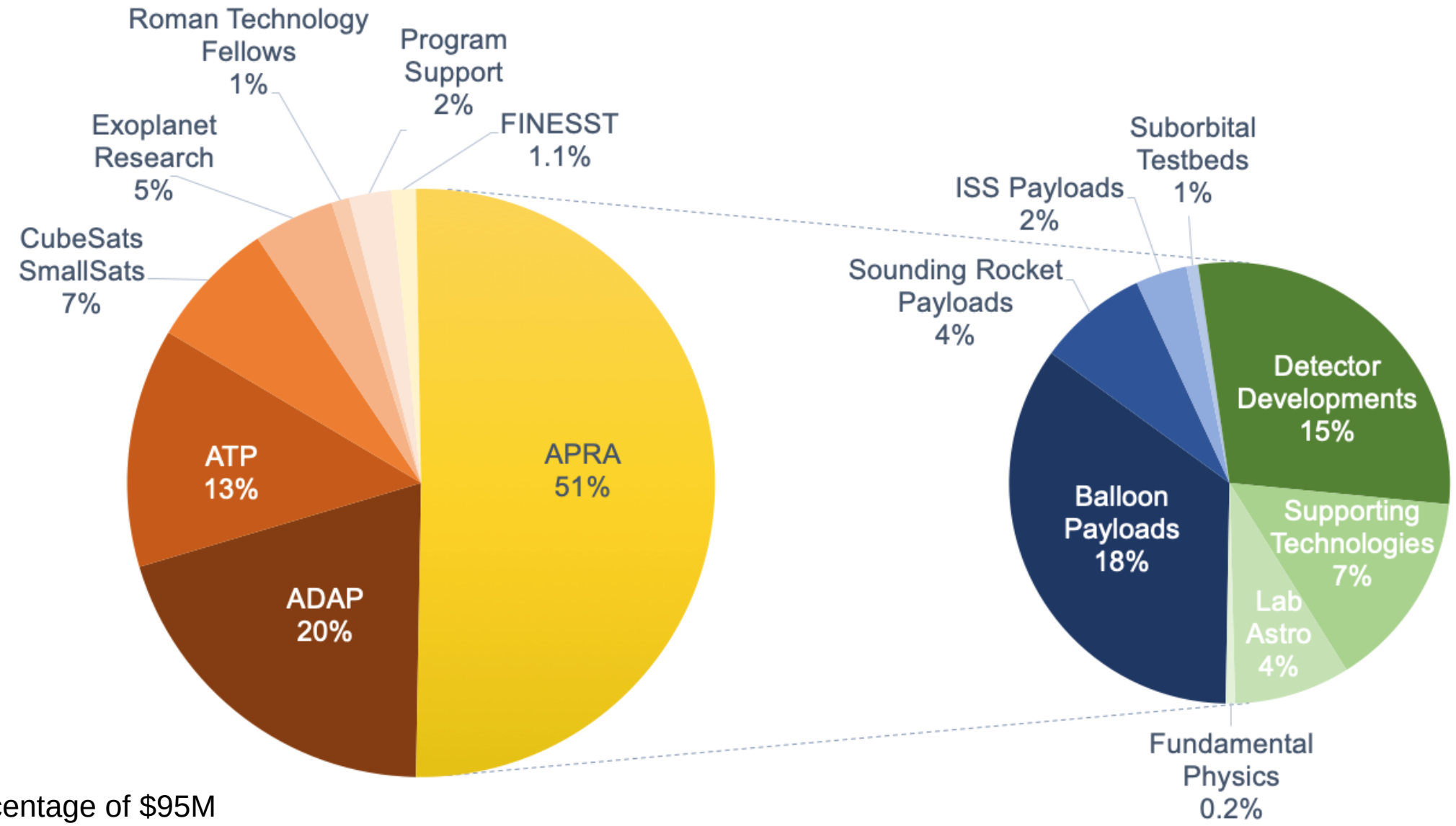
Astrophysics R&A Update

Astrophysics Advisory Committee
March 5, 2020

Stefan Immler, Dan Evans
Astrophysics Division
Science Mission Directorate

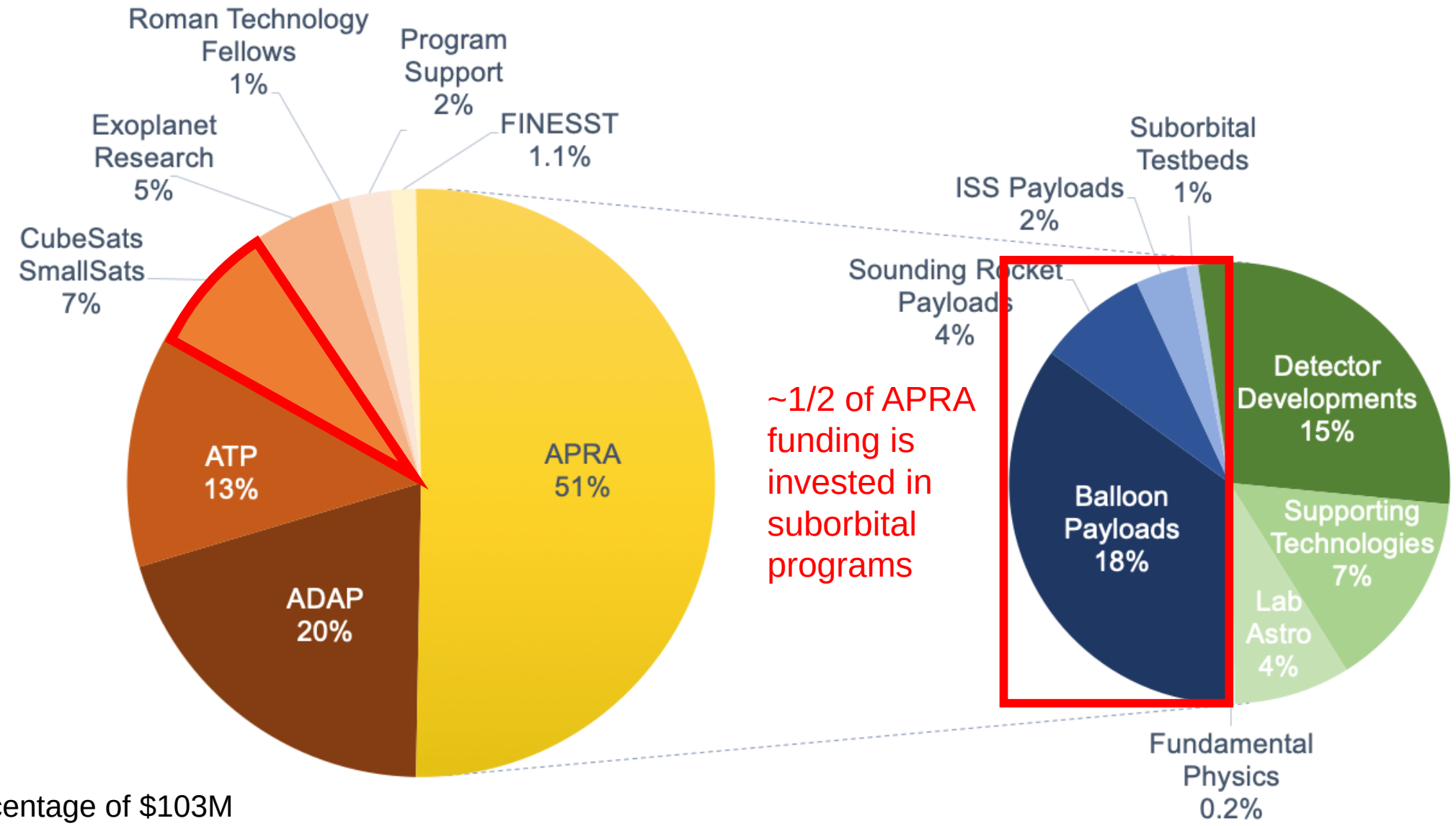
ROSES-19 Status Update

Balance of R&A Elements



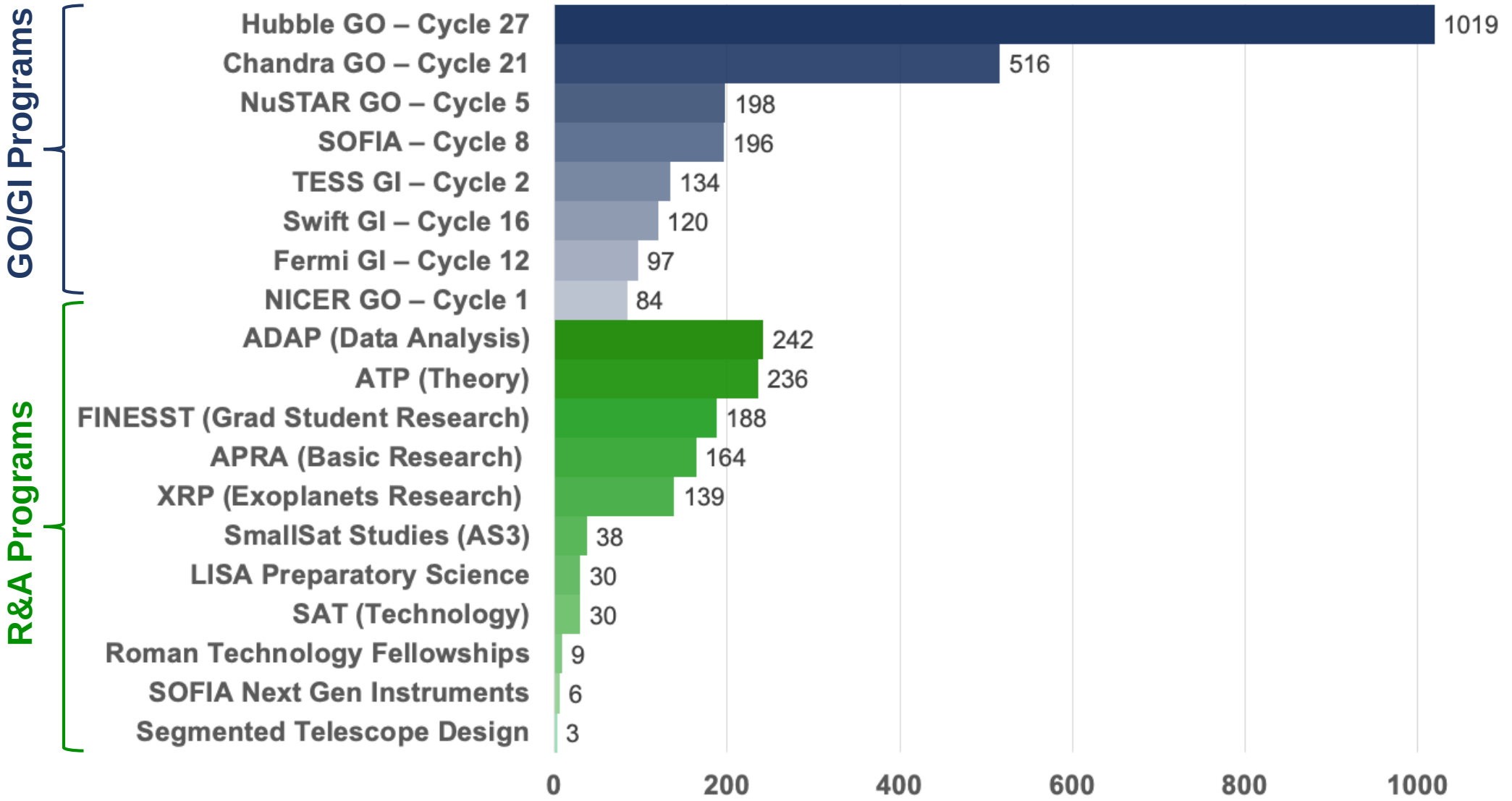
* FY19 percentage of $95M

Balance of R&A Elements



* FY19 percentage of $103M

Number of Proposals

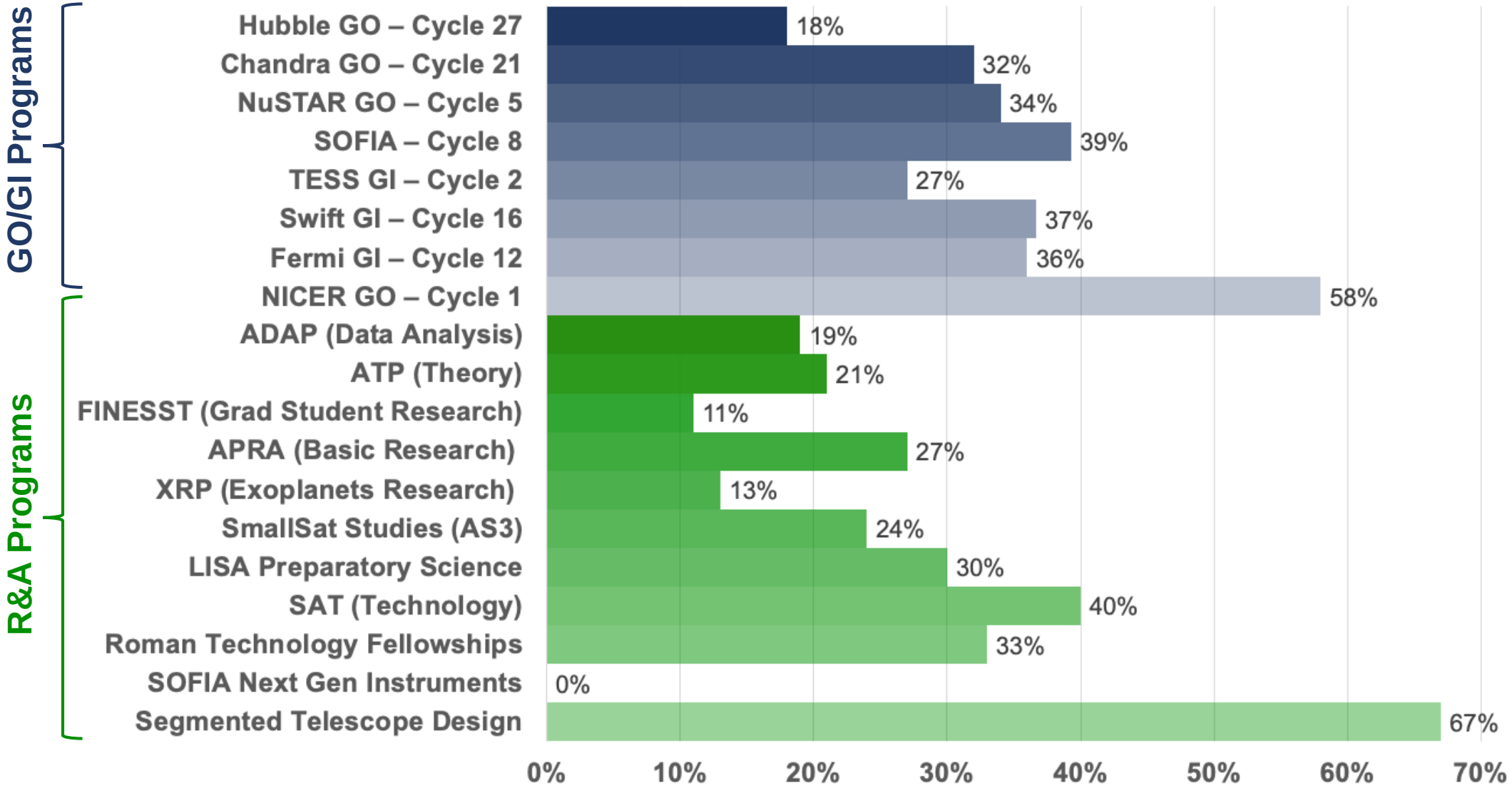


GO/GI Programs: 2,364 proposals

Total: 3,449 proposals

R&A Programs: 1,085 proposals

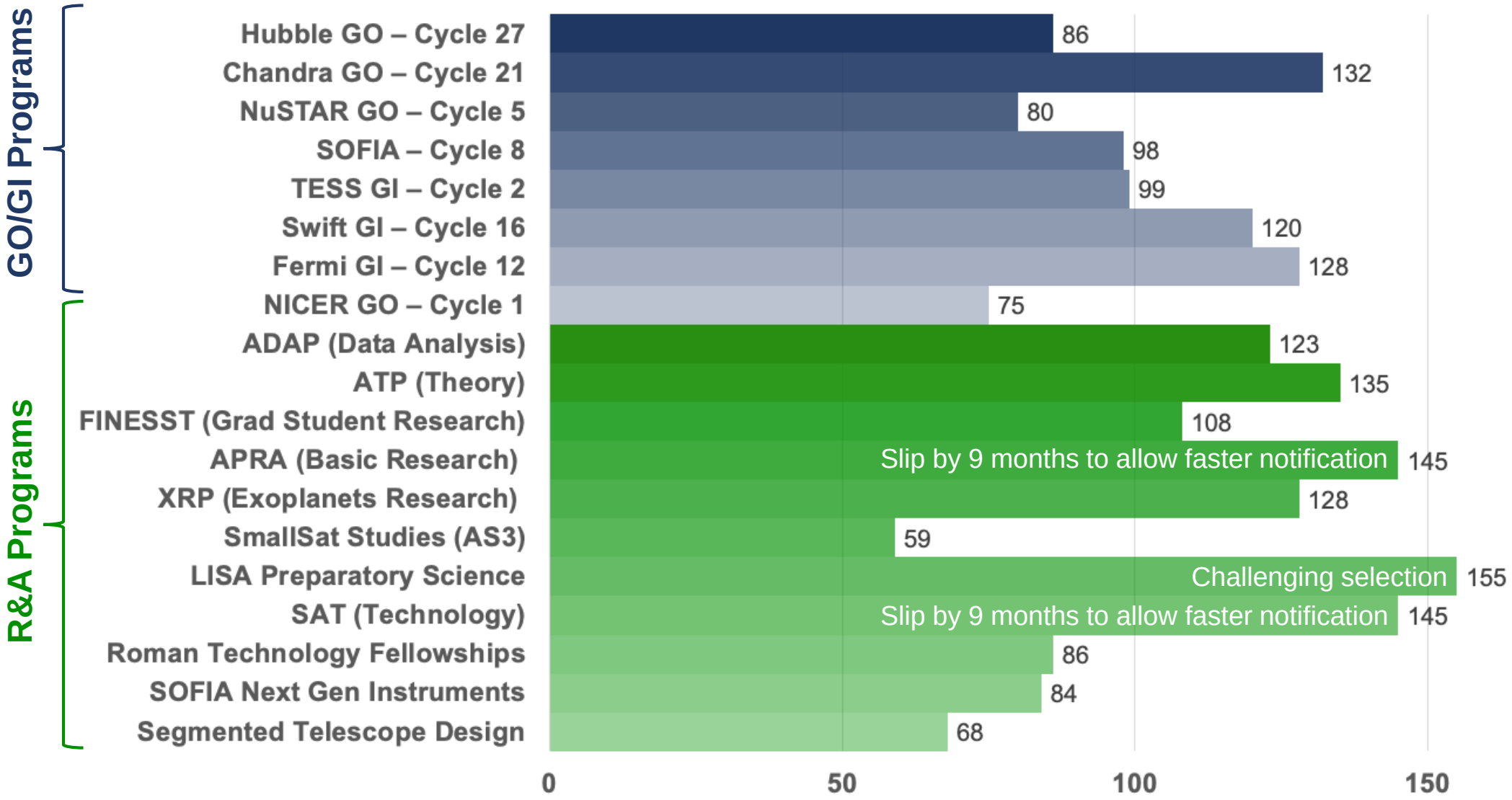
Selection Rates



GO/GI Programs: 26%

R&A Programs: 20%

PI Notification (Days after Proposal Submission)

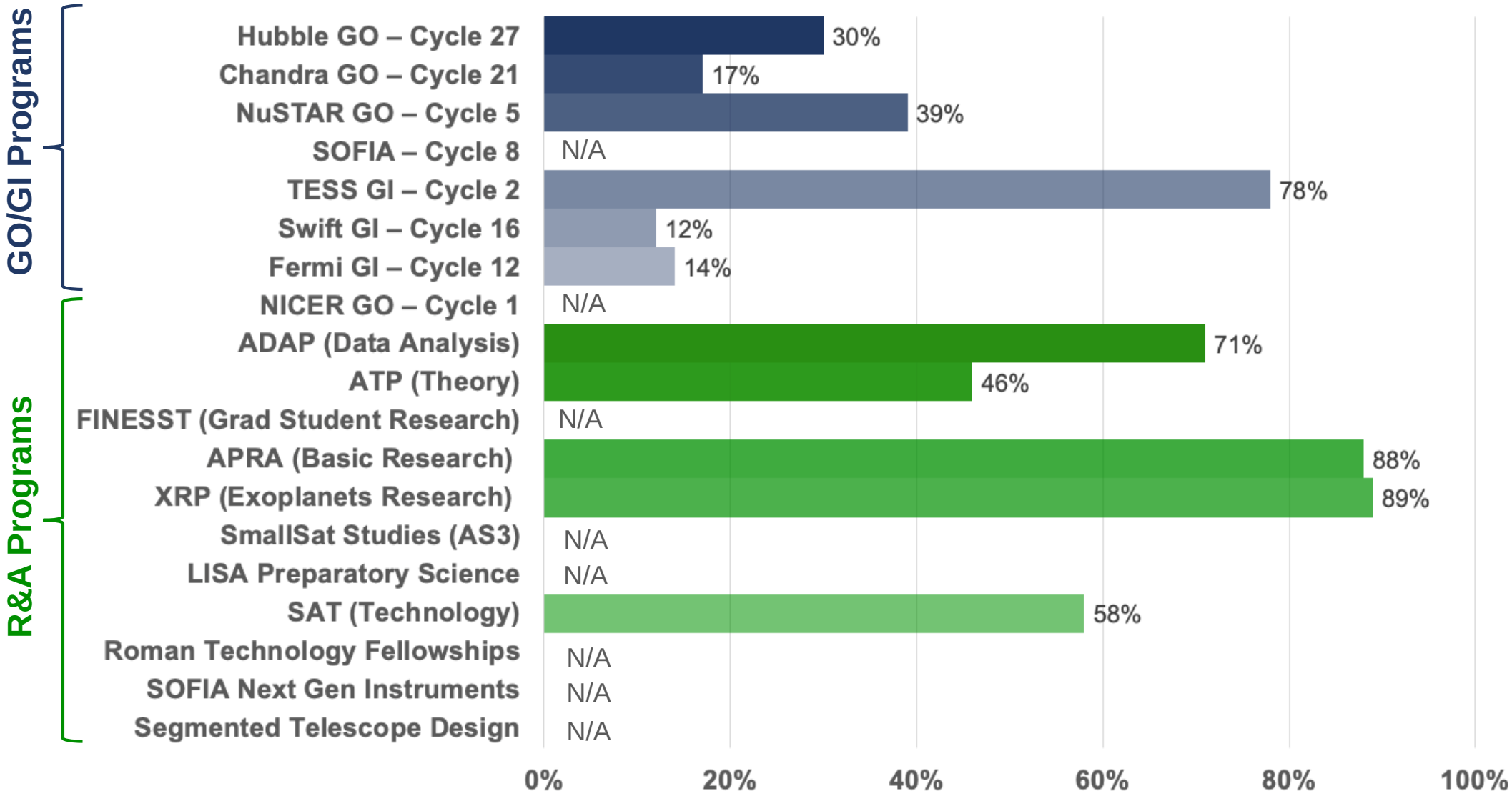


GO/GI Programs: Average 108 days

80% of all PIs are notified < 87 days

R&A Programs: Average 112 days

New PIs (not funded by same Program within 5 Years)

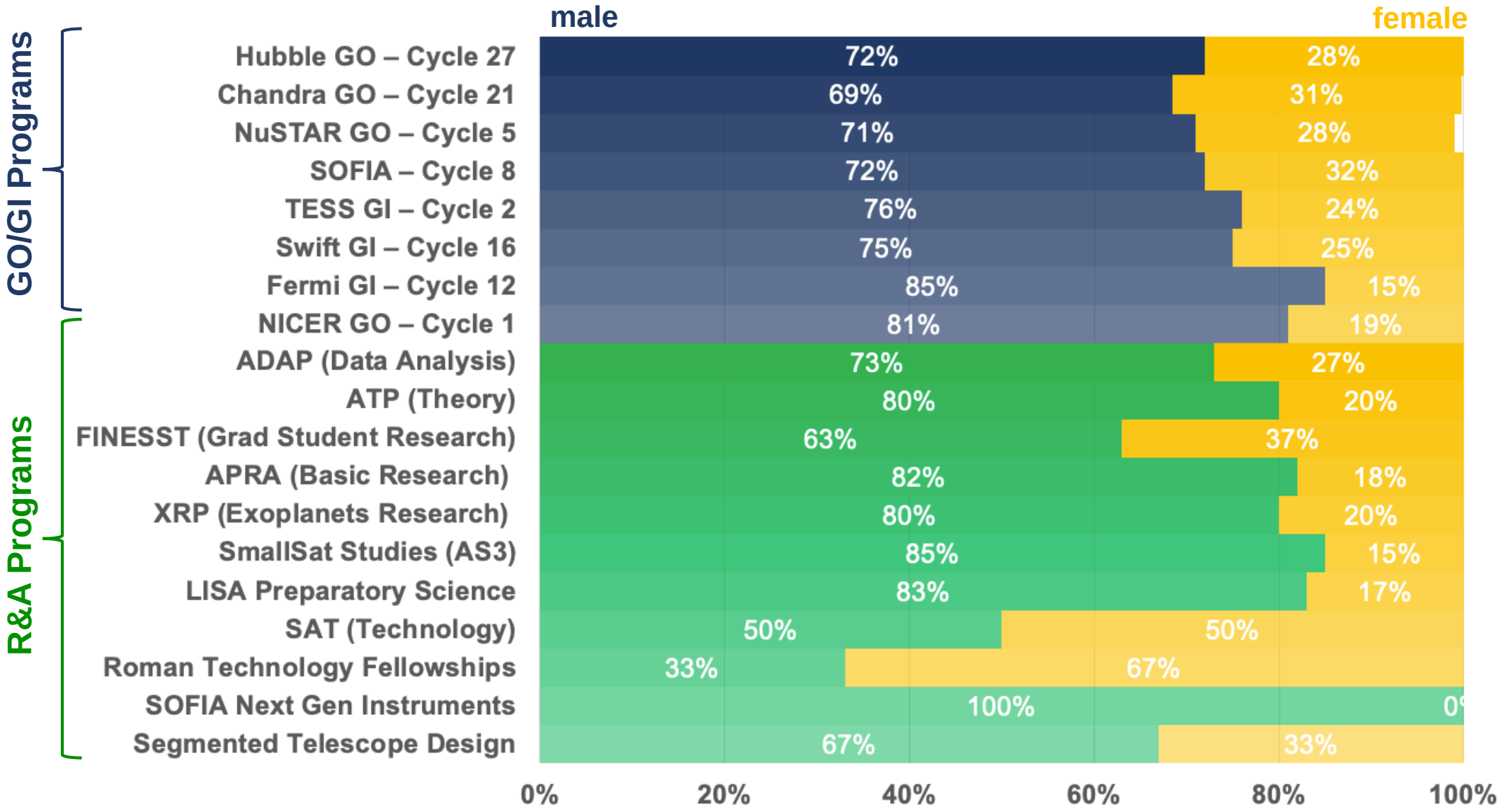


GO/GI Programs: 32% new PIs

~50% of our PIs are new PIs

R&A Programs: 70% new PIs

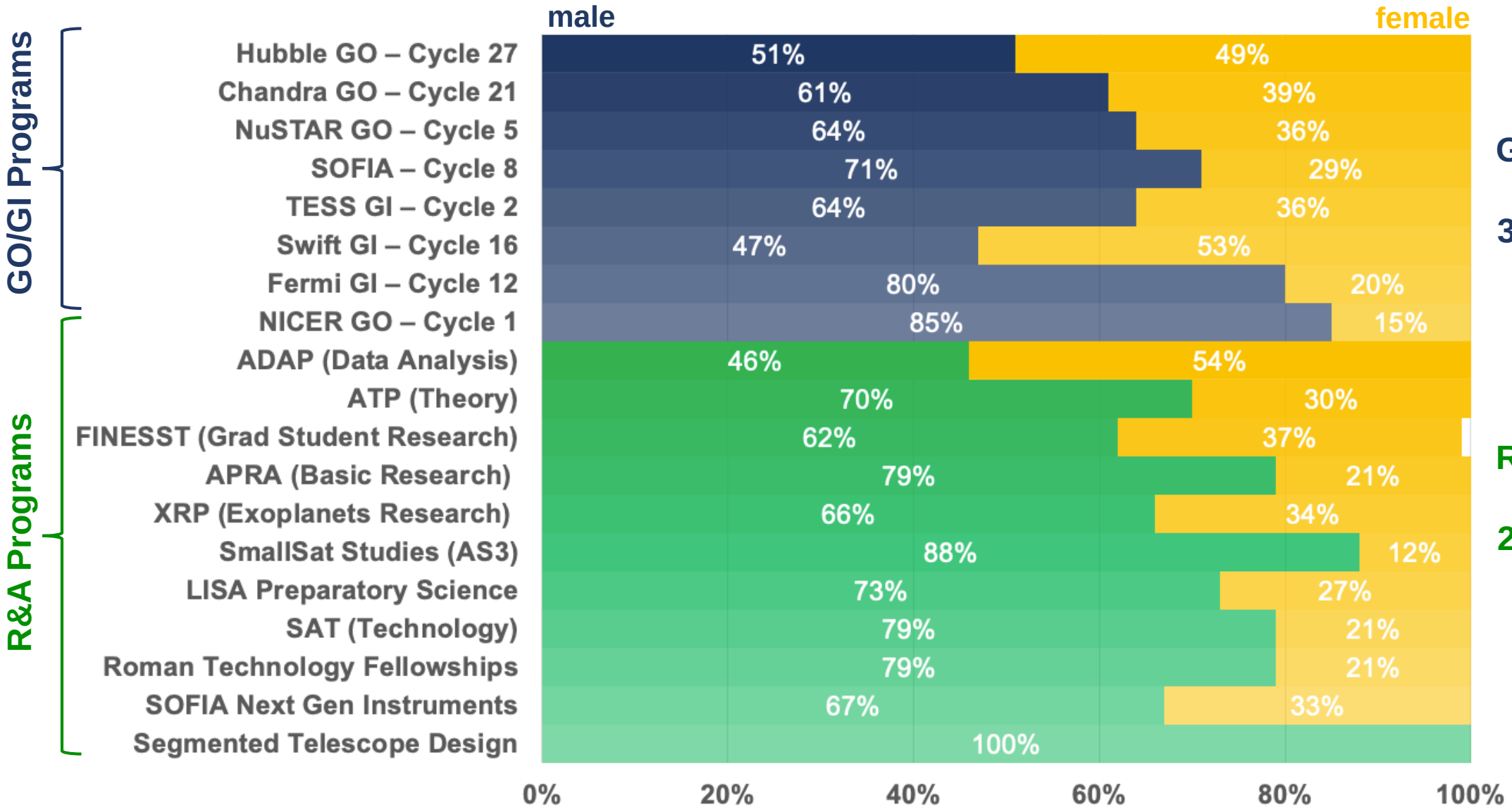
Inferred PI Gender Diversity (Submitted) – male/female



GO/GI Programs:
72% male PIs
28% female PIs

R&A Programs:
75% male PIs
25% female PIs

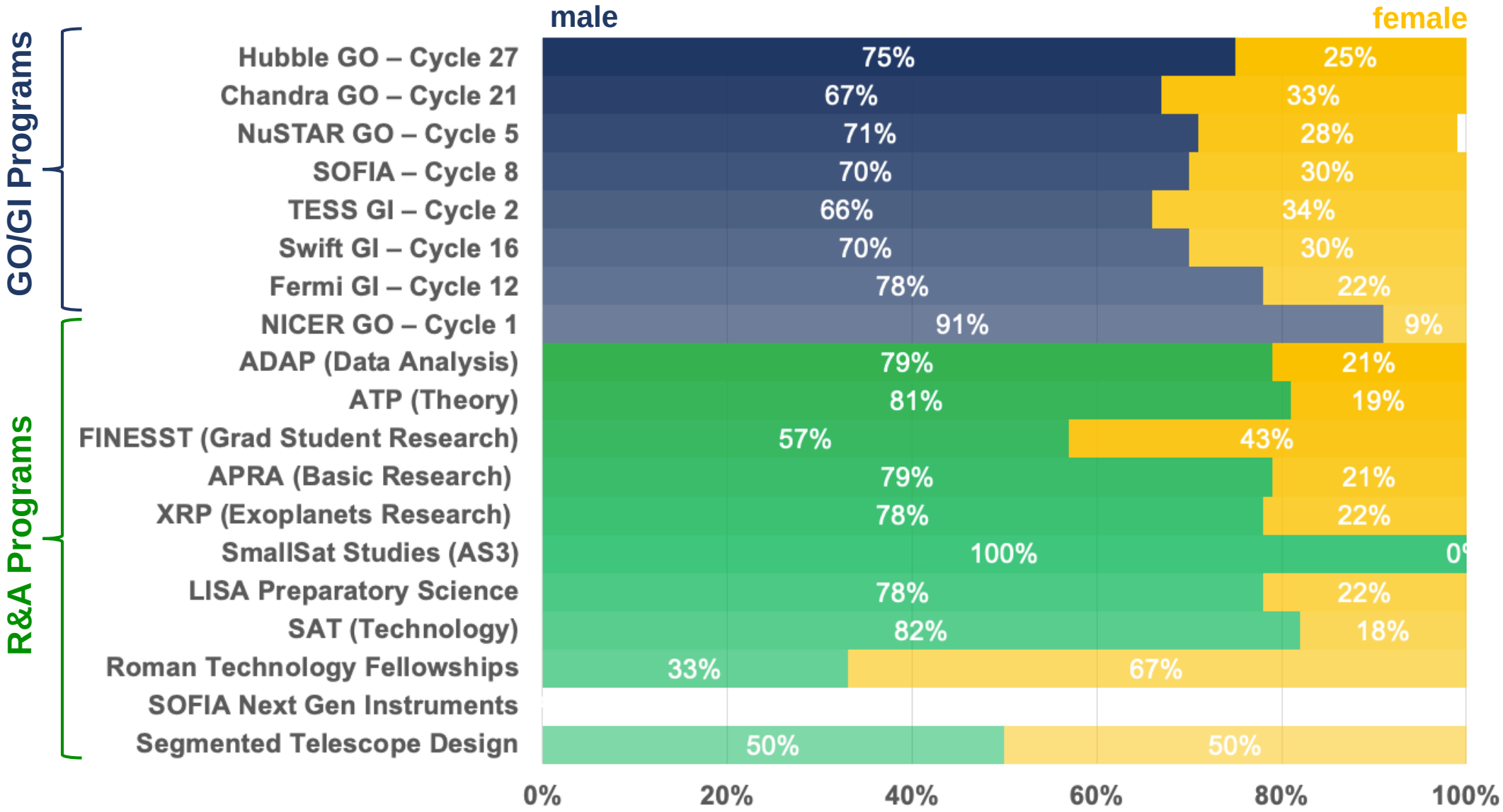
Panel Gender Diversity – male/female



GO/GI Programs:
64% male panel
36% female panel

R&A Programs:
74% male panel
26% female panel

Inferred PI Gender Diversity (Selected) – male/female

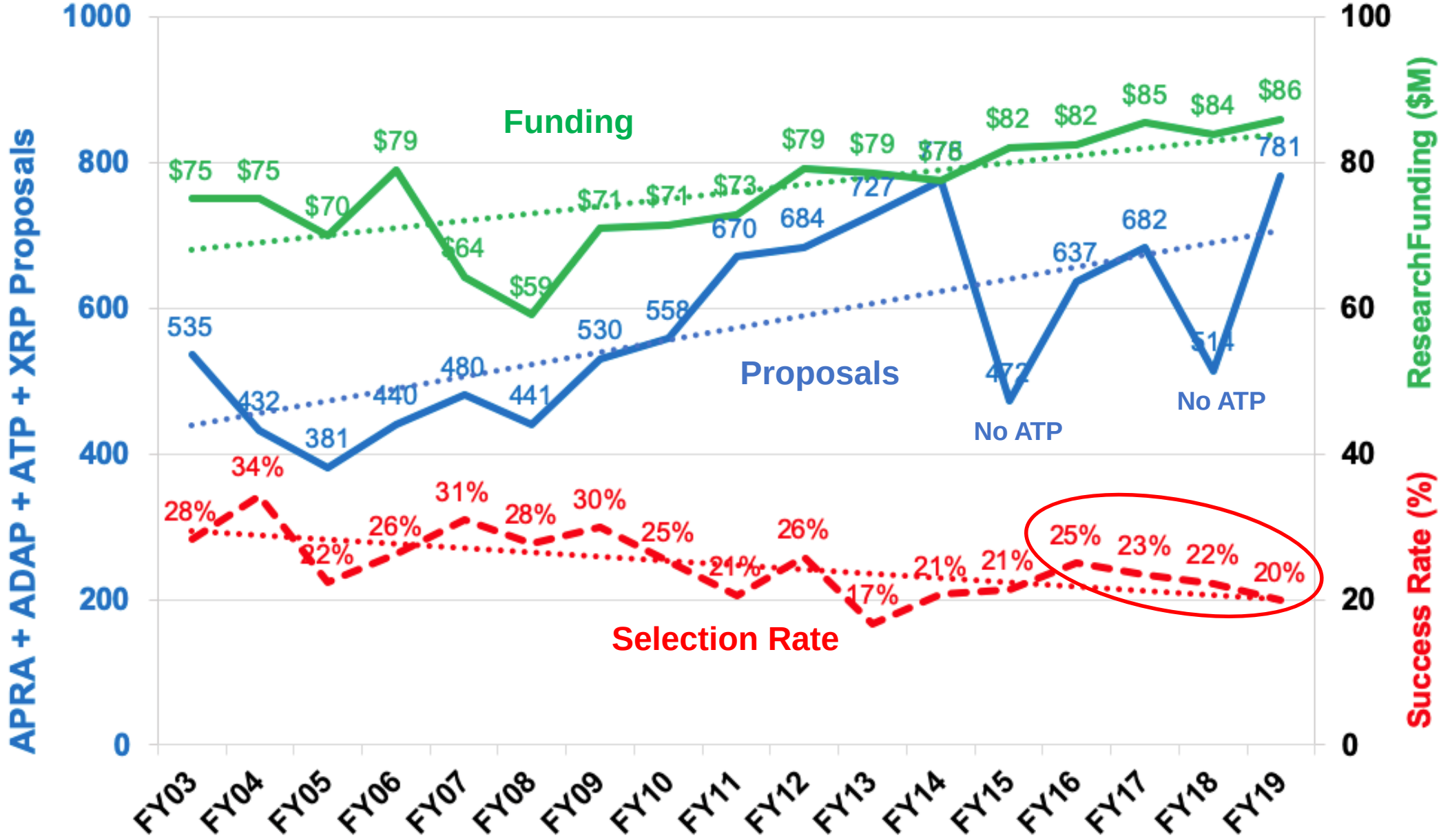


GO/GI Programs:
73% male PIs
27% female PIs

Selections are consistent with submissions

R&A Programs:
77% male PIs
23% female PIs

R&A Selection Rates



Falling R&A Selection Rates

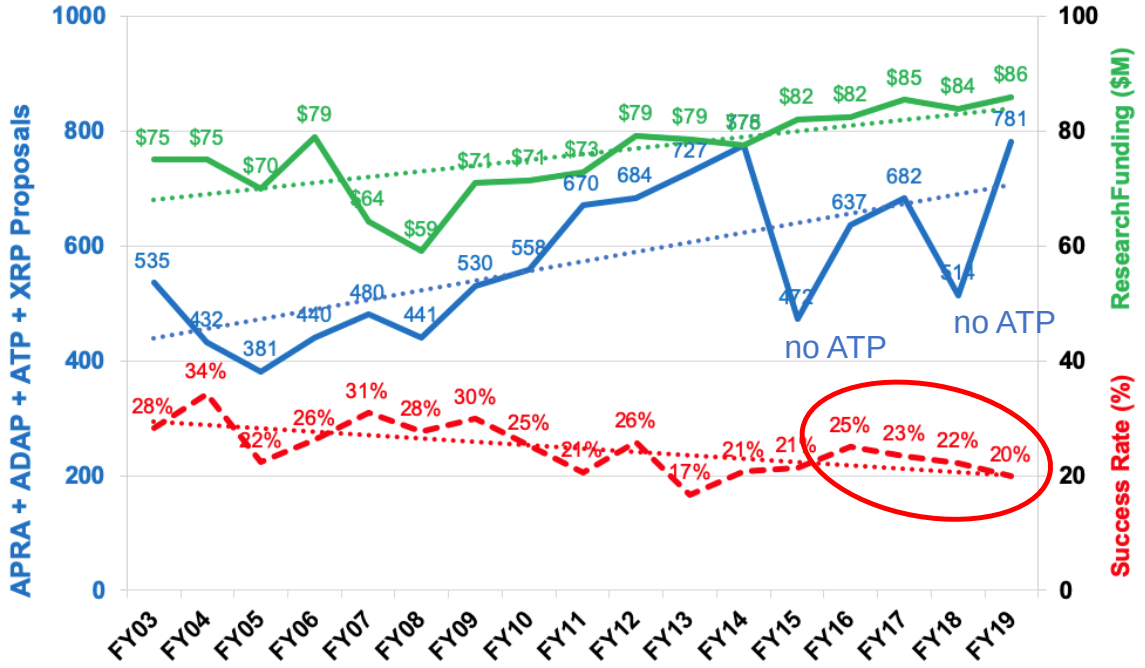
R&A selection rates are falling because:

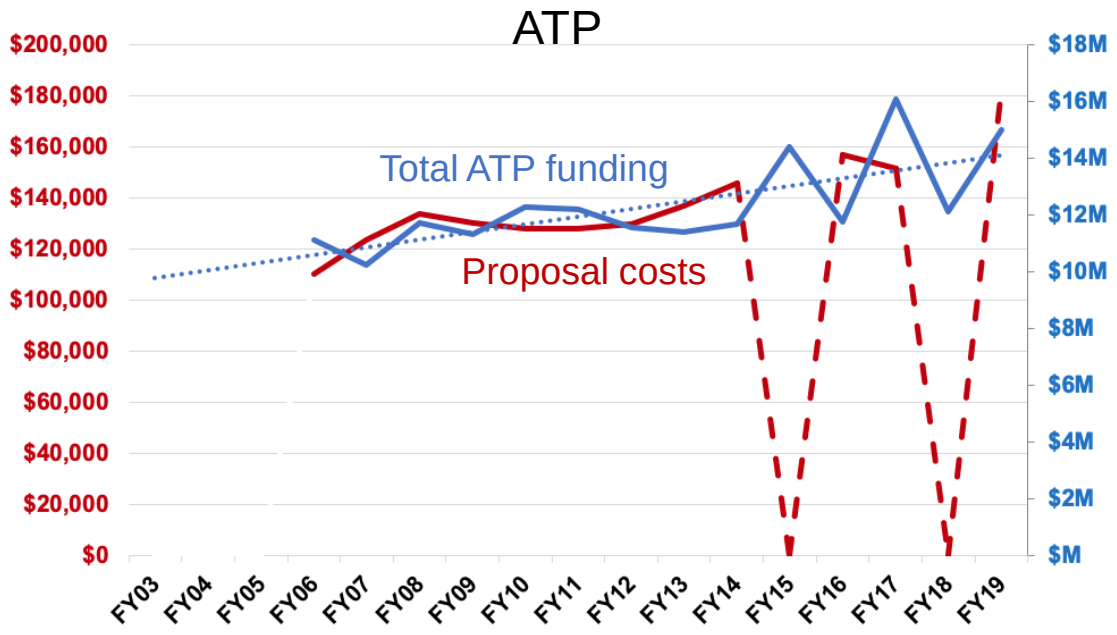
+47% more proposals over 10 years
+39% more costs per proposal over 10 years
+34% R&A funding growth over 10 years

What can we do?

- We discussed ideas at the R&A Offsite on Feb 18 how we can increase the R&A selection rates.

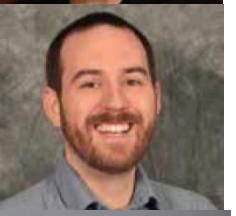
- We will discuss with NSF at the next APD/AST meeting (June) which ideas the NSF has tried and worked/didn't work to learn from their experiments.





Nancy Grace Roman Technology Fellowships



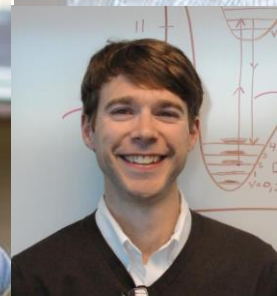












Nancy Grace Roman Technology Fellowships

2018:
Regina Caputo, NASA GSFC (cosmic rays/gamma-ray)
Sarah Heine, MIT (optics and gratings for polarimeters)
Gregory Mace, UT Austin (optics and spectroscopy)

2017:
Manel Errando, Washington University, St. Louis
Adam McCaughan, NIST/Boulder
Varun Verma, NIST/Boulder

2016:
Abigail Vieregg, University of Chicago
Omid Noroozian, NRAO

2015:
Erika Hamden, California Institute of Technology
Daniel Cunnane, NASA Jet Propulsion Lab
Eric Schindhelm, Southwest Research Institute

2014:
John Conklin, University of Florida
Brian Fleming, University of Colorado
Tyler Groff, Princeton University

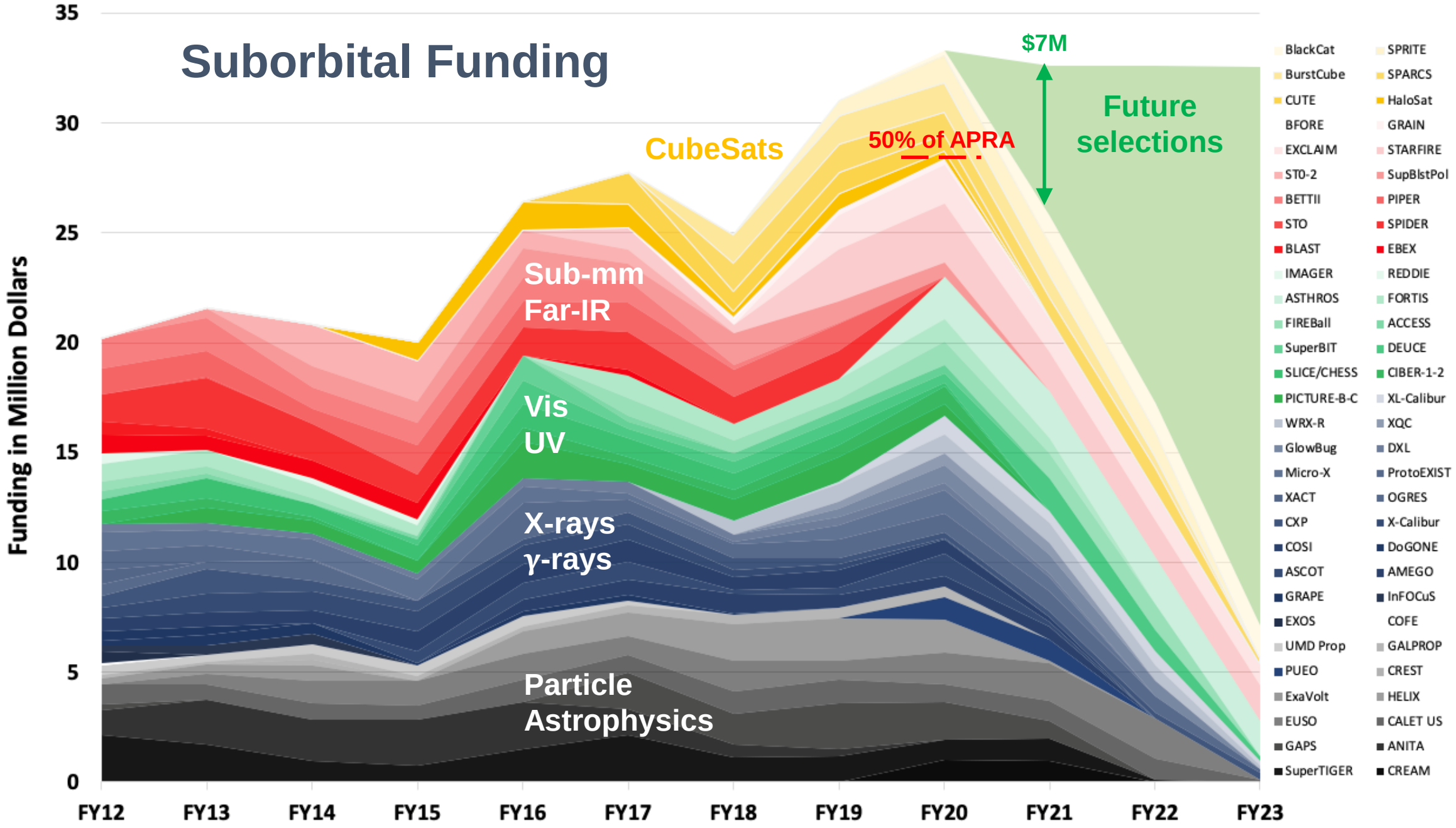
2013:
Not solicited

2012:
Cullen Blake, University of Pennsylvania
Kevin France, University of Colorado

2011:
Judd Bowman, Arizona State University
Michael McElwain, NASA GSFC
Randall McEntaffer, University of Iowa

Suborbital Investigations

Suborbital Funding



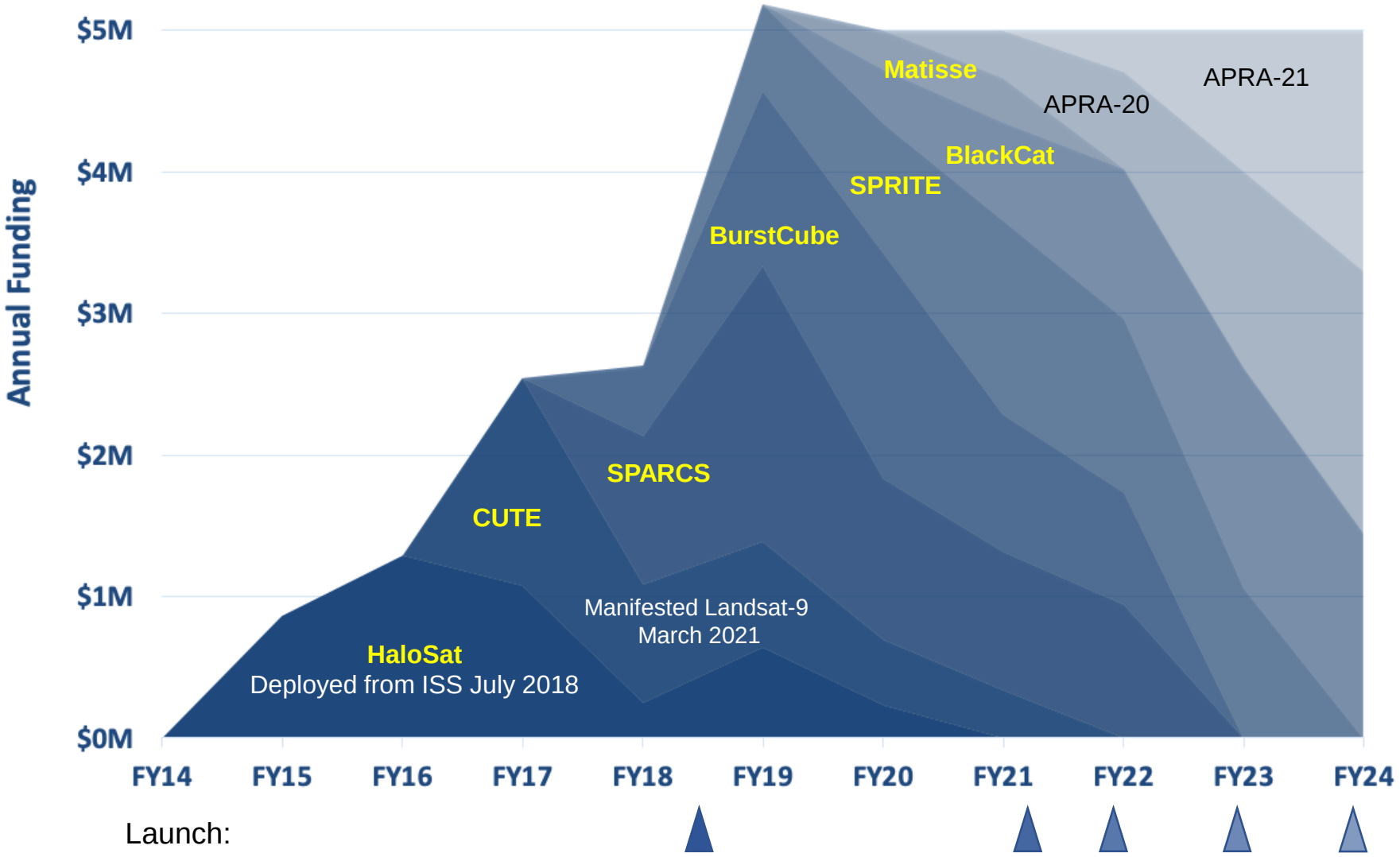
APRA-18 Suborbital Selections

Balloon Program				
Title	**PI Last Name**	**Institution**	**Category**	**Portfolio**
XL-Calibur	Krawczynski, Henric	Washington University	Balloon	HEA
ASTHROS	Pineda, Jorge	Jet Propulsion Laboratory	Balloon	IR/sub-mm
FIREBall-2	Martin, Christopher	California Institute of Technology	Balloon	UV/Vis
PUEO	Vieregg, Abigail	University of Chicago	Balloon	PA
SuperTIGER-2	Rauch, Brian	Washington University, St Louis	Balloon	PA

Sounding Rocket				
Title	**PI Last Name**	**Institution**	**Category**	**Portfolio**
OGRE	McEntaffer, Randy	Pennsylvania State University	Sounding Rocket	HEA
Detector for diffuse hot gas	McCammon, Dan	University of Wisconsin	Sounding Rocket	HEA
Micro-X	Figueroa, Enectali	Northwestern University	Sounding Rocket	HEA
SISTINE + FLUID	France, Kevin	University of Colorado	Sounding Rocket	UV/Vis

CubeSat / ISS Payload				
Title	**PI Last Name**	**Institution**	**Category**	**Portfolio**
BlackCAT	Falcone, Abe	Pennsylvania State University	CubeSat	HEA
CALET	Guzik, T. Gregory	Louisiana State University	ISS Payload	PA

Astrophysics CubeSat Initiative



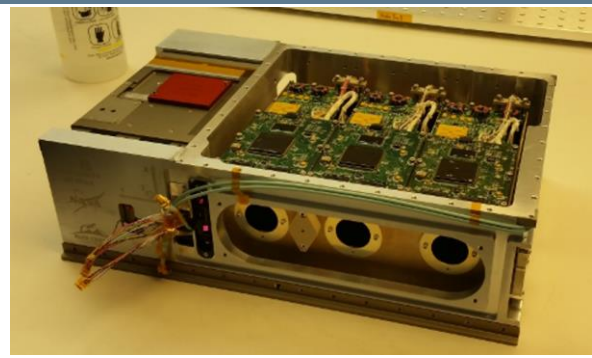
NASA's Astrophysics Division is investing approximately $5M annually in a new CubeSat initiative.

HaloSat, our first CubeSat, has been in orbit since July 2018.

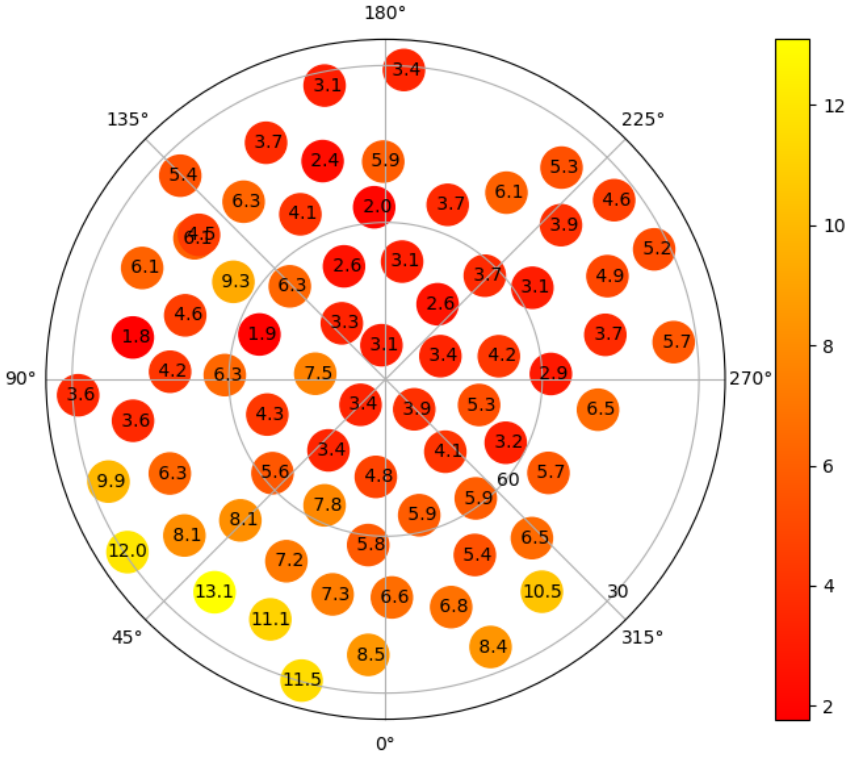
Producing excellent data.

Re-entry expected in late 2020.

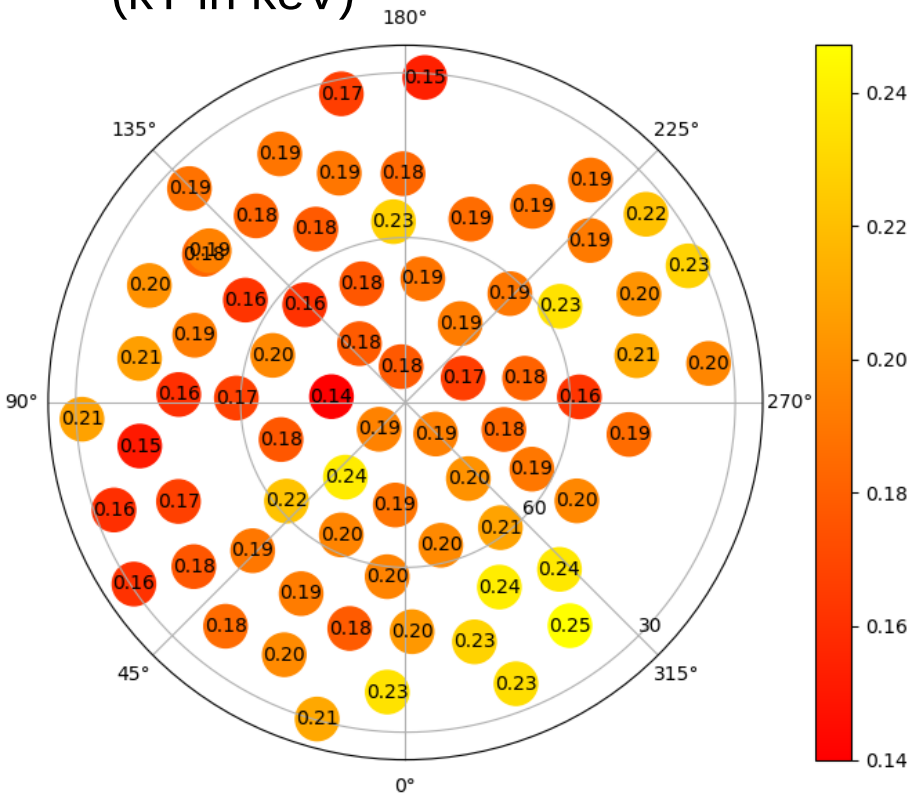
First Astrophysics CubeSat, HaloSat: Results on Southern Galactic Halo

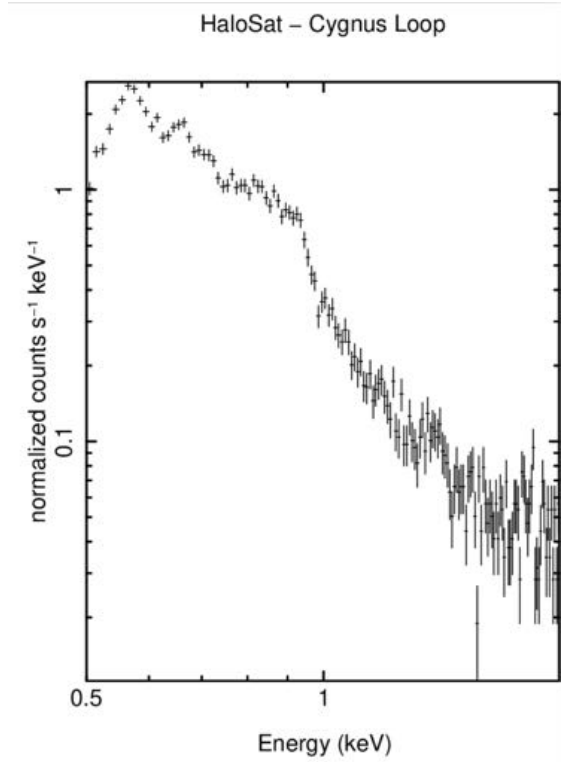


Emission Measure
(10^{-3} cm^{-6} pc)



Temperature
(kT in keV)

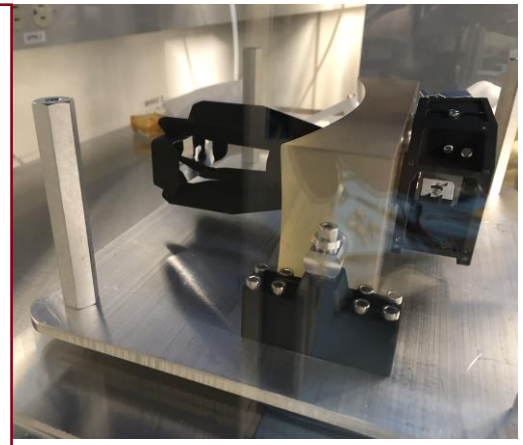




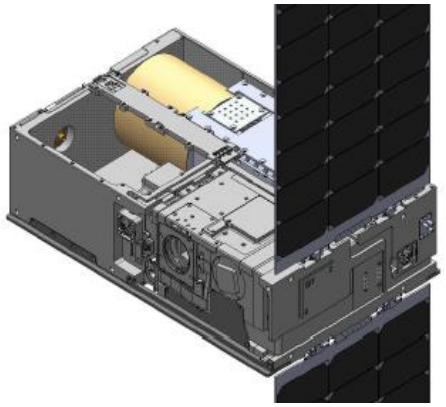
Large variation in EM – factors of 10x
New Finding: Galactic halo is concentrated towards core, lumpy

Five CubeSat in Development

- **CUTE, PI**: Kevin France, CU,
- **Science Objectives:** The Colorado Ultraviolet Transit Experiment (CUTE) will take medium resolution UV spectra of 14 hot Jupiters during transit, in order to measure atmosphere being ablated away.
- **Technologies:** BCT S/C, COTS telescope and camera.
- **Launch**: March 21 on LS-9

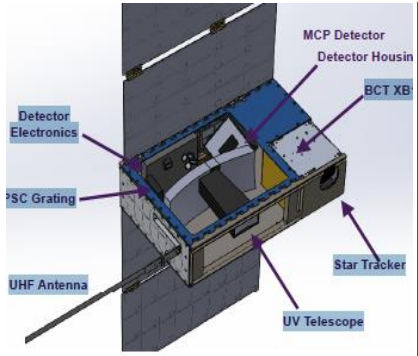


- **SPARCS, PI**: Eygenya Shkolnik, ASU
- **Science Objectives:** Determine rate, strength and 2-band color of bright UV flares from 25 M dwarfs, effect on habitability?
- **Technologies:** BCT S/C, δ–doped CCD, UV dichroic.
- **Launch**: September 2021



- **BurstCube, PI:** Jeremy Perkins (GSFC)
- **Science Objectives:** Rapid localizations for LIGO/Virgo detections with short GRBs; Search of g-ray transients.
- **Technologies:** Dillingr derived bus, Fermi-GBM like detectors.
- **Launch**: Fall 2021

- **SPRITE, PI**: Brian Fleming, CU
- **Science Objectives:** Determine ionization rate of IGM from galaxies and AGN, trace feedback within galaxies driven by star-forming regions, using low-resolution imaging UV spectrograph.
- **Technologies:** in house S/C, UV coatings, next-gen MCP.
- **Launch**: Fall 2022



- **BlackCat, PI**: Abe Falcone, Penn St.
- **Science Objectives:** GRB/Transient detection in 0.2-20keV with coded mask.
- **Technologies:** CMOS X-ray CCD
- **Launch**: FY2024

ROSES-20

ROSES-2020 Astrophysics Elements

Supporting Research and Technology

- Astrophysics Research & Analysis (APRA)
- Strategic Astrophysics Technology (SAT)
- Roman Technology Fellowships (RTF)
- Astrophysics Theory Program (ATP) (biennial, not this year)
- Theoretical and Computational Astrophysics Networks (TCAN) (triennial, this year)
- Exoplanet Research Program (XRP) (cross-div)
- Topical Workshops, Symposia, and Conferences (TWSC)

Data Analysis

- Astrophysics Data Analysis (ADAP)
- GO/GI programs for:
  - Fermi
  - Swift
  - NuSTAR
  - TESS
  - NICER

Mission Science and Instrumentation

- Sounding rocket, balloon, cubesat, and ISS payloads solicited through APRA
- XRISM Guest Scientists (one time)
- Astrophysics Explorers U.S. Participating Investigators (triennial, this year)
- Pioneers

Separately Solicited

- GO/GI/Archive/Theory programs for:
  - Chandra
  - Hubble
  - SOFIA
  - Webb
- NASA Hubble Fellowship Program
- NASA Postdoctoral Program
- FINESST Graduate Student Research Awards

New in ROSES-2020:

- APD participates in cross-divisional TWSC
- XRISM Guest Scientist
- Astrophysics Explorers U.S. Participation Investigators (APEX USPI) (not R&A)
- Pioneers (see presentation by Michael Garcia)
- Data Management Plan will be evaluated as part of the intrinsic merit of proposals
- Announcement that ROSES-2021 will enable open software/code/source/models
- High Risk / High Impact: special review process will be implemented
- Proposals will be evaluated dual-anonymously

APAC Recommendation: PI Diversity Tracked

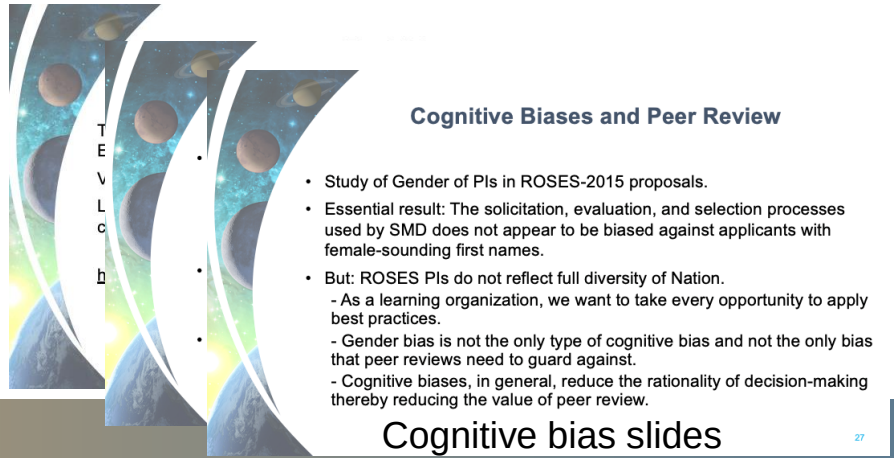
“APAC also requests a report on the success metrics, quantified to track outcomes resulting in the division-wide efforts to lower participation barriers for early- and mid-career investigators across a span of institutions and NASA Centers. APAC requests that APD track the impact of these programs on the diversity of Astrophysics missions, programs, and proposals submitted to the APD.”

Removing Barriers for Early/Mid-Career Investigators

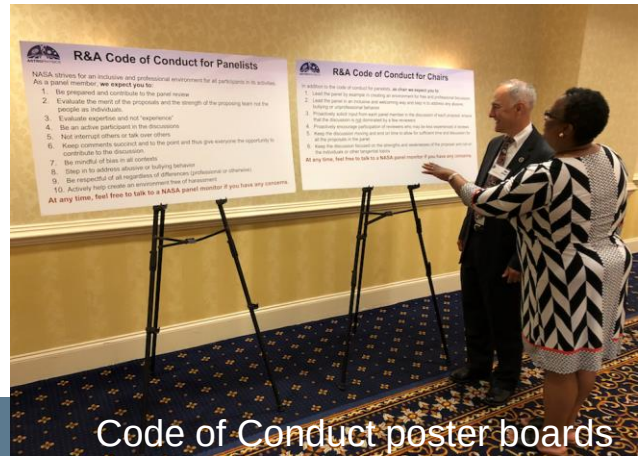
To help remove barriers, we have implemented the following steps:

- We doubled the FINESST funding allocation in FY20
- We developed slides for peer reviews that discuss cognitive biases and how to mitigate them
- Code of Conduct poster boards for panels and panel chairs are presented at all peer reviews
- NASA's Office of Diversity and Equal Opportunity has developed a short video that is sent to reviewers before the review and is shown at all peer reviews
- We encourage panels to learn about unconscious bias before arriving at the review
- Program Officers need to report on the diversity of the proposing community, the review panels and selection recommendations to the R&A selecting official before selection are made
- Proposals will be evaluated dual-anonymously to reduce bias (see separate slides)
- As a learning organization, we want to take every opportunity to apply best practices

NASA implicit bias video



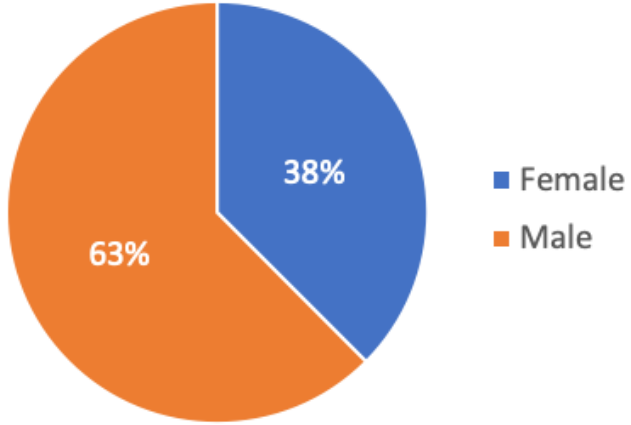
Cognitive bias slides



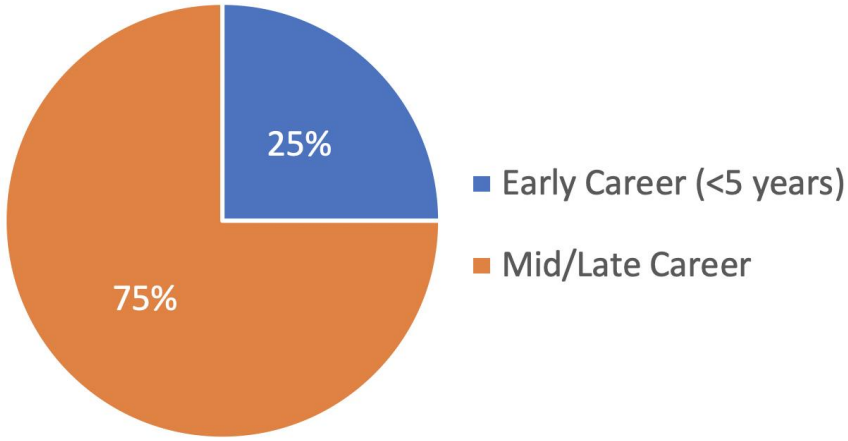
Code of Conduct poster boards

Panel Diversity for Upcoming Astrophysics Review

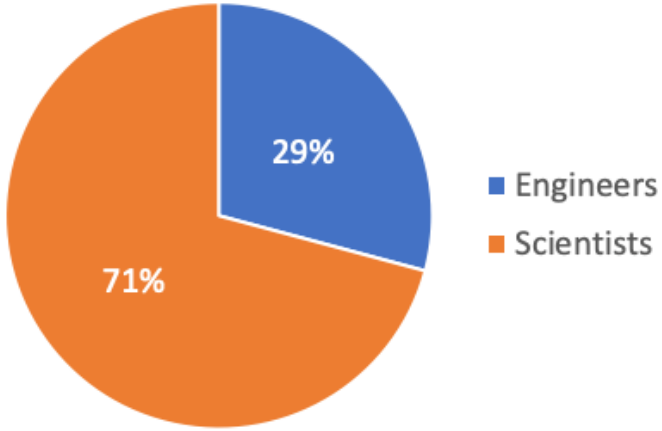
Inferred Gender Diversity



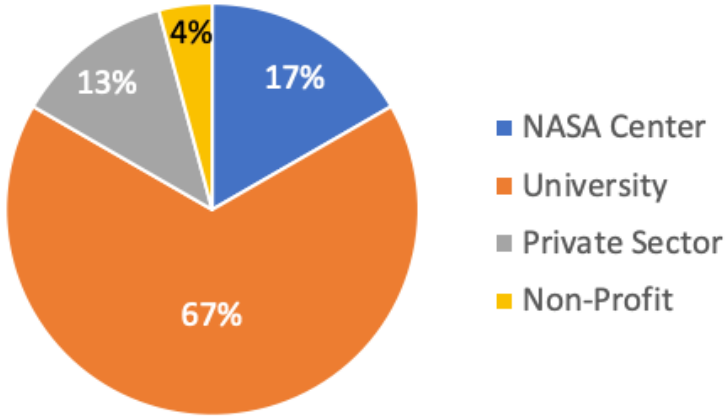
Career Stage Diversity



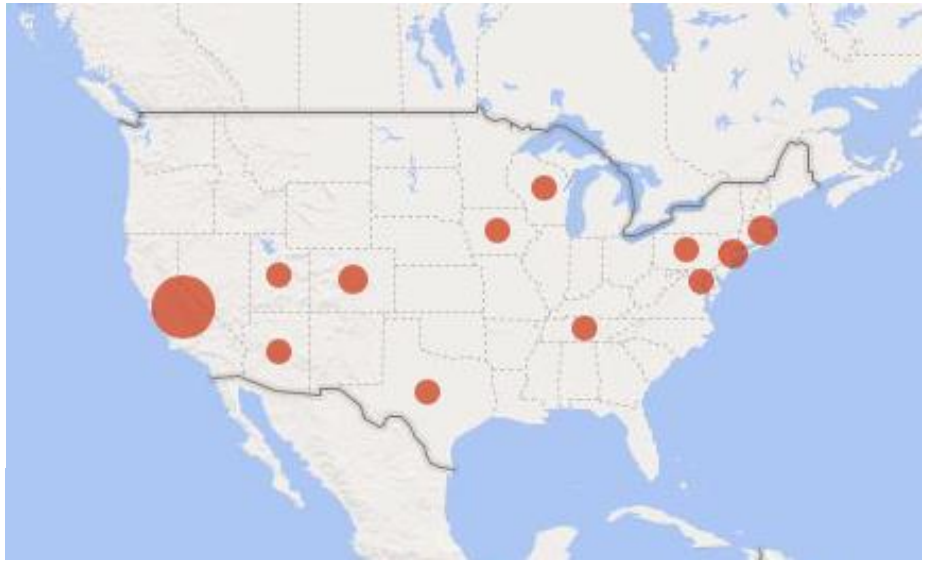
Career Background Diversity



Institution Type Diversity



Geographic Diversity of Reviewer Institutions



APAC Recommendation: PI Diversity Tracked

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NASA Response: We welcome APAC recommendation how we could further remove barriers for early- and mid-career investigators

Dual Anonymous Peer Reviews (DAPR)

Dual Anonymous Peer Reviews

Format	Program	Anticipated Proposal Due Date
Dual-Anonymous (GO pilot)	NuSTAR Cycle 6	1/24/2020
Traditional	Fermi Cycle 13	2/19/2020
Dual-Anonymous	Hubble Cycle 28	3/4/2020
Traditional	Chandra Cycle 22	~ 3/2020
Dual-Anonymous	Webb Cycle 1	5/1/2020
Dual-Anonymous (R&A pilot)	ADAP	5/14/2020
Dual-Anonymous	Swift Cycle 17	~ 9/2020
Dual-Anonymous	NICER Cycle 3	~ 11/2020
Dual-Anonymous	TESS Cycle 4	~ 1/2021
Dual-Anonymous	NuSTAR Cycle 7	~ 1/2021
Dual-Anonymous	Fermi Cycle 14	~ 2/2021
Dual-Anonymous	Hubble Cycle 29	~ Spring 2021
Dual-Anonymous	Chandra Cycle 23	~ 3/2021

APAC Dual Anonymous Peer Review Recommendation 1

“The committee recommends providing many opportunities for proposers to be trained in the submission of an anonymous proposal that meets the guidelines. Town Halls at AAS meetings as well as webinars would be an important component of this training.”

APAC Dual Anonymous Peer Review Recommendation 2

“The committee also supports a “Dear Colleague” letter from Dr. Hertz to the community to explain the changes, the roadmap for implementation, and the training opportunities for the proposers.”

NASA Response

NASA concurs. Below is a timeline of community announcements, training opportunities, and Town Halls.

Date	Item
November 27, 2019	Dear Colleague Letter issued by Paul Hertz
January 5, 2020	NASA Town Hall @ AAS
February 27, 2020	Astrophysics GO/GI virtual community Town Hall. Slides at https://science.nasa.gov/researchers/dual-anonymous-peer-review)
March 3, 2020	SMD-wide virtual community Town Hall with Dr. Thomas Zurbuchen (for ROSES-20 pilot: ADAP, Earth USPI, Habitable Worlds, Heliophysics GI-Open). Slides at https://science.nasa.gov/researchers/dual-anonymous-peer-review)
April 2, 2020	ADAP proposers' webinar on dual-anonymous peer review
June 2, 2020 (tentative date)	Dual-anonymous peer review Special Session @ AAS
September, 2020	Dual-anonymous peer review Special Session @ AAS HEAD meeting




Questions?