ISS NATIONAL LABORATORY®
CENTER FOR THE ADVANCEMENT OF SCIENCE IN SPACE

ISS National Laboratory Q1FY25 Report

Quarterly Report for the Fiscal Year 2025 Period October 1, 2024 – December 31, 2024

Table of Contents

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Q1FY25 Metrics

ISS NATIONAL LAB UTILIZATION AND OPERATIONS TARGET METRICS

TARGET METRICS	FY25 Q1	FY25 Q2	FY25 Q3	FY25 Q4	YTD FY25 Total	FY25 Target	FY25 Stretch
DEMAND FOR ISS RESOURCES							
1) Ratio of awardable proposals evaluated to expected awards (year to date)	3:1				**3:1**	**3:1**	**N/A**
2) Leverage ratio of external funding to internal funding (new awards) (year to date)	11:1				**11:1**	**1:1**	**2:1**
FUNDAMENTAL SCIENCE							
3) Fundamental Science projects selected	--				**--**	**7**	**9**
4) External funding supporting Fundamental Science users of the ISS National Lab	$--				**$--**	**$6M**	**$9M**
APPLIED RESEARCH & DEVELOPMENT							
5) Applied Research & Development projects selected	--				**--**	**2**[a]	**3**
6) Ratio of external funding (self-reported) to CASIS and MI&O funding supporting Applied Research & Development users of the ISS National Lab (year to date)	--				**--**	**1:1**	**2:1**
TECHNOLOGY DEMONSTRATION							
7) Technology Demonstration projects selected	3				**3**	**11**	**14**
8) Ratio of external funding (self-reported) to CASIS and MI&O funding supporting Technology Demonstration users of the ISS National Lab (year to date)	14:1				**14:1**	**4:1**	**6:1**
EDUCATION & OUTREACH							
9) Education & Outreach projects selected	1				**1**	**2**	**3**
10) New Corporate or OGA sponsorships agreements	0				**0**	**1**	**2**
PROPOSAL MANAGEMENT							
11) Time from solicitation close to selection/non-selection notification (year to date)	67 days				**67 days**	**≤65 days**	**≤60 days**

a. *Beginning in FY25, the Applied Research & Development target metric will not include an estimate of NASA InSPA NRA awards flying under ISS National Lab allocation.*

ISS NATIONAL LAB UTILIZATION AND OPERATIONS TRACKING METRICS

The following metrics have no target for FY25 but will be tracked internally and discussed in face-to-face meetings with NASA.

TRACKING METRICS	FY25 Q1	FY25 Q2	FY25 Q3	FY25 Q4	YTD FY25 Total
OVERALL PROJECT QUALITY AND DEMAND					
1) Percent of proposals reviewed that were awardable (year to date)	61%				**61%**
2) Percent of proposals reviewed that were high quality (year to date)	13%				**13%**
3) Percent of high-quality proposals not selected (year to date)	0%				**0%**
4) Percent of completed projects that met research objectives (year to date)	100%				**100%**
5) Percent of completed Technology Dev/Demo and In-Space Production projects demonstrating technology readiness level (TRL) advancement (year to date)	100%				**100%**
6) ISS National Lab projects selected	4				**4**
7) Users by new/returning					
(a) ISS National Lab return users	1				**1**
(b) ISS National Lab new users	3				**3**
8) Projects by type					
(a) Commercial	3				**3**
(b) Academic/nonprofit	1				**1**
(c) Government agency	0				**0**
9) Leverage ratio of external funding to internal funding (year to date)	11:1				**11:1**
10) Active solicitations	2				**2**
11) ISS National Lab concepts received	54				**54**
12) ISS National Lab proposals received	23				**23**
13) Time from selection notification to agreement draft sent to principal investigator (year to date)	39 days				**39 days**
14) Time from agreement draft to award (year to date)	32 days				**32 days**
15) Time to flight	13 months				**13 months**

TRACKING METRICS (Continued)	FY25 Q1	FY25 Q2	FY25 Q3	FY25 Q4	YTD FY25 Total
PAYLOADS DELIVERED					
16) Commercial Service Provider Facility Utilization payloads delivered	14				**14**
(a) Percentage of Commercial Service Provider Facility Utilization payloads flown that met mission success criteria (previous fiscal year quarter)[b]	100%				**100%**
17) Education & Outreach payloads delivered	2				**2**
18) Fundamental Science payloads delivered	5				**5**
(a) Percentage of Fundamental Science payloads flown that met mission success criteria (previous fiscal year quarter)[b]	100%				**100%**
19) Applied Research & Development payloads delivered	2				**2**
(a) Percentage of Applied Research & Development payloads flown that met mission success criteria (previous fiscal year quarter)[b]	0%				**0%**
20) Technology Demonstration payloads delivered	2				**2**
(a) Percentage of Technology Demonstration payloads flown that met mission success criteria (previous fiscal year quarter)[b]	N/A				**N/A**
21) Total ISS National Lab-sponsored payloads delivered	25				**25**
COMMUNITY ENGAGEMENT AND INVESTMENT					
22) New partnerships formed	0				**0**
23) Total external funding committed	$5,474,854				**$5,474,854**
24) Funds raised post award and postflight by startup companies with ISS National Lab-sponsored flight projects					
(a) Funds raised postflight	$146.4M				**$146.4M**
(b) Funds raised post award	$146.4M				**$146.4M**
25) External funding committed from new OGA partnerships	$0				**$0**
26) New educational partnerships	0				**0**

TRACKING METRICS (Continued)	FY25 Q1	FY25 Q2	FY25 Q3	FY25 Q4	YTD FY25 Total
COMMUNITY ENGAGEMENT AND INVESTMENT (CONTINUED)					
27) (a) Number of high school and higher education students contributing to research projects completed during the fiscal year	9				**9**
(b) Number of interns supported by ISS National Lab - Industry Partner cost-share program	0				**0**
28) Total individuals participating in ISS National Lab Education & Outreach programs and projects (self-reported)	1,232,064				**1,232,064**
29) Total individual users of ISS National Lab online education products (self-reported)	2,535,547				**2,535,547**
IMPLEMENTATION PARTNERS AND COMMERCIAL SERVICE PROVIDER ACTIVITIES					
30) Number of Implementation Partners (year to date)	33				**33**
31) Number of Commercial Service Providers (year to date)	13				**13**
32) New Umbrella User Agreements executed	0				**0**
33) New commercial facilities added	0				**0**
34) Commercial facilities (year to date)	23				**23**
35) RRFs submitted	26				**26**
36) RRFs approved	25				**25**
37) RRF approval time (year to date)	6 days				**6 days**
RESOURCE UTILIZATION					
38) Crew time (actual vs. increment pair – 3 months allocation)					
(a) Ascent flight resources					
Upmass	91%				**91%**
Cold stowage	51%				**51%**
Big bags	25%				**25%**
Powered lockers	75%				**75%**
(b) Facility resources (reported in Q2 and Q4)					
Commercial facilities					
JEM airlock					
Life Sciences Glovebox					
Microgravity Science Glovebox					

TRACKING METRICS (Continued)	FY25 Q1	FY25 Q2	FY25 Q3	FY25 Q4	YTD FY25 Total
RESOURCE UTILIZATION (CONTINUED)					
39) Number of payloads that did not turnover per the nominal delivery schedule	2				**2**
Principal investigators	0				**0**
Implementation Partners	2				**2**
CASIS	0				**0**
NASA	0				**0**
40) Number of re-flight experiments flown	0				**0**
Fundamental Science	0				**0**
Applied Research & Development	0				**0**
Technology Demonstration	0				**0**
Education and Outreach	0				**0**
Commercial Service Provider Utilization	0				**0**
41) Number of payloads ready to fly that were left on the ground due to limited resources (upmass, crew time, cold stowage, etc.)	0				**0**
42) Number of payloads removed from the manifest after the freeze date because the principal investigator/payload could not make the flight	1				**1**
OVERALL PROJECT RESULTS					
43) Number of peer-reviewed papers including those accepted for publication in Tier 1 journals	13				**13**
44) Number of new patents pending	2				**2**

a. Beginning in FY25, the Applied Research & Development target metric will not include an estimate of NASA InSPA NRA awards flying under ISS National Lab allocation.

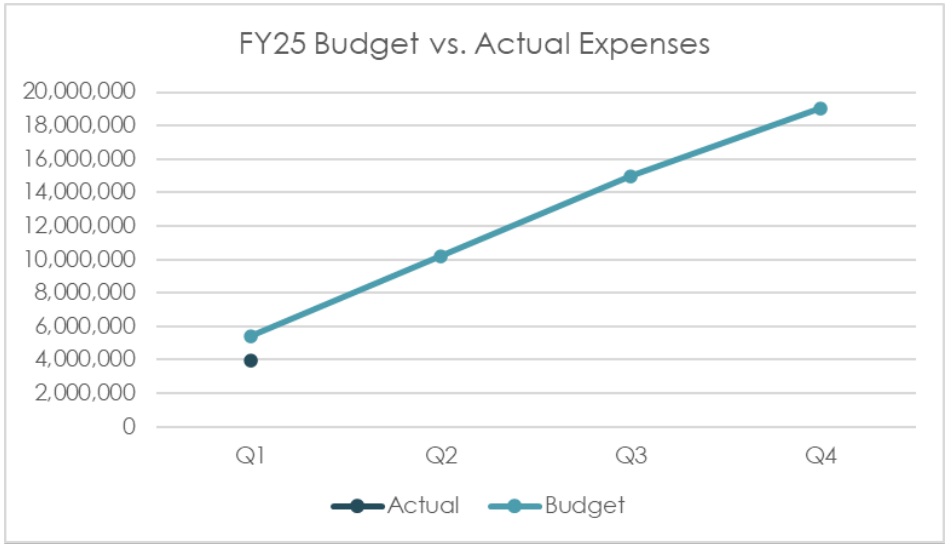
b. Data is from the previous fiscal year quarter. Whether a payload met research objectives often cannot be determined until it has been returned to the investigator and initial data has been reviewed.

FINANCIALS

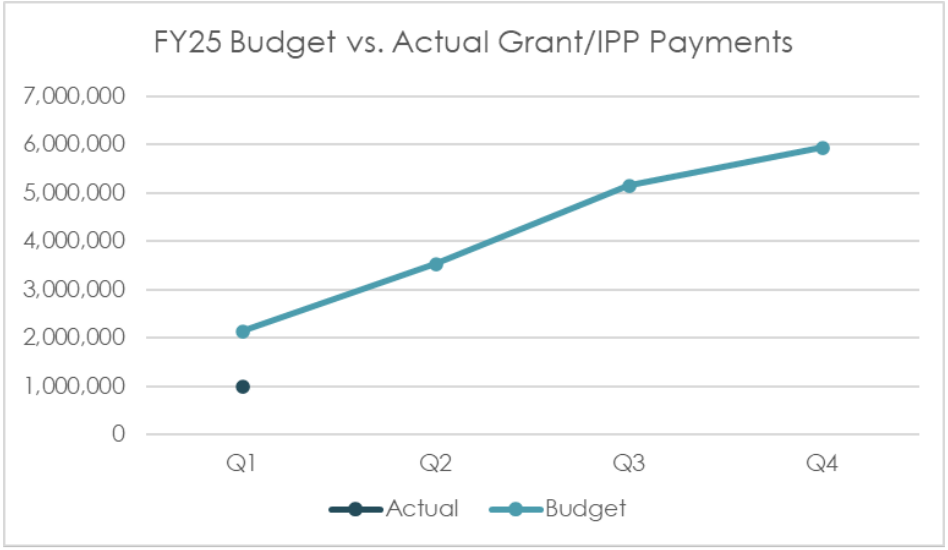
Business Status Report (unaudited)

Expenses	Q1 Actual FY25	Q1 Budget FY25	Q1 Variance FY25
Direct Labor	$2,186,075	$2,378,283	($192,208)[a]
Subcontracts	$241,254	$233,321	$7,933
Other Direct	$384,612	$454,121	($69,509)
Travel	$74,374	$124,576	($50,202)
Office Supplies and Equipment	$96,518	$109,517	($12,999)
Grants	$986,173	$2,139,463	($1,153,290)[b]
Total Expenses	$3,969,006	$5,439,281	($1,470,275)

a. Salaries and Benefits: At 12/31 50.5 FTE vs 54 budgeted.
b. Grants: Recipient milestone payments shifted based on awardees' actual spend rates and their ability to successfully deliver milestones on schedule.



IPP = Implementation Partner Payments



IPP = Implementation Partner Payments

Breakout of ISS National Lab Grants Payments

	Q1FY25	Q2FY25	Q3FY25	Q4FY25	FY25 YTD Total
Academic	$270,708				$270,708
Commercial	$715,465				$715,465
Other Government Agency	-				-
Total	**$986,173**				**$986,173**

Total Value of Grants Awarded *(i.e., funds committed toward future projects)*

	ACTUAL Q1	ACTUAL Q2	ACTUAL Q3	ACTUAL Q4	ACTUAL FY25
Total value of grants awarded[a]	$487,798				$487,798

a. Grants include awards to projects and programs as well as modifications and extensions. The ability to award new grants will be dependent on the availability of additional funding for the ISS National Lab.

Breakout of Cooperative Agreement Funding

	Q1FY25	Q2FY25	Q3FY25	Q4FY25	FY25 YTD Total
Direct	56%	%	%	%	56%
Indirect	19%	%	%	%	19%
Grants	25%	%	%	%	25%

IN-ORBIT ACTIVITIES

- SpaceX's 31st Commercial Resupply Services (CRS) mission launched carrying 25 ISS National Lab-sponsored payloads, including the following (full details on the launch page):
  - Twelve payloads utilizing the MISSE Flight Facility are testing material durability in space, guiding advancements in spacecraft and terrestrial material.
  - Kall Morris Inc. (KMI) is testing the REACCH capture system for space debris removal using NASA's Astrobee free-flying robots on station, bringing the system closer to commercialization.
  - Malta College of Arts, Science, and Technology, with support from ISS National Lab Commercial Service Provider Voyager Space, is testing heatless welding techniques.
  - As part of the Student Spaceflight Experiments Program, nearly 40 student-led projects launched to the space station, including research on plant germination, biofilm growth, eco-friendly worms, and more.
- NASA's eighth rotational crew mission (Crew-8) returned with seven ISS National Lab-sponsored payloads, including the following:
  - Two payloads, one from pharmaceutical company Eli Lilly & Company and the other from Butler University, leveraged Redwire's Pharmaceutical In-space Laboratory (PIL-BOX) to crystallize organic molecules in microgravity to help improve therapeutics for patients on Earth.
  - The U.S. Air Force Academy and Rhodium Scientific studied the root growth of the Arabidopsis plant, a member of the mustard plant family, at two different orbital altitudes to gain insight into crop production on long-duration spaceflight missions and in high-radiation environments.
- SpaceX CRS-31 returned nearly 35 ISS National Lab-sponsored payloads, including:
  - Sphere Entertainment Co. completed phase two of a technology development project testing the ability of Big Sky—an ultrahigh-resolution, single-sensor camera—to capture content from the ISS for its Sphere event venue in Las Vegas.
  - Researchers at Florida International University and Colorado Mesa University, supported by the National Science Foundation, advanced their development of tiny engineered particles called active colloids to advance drug delivery, disease screening, and water desalination.
  - A University of Notre Dame investigation demonstrated how bubbles formed in microgravity to enhance biosensing technology that could improve cancer diagnosis.

R&D PROGRESS AND SUCCESSES

- In Q1, 13 new peer-reviewed journal articles were published, including two from top-tier journals (view a full list of peer-reviewed publications related to the ISS National Lab at www.ISSNationalLab.org/publications/):
  - Anand R, Madhavi V, Lu K. Effect of boron on phase, nanostructure, and thermal stability of polycarbosilane-derived SiC ceramics. *Ceram Int.* 2024;50:53701-53711.
  - Fouchal Y, Ramirez R, Beloreshka M, Plis EA. Comparative evaluation of spacecraft materials properties under simulated and true space environments. J Astron Sci. 2024;71(6):53.
  - Fu Y, Frechette J. Distinct contributions of particle adsorption and interfacial compression to the surface pressure of a fluid interface. *Langmuir*. 2024;40:2471-24483.
  - Georgescu A, Oved JH, Galarraga JH, et al. Self-organization of the hematopoietic vascular niche and emergent innate immunity on a chip. Cell Stem Cell. 2024;31(12):1847-64.
  - Harriot AD, Ward CW, Kim DH. Microphysiological systems to advance human pathophysiology and translational medicine. *J Appl Phys*. 2024;137(5):1494-501.
  - Irace PH, Reeves RD, Stephens S, Roberts MS. Transport phenomena research in microgravity via the ISS National Lab to benefit life on Earth. Grav Space Res. 2024;12:145-158.
  - Klarmann GJ, Rogers AJ, Gilchrist KH, Ho VB. 3D bioprinting meniscus tissue onboard the International Space Station. *Life Sci Space Res*. 2024;43:82-91.

- Li Z, Ozbakir Y, Frick JJ, et al. On-Orbit Processing and Hardware Performance of Microgravity Hydrothermal Synthesis for Graphene Aerogel. *J Manuf Sci Eng*. 2024;146(12):121007.
- Mozneb M, Arzt M, Mesci P, et al. Surface tension enables induced pluripotent stem cell culture in commercially available hardware during spaceflight. *npj Microgravity*. 2024;10(1):97.
- Plawsky JL, Rishty AJ, Woodcock C. Transport through a chiral tiling: The effect of Aperiodicity on flow and particle capture. *Chem Eng Sci.* 2025;304:121020.
- Regner AM, DeLeon M, Gibbons KD, et al. Increased deformations are dispensable for encapsulated cell mechanoresponse in engineered bone analogs mimicking aging bone marrow. *Mechanobiol Med*. 2025;3(1):100097.
- Singh K, Verma P, Srivastava R, et al. Mission SpaceX CRS-19 RRRM-1 space flight induced skin genomic plasticity via an epigenetic trigger. *iScience*. 2024;27(12):111382.
- Zhao L, Gulati P, Caballero F, et al. Asymmetric fluctuations and self-folding of active interfaces. *PNAS*. 2024;121:e2410345121.

- Two patents related to ISS National Lab-sponsored research were identified in Q1, both from biotechnology startup Encapsulate, whose research was awarded through the Technology in Space Prize:
  - A patent was issued for nCapsule biochip, a multigel tumor-on-a-chip system that allows cancer cells to grow in a 3D environment that more closely resembles how tumors grow in the body. The system can be used to screen potential new cancer drugs.
  - A patent was filed for nVasive, a system and method for predicting the metastatic potential of cancer cells.

LEO ECONOMY

Demand

- In Q1 FY2025, four new projects were selected.
  - Two were selected through NLRA 2024-4: Technology Advancement and Applied Research Leveraging the ISS National Lab: Cycle 1
    - Trans Astronautica Corporation will demonstrate its FlyTrap capture bag technology, a deployable system that captures and manipulates space debris and other objects in the Bishop Airlock.
    - Skycorp Incorporated will test a 100-terabyte-class server, measuring wear metrics and testing software applications in harsh space conditions.
  - One project from Xheme, Inc. was selected that will test innovative coatings and material programmability approaches to advanced technology.
  - One was selected through NLRA 2024-5: STEM Education and Workforce Development**:**
    - The Cleveland Clinic Foundation will introduce Ph.D. and M.D. students to space medicine to inspire them to pursue space-related careers.
- Two solicitations opened in Q1: NSF/CASIS 2025 Collaboration on Tissue Engineering and Mechanobiology on the ISS to Benefit Life on Earth and NLRA 2025-1: ISS National Lab Research Announcement for Follow-On Projects.

Supply

- Axiom Space and Burjeel Holdings PLC, a specialty healthcare services provider listed on the Abu Dhabi Securities Exchange, signed a Memorandum of Understanding to conduct science research and test new technologies in space. This collaboration, which aims to expand access to microgravity for medical advancements, marks the beginning of a long-term partnership.
- Redwire Corporation launched an investigation to the ISS in partnership with Bristol Myers Squibb to study model small molecule compounds using Redwire's PIL-BOX facility. Results from this research could enhance

drug stability, streamline manufacturing processes, and improve efficiencies across various therapeutic areas, including oncology, immunology, and cardiovascular disease.

- Sierra Space was named in *Fast Company's* annual Next Big Things in Tech list as one of three companies highlighted in the Space and Telecom category "for reinventing cargo transportation to and from the ISS" with its Dream Chaser spaceplane. The list recognizes emerging technology that has a profound impact on its respective industries.

Investment

- Q1 showed improved funding activity in the ISS National Lab's startup ecosystem in a more enthusiastic environment for early-stage space companies. Based on publicly available data, a total of $146.4 million of private capital and grant funding was raised during the quarter by startups that have completed a flight project with the ISS National Lab. This is the highest amount of such funding raised in a quarter over the past 12 quarters. To date, close to $2.4 billion of such startup funding has been raised post-ISS National Lab flight projects.
  - The funding activity was led by Axonis Therapeutics but also included capital raises or grant awards for Aphios Corp., Eascra Biotech, Encapsulate, GITAI, Orbital Sidekick, SatRev, and others.
- The ISS National Lab investor ecosystem includes 320 participants across financial and corporate investment organizations. To date, CASIS has facilitated more than 1,420 capital introductions between startups and investors in the ISS National Lab ecosystem. While the investor appetite toward space startups has remained highly selective, our ecosystem remains a source of capital connections and potential future funding for early-stage companies planning studies on the ISS.

STEM EDUCATION AND WORKFORCE DEVELOPMENT

- The ISS National Lab partnered with the American Society for Gravitational and Space Research (ASGSR) to host two webinars as part of a Student Webinar Series to provide students with stories of industry success and tips for attending scientific conferences.
- The ISS National Lab ran a successful Giving Tuesday fundraising campaign, raising nearly $6,375 to send more than 100 STEM kits to Title I school classrooms throughout the United States.
- At the Florida Association of Science Teachers (FAST) conference, ISS National Lab staff gave a presentation on ISS-related educational programs.

OUTREACH AND STAKEHOLDER ENGAGEMENT

- A new issue of *Upward*, the official magazine of the ISS National Lab, was published in Q1, highlighting successful results from three investigations: a MicroQuin study revealing the key to cancer cell survival that could lead to a drug that treats all types of cancer; an Axonis Therapeutics investigation testing a gene therapy for neurological conditions in mature brain models; and an AstroRad project testing a vest designed to protect astronauts from radiation by shielding sensitive areas. Amelia Smith, *Upward* managing editor, wrote the perspective piece for the issue. *Upward* currently has more than 7,700 subscribers.
- The ISS National Lab released a video showcasing a Bristol Myers Squibb investigation launched on SpaceX CRS-31. The investigation aimed to advance protein crystallization to improve drug therapeutic manufacturing.
- ISS National Lab media coverage during Q1 includes:
  - Assembly magazine published an article about a Malta College of Arts, Science, and Technology investigation to test cold welding techniques in space.
  - Astrobiology covered a Genes in Space student experiment that tested a novel technique used to study the human genome.
  - The Associated Press published an ISS National Lab-issued press release promoting an *Upward* feature on AstroRad.

- The ISS National Lab hosted a pre-conference workshop on biomanufacturing and advanced materials at ASGSR 2024. The workshop featured three panels with experts from research, industry, and government to raise awareness of the benefits of space-based R&D and the need for workforce development in this field.
- An ISS National Lab staff member served as an associate editor for an editorial in a special issue of the *Journal of Manufacturing Science and Engineering*.
- ISS National Lab staff participated in invited speaking engagements at the Society of Rheology annual meeting, the Wake Forest Institute for Regenerative Medicine Piedmont Triad Regenerative Medicine Engine webinar for in-space biomanufacturing, the University of California San Diego's 2024 Sanford Stem Cell Institute Symposium, and the Ecosystemic Futures Podcast Season 6 "More Shots on Goal: Scaling Up Space Manufacturing for Earth's Future."

Full Project Pipeline Details

Visit our project pipeline database for a complete list of ISS National Lab-sponsored projects, including flight status.