



ISS National Laboratory Q1FY22 Report

Quarterly Report for the Fiscal Year 2022 Period October 1, 2021 – December 31, 2021

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Q1FY22 Metrics

FUNDAMENTAL SCIENCE	ACTUAL Q1	ACTUAL Q2	ACTUAL Q3	ACTUAL Q4	ACTUAL FY22	TARGET FY22
External Funding from Other Government Agencies Supporting Fundamental Science Users	N/A	N/A	N/A	N/A		TBD
Fundamental Science Payloads Delivered	3					TBD
IN-SPACE PRODUCTION APPLICATIONS						
New Roadmaps Developed for In-Space Production Applications	1					TBD
TECHNOLOGY DEVELOPMENT						
Funds Raised Postflight by Startup Companies with Flight Projects	\$554M					TBD
Technology Demonstration Payloads Delivered	1					TBD
COMMERCIAL SERVICE PROVIDERS						
Umbrella Agreements Signed with All Current Commercial Facility Managers	100%					TBD
Commercial Service Provider Allocation	N/A					TBD
EDUCATION AND OUTREACH						
Individuals Participating in ISS National Lab STEM Programs and STEM Grants Projects	2,188,101					TBD
Total Audience of ISS National Lab Online Education Products	4,059,959					TBD
CORE ISS NATIONAL LAB RESOURCE UTILIZATION METRICS						
Crew Time (<i>Actual vs. increment pair-3 months allocation</i>)		--				TBD
Upmass		--				TBD

ISS NATIONAL LAB UTILIZATION AND OPERATIONS TRACKING METRICS

	ACTUAL Q1	ACTUAL Q2	ACTUAL Q3	ACTUAL Q4	ACTUAL FY21
Commercial Service Provider Utilization Payloads Delivered	14				
Education and Outreach Payloads Delivered	0				
In-Space Production Applications Payloads Delivered	0				
Total ISS National Lab Payloads Delivered	18				
New ISS National Lab Proposals Received	3				
New ISS National Lab Projects Selected	8				
<i>By New/Returning Type</i>					
ISS National Lab Return Users	5				
ISS National Lab New Users	3				
<i>By User Type</i>					
Commercial	6				
Academic/Nonprofit	2				
Government Agency	0				
Number of Days from Solicitation Close to Announcement	72				
New Commercial In-Orbit Facilities Added	0				
Commercial In-Orbit Facilities (cumulative)	18				
<i>Ascent Flight Resources</i>					
Upmass	--				
Cold Stowage	--				
Big Bags	--				
Powered Lockers	--				
<i>Facility Resources</i>					
Commercial Facilities	--				
JEM Airlock	--				
Life Science Glovebox	--				
Microgravity Science Glovebox	--				
Peer-reviewed Scientific Journal Publications from Projects	N/A	N/A	N/A	N/A	
Funds Raised Post Award by Startup Companies with Flight Projects	N/A	N/A	N/A	N/A	

Note: Resource data is projected/estimated based on payload requirements in the queue at the start of FY2022. Metrics marked "N/A" by quarter are only reported on an annual basis.

FINANCIALS

Business Status Report (unaudited)

Expenses	Q1 Actual FY22	Q1 Budget FY22	Q1 Variance FY22	Expenses	Q1 Actual FY22	Q1 Budget FY22
Direct Labor	\$1,717,396	\$1,736,474	\$(19,078)	Direct Labor	\$1,717,396	\$1,736,474
Subcontracts	\$228,345	\$461,740	\$(233,395)	Subcontracts	\$228,345	\$461,740
Other Direct	\$207,579	\$491,135	\$(283,556)	Other Direct	\$207,579	\$491,135
Travel	\$70,158	\$105,164	\$(35,006)	Travel	\$70,158	\$105,164
Office Supplies and Equipment	\$86,404	\$134,141	\$(47,737)	Office Supplies and Equipment	\$86,404	\$134,141
Grants	\$704,444	\$1,562,176	\$(857,732)	Grants	\$704,444	\$1,562,176
Total Expenses	\$3,014,326	\$4,490,830	\$(1,476,504)	Total Expenses	\$3,014,326	\$4,490,830

Breakout of ISS National Lab Grants Payments

	Q1FY22	Q2FY22	Q3FY22	Q4FY22	FY22 YTD Total
Academic	\$0				
Commercial	\$973,157				
Other Government Agency	\$0				
Mission-Based Costs	\$0				
Total	\$973,157				

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

	ACTUAL Q1	ACTUAL Q2	ACTUAL Q3	ACTUAL Q4	ACTUAL FY22
Total value of grants awarded*	\$973,157				

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

Breakout of Cooperative Agreement Funding

	Q1FY22	Q2FY22	Q3FY22	Q4FY22	FY22 YTD Total
Academic	\$156,577				\$156,577
Commercial	\$547,867				\$547,867
Other Government Agency	-				-
Total	\$704,444				\$704,444

IN-ORBIT ACTIVITIES

- The [SpaceX Crew-3 mission](#) carried four astronauts to the ISS. Among the payloads delivered on this mission was an ISS National Lab-sponsored investigation from the National Cancer Institute focused on crystallization for improved drug design. Additionally, the Crew-3 astronauts are supporting a wide variety of ISS National Lab-sponsored research during their time on station.
- SpaceX's 24th Commercial Resupply Services (CRS) mission delivered several ISS National Lab-sponsored payloads, including the following (full details are on the [SpaceX CRS-24 launch page](#)):
 - Merck & Co. conducted an investigation that builds on its prior ISS National Lab-sponsored research to improve the manufacture and storage of the FDA-approved cancer therapeutic Keytruda®.
 - Procter & Gamble launched chemical constituents of Tide detergent to test their potential application as cleaning ingredients for use in space and to monitor their stability in microgravity as a means to enhance product performance on Earth and in space.
 - A Clemson University project funded by Target Corporation through the ISS Cotton Sustainability Challenge examined gene expression in tissues from cotton plants exposed to the stresses of spaceflight to better understand plant growth and regeneration.
 - The National Stem Cell Foundation conducted a study of neurodegeneration in 3D culture using cells derived from patients with primary progressive multiple sclerosis and Parkinson's disease, marking the first time disease-specific cells from patients with neurodegenerative diseases were studied on the ISS.
 - Emulate, a biotechnology company focused on Organs-on-Chips technology, launched a tissue chip investigation funded by the National Institutes of Health focused on the blood-brain barrier to gain a better understanding of neurodegenerative diseases.
 - LambdaVision, a biotechnology company focused on eye diseases, conducted an investigation to advance the development of the company's protein-based artificial retina that restores vision in patients with retinal degeneration.
 - ISS National Lab Commercial Service Provider Rhodium Scientific, in collaboration with Lawrence Berkeley National Laboratory, tested the ability of bacteria to protect DNA through the stresses of launch, in-orbit stowage, and return to Earth.

R&D PROGRESS AND SUCCESSES

- Solicitations that opened in Q1 include:
 - [ISS National Lab Sustainability Challenge: Beyond Plastics](#) (in partnership with Estée Lauder)
 - Two ISS National Lab Research Announcements (NLRAs):
 - NLRA 2022-3: [In-Space Production Applications: Tissue Engineering and Biomanufacturing](#)
 - NLRA 2022-5: [Technology Advancement and Applied Research Leveraging the ISS National Lab](#)
 - Two solicitations in collaboration with the National Science Foundation (NSF):
 - NSF/CASIS 2022 [Collaboration on Tissue Engineering and Mechanobiology on the ISS to Benefit Life on Earth](#)
 - NSF/CASIS 2022 [Collaboration on Transport Phenomena Research on the ISS to Benefit Life on Earth](#)
- Three new peer-reviewed journal articles were published in Q1 (view a full list of peer-reviewed journal publications related to the ISS National Lab at www.ISSNationalLab.org/publications):
 - Thakur V, Alcoreza N, Cazares J, Chattopadhyay M. Changes in Stress-Mediated Markers in a Human Cardiomyocyte Cell Line under Hyperglycemia. Int J Mol Sci. 2021 Oct 7;22(19):10802. <https://doi.org/10.3390/ijms221910802>
 - Peditakis I, Kodella KR, Manatakis DV, et al. Modeling alpha-synuclein pathology in a human brain-chip to assess blood-brain barrier disruption. Nat Commun. 2021 Oct 8;12(1):5907. <https://doi.org/10.1038/s41467-021-26066-5>

- Wubshet NH, Arreguin-Martinez E, Nail M, et al. Simulating microgravity using a random positioning machine for inducing cellular responses to mechanotransduction in human osteoblasts. Rev Sci Instrum. 2021 Nov 1;92(11):114101. <https://doi.org/10.1063/5.0056366>
- [A perspective paper was published](#) (online ahead of print) in the journal Stem Cell Reports discussing the outcomes of the Biomanufacturing in Space Symposium hosted by CASIS and the University of Pittsburgh's McGowan Institute for Regenerative Medicine in 2020.
- [A conference proceedings paper](#) on in-space production authored by ISS National Lab staff was published in TechConnect Briefs.
- The CEO of Ras Labs [published a book](#) on state-of-the-art advances in smart materials that included a discussion of the company's [ISS National Lab-sponsored investigation](#) on its Synthetic Muscle™ material.

LEO ECONOMY

Demand

- Eight new projects were selected in Q1:
 - Five of the new projects were awarded through the 2nd cycle of technology development NLRAs: a project from Flawless Photonics Inc. to improve the space-based manufacturing of optical fibers; a technology development project from Boeing and its partners to advance flow chemistry technology in space; a project from ISS National Lab Commercial Service Provider Techshot, Inc. to advance development of its greenhouse facility; a project from ISS National Lab Implementation Partner Felix & Paul Studios to accelerate downlink capability for live streaming high-resolution, 360-degree virtual reality video from the ISS; and a project from HySpeed Computing to demonstrate the real-time streaming of ultra-high-resolution imagery from space-based sensors to Earth.
 - Two of the projects selected in Q1 were from startup companies awarded through the Technology in Space Prize (funded by Boeing and CASIS) in collaboration with MassChallenge:
 - A project from Oculogenex, Inc. testing an investigational gene therapy product for age-related macular degeneration.
 - A project from krtkl inc. to raise the technology readiness level of a new hardware platform for inter-satellite communications.
 - One is a Commercial Service Provider partnership with LaMont Aerospace to improve the capability of their commercial R&D facilities.
- CASIS entered into an agreement with the U.S. Department of Energy (DOE) Lab-Embedded Entrepreneurship Program (LEEP) at Argonne National Laboratory to develop a collaboration enabling DOE LEEP entrepreneurs to benefit from access to the ISS National Lab to accelerate DOE-sponsored research and development.

Supply

- Commercial Service Provider Redwire Space acquired Techshot, Inc., another Commercial Service Provider.
- [NASA selected Implementation Partner Axiom Space](#) for the second private astronaut mission to the ISS, with a target launch date in fall 2022 or spring 2023.
- Implementation Partner Sierra Space announced a \$1.4 billion Series A investment of primary capital, the first capital raise for the company and the second largest private capital raise globally in the aerospace and defense sector to date.
- [Several Implementation Partners and Commercial Service Providers](#) were announced as teammates for two U.S. companies that were selected by NASA to develop designs of space stations and other commercial destinations in space.

Investment

- Q1 was a record quarter of capital-raising activity by startups in the ISS National Lab ecosystem. Based on publicly available data, \$554 million of private and public capital as well as grant funding was raised during Q1 by startups that have completed a flight project through the ISS National Lab, bringing the total amount to date to more than \$1.7 billion.
- The ISS National Lab Investor Network continues to expand, reaching a cumulative 256 members in Q1. To date, CASIS has facilitated more than 1,000 capital introductions between startups and investors in the ISS National Lab ecosystem.

EDUCATION OUTREACH AND ENGAGEMENT

- CASIS announced the [James A. Abrahamson Space Leader Fellowship](#). This 12-month fellowship is designed to promote workforce development for exceptional undergraduate and early-stage graduate students from underrepresented groups by introducing them to the diversity of research and technology development enabled by space.
- The ISS National Lab hosted a SpaceX CRS-24 student launch event that included 23 college students from Columbia University and the University of Idaho whose experiments were launching on this mission. As part of the event, the students presented their research at the Kennedy Space Center Visitor Complex.
- The Zero Robotics film "[Zero Gravity: The Journey to Space is Just a Code Away](#)," which highlights the Zero Robotics coding and robotics challenge, was screened at numerous film festivals around the U.S.
- Story Time From Space reported 480,000 reading minutes for Q1.
- The Space Station Ambassador program continued to expand, with 79 new members in Q1.

OUTREACH AND STAKEHOLDER ENGAGEMENT

- The ISS National Lab hosted its third Women Defying Gravity networking session, continuing efforts to engage with women in the aerospace community.
- CASIS and Estée Lauder public relations outreach for the ISS National Lab Sustainability Challenge: Beyond Plastics led to media coverage from outlets like [Space.com](#), [Space News](#), [Glossy](#), and [Cosmetics Business](#).
- The ISS National Lab was invited to organize a plenary session at the [American Society for Gravitational and Space Research \(ASGSR\)](#) annual meeting.
- The ISS National Lab participated in a [panel session at the ASCEND conference](#) focused on private-sector users of the ISS National Lab and the value space-based research brings to their R&D goals and business models.
- ISS National Lab staff participated in several additional speaking engagements at conferences, including the International Space Medicine Summit, the Tissue Engineering and Regenerative Medicine International Society (TERMIS) World Congress, the SelectBio Space Summit, the TechConnect World Innovation Conference and Expo, and the Association of University Research Parks International Conference.

ADDITIONAL UPDATES

- The ISS National Lab [User Advisory Committee \(UAC\) held a virtual introductory meeting](#) to introduce the UAC and its members.
- Former NASA Chief Scientist [Waleed Abdalati joined the CASIS Board of Directors](#).

Full Project Pipeline Details

- For a full list of ISS National Lab projects and programs, including flight status, visit our [project pipeline database](#).