ISS NATIONAL LABORATORY®

ISS National Laboratory Q3FY24 Report

Quarterly Report for the Fiscal Year 2024 Period April 1, 2024 – June 30, 2024

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Q3FY24 Metrics

ISS NATIONAL LAB UTILIZATION AND OPERATIONS TARGET METRICS

TARGET METRICS	FY24 Q1	FY24 Q2	FY24 Q3	FY24 Q4	YTD FY24 Total	FY24 Target	FY24 Stretch
DEMAND FOR ISS RESOURCES							
1) Ratio of awardable proposals evaluated to expected awards (cumulative)	3:1	3:1	3:1		**3:1**	**3:1**	**N/A**
2) Leverage ratio of external funding to CASIS funding (cumulative)[a]	9:1	6:1	2:1		**2:1**	**1:1**	**2:1**
FUNDAMENTAL SCIENCE							
3) Fundamental Science projects selected	--	--	--		**--**	**8**	**10**
4) External funding supporting Fundamental Science users of the ISS National Lab	$--	$--	$--		**$--**	**$4M**	**N/A**
APPLIED RESEARCH & DEVELOPMENT							
5) Applied Research & Development projects selected	1[c]	0	3		**4**	**8**	**10**
6) Ratio of external funding to CASIS funding (self-reported) supporting Applied Research & Development users of the ISS National Lab (cumulative)[a]	--	--	--		**--**	**1:1**	**2:1**
TECHNOLOGY DEMONSTRATION							
7) Technology Demonstration projects selected	3	2	3		**8**	**8**	**10**
8) Ratio of external funding to CASIS funding (self-reported) supporting Technology Demonstration users of the ISS National Lab (cumulative)[a]	9:1	6:1	2:1		**2:1**	**1:1**	**2:1**
EDUCATION & OUTREACH							
9) Education & Outreach projects selected	--	--	--		**--**	**4**	**5**
10) New Corporate or OGA sponsorships agreements	0	0	0		**0**	**1**	**3**
PROPOSAL MANAGEMENT							
11) Time from solicitation close to selection/non-selection notification (cumulative)	59 days	63 days	60 days		**60 days**	**≤65 days**	**≤60 days**

ISS NATIONAL LAB UTILIZATION AND OPERATIONS TRACKING METRICS

The following metrics have no target for FY24 but will be tracked internally and discussed in face-to-face meetings with NASA.

TRACKING METRICS	FY24 Q1	FY24 Q2	FY24 Q3	FY24 Q4	YTD FY24 Total
OVERALL PROJECT QUALITY AND DEMAND					
1) Percent of proposals reviewed that were awardable (cumulative)	74%	76%	80%		**80%**
2) Percent of proposals reviewed that were high quality (cumulative)	3%	8%	20%		**20%**
3) Percent of high-quality proposals not selected (cumulative)	0%	0%	0%		**0%**
4) Percent of completed projects that met ≥80% of their research objectives (cumulative)	0%	23%[c]	36%		**36%**
5) Percent of completed Technology Dev/Demo and In-Space Production projects demonstrating technology readiness level (TRL) advancement (cumulative)	75%[c]	57%[c]	69%		**69%**
6) ISS National Lab projects selected	4[c]	2	6		**12**
7) Users by new/returning					
(a) ISS National Lab return users	2	0	1		**3**
(b) ISS National Lab new users	2[c]	2	5		**9**
8) Projects by type					
(a) Commercial	3[c]	2	4		**9**
(b) Academic/nonprofit	1	0	2		**3**
(c) Government agency	0	0	0		**0**
9) Multiplier on CASIS grant funding committed (cumulative)[a]	3:1	3:1	1:1		**1:1**
10) Active solicitations	3	3	1		**7**
11) ISS National Lab concepts received	16	108	95		**219**
12) ISS National Lab proposals received	37	14	51		**102**
13) Time from selection notification to agreement draft sent to principal investigator (cumulative)	76 days	73 days	67 days		**67 days**
14) Time from agreement draft to award (cumulative)	50 days	56 days	47 days		**47 days**
15) Time to flight	21 months	17 months	N/A		**19 months**

TRACKING METRICS (Continued)	FY24 Q1	FY24 Q2	FY24 Q3	FY24 Q4	YTD FY24 Total
PAYLOADS DELIVERED					
16) Commercial Service Provider Facility Utilization payloads delivered	12[c]	39	N/A		**51**
(a) Percentage of Commercial Service Provider Facility Utilization payloads flown that met mission success criteria (previous fiscal year quarter)[b]	87%[c]	100%[c]	95%		**94%**
17) Education & Outreach payloads delivered	1	3	N/A		**4**
18) Fundamental Science payloads delivered	3	5	N/A		**8**
(a) Percentage of Fundamental Science payloads flown that met mission success criteria (previous fiscal year quarter)[b]	71%	100%	100%		**90%**
19) Applied Research & Development payloads delivered	1	4	N/A		**5**
(a) Percentage of Applied Research & Development payloads flown that met mission success criteria (previous fiscal year quarter)[b]	100%	100%	N/A		**100%**
20) Technology Demonstration payloads delivered	0	4	N/A		**4**
(a) Percentage of Technology Demonstration payloads flown that met mission success criteria (previous fiscal year quarter)[b]	100%	50%[c]	N/A		**75%**
21) Total ISS National Lab-sponsored payloads delivered	17[c]	55	N/A		**72**
COMMUNITY ENGAGEMENT AND INVESTMENT					
22) New partnerships formed	2	4	1		**7**
23) Total external funding committed	$4,049,227	$725,996	$8,492,498		**$13,267,721**
24) Funds raised post award and postflight by startup companies with ISS National Lab-sponsored flight projects					
(a) Funds raised postflight	$56.5M[c]	$6.4M	$70.5M		**$133.5M**
(b) Funds raised post award	$56.5M[c]	$10.8M[c]	$72.5M		**$139.9M**
25) External funding committed from new OGA partnerships	$0	$0	$0		**$0**
26) New educational partnerships	0	3	0		**3**

TRACKING METRICS (Continued)	FY24 Q1	FY24 Q2	FY24 Q3	FY24 Q4	YTD FY24 Total
COMMUNITY ENGAGEMENT AND INVESTMENT (CONTINUED)					
27) Number of high school and higher education students contributing to research projects completed during the fiscal year	27[c]	6[c]	21		**54**
28) Total individuals participating in ISS National Lab Education & Outreach programs and projects (self-reported)	1,576,201	2,154,605	113,966		**3,844,772**
29) Total individual users of ISS National Lab online education products (self-reported)	6,040,751	3,759,642	1,114,993		**10,915,386**
IMPLEMENTATION PARTNERS AND COMMERCIAL SERVICE PROVIDER ACTIVITIES					
30) Number of Implementation Partners (cumulative)	33	33	33		**33**
31) Number of Commercial Service Providers (cumulative)	14	14	14		**14**
32) New Umbrella User Agreements executed	0	0	0		**0**
33) New commercial facilities added	0	0	0		**0**
34) Commercial facilities (cumulative)	24	23	23		**23**
35) RRFs submitted	14	23[c]	33		**70**
36) RRFs approved	12[c]	22	32		**66**
37) RRF approval time (cumulative)	9 days	7 days	7 days		**7 days**
RESOURCE UTILIZATION					
38) Crew time (actual vs. increment pair – 3 months allocation)	66%		TBD		**66%**
(a) Ascent flight resources					
Upmass	53%	150%	N/A		**102%**
Cold stowage	74%	79%	N/A		**77%**
Big bags	0%	84%	N/A		**42%**
Powered lockers	75%	73%	N/A		**74%**
(b) Facility resources (reported in Q2 and Q4)					
Commercial facilities	56%		TBD		**56%**
JEM airlock	2		TBD		**2**
Life Sciences Glovebox	7		TBD		**7**
Microgravity Science Glovebox	9		TBD		**9**

TRACKING METRICS (Continued)	FY24 Q1	FY24 Q2	FY24 Q3	FY24 Q4	YTD FY24 Total
RESOURCE UTILIZATION (CONTINUED)					
39) Number of payloads that did not turnover per the nominal delivery schedule	2	3	N/A		**5**
Principal investigators	0	0	N/A		**0**
Implementation Partners	2	3	N/A		**5**
CASIS	0	0	N/A		**0**
NASA	0	0	N/A		**0**
40) Number of re-flight experiments flown	0	1	N/A		**1**
Fundamental Science	0	0	N/A		**0**
Applied Research & Development	0	0	N/A		**0**
Technology Demonstration	0	1	N/A		**1**
Education and Outreach	0	0	N/A		**0**
Commercial Service Provider Utilization	0	0	N/A		**0**
41) Number of payloads ready to fly that were left on the ground due to limited resources (upmass, crew time, cold stowage, etc.)	2	1	2		**5**
42) Number of payloads removed from the manifest after the freeze date because the principal investigator/payload could not make the flight	2	0	0		**2**
OVERALL PROJECT RESULTS					
43) Number of peer-reviewed papers including those accepted for publication in Tier 1 journals	8[c]	21[c]	4		**33**
44) Number of new patents pending	0	0	0		**0**

a. CASIS awards funded with NASA MI&O are included.

b. Data is from 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.

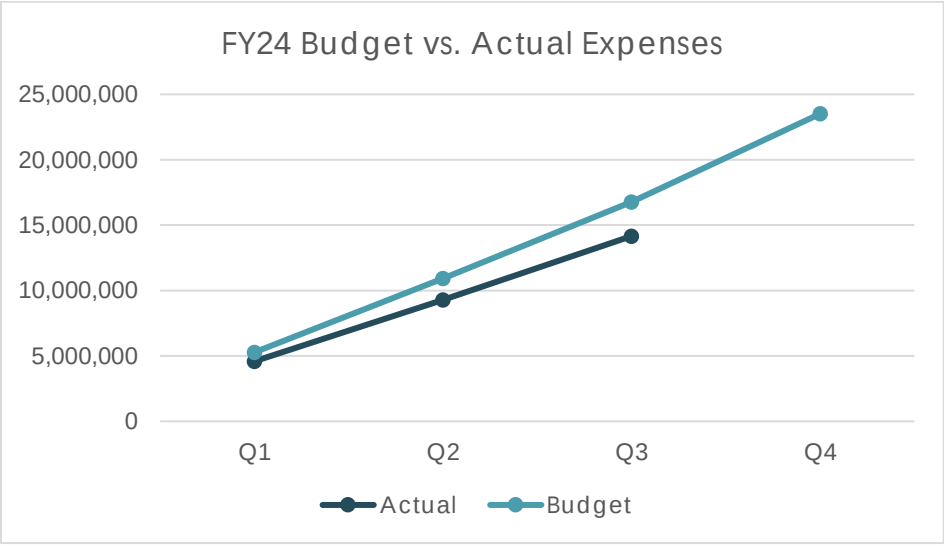
c. Additional/new data available after previous quarterly report completion.

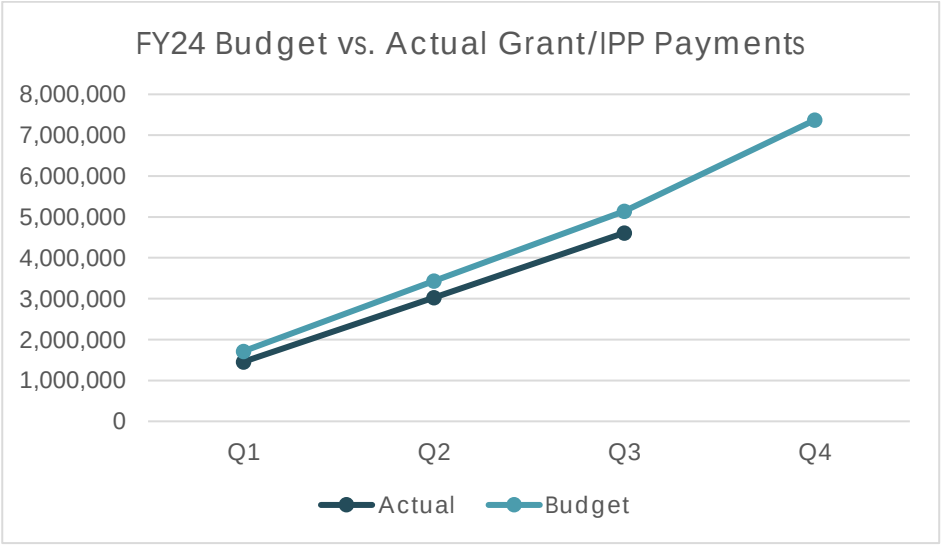
FINANCIALS

Business Status Report (unaudited)

Expenses	Q3 Actuals	Q3 Budget	Variance	Actual YTD FY24	Budget YTD FY24	Variance YTD FY24
Direct Labor	$2,334,728	$2,673,654	($338,926)	$6,898,089	$7,910,608	$(1,012,519)[a]
Subcontracts	$308,209	$439,339	($131,130)	$891,251	$1,133,431	$(242,180)[b]
Other Direct	$440,025	$705,627	($265,602)	$1,065,228	$1,638,326	$(573,098)[c]
Travel	$127,799	$153,608	($25,809)	$423,327	$449,017	$(25,690)
Office Supplies and Equipment	$91,897	$176,270	($84,373)	$272,157	$509,164	$(237,007)[d]
Grants & Mission-Based Costs	$1,583,170	$1,708,104	($124,934)	$4,609,131	$5,140,236	$(531,105)[e]
Total Expenses	$4,885,828	$5,856,602	($970,774)	$14,159,183	$16,780,782	**$(2,621,599)**

a. Salaries and Benefits: At 6/30 55 full-time equivalent vs 63.5 budgeted.
b. Subcontracts: Reduced legal costs as contracts personnel have been filled.
c. Other Direct: In part due to advertising having been adjusted below plan, the timing of some budgeted trade shows, other trade shows scheduled but not attended, and the timing of costs related to the ISSRDC.
d. Office Supplies and Equipment: Computer purchases have been capitalized and some reduced costs in Subscriptions and Memberships, $70k of which is due to timing.
e. Grants: Recipient milestone payments shifted based on awardees' actual spend rates and their ability to successfully deliver milestones on schedule.





IPP = Implementation Partner Payments

Breakout of ISS National Lab Grants Payments

	Q1FY24	Q2FY24	Q3FY24	Q4FY24	FY24 YTD Total
Academic	$477,216	$660,169	$1,381,942		$2,519,327
Commercial	$978,131	$910,444	$195,396		$2,083,971
Other Government Agency	-	-	$5,833		$5,833
Total	$1,455,347	$1,570,613	$1,583,171		$4,609,131

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

	ACTUAL Q1	ACTUAL Q2	ACTUAL Q3	ACTUAL Q4	ACTUAL FY24
Total value of grants awarded[a]	$197,188	$417,648	$6,028,589		6,643,425

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

	Q1FY24	Q2FY24	Q3FY24	Q4FY24	FY24 YTD Total
Direct	46%	44%	43%	%	44%
Indirect	22%	23%	25%	%	23%
Grants	32%	34%	32%	%	33%

IN-ORBIT ACTIVITIES

- In Q3, ISS crew members worked on several ISS National Lab-sponsored investigations that launched on NASA's SpaceX 30th Commercial Resupply Services (CRS) mission, including:
  - A project from Redwire Space to advance a system that crystallizes proteins for in-space pharmaceutical manufacturing.
  - An experiment from Oculogenex, Inc. testing a novel gene therapy for age-related macular degeneration.
  - An investigation by Boeing and CSIRO, the Australian government research and funding agency, using NASA's free-flying robotic Astrobee system to test innovative mapping technology by creating 3D maps of the space station.
  - An investigation from the University of Connecticut to improve nanoparticle-based technology for precision drug delivery to treat diseases such as arthritis, cancer, and neurological disorders.
- The crew continued work on a University of California, Santa Barbara investigation funded by the U.S. National Science Foundation studying the role the mucus lining of the human airway plays in transporting liquid plugs used to deliver medication to the lungs.
- The SpaceX CRS-30 Dragon capsule splashed down, returning more than 40 ISS National Lab-sponsored experiments.

R&D PROGRESS AND SUCCESSES

- In Q3, four new peer-reviewed articles were published (view a full list of peer-reviewed publications related to ISS National Lab research at www.ISSNationalLab.org/publications/):
  - Amselem S, Kogan D, Loboda O, et al. Monoclonal antibodies from space: Improved crystallization under microgravity during manufacturing in orbit. J Explor Res Pharm. 2024;9(2):96-105.
  - Doerr B, Albee K, Ekal M, et al. The ReSWARM microgravity flight experiments: Planning, control, and model estimation for on-orbit close proximity operations. J Field Robot. 2024:1-35.
  - Frick JJ, Ormsby R, Li Z, et al. Autoclave design for microgravity hydrothermal synthesis. Micro Sci Tech. 2024;36:23.
  - Sharma A, Li Y, Liao YTT, et al. Effects of confinement on opposed-flow flame spread over cellulose and polymeric solids in microgravity. Microgravity Sci Tech. 2024;36:20.
- Redwire successfully 3D printed cardiac tissue using its BioFabrication Facility (BFF).

LEO ECONOMY

Demand

- Six new projects were selected in Q3 through three solicitations:
  - One project was selected through NLRA 2024-1: In-Space Production Applications: Tissue Engineering and Biomanufacturing:
    - Sciperio, Inc. aims to develop 3D bone marrow organoids that more accurately model red blood cell production to eventually biomanufacture universal red blood cells for transfusion.
  - In Q3, three projects were selected through NLRA 2023-10: Igniting Innovation: Science in Space to Cure Disease on Earth (two additional projects were selected in July and will be counted in Q4):
    - The University of California, San Diego, seeks to use patient-derived tumor organoid models to study the accelerated cancer development in microgravity and identify new cancer therapeutic targets.
    - Cedars-Sinai Medical Center aims to grow vascularized cardiac spheroids from induced pluripotent stem cells to model cardiovascular disease and screen cancer drugs for cardiac toxicity.
    - Eascra Biotech seeks to develop new cancer therapeutics using Janus base nanoparticles to deliver safe and effective treatment for solid tumor cancers.
  - Two projects were selected through the NASA Research Announcement entitled Research Opportunities for ISS Utilization, Focus Area 1:

    - LambdaVision will continue research to advance the development of its artificial retina to restore vision to those blinded by degenerative retinal diseases.
    - Aspera Biomedicines aims to leverage tumor organoid nanobioreactor platforms to accelerate the development of a new therapeutic for various cancers.
- One solicitation opened in Q3: NLRA 2024-7: Technology Advancement and Applied Research Leveraging the ISS National Lab: Cycle 2.

Supply

- Boeing's CST-100 Starliner successfully completed its first crewed launch and docking to the ISS, carrying NASA astronauts Butch Wilmore and Suni Williams to the orbiting laboratory.
- Starlab Space announced the addition of Palantir Technologies, Inc. as a strategic partner and the exclusive supplier of enterprise-wide software data management solutions for the Starlab commercial space station.
- Redwire Corporation broke ground on its new 30,000-square-foot microgravity payload development and space operations facility at the Novaparke Innovation & Technology Campus in Floyd County, Indiana.

Investment

- Q3 continued to show signs of stabilizing capital access in the space industry. However, the environment remained challenging, and new funding in the ISS National Lab ecosystem was relatively limited, though better than in Q2. Based on the publicly available data, $70.5 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. To date, close to $2.2 billion of such startup funding has been raised post-ISS National Lab flight projects.
    - Lynk Global led capital-raising in Q3, with additional funding announcements from LambdaVision and krtkl.
- The ISS National Lab Investor Network continued to expand, with more than 310 participants from financial and corporate investment organizations. It 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 Space Station Ambassador program continued to expand, with 113 new ambassadors in Q3.
- The 2024 Space Station Ambassador award recipients were announced, with one educator receiving the Space Station Explorers Exceptional Educator Award and the other the Tony So Excellence in Education Award.
- The 2024 Genes in Space student competition finalists were announced, and five student teams were chosen to present their ideas for pioneering DNA research on station at this year's ISSRDC in Boston.
- The ISS National Lab hosted a solar eclipse viewing event at the Dallas Arboretum, with around 7,000 attendees and representatives from NASA, the Limitless Space Institute, the Space Foundation, and Story Time From Space.
- The ISS National Lab partnered with the American Society for Gravitational and Space Research to host a Student Webinar Series, a monthly event for undergraduate and graduate students to learn about space-related careers.
- At Science in the Rockies, a professional development opportunity that hosted around 200 educators from across the U.S., the ISS National Lab presented opportunities to incorporate space-related programs and activities into the classroom.
- The ISS National Lab sponsored and exhibited at the Space Port Area Conference for Educators (SPACE), which hosted 300 educators from across the U.S.
- In Q3, Space Station Explorers partner program Rosie Riveters engaged 905 students in hands-on STEM activities through the Rosie Labs in-school program.

OUTREACH AND STAKEHOLDER ENGAGEMENT

- A new issue of *Upward*, official magazine of the ISS National Lab, was published during Q3, highlighting successful results in three feature stories: one highlighting research using Astrobee robots, another on an MIT tissue chip investigation studying post-traumatic osteoarthritis, and the third on Orbital Sidekick's hyperspectral imaging technology for global monitoring. The ISS National Lab deputy chief scientist authored a perspective piece for the issue. *Upward* currently has more than 7,300 subscribers.
- The ISS National Lab website had more than 495,300 views in Q3, a 111-percent increase from Q2 of FY23.
- In Q3, ISS National Lab press releases received more than 50,400 views from the media, and more than 7,740 articles were published.
- The ISS National Lab promoted ISSRDC through marketing efforts and press releases, highlighting sessions and speakers such as robotics researcher Kate Darling and astronaut Woody Hoburg.
- The ISS National Lab hosted a webinar for the technology development NLRA that opened in Q3, attracting hundreds of interested researchers.
- The ISS National Lab collaborated with NASA on a Destination Station outreach event in Boston. It informed the public and targeted companies about the benefits of space-based research. The event visited locations including Moderna, OLink, Massachusetts General Hospital, MIT, and Lab Central.
  - Prior to the event, Destination Station received media coverage from the Boston Business Journal, Boston NPR radio, and WBZ radio.
- ISS National Lab media coverage during Q3 includes:
  - Articles in The Register and Interesting Engineering discussed an MIT tissue chip experiment to study post-traumatic osteoarthritis featured in *Upward*.
  - Space Daily highlighted Orbital Sidekick after promoting a related *Upward* feature about the startup's technology development on the space station.
  - IFL Science linked to and quoted an *Upward* feature covering an investigation on flame behavior.
  - STAT News covered ISS National Lab-sponsored cancer research by Sanford Stem Cell Institute.
  - An R&D World article covered ISSRDC 2024.
  - An article in Electronics Weekly discussed ISS National Lab-sponsored investigations that returned via SpaceX CRS-30.
  - Federal News Network featured an ISS National Lab science team member on a podcast discussing in-space production applications.
  - An article in Plastics Today highlighted an ISS National Lab research announcement for in-space production applications.
- The ISS National Lab presented at the 2024 SelectBIO Space Summit and the 2024 MRS Spring Meeting, and its chief scientific officer participated in a panel discussion at the MPS World Summit's NIH Tissue Chip Consortium. The ISS National Lab also attended the 98th American Chemical Society Colloids and Surface Science Symposium.

Full Project Pipeline Details

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