorporate any hazard identified in this section if they are willing to commit to providing all additional documentation by the specified deadlines. **Please see Appendix B for more information about the Balloon Program Office's required documentation for hazards and additional payload information.**

Table 2: Hazardous Materials List

RF transmitters	**See Appendix B**
High Voltage	**See Appendix B**
Lasers (Class 1, 2, and 3R only) Fully Enclosed	**See Appendix B**
Pressure Vessels	**See Appendix B**
Non-Rechargeable Batteries	**See Appendix B**
Magnets	**BANNED for field strengths greater than 1 Gauss**
Intentionally Dropped Components	**BANNED**
Liquid Chemicals	**BANNED**
Cryogenic Materials	**BANNED**
Radioactive Material	**BANNED**
Pyrotechnics	**BANNED**
UV Light	**BANNED**
Biological Samples	**BANNED**
Rechargeable Batteries	**BANNED**
High intensity light source	**BANNED**

VI. Anticipated Schedule

The anticipated schedule for the upcoming HASP campaign is illustrated in Table 3. The dates in this table are approximate and are subject to change. The payload selection for this flight will be announced in Early December 2024. Our comments on your application, including requests for further information, will be forwarded to you shortly following the selection announcement. Your team should submit a response to these comments within the following two weeks. You will be required to submit a brief status report each month and participate in a monthly teleconference. The status report will be due on the last Friday of each month, and the teleconference will be held on the first Friday of each month. Details about the status reports and teleconference participation are below under "Deliverables" (Section VII).

Figure 7: Student teams at the HASP 2017 integration and system test.

A *NASA Integration On-site Security Clearance Document* listing all participants going to the CSBF facilities at Palestine, TX for HASP integration must be provided to the HASP management team by April 25, 2024, while an equivalent document for all participants going to the CSBF facilities in Ft. Sumner, NM for the HASP flight will be due by June 27, 2024. A description of the requirements for these lists can be found under "Deliverables" (Section VII) and in the Appendix. **Note: Foreign nationals from Designated Countries will not be allowed on-site at NASA facilities, with no exceptions. See Appendix A for the link to the US Department of State's current list of designated countries.** The template for these lists is available on the HASP website.

A preliminary version of the *Payload Specification and Integration Plan (PSIP)* will be due in March, and a description of the PSIP document can be found in "Deliverables" (Section VII). This preliminary PSIP must include a finalized set of all hazard documentation and a mechanical Bill of Materials. This information must be provided to NASA Safety for review at this time. We will provide comments on the preliminary PSIP, which should be incorporated into revisions for the document's final version, which is due in June.

Figure 8: HASP and student payloads in the CSBF BEMCO chamber in preparation for thermal / vacuum testing.

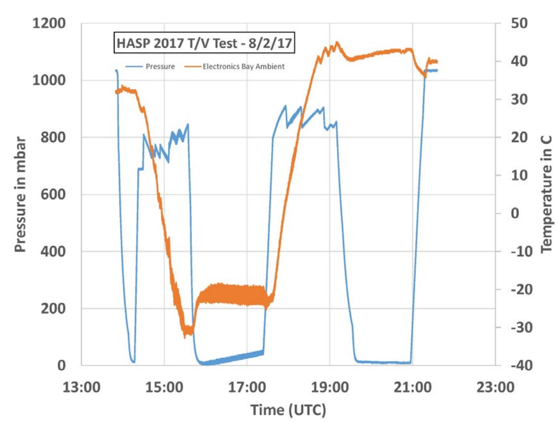

Figure 9: A typical temperature (orange) and pressure (blue) profile for a HASP thermal / vacuum test.

Student payload integration with HASP will occur around the last week of July/first week in August at the CSBF facility in Palestine, TX. It will include thermal/vacuum testing to simulate the temperature and pressure extremes your payload will experience during a HASP flight (see Figures 7, 8, and 9). During the integration process, you must successfully satisfy the HASP serial communication, power, and mechanical interface requirements. You must prove that your payload operates correctly during one of the two thermal/vacuum test opportunities. In addition, your final *Flight Operations Plan (FLOP)* will also be due. The team will be issued a Payload Integration Certification (PIC) with flight certification upon successful integration. The flight certification is helpful in justifying flight operation support from your funding agency. If issues are uncovered and not resolved during integration, you will likely be issued a *PIC without flight certification*. There will be about two to three weeks before the flight to correct problems. However, there will be no pre-launch testing on the flight line and little flexibility to resolve any issues. Thus, the decision to participate in the HASP mission without flight certification must be considered between your funding agency and your team.

We strongly urge all student teams to perform some level of thermal / vacuum testing of your payload before arriving at CSBF for HASP integration. Performing a thermal / vacuum test will enable you to identify potential flight issues with your payload early, but you still have time to correct these issues before HASP integration. Note that student teams that do not have local access to a testing facility may contact HASP Management (hasp@lsu.edu) to determine if testing

Table 3: Anticipated HASP 2025 Schedule

August 26, 2024	HASP 2024 Call for Proposal Released
September 27, 2024	Q & A Teleconference
October 11, 2024	Notice of Intent Letter Due
October 18, 2024	Application Development Teleconference
November 04, 2024	Application due date
~December 08, 2024	Announce student payload selection
January 15, 2025	HASP 2025 Kick Off Meeting
January –November 2025	Monthly status reports and teleconferences
March 28, 2025	Preliminary PSIP document due
April 25, 2025	NASA Integration Security Document due
June 27, 2025	Final PSIP Document due
June 27, 2025	NASA Flight On-Site Security Document Due
July 15, 2025	Final FLOP Document due
July 28 – Aug 1, 2025	Student payload integration at CSBF *
August 26 – August 30, 2025	HASP flight preparation *
September 01, 2025	Target flight ready *
September 02, 2025	Target launch date and flight operations *
September 04 – Sept 08, 2025	Recovery, packing, and return shipping *
September – November 2025	Monthly status reports and teleconferences
December 12, 2025	Final Flight / Science Report due

using the LSU Bemco Balloon Environment chamber would be feasible. Any environmental testing request should be made at least 30 days prior to any anticipated test. Scheduling a test will be considered as time and resources permit.

Flight operations are planned for Ft. Sumner, New Mexico, in late August / early September. The HASP vehicle and support crew will arrive on-site in late August. Any student payloads that have already been integrated with HASP (i.e., in late July) can be flown without any further intervention by the student team. Data from the flight will be available via the HASP website. **Note: Teams will not be allowed to follow the HASP recovery team.** Following the flight, the payload will be returned to the group using your supplied container and pre-paid shipping label. **(Note that if a shipping container and pre-paid shipping label are not provided by the time of HASP recovery, the return of your payload may be significantly delayed, and you may need to travel to CSBF or LSU to pick up your payload.)** If the entire dataset is desired, it will be zipped on the HASP website sometime after the flight. If you wish, you must request a copy of the raw data from HASP's flight disks.

Exact launch dates are impossible to predict and highly depend upon the local weather conditions and the number of other balloon payloads waiting for the launch. At this time, we are targeting early September, but this could be one week earlier or several weeks later.

Note that on-site participation by the student team during Integration and System Testing at CSBF in Palestine, Texas, and during Flight operations in Fort Sumner, New Mexico, is not required, provided you have fully and accurately completed the PSIP and FLOP deliverables (see section VII) and supply a flight ready and tested payload. The PSIP and FLOP document all your payload interfaces to HASP and fully describe your data interface, data format, commands, payload test, and verification procedures. With these documents, HASP management should understand how your payload is supposed to operate. Further, your flight data during integration and flight operations is available online for you to verify at your home institution, and command requests can be delivered to the remote operation site. However, HASP management will not take responsibility for interpreting documentation, diagnosing issues, or modifying/repairing payload problems. HASP Management will also not take responsibility for any integration, pre-launch, or flight operation procedures other than a simple power-up and power-down. Any payload supplied with incomplete documentation that encounters a problem during integration or pre-launch or that requires complex preparation without student team personnel on-site to address issues will not be flown and will merely be returned to the responsible institution. Plan accordingly!

VII. Deliverables

Even if your payload application is accepted, your seat on the next HASP flight is contingent upon providing status reports, documentation describing the payload, meeting required deadlines, plans for integration and flight operations, and participation in the monthly teleconferences. In addition, application for a future HASP flight will be contingent on delivering a *Final Flight/Science Report* for past flights. These documents are described below, and templates are available on the HASP website. *Note that filling out these documents is not necessary for your application. Still, it will give you an idea of the kind of information that you might include in your application and what we will require once your payload is developed.*

Monthly Status Reports: A status report from the student team lead will be due from January through November on the last Friday of the month. This is a brief report, no longer than one or two pages, that describes that month's 1) activities of the team members, 2) issues encountered during payload design/development, 3) milestones achieved, and 4) current team members, demographics, and leaders. The report will be submitted utilizing a submission form provided to all flight teams in their acceptance documentation. No other submission methods will be allowed.

Kick-Off Meeting: A HASP 2025 Kick-Off virtual meeting (via Microsoft Teams) will be held in early January to introduce the HASP leadership team, provide a detailed overview of the HASP 2025 schedule and expectations, and to answer any questions that the accepted flight teams may have. The exact will be provided to teams in their acceptance documentation.

Monthly Teleconference Meetings: A virtual meeting (via Microsoft Teams) will be held from February through December on the first Friday of the month. At least the Faculty Advisor and Student Team Lead should be present at the teleconference, but we encourage all team members to participate. These teleconferences will be used to 1) announce upcoming events and schedules, 2) provide feedback on the monthly status reports, 3) answer questions on the HASP interface, 4) provide expert advice on payload development, and 5) share experiences among HASP participants. Details about the Teams meeting link and procedure will be announced later.

Payload Specification & Integration Plan (PSIP): The **Preliminary PSIP** and **Final PSIP** documents provide technical details on the final flight configuration of your payload, including measured weight, measured current draw (@30 VDC), downlink data format and rate, uplink commands, analog output usage, discrete command usage, and dimensioned mechanical drawings. In addition, your plans for integration with HASP should include, at least, all test procedures and test procedure validation results, requested test equipment, schedule, and personnel participating in integration. The Preliminary PSIP must also include a mechanical Bill of Materials for NASA safety review. A BoM spreadsheet is included with the PSIP template. If the payload contains an item from the Hazardous Materials List, additional safety forms will be required in the Preliminary and Final PSIP.

A finalized and complete version of the Hazards safety forms must be included in the Preliminary PSIP. If there are any emergency changes to payload hazards between the submission of the Preliminary PSIP and the Final PSIP, report them to HASP and BPO management as soon as possible, as these changes must be reviewed for approval. Changes are not guaranteed. The final PSIP must include a completed hazard documentation form; no changes to payload hazards will be allowed after NASA Safety approval.

The PSIP template that teams must use is available at https://laspace.lsu.edu/hasp/Participantinfo.php. The PSIP documentation must be uploaded via a submission form that will be provided to flight teams in their acceptance documentation. No other submission methods will be allowed. The Preliminary PSIP will be due March 28, 2025, and the Final PSIP will be due June 27, 2025.

NASA Integration On-site Security Clearance Documentation: This document provides required information to CSBF and Wallops Flight Facility that is necessary for an individual to be allowed onsite at the Columbia Scientific Balloon Facility in Palestine, TX. This information is time-sensitive. Foreign nationals born in US State Department designated countries or with citizenship from designated countries will not be granted entry to NASA facilities, with no exceptions. Additionally, the HASP team, CSBF, and NASA will not provide letters of visa sponsorship/invitation. We are also not responsible for visa delays inside embassies, so plan accordingly. This document must be completed by April 25, 2025. Any individual traveling for this trip must be included in this document. **No Foreign National additions to this list will be accepted after this date. It is possible to add US Citizen/Green Card holders to the lists up to one (1) month before the official arrival date. All changes after that date will be refused.** See Appendix A for more information. The spreadsheet required for this security document is available at https://laspace.lsu.edu/hasp/Participantinfo.php. Any schools with foreign nationals traveling to Palestine must also provide a letter on institution letterhead identifying the foreign nationals and accepting responsibility for them while onsite. An example of this letter will be posted on the HASP website on the link above and will be included in the PSIP template. The Security spreadsheet and Foreign Nationals Letter (if required) must be uploaded utilizing a submission form that will be provided to flight teams in their acceptance documentation. No other submission methods will be allowed.

NASA Flight On-site Security Clearance Documentation: This document provides required information to CSBF and Wallops Flight Facility that is necessary for an individual to be allowed onsite at the HASP launch site in Ft. Sumner, NM. This information is time-sensitive. Foreign nationals born in US State Department designated countries or with citizenship from designated countries will not be granted entry to NASA facilities with no exceptions. Additionally, the HASP team, CSBF, and NASA will not provide letters of visa sponsorship/invitation. We are also not responsible for visa delays inside embassies, so plan accordingly. This document must be completed by June 27, 2025. Any individual traveling for this trip must be included in this document. **No Foreign National additions to this list will be accepted after this date. It is possible to add US Citizen/Green Card holders to the lists up to one (1) month before the official arrival date. All changes after that date will be refused.** See Appendix A for more information. The spreadsheet required for this security document is available at https://laspace.lsu.edu/hasp/Participantinfo.php. Any schools with foreign nationals traveling to Fort Sumner must also provide a letter on institution letterhead that identifies the foreign nationals and accepts responsibility for them while onsite. An example of this letter will be posted on the HASP website on the link above and will be included in the PSIP template. The Security spreadsheet and Foreign Nationals Letter (if required) must be uploaded utilizing a submission form that will be provided to flight teams in their acceptance documentation. No other submission methods will be allowed.

Flight Ready Payload: The final instrument that satisfies all the interface requirements specified in the *HASP—Student Payload Interface Manual*, is fully described in the PSIP, with flight operations documented in the FLOP, as well as satisfying the science objectives defined in the original HASP application and has been tested to prove that all such requirements have been met. The Flight Ready Payload is delivered before HASP integration and system testing at CSBF in August and will be returned to the responsible institution following the flight.

Payload Integration Certification (PIC): At integration, all interfaces will be documented and validated, the correct operation of the payload will be verified, and any issues identified will be detailed. This certification will be handled by HASP management during integration. A sample version of the form can be located at https://laspace.lsu.edu/hasp/Participantinfo.php. You will not be certified to fly until the PIC is complete.

FLight Operation Plan (FLOP): This document will detail procedures for flight line setup, pre-launch checkout, flight operations, error recovery, pre-terminate procedure, and payload recovery including a timeline showing specific events relative to launch at T=0 and identifying personnel participating in flight operations. Note that any payload operations to be performed other than power-up ~one hour before launch (T – 1 hr) and power-down before termination must be specified in this document. This document is due on July 25, 2025, before integration begins. A template that teams must use for this document is available at https://laspace.lsu.edu/hasp/Participantinfo.php. The FLOP documentation must be uploaded via a submission form that will be provided to flight teams in their acceptance documentation. No other submission methods will be allowed.

Final Flight / Science Report: A final report on the results from the flight of your payload is due by December 12, 2025. This report should include an assessment of the payload performance, problems encountered, lessons learned, the science / technical results from the flight, and the demographics of all participants in your project. The report must be submitted utilizing a submission form provided to flight teams. No other submission methods will be allowed.

Balloon Program Office Documentation: Please see Appendix B for information that the NASA Balloon Program Office will request to facilitate NASA WFF Safety and Mission Assurance Division's ability to perform flight and ground safety assessments for the Fort Sumner Campaign. There are three forms to be completed that will provide the necessary information for each payload.

VIII. Special Requests

We will entertain requests for your payload to exceed one or more constraints on weight, dimension, telemetry, and location. All waiver requests **MUST** be fully described, including a weight table, power table, dimensioned mechanical drawings, power supply schematic, etc. AND must clearly justify how the waiver will impact your science. Such applications will be accepted **only** if we feel the request is fully justified and does not negatively impact HASP or surrounding payloads. Thus, it is strongly advised that if you decide to make a special request, you should also include a section discussing the implications if your request is not granted. Note that a statement that the modification will enable you to acquire more data is insufficient to justify exceeding a constraint. You must **prove how a major scientific objective will be lost** if your request is not granted. Flight applications without a fully justified waiver request will have the waiver rejected. Finally, even if a waiver is granted, the student team will need to assume all risks associated with exceeding a HASP constraint, including possible rejection of the payload by CSBF following compatibility testing, damage to or loss of the payload, and loss of payload data.

IX. Q&A Teleconference

A special virtual meeting (via Microsoft Teams) will be held on **Monday, September 27, 2024, at 10:00 am (central time)** for groups planning to submit a HASP application. During the meeting, we will briefly describe the HASP program and what we expect to see in all applications and address any questions you may have. Groups who have previously flown on HASP and new organizations should plan on attending this Microsoft Teams meeting. A second Application Development virtual meeting will be held on **Friday, October 18, 2024, at 10:00 am (central time)** to discuss any questions potential applicants may have while creating their proposal. To participate in either or both teleconferences, please register at https://lsu.formstack.com/forms/hasp_qa_registration. Once registered, all the appropriate Teams information will be emailed to the participants.

X. Application Preparation and Submission

For the 2025 HASP flight, up to sixteen (16) small and eight (8) large payload seats will be available for student groups. To be considered for the 2025 HASP flight, all teams must submit a Notice of Intent on or before **October 11, 2024** and complete a payload application on or before **November 04, 2024.** The received applications will be reviewed, and seat awards will be announced in early **December 2024**. The template for the HASP 2025 application can be located on the HASP Participant Information page of the HASP website -- https://laspace.lsu.edu/hasp/Participantinfo.php.

The application package includes a standard HASP application cover sheet, payload description, team management and structure, payload interface specifications, and preliminary drawings. It can be submitted in MS Word, PDF, or hardcopy format.

The **cover sheet** form is a 1-sheet description of the payload. The boxes on the cover sheet should be self-descriptive with the following exception. In "Payload Class, " identify whether you are applying for a **small** or **large** payload seat. The "Project Abstract" is limited to 200 words and should briefly summarize your payload "science" objectives, team structure, and interface requirements. If your team has a name different from the project name, you can enter it in the "Team Name" box; otherwise, enter the payload acronym or leave it blank. Enter the URL in the next box if your team or project has a website. Finally, we will need complete contact information for the faculty advisor and the student, who will interface with the student team and HASP management. The cover sheet is limited to one page.

The **payload description** provides a two to three-page summary of the scientific and/or engineering problem your payload will address, the specific scientific/engineering objectives, a high-level review of your payload systems, plus a statement of the principle of operation of your experiment. Be sure to include a thermal control 'plan.' **You MUST include a discussion about how your primary scientific goals and objectives align with the expected environmental conditions that the HASP platform will experience.** This section should provide the reader with a reasonable understanding of the "why, what, and how" of your payload.

The application should also include a description of **how your team is structured and managed**. This section should include an organization chart and a team lead list. Complete contact information (including e-mail address) should be provided for the principal team leads, plus faculty advisors. Also include a description of how the team effort is organized and managed and a preliminary timeline, with milestones, leading to integration with HASP and flight operations. We will also need to know how many personnel are anticipated to participate in the integration at CSBF and flight operations at Ft. Sumner. Finally, **this section must include a detailed discussion of the faculty advisor's role in the HASP project,** including the number of hours anticipated to be devoted to student mentorship, a plan for how the advisor will manage team finances, student team development, payload definition/design/development, and a statement acknowledging the HASP deliverable due dates and schedule milestones.

The **payload specifications** section should describe what HASP resources you will use and how your payload will fit within the HASP constraints. This section should include your weight budget with uncertainties, mounting plate footprint, payload height, power budget, downlink serial telemetry rate, uplink serial command rate, anticipated use of analog downlink channels or additional discrete commands, as well as the desired payload location and orientation, and potential hazards. Also, include a brief description of your anticipated procedures during integration with HASP and flight operations. You may request resources that somewhat exceed those specified for your payload class or those not mentioned in this document. This request must be in the form of a waiver exemption request. See Section VIII for what should be included in a waiver request. Payloads significantly impacted by the limited resources available are unlikely to be good candidates for a HASP flight.

A collection of **preliminary drawings** illustrating particular aspects of your payload is required in this application. Typical items to include here would be a dimensioned drawing of your payload, a power circuit diagram showing wiring to the EDAC connector and all voltage converters, anticipated modifications to the payload mounting plate, sketches of your mounting structure, and illustrations of your preferred payload orientation and location on HASP. Failure to include this required information could result in a rejection of your flight application.

Finally, completed documentation of any hazardous items you plan to include in your payload, as identified in Table 2 and Appendix B, must be attached to your application. Failure to include this documentation will result in the rejection of your application. Further, adding a hazard following acceptance of your application for HASP will disqualify flight status.

An example of the HASP Student Payload Application is provided on the HASP website along with this CFP and the application cover page in MS Word format. The example application is from a previous student team that provided most of the information we want to see in a HASP application. HOWEVER, note that these applications were submitted several years ago before new documentation requirements concerning hazards, safety, and faculty advisor roles were implemented. We strongly advise that ALL members of student teams considering applying for a HASP seat read the current HASP CFP, the application template, the example application, and the HASP Student Payload Interface Manual. These documents are on the HASP "Participant Information" page https://laspace.lsu.edu/hasp/Participantinfo.php.

Once completed, your application should be submitted (see section XI) via the online submission form as a fully searchable PDF or MS Word or in hardcopy to the address listed in section XI by November 04, 2024. As the applications are reviewed, priority will be given to those payloads that are clearly student-designed, built, managed, and operated. Still, projects with only a partial student component are also welcome to apply. The application will be reviewed for completeness, consistency, scientific or technical justification, and ability to fit within the HASP constraints. Seat awards will be announced in early December 2024.

XI. Submission of Application

Your completed application should be **submitted via the online submission form - https://lsu.formstack.com/forms/hasp_application by 11:59 pm on Monday, November 04, 2024 (Central Time.)** Applications received after this deadline will be reviewed only after on-time applications and only on a merit and seat availability basis. The completed application must use the Application Template and be saved as a fully searchable PDF file (preferred) or a Microsoft Word document. Your application will not be accepted in any other format. The faculty advisor and student lead will receive an acknowledgment that your application was received.

Alternatively, you can submit a hardcopy of your application by the due date/time given above to the following address:

Douglas Granger
202 Nicholson Hall / Tower Drive
Department of Physics & Astronomy
Louisiana State University
Baton Rouge, LA 70803-4001

Note that as long as your electronic copy is submitted on time, there is no need to submit a hardcopy application.

XII. Financial Support

Each applicant for a HASP seat must provide their own financial support for payload development, testing, integration in Palestine, TX, flight operations in New Mexico, and subsequent data analysis. Such financial support, for example, is needed for but is not limited to, the purchase of supplies, sensors, lab equipment, student salaries, test facility fees, faculty advisor support, travel expenses, special services, shipping, structural materials, electronic components, and other similar items. It is **highly** recommended that a team seek/develop the needed financial resources while completing this application. Finally, in all likelihood, the team faculty advisor will need to manage the financial support at the team institution, and a commitment by the faculty advisor to provide this management will be critical to a successful project.

XIII. Foreign Travel Documentation

HASP Management will **not** provide any travel documentation for foreign teams. This includes, but is not limited to, official invitations, VISA support documentation, and letters to the embassy. The CFP, payload application, and payload acceptance can be used to support your travel request. Any schools with foreign nationals traveling to Palestine or Fort Sumner must also provide a letter on institution letterhead that identifies the foreign nationals and accepts responsibility for them while onsite. An example of this letter will be posted on the HASP website (https://laspace.lsu.edu/hasp/Participantinfo.php) and will be included in the PSIP documentation.

XIV. Private Company Support for a HASP Student Team

Private companies cannot use HASP or provide support for a HASP student team to claim improvement on their product technical readiness level or similar commercial gain. If a private company supports a student team, the team application must clarify what support is provided by the private company and what effort is planned to be accomplished by the students. A letter of support from the private company specifying the company's contributions to the team and committing the company not to claim commercial gain as a result of the HASP flight must be included in the application. Note that a company logo can be affixed to the exterior of a student payload in acknowledgment of the company's support.

Attachments
Required Proposal Forms

The NOI is required if you intend to submit a proposal to HASP; however, submitting an NOI does not mean you are required to submit a proposal. NOI information will be used to communicate with potential applicants should changes to the CFP be required. Only the Lead Institution needs to submit an NOI.

- **NOI (due October 11, 2024)**

HASP Program Notice of Intent (NOI) to Propose

This NOI must be submitted by either the Student Leader or Faculty Advisor to the HASP Management on or before Friday, October 11, 2024. No institutional signature is required for the NOI.

TENTATIVE PAYLOAD TITLE:	
INSTITUTION:	
Type: (UNIVERSITY, MSI, COMMUNITY COLLEGE, HIGH SCHOOL, ETC)	
NAME OF STUDENT LEADER:	STUDENT LEADER E-MAIL:
MAILING ADDRESS:	STUDENT LEADER PHONE NUMBER:
NAME OF FACULTY ADVISOR:	FACULTY ADVISOR E-MAIL:
MAILING ADDRESS	FACULTY ADVISOR'S PHONE NUMBER
ADDITIONAL INSTITUTIONS IF SUBMITTING A MULTI-INSTITUTION PROPOSAL:	

Appendix A: NASA On-Site Security Clearance Requirements

NASA maintains strict entrance requirements for anyone planning to enter a NASA facility, including the Columbia Scientific Balloon Facility in Palestine, Texas, and the Launch Facility in Ft Sumner, New Mexico. Both Citizenship and Country of Birth identifiers are used to determine the applicant's classification. **NOTE:** Any schools with foreign nationals traveling to Palestine or Fort Sumner must also provide a letter on institution letterhead identifying the foreign nationals and accepting responsibility for them while onsite. An example of this letter will be posted on the HASP website - https://laspace.lsu.edu/hasp/Participantinfo.php .

Applicant	Country of Birth	Citizenship	Classification
	USA	USA	US National
	Foreign Non-Designated	USA / USA Green Card	US National
	Designated	USA / USA Green Card	US National
	Foreign Non-Designated	Foreign Non-Designated	Foreign National Non-Designated
	Foreign Non-Designated	Designated	Designated National
	Designated	Foreign Non-Designated	Designated National
	Designated	Designated	Designated National

If the Applicant is a US citizen:

1. If the site visit is less than 29 days,
    a. No background investigation is required
    b. Government-issued identification is required to access CSBF sites (PSN, FTS, etc.)
2. If the site visit is greater than 29 days,
    a. Background investigation is required
    b. Required to fill out forms to be assigned a NASA identity

If the Applicant is a Foreign National from a Non-Designated Country:

1. If the applicant has been assigned a US Green Card, see the requirements listed above for US Citizens.
2. If the applicant does not have a Green Card and is from a Non-designated Country,
    a. Notify CSBF of the individual name, email address, and affiliated institution
    b. Applicant must create a NASA profile
    c. ESTA, Passport, Visa, I94, etc., potentially required
    d. WFF will perform a background check

If Applicant is a Foreign National from a Designated Country:

1. The Applicant will **NOT** be approved for access to NASA Facilities
2. For more information on US Designated Countries, please visit this site -- https://oiir.hq.nasa.gov/nasaecp/.

Appendix B: Required Hazard Documentation for NASA's Scientific Balloon Program Office

NASA Scientific Balloon Program Office (BPO) 's primary mission manager and point of contact for the High Altitude Student Platform's (HASP) mission are Christy Hales and Andy Hynous. In the event that your payload includes a non-banned hazard, NASA BPO will require additional information. The application should provide preliminary information, and a finalized version must be included in the Preliminary PSIP due in March. This additional information is required as hazards could include personnel injury or death and health issues and is needed to facilitate NASA WFF Safety and Mission Assurance Division's ability to perform flight and ground safety assessments for the Fort Sumner Campaign. The required data below and additional data provided in the PSIP will be included in the Ground and RF flight safety plans generated by NASA WFF Safety and required for HASP flight operations.

I. Radio Frequency Transmitter Requirements for HASP Flights

RF transmitters are listed as a safety hazard by NASA. As such, the use of RF transmitters on HASP must be documented and approved in the Ground and RF flight safety plans. Any team using a transmitter must provide the following information in both their application and the PSIP document supplied later in the flight season. **In addition, the frequency range 425 – 435 MHz is used for critical flight operations and, therefore, BANNED** for any payload use. This table must be completed for each RF transmitting device type flown on HASP.

HASP 2024 RF System Documentation	
Manufacture Model	
Part Number	
Ground or Flight Transmitter	
Type of Emission	
Transmit Frequency (MHz)	
Receive Frequency (MHz)	
Antenna Type	
Gain (dBi)	
Peak Radiated Power (Watts)	
Average Radiated Power (Watts)	

II: High Voltage Hazard Requirements for HASP

High Voltage systems are listed as a safety hazard on NASA payloads. Therefore, the use of High Voltage on HASP must be documented and approved in the Ground and Flight safety plans. A source is considered High Voltage if the output voltage exceeds 50V. Any team using a high-voltage source must provide the following information in their application and the PSIP document supplied later in the flight season for each source type. In addition, a detailed schematic, safety plan, and operation procedure must be included in this application. A final version of these requirements must be included in the PSIP submitted later in the flight cycle.

HASP 2024 High Voltage System Documentation	
Manufacture Model	
Part Number	
Location of Voltage Source	
Fully Enclosed (Yes/No)	
Is High Voltage Source Potted?	
Output Voltage	
Power (W)	
Peak Current (A)	
Run Current (A)	

III: Lasers (Class 1, 2, and 3R) Hazard Requirements for HASP

Lasers are listed as a safety hazard on NASA payloads. Therefore, the use of lasers on HASP must be documented and approved in the Ground and Flight safety plans. Only Class 1, 2, and 3R lasers will be considered for flight. All other laser classes are **banned**. Any team using an onboard laser must provide the following information in their application and the PSIP document supplied later in the flight season for each source type. The laser approval process is a very time-consuming operation, and complete data must be submitted with the application to ensure that the payload team is notified of the approval status early in the HASP timeline. In addition, a detailed schematic, safety plan, and operation procedure must be documented in the PSIP.

HASP 2024 Laser System Documentation			
Manufacture Model			
Part Number			
Serial Number			
GDFC ECN Number			
Laser Medium			
Type of Laser			
Laser Class			
NOHD (Nominal Ocular Hazard Distance)			
Laser Wavelength			
Wave Type		*(Continuous Wave, Single Pulsed, Multiple Pulsed)*	
Interlocks		*(None, Fallible, Fail-Safe)*	
Beam Shape		*(Circular, Elliptical, Rectangular)*	
Beam Diameter (mm)		**Beam Divergence (mrad)**	
Diameter at Waist (mm)		**Aperture to Waist Divergence (cm)**	
Major Axis Dimension (mm)		**Major Divergence (mrad)**	
Minor Axis Dimension (mm)		**Minor Divergence (mrad)**	
Pulse Width (sec)		**PRF (Hz)**	
Energy (Joules)		**Average Power (W)**	
Gaussian Coupled (e-1, e-2)		*(e-1, e-2)*	
Single Mode Fiber Diameter			
Multi-Mode Fiber Numerical Aperture (NA)			
Flight Use or Ground Testing Use?			
Beams Enclosed?			
Transmitting External to Payload?			

IV: On-Board Batteries Hazard Requirements for HASP

Batteries are listed as a safety hazard on NASA payloads. Therefore, using any batteries on HASP must be documented and approved in the Ground and Flight safety plans. Unmodified general-use alkaline and lithium-ion batteries will be approved but must be documented in the form below. Any modifications to pre-packaged batteries are **banned** and will not be allowed on HASP**.** In addition, all rechargeable batteries are banned from being used on HASP. All Li-ion batteries must have a UL certification. Li-Ion batteries must be stored in a fire-rated bag or cabinet when not installed in the instrument. Examples of previous battery types that have been approved on HASP are listed below:

- Any domestic battery manufacturer: Duracell, Energizer, Rayovac, etc
- Ultralife U9VL-J-P

HASP 2024 Battery Hazard Documentation	
Battery Manufacturer	
Battery Type	
Chemical Makeup	
Battery modifications	*(Must be NO)*
UL Certification for Li-Ion	
SDS from manufacturer	
Product information sheet from the manufacturer	

V: Pressurized System Hazard Requirements for HASP

Pressurized systems are listed as a safety hazard on NASA payloads. Therefore, the use of any pressurized systems on HASP must be documented and approved in the Ground and Flight safety plans. Any component with a pressure differential with the external atmosphere surrounding it is considered a pressurized system. Teams that have questions about Pressurized System hazards can request, through HASP Management, a meeting with the NASA Pressure Systems Manager.

Additional documents required for review and certification of the pressurized or vacuumed systems include:

- The following requirements apply to all components within the pressure boundary (the pressure source to the exhaust/relief valve)
  - Detailed Pressure Systems Configuration Drawings/Schematics
  - Detailed Bill of Materials with Maximum Allowable Working Pressure (MAWP) pressure ratings
  - Data Sheets of Applicable Pressurized Components (Valves, Regulators, Relief Valves, Gauges, flexible hoses)
- Proof Pressure Test Records &/or Leak Test Records

  Pressure Vessels containing custom-made or non-coded components will need to be tested. Pressure/leak test results must be included in documenting a stable chamber per applicable safety and engineering practices. NASA Safety guidelines require a 10-minute pressure/leak test. Mission Assurance testing should be 12 hours.
- Functional Test Record for Relief Valves (sticker or tag on equipment)
  - All relief valves must be ASME-rated. New valve needs the requires stamp information. Reused valves require a pop test.
- Applicable calibration record for pressure gauges (stickers or tags on equipment)
  - Safety critical pressure gauges must be calibrated every three years. Reference-only pressure gauges must be calibrated every five years. Calibration documentation must be included.
- Applicable engineering analyses (possibly analysis may include pipe/tube stress analysis per ASME B31.3, tube pressure rating table, or relief device sizing analysis)
- Provide pressurization hazardous procedure, if applicable, and SDS(s)
- Note: Personnel training in pressure systems or compressed gas safety is also required to operate pressure systems at NASA WFF or its associated facility.
  - Pressure systems safety training and on-the-job training for mission operations required. A letter from university management certifying that students or system operators have completed this training must be included.

HASP 2024 Pressurized System Hazard Documentation	
System Description	
Maximum Expected Operating Pressure (PSIG) or Vacuum	
Fluids (e.g. GN2, GHe, Air)*	
Notes	
SDS from manufacturer	

***Note:** Only gaseous fluids are allowed here. Any liquids are still banned on HASP.