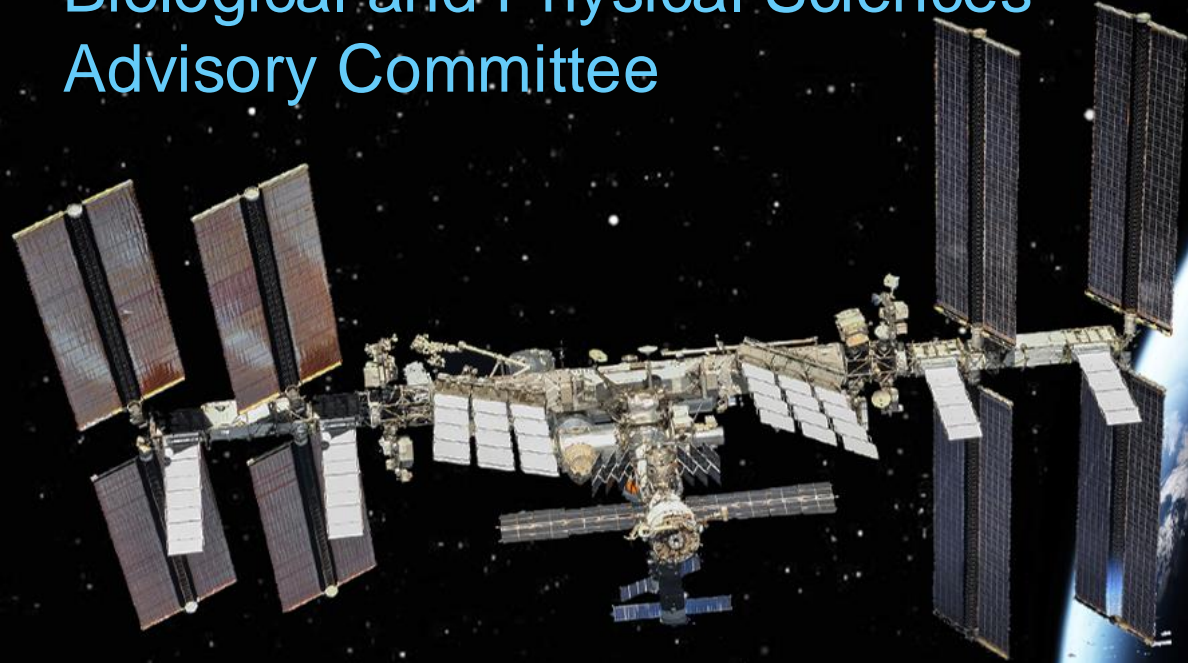


National Aeronautics and  
Space Administration



# ISS Program Update

Biological and Physical Sciences  
Advisory Committee



Jennifer Buchli

Chief Scientist, ISS Program

April 25, 2024

# Agenda

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Research Statistics  
Types of Research  
Results  
Recent Highlights  
Looking Forward

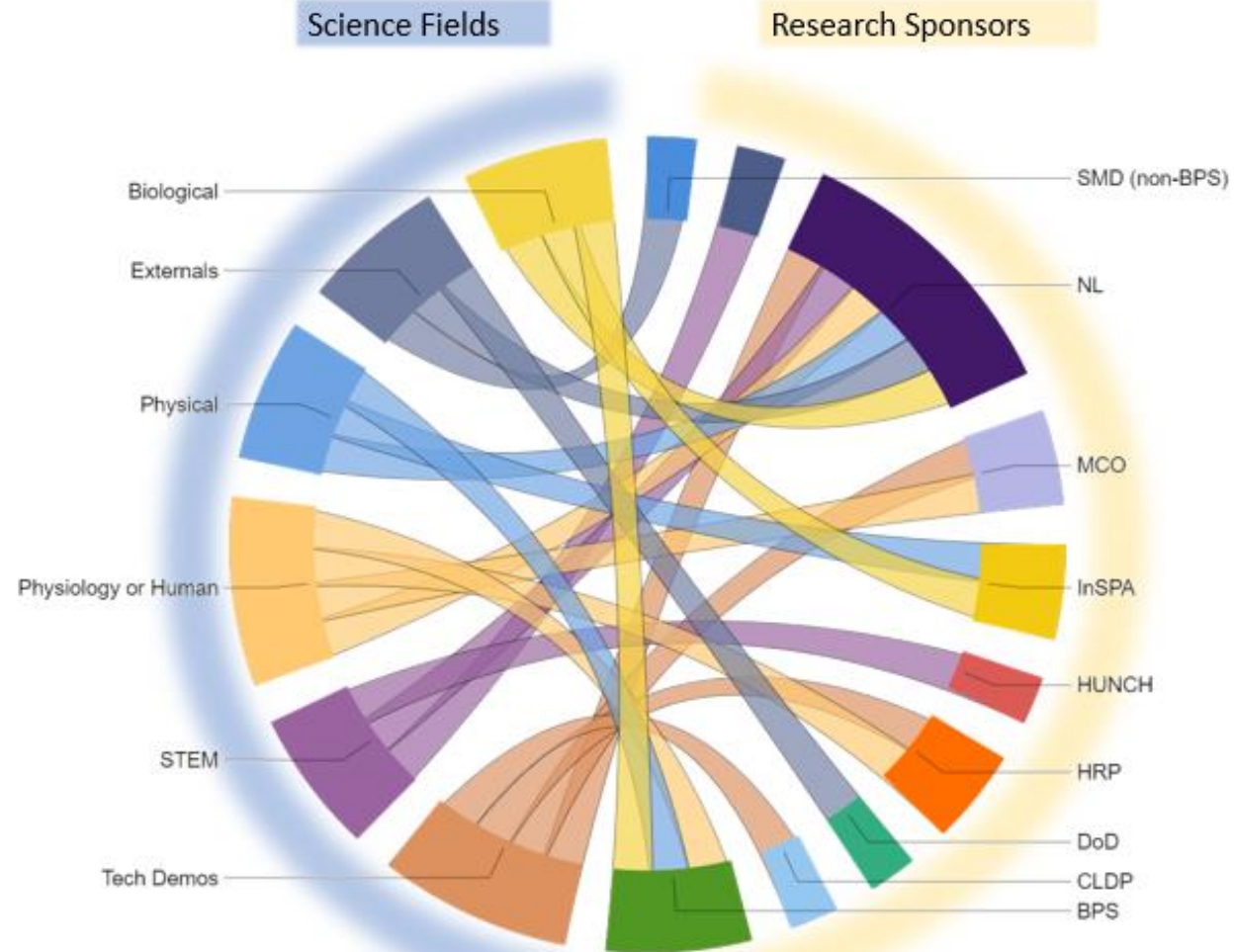


# Research Statistics: Expedition 0- 70

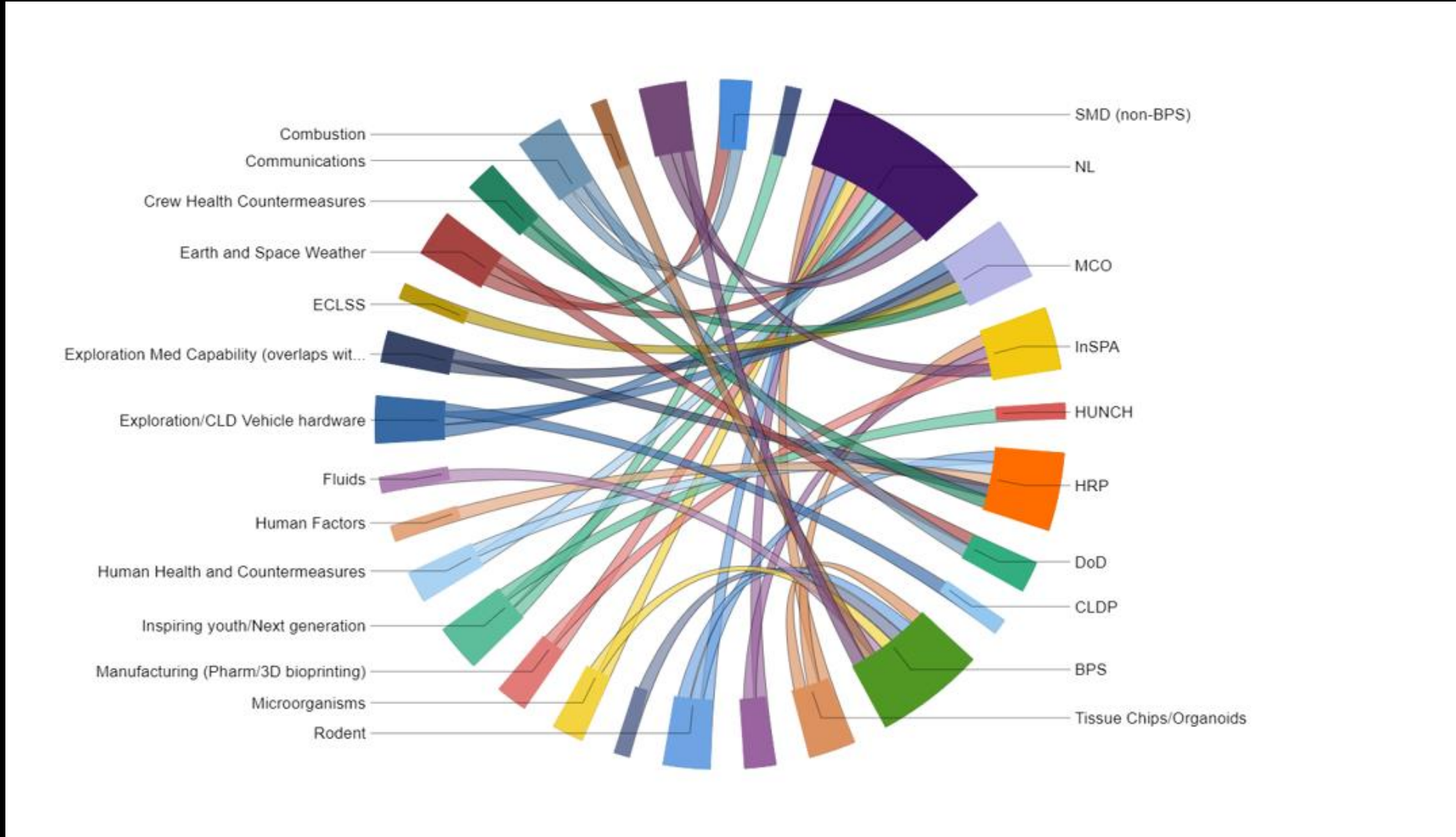
- 3900+ Investigations
- 4000+ Publications
- 5000+ Researchers
- 250+ Active Research Facilities
- 100+ Countries



# Science Categories

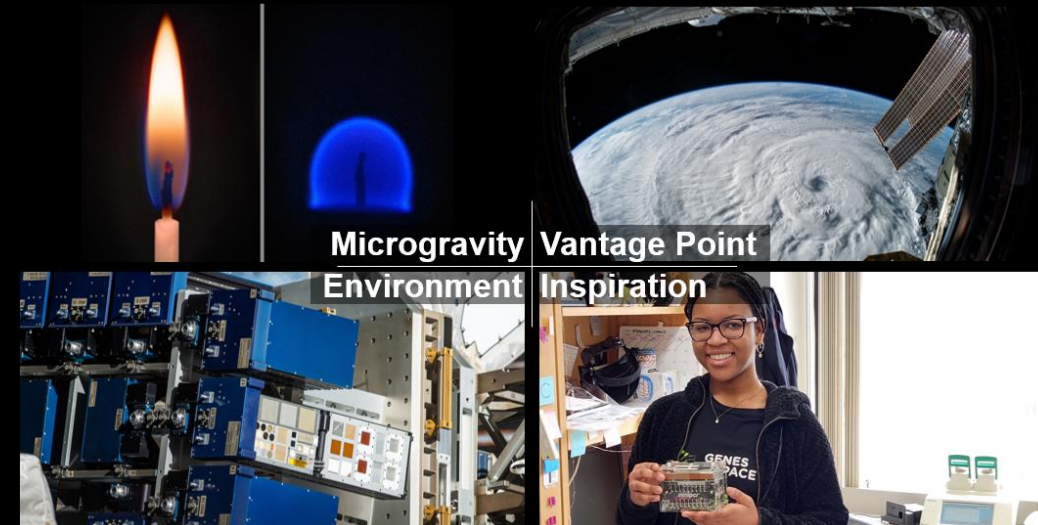


# Science Subcategories



# ISS offers core capabilities for the following science fields:

- Biology and Biotechnology
  - Cellular Biology, Tissue engineering (3D Bioprinting), Biotechnology (onboard gene sequencing), Microbiology, Model organisms for physiology (rodents, fish, fruit flies, nematodes), plant research
- Physical Science
  - Combustion (fuel characteristics/ efficiency, fire safety), fluid physics, material science, electrostatic forces, nanoparticles, quantum mechanics (Cold Atom Lab)
- Educational Activities
  - On board robotics demonstrations and competitions (SPHERES, ASTROBEE) Ham/amateur radio, Genes in Space
- Human Research
  - Human physiology, immunology, bone and muscle loss, SANS, space radiation, isolation and confinement, gravity fields (readaptation studies included in post flight field tests), CIPHER complement for human exploration
- Earth and Space Science: 90% of the Earth's inhabited surfaces
  - External Earth Instruments (ECOSTRESS, GEDI, OCO-3, SAGE, EMIT, etc. ) External Crew Earth Observation (NASA Disaster Response Program/ International disaster response support), Astrophysics/Fundamental Physics/Heliophysics (Alpha Magnetic Spectrometer, NICER- neutron stars, AWE- Atmospheric Waves, Space Weather)
- Technology
  - Robotics, robotic surgery demonstrations, fiber manufacturing, laser communications, improved guidance and navigation for exploration (star tracker)



# International Collaboration

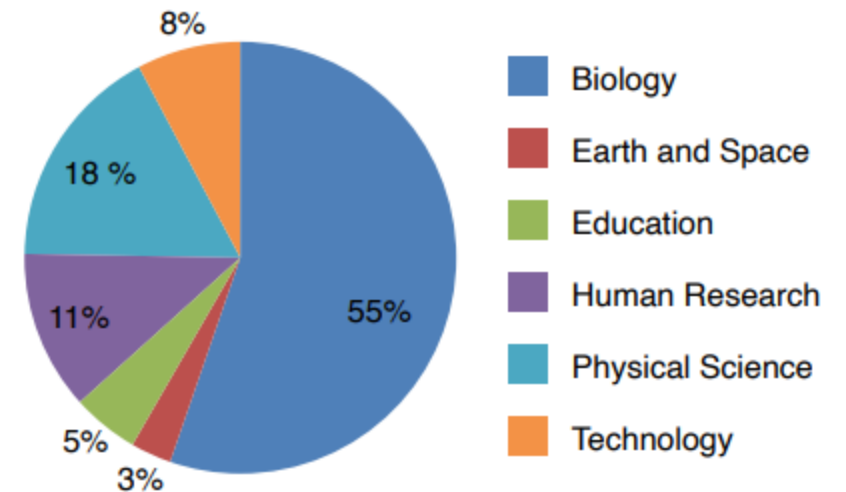
## International Collaboration on ISS

### ISS Benefits Increased Through International Collaboration

Partner Agency*	Agency Only	Collaboration (Hosting)	Investigations Implemented	Collaboration (Participating)	Total Agency Impact	% Increase Through Collaboration
CSA	36	13	49	51	100	104%
ESA	358	107	465	386	851	83%
JAXA	686	257	943	203	1146	22%
NASA	1329	283	1612	140	1752	9%
ROSCOSMOS	343	312	673	288	943	44%
<b>Totals</b>			3742	1068	4792	29%

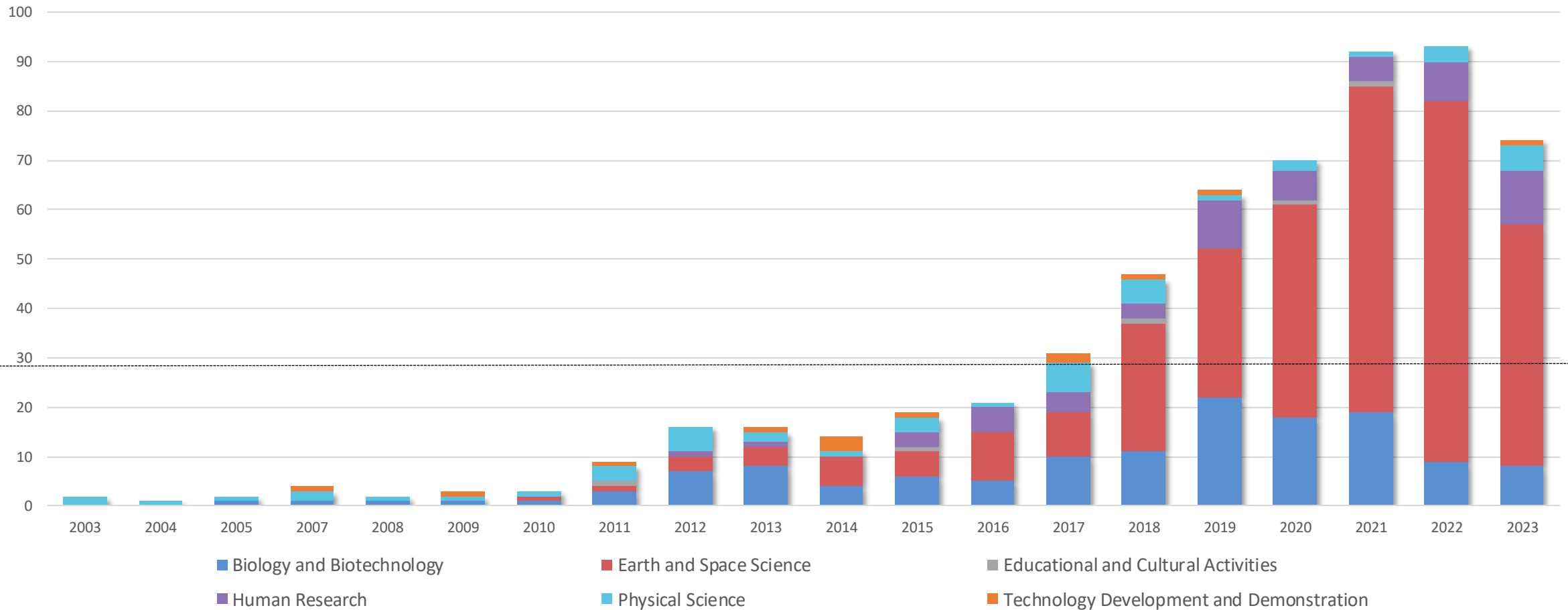
\*NASA utilization includes 70 investigations, ESA utilization includes 3 investigations, and ROSCOSMOS utilization includes 1 investigation by the Italian Space Agency (ASI), an ISS Participant Agency.

### International Collaboration Percentage by Investigation Categories



# Results

## Count of Station Publications in Top 100 Journals



Count of publications reported in journals ranked in the top 100 according to global standards of Clarivate. A total of 567 top-tier publications through the end of FY-23 are shown by year and research category.

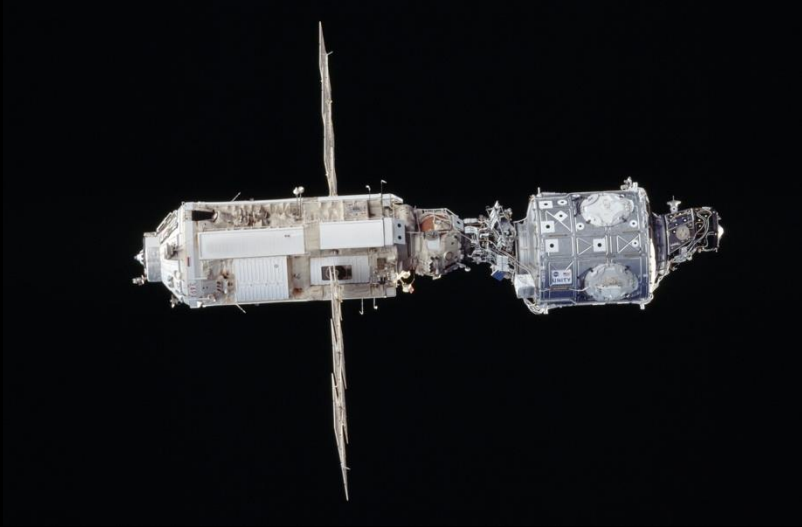


# Annual Highlights



# Recent ISS Program Highlights

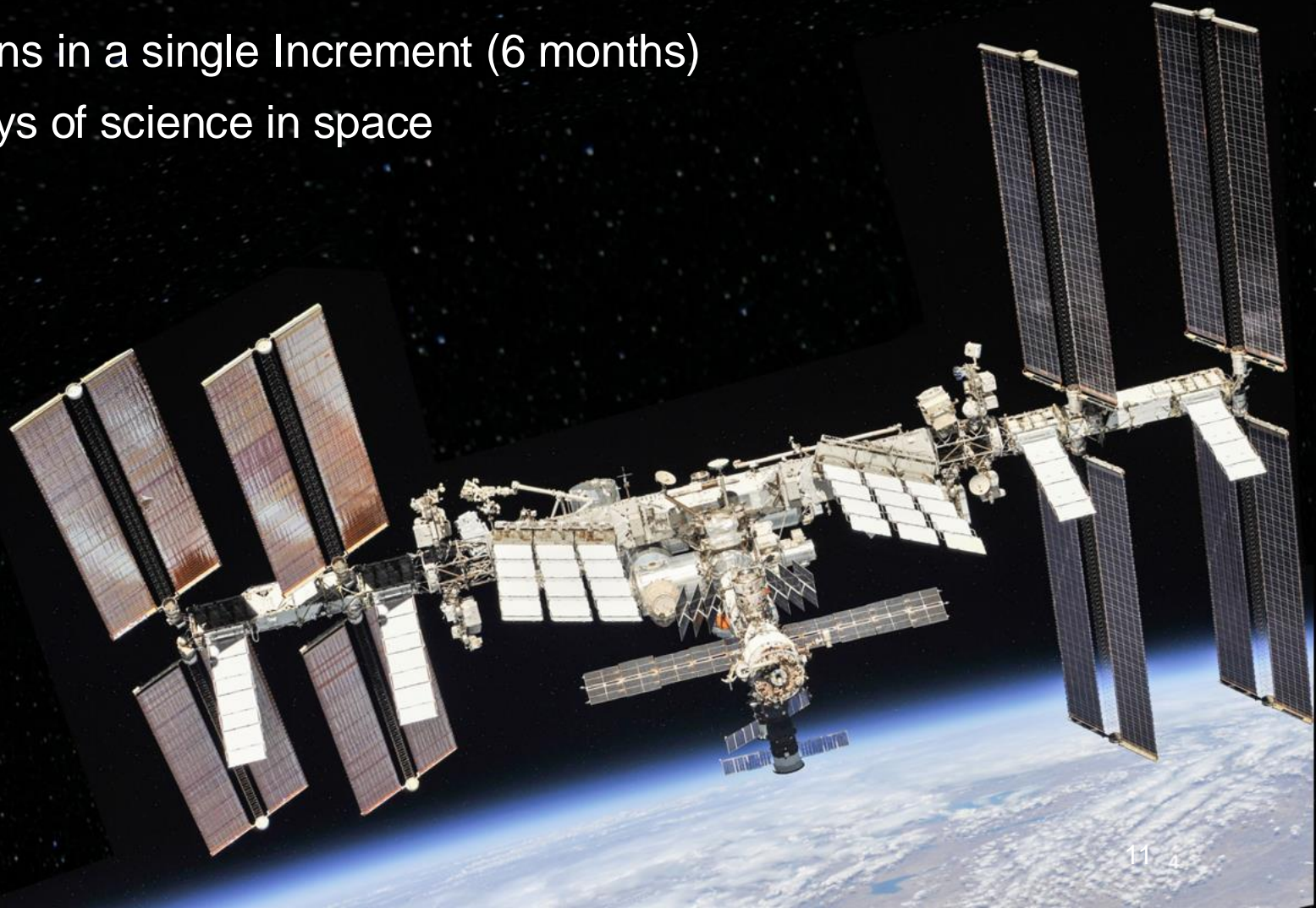
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# 2023

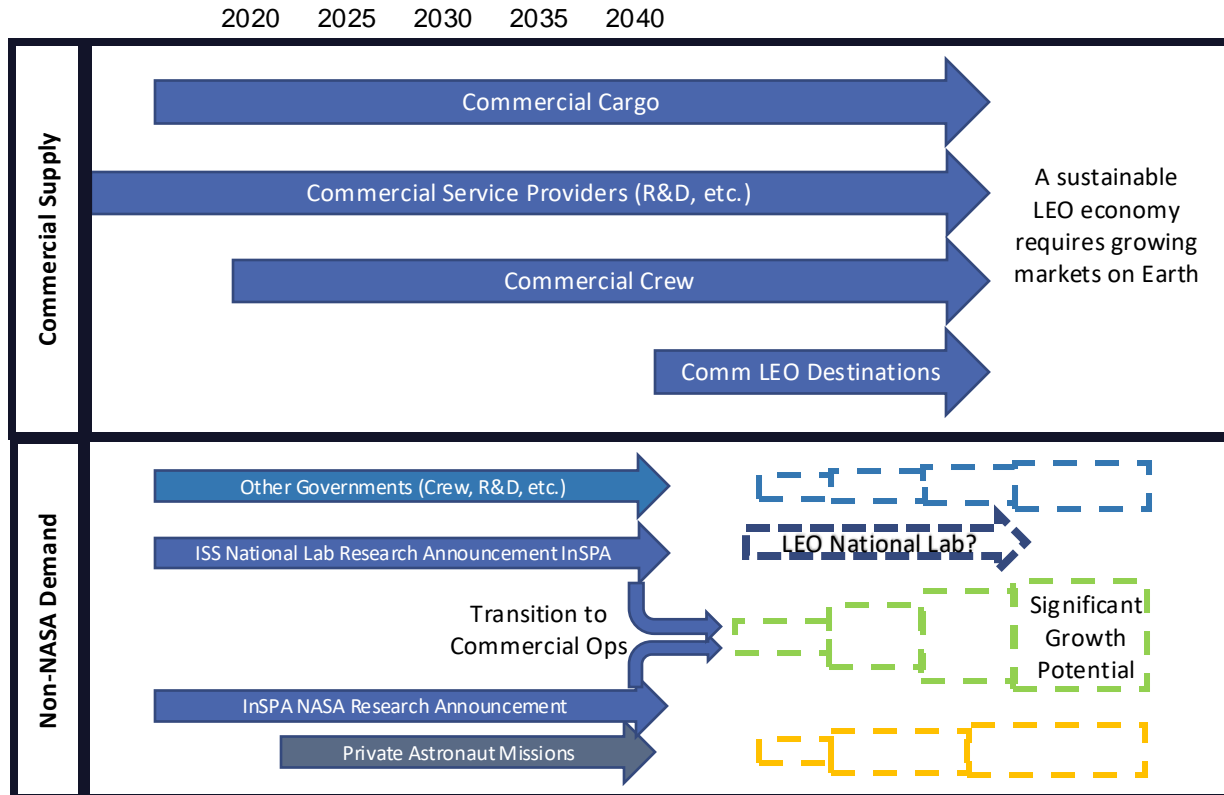
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- IROSA: Launch and deploy of the 3<sup>rd</sup> set of IROSA wings, upgrading power channels 1A and 1B
- 1267 Hours of Crew Payload Operations in a single Increment (6 months)
- Frank Rubio- Record Breaking 371 days of science in space
- 2,600 lbs of cargo launched
- 12,900 lbs of cargo returned
- RR22 Software Transition



# Strategy for Development of LEO Economy

## In Space Production Applications



- Investigation into scalable and sustainable commercial microgravity manufacturing or products to support economic markets in LEO and on earth
  - Provides demand for CLDs
- Focus on Administration priorities
  - Cancer Moonshot (National Cancer Plan)
  - Domestic Biomanufacturing (Executive Order)
  - Semiconductor R&D (CHIPS Act)
- Collaboration between NASA and ISS National Lab (CASIS)
- Two areas of Interest
  - Tissue Engineering & Biomanufacturing (cancer therapies)
  - Advanced Materials & Manufacturing (fiber, semiconductors)
- Independently verified merits
  - Demonstrate control of in-space production and manufacturing hardware and processes
  - Manufacture specific products on ISS (better than on Earth)
  - Demonstrate scale-up
  - Transition to commercial operations (on CLD)

# 2024 Flight Status: Recent and Upcoming Missions



Ax-3



NG-20



Progress 87



Crew-8



SpX-30



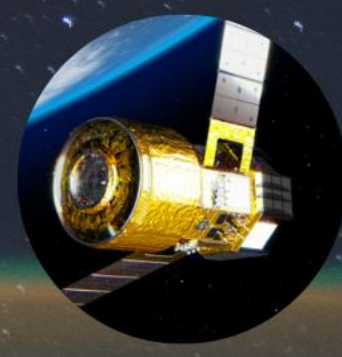
71 Soyuz



DCC-1



CFT



HTV-X1



Progress 88

# Looking Forward

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- Robust US transportation capability (2 crew and 3 cargo providers)
  - New Vehicles: HTV-X, Sierra Space Dream Chaser, Boeing CST
- Continued Integrated Crew (NASA on Soyuz and Russians on USCVs)
- Private Astronaut Missions
- Axiom Commercial Segment & ISS Reconfiguration
- New EVA Suit & Transition from EMU
- ISS Vehicle Upgrades (e.g. Arrays, Exploration Life Support & Exercise, Comm Systems)
- USOS Propulsion Capabilities
- Deorbit Vehicle Procurement and Deorbit Strategy
- Investigating new capabilities: on-orbit analysis, furnace, commercial plant greenhouse

# MISSION

On the horizon...



July 29 – Aug. 1

Boston, MA

[issconference.org](http://issconference.org)



@Space\_Station

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@ISS

@NASA