National Aeronautics and Space Administration

EXPLORE SOLAR SYSTEM&BEYOND

R&A Update

APAC Meeting | March 16, 2021

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Astrophysics R&A by the Numbers

R&A Programs (Mar 20 – Mar 21):

- 890 proposals (no ATP, SAT)
- 18% average selection rate
- 375 individual PIs funded in FY21
- 161 unique institutions funded in FY21
- Notified all PIs within 150 days
- Made diverse selections for PIs, institution types and geography
- Over ½ of all PIs are new PIs

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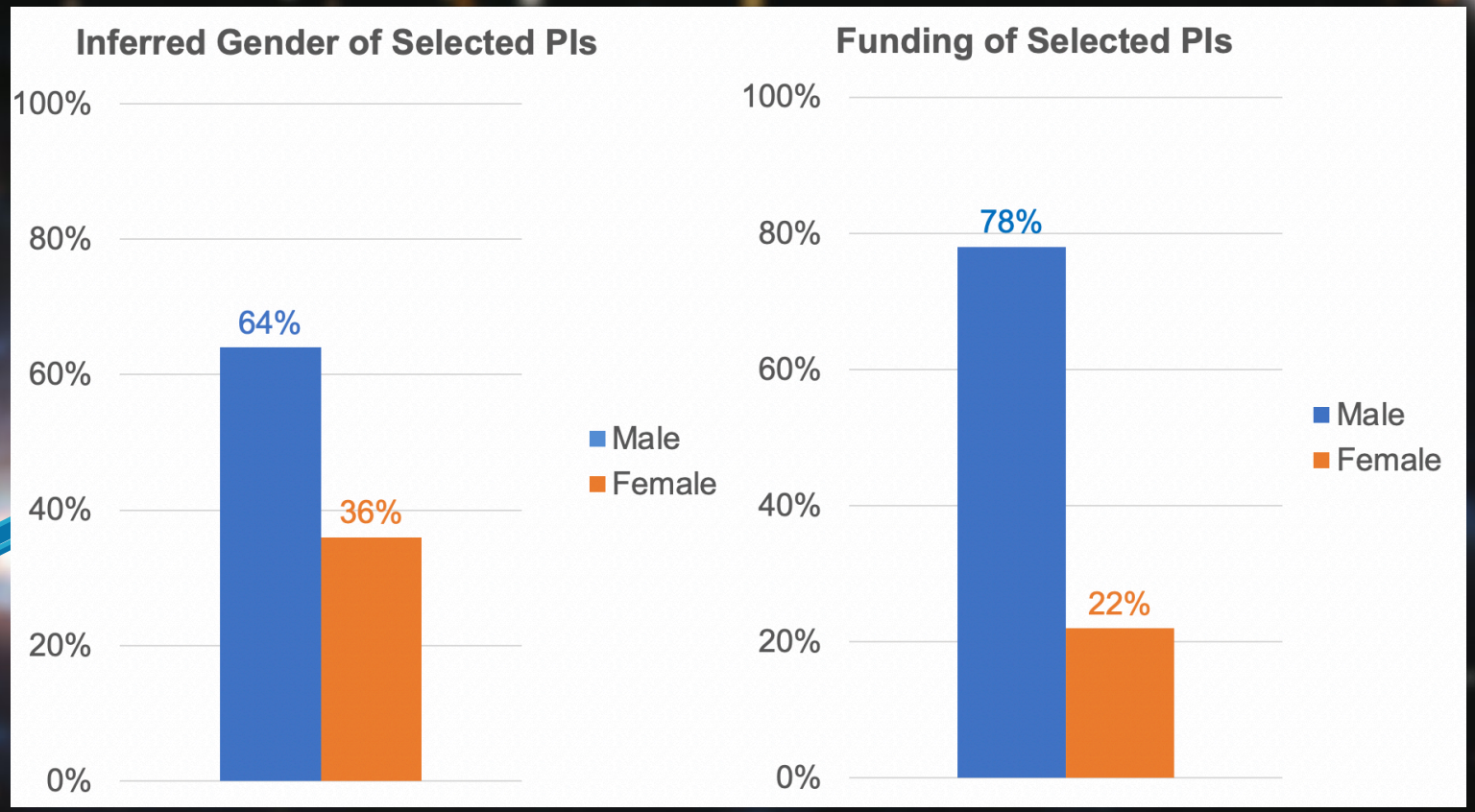

Selection rate for female-led proposals is still lower than women in STEM: 43% of the U.S. workforce for scientists and engineers are women (NSF). Female-led proposals have lower average funding level.

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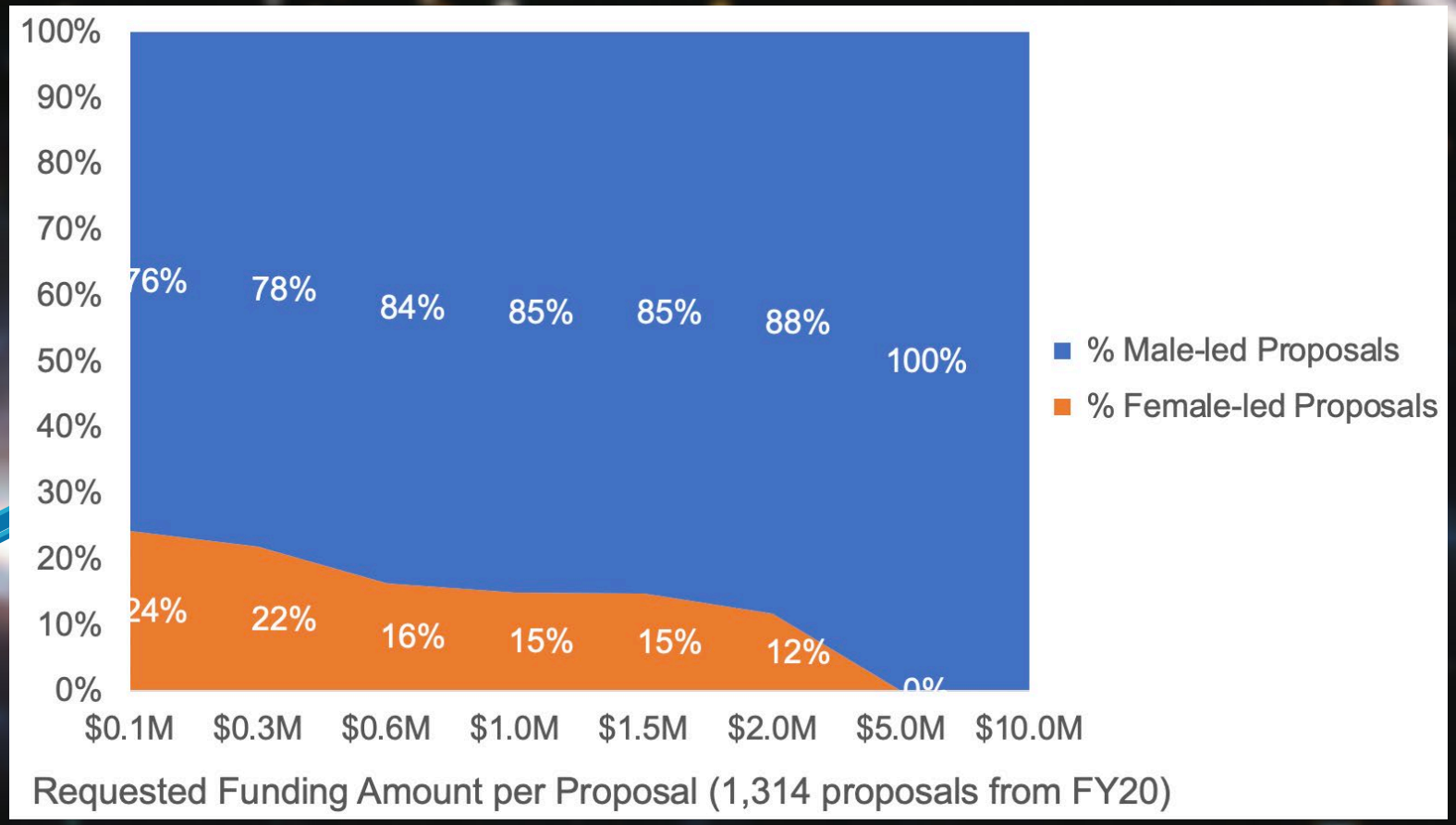

Decreasing female-led proposal rate as a function of requested funding amount.

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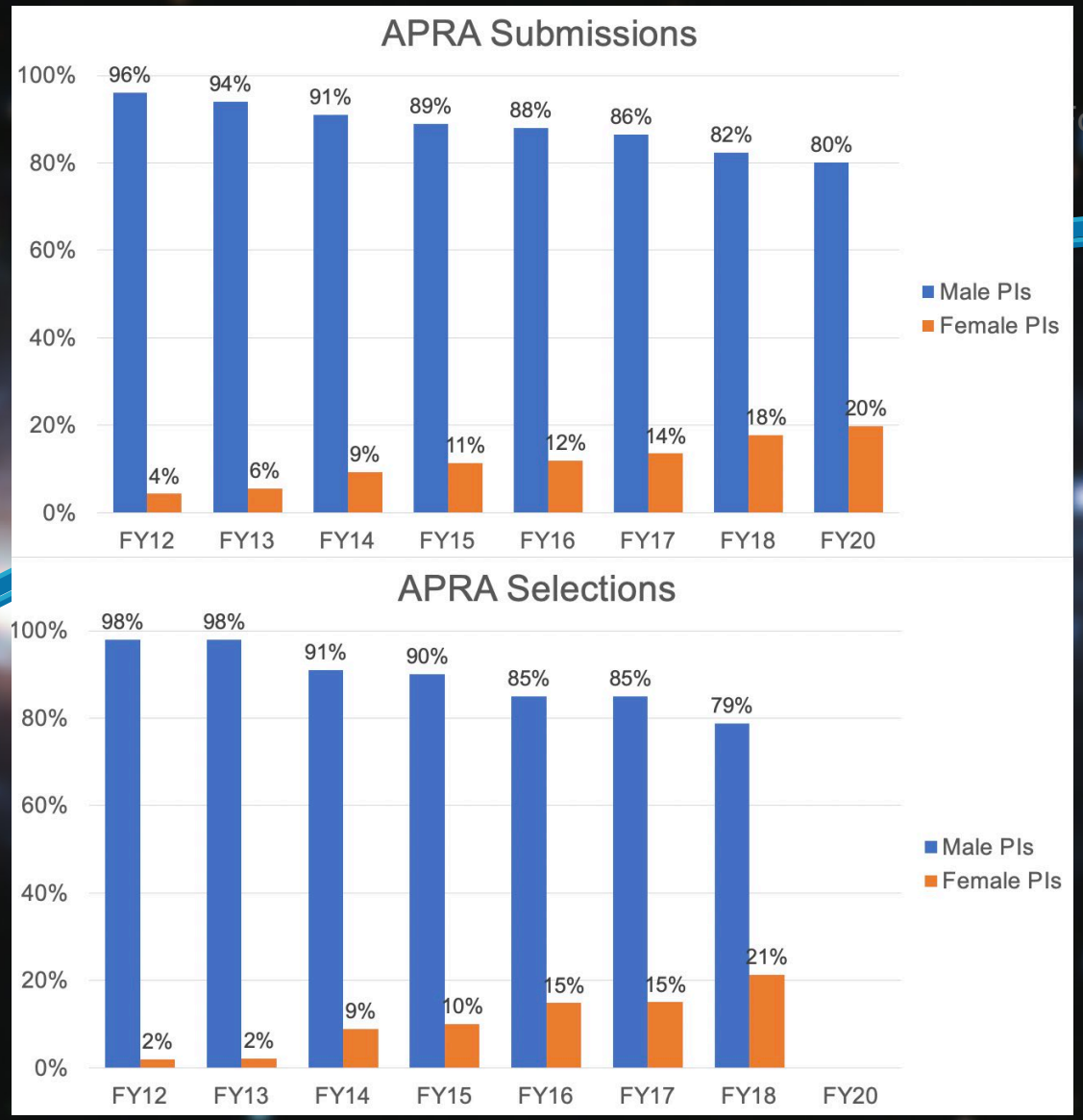

Submission and selection rates of female-led proposals are increasing.

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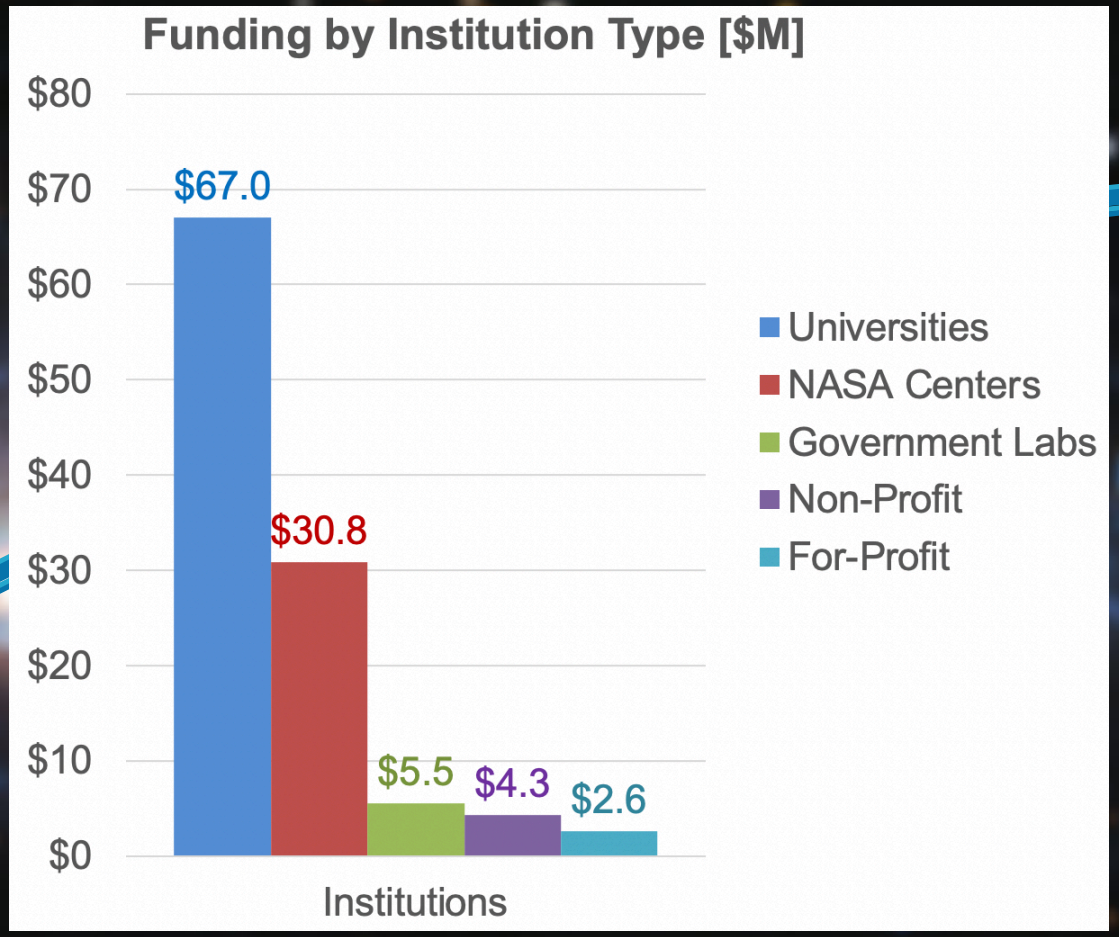

FY21: $110M in R&A funding.

72% of total FY21 R&A funding is going outside of NASA.
67% of total FY21 R&A funding is going outside of government.

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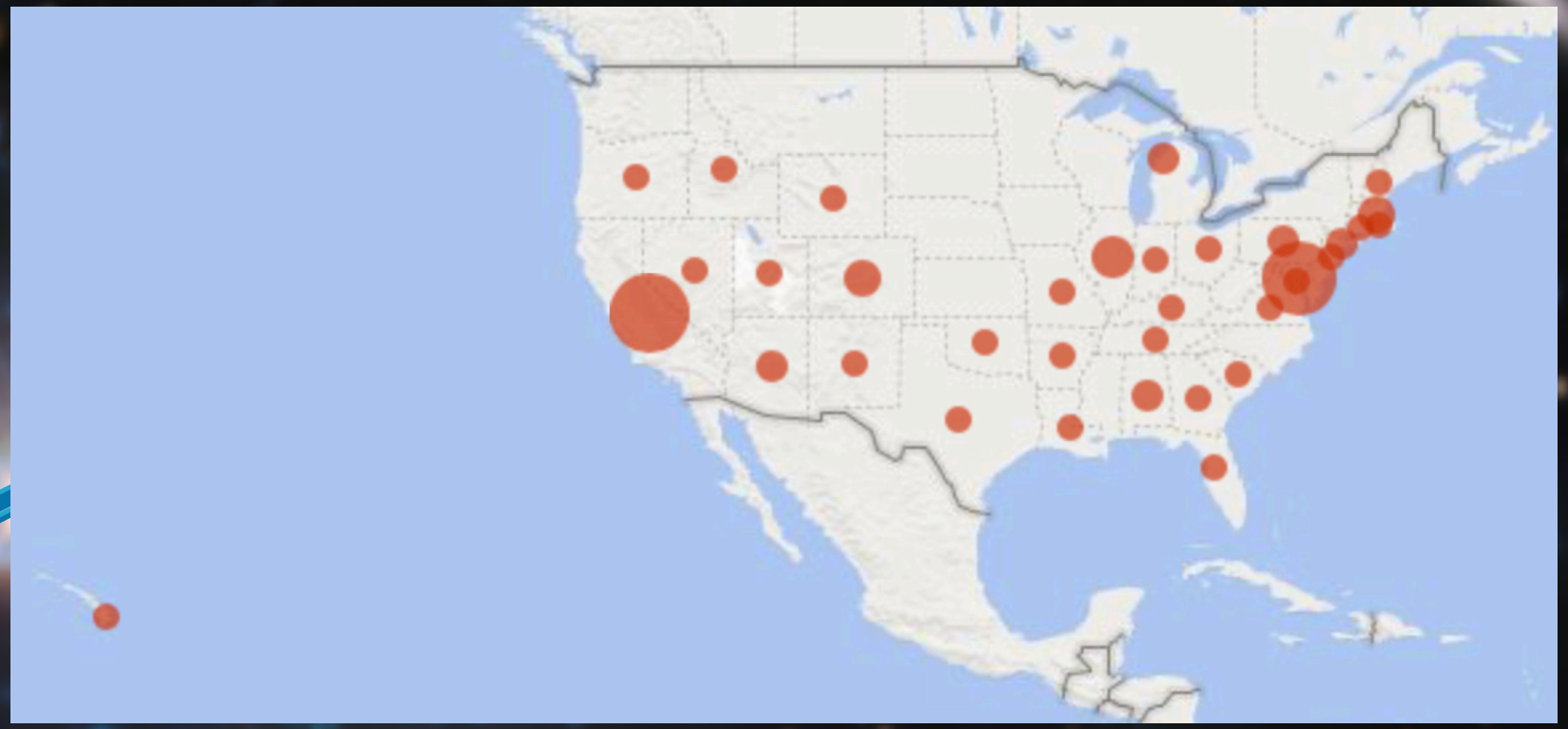

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R&A funding is going to 36 States + District of Columbia.

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Investigations in the Areas:

- Data analysis and techniques
- Theory and computation
- Laboratory astrophysics
- Detectors and electronics
- Supporting technologies
- Materials, optics, gratings, coatings
- Spanning the entire range of TRLs
- RTF fellows, FINESST, citizen science

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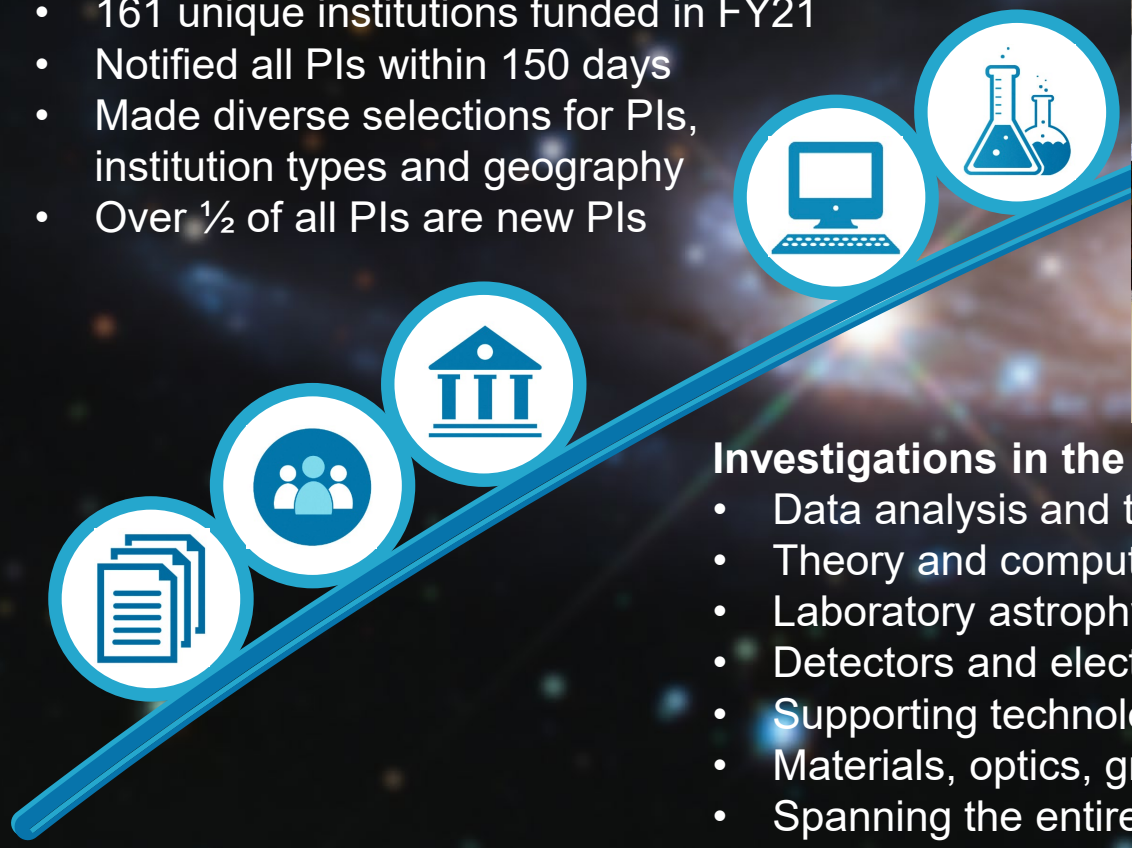

Nancy Grace Roman Technology Fellowships

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

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Since the inception of the RTF program in 2011, 19 candidates who submitted a qualifying APRA proposal have been awarded a Roman fellowships. New selections will be made this year from the recent pool of APRA PIs.

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Suborbital Programs:

- ½ of APRA funding
- 19 balloon programs
- 10 sounding rockets
- 1 suborbital testbed
- 1 ISS-attached payload
- 5 CubeSats:
  - 4 in development
  - 1 CubeSat operated for 2 year
- 8 SmallSat Studies

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GO/GI Programs:

- 8 missions
- 2,253 proposals
- 35% selection rate
- 1/3 are new PIs
- Funding for Archive, theory

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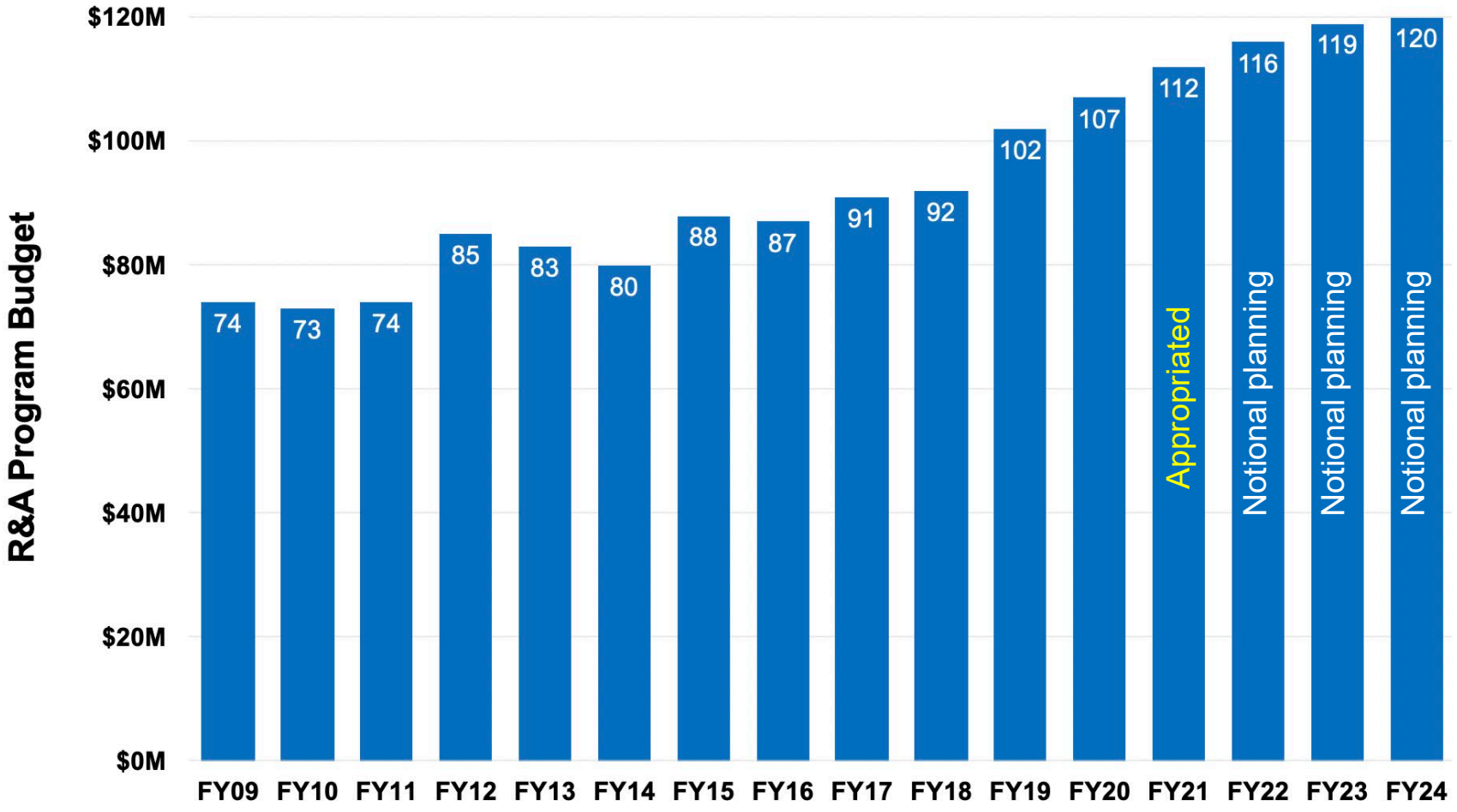
Total R&A Program:
3,143 proposals reviewed in one year.
22% overall selection rate for R&A.

Recent R&A Initiative

- **Exoplanet Consolidation**: All exoplanet investigations under XRP, ramping up funding.
- **Laboratory Astrophysics**: Capital equipment purchases eligible for APRA starting in ROSES-20.
- **Pioneers**: Established new program for <$20M SmallSats, balloons, ISS payloads.
- **FINESST**: Doubled funding and selection rate for graduate student program.
- **Data Management Plan**: Now part of the intrinsic merit evaluation of proposals.
- **High Risk / High Impact**: Assessed for all proposals and forwarded to SMD blue ribbon panel.
- **Topical Workshops, Symposia and Conferences**: Astrophysics participates in SMD solicitation.
- **Citizen Science**: Astrophysics participates in SMD solicitation for Citizen Science seed funding.
- **Open Software and Code**: Astrophysics participates in upcoming SMD initiative.
- **Diversity of Proposing Teams**: Pilot program for this year's theory program (ATP) to evaluate efforts of the PI's plans for creating and sustaining a positive and inclusive working environments.
- **Code of Conducts for Peer Reviews**: Astrophysics CoC is now adopted for all SMD reviews.
- **R&A Town Hall**: held first R&A town hall at Jan AAS to address community questions.
- **Diversity, Equity, and Inclusion**: Established DEI taskforce for Astrophysics R&A, implementing recommendations of SMD's Anti-Racism Action Group.

See presentations by Kartik Sheth and Evan Scannpieco on Day 3

R&A Research Funding



Since the last Decadal Survey:
+38% R&A funding growth

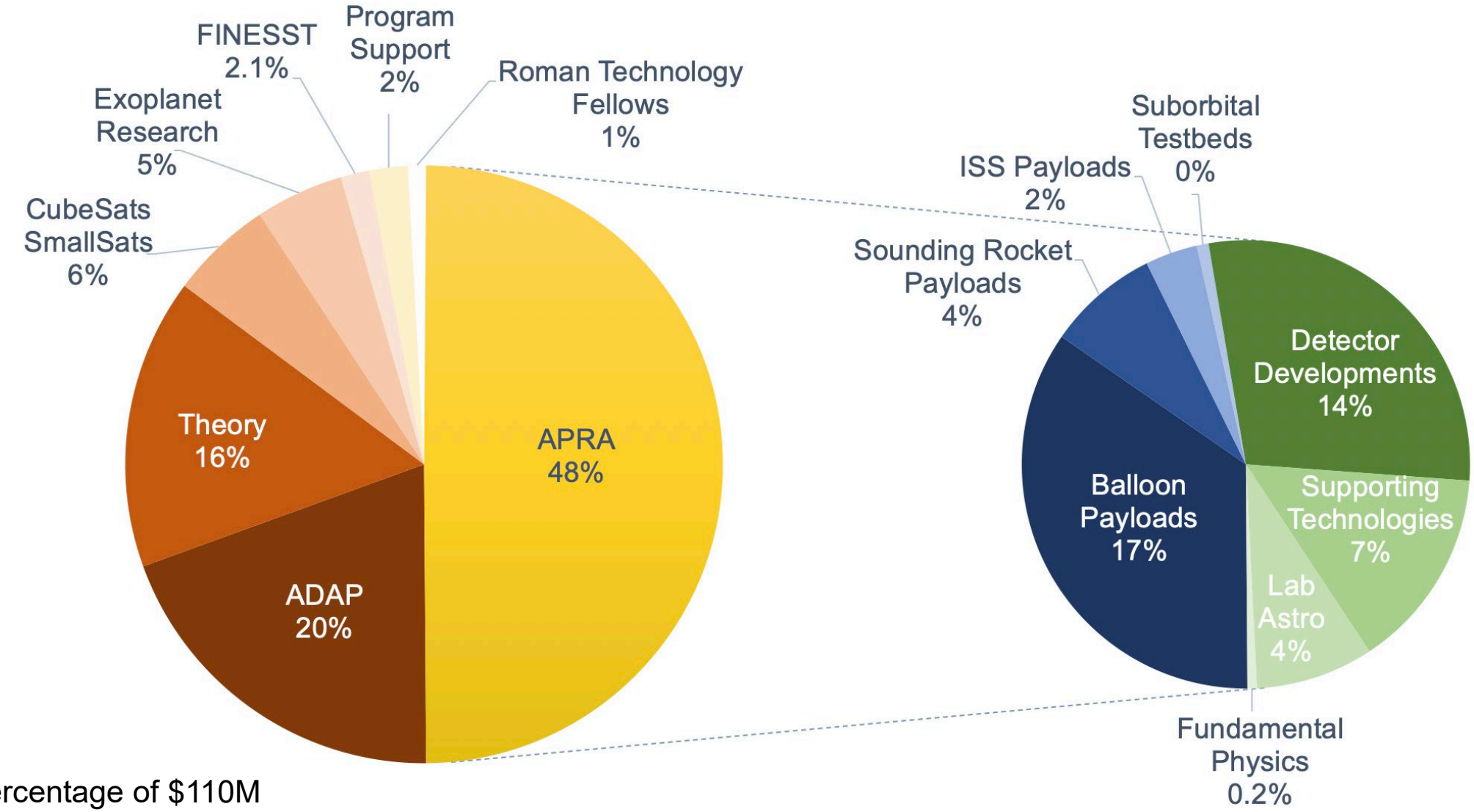
Notional Planning:
+60% over 17 years.

Includes:
APRA, ADAP, XRP, ATP, TCAN, FINESST, RTF, CubeSats, SmallSat studies

GO/GI Programs of missions provide additional ~$100M/year

Sustained growth in R&A research funding since the 2010 Decadal Survey

Balance of R&A Elements



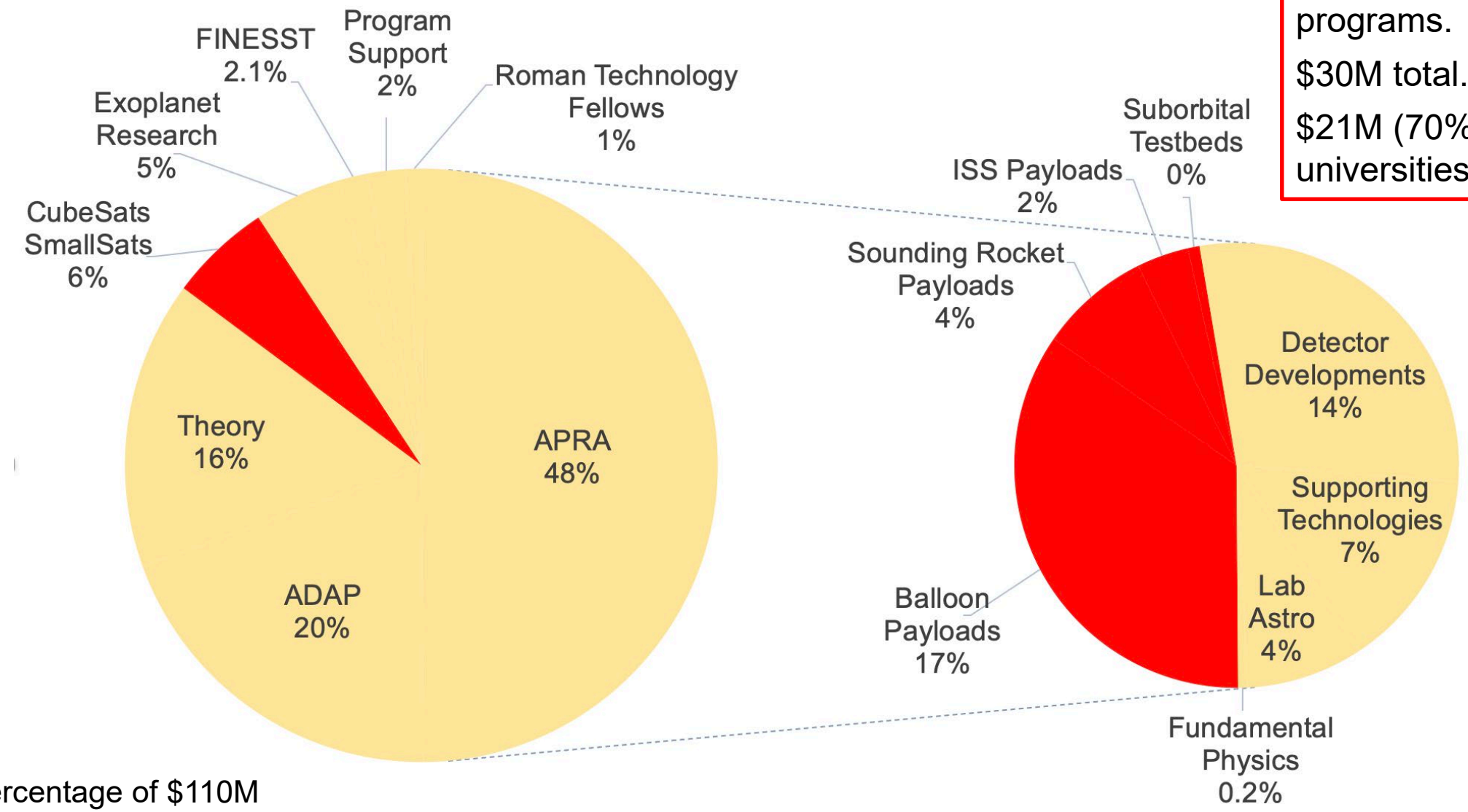
* FY21 percentage of $110M

Balance of R&A Elements

½ of APRA funding is invested in suborbital programs.

$30M total.

$21M (70%) goes to universities.



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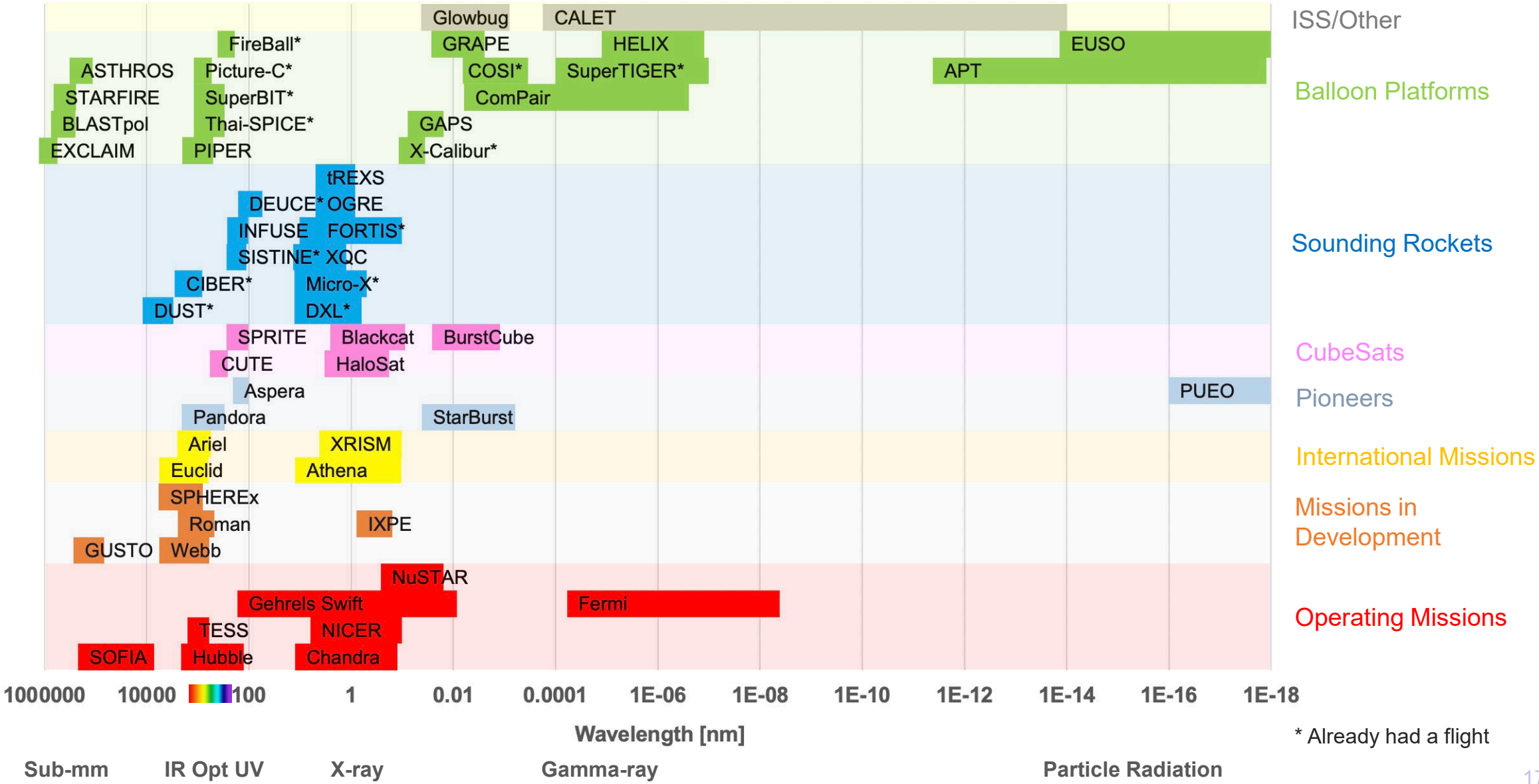
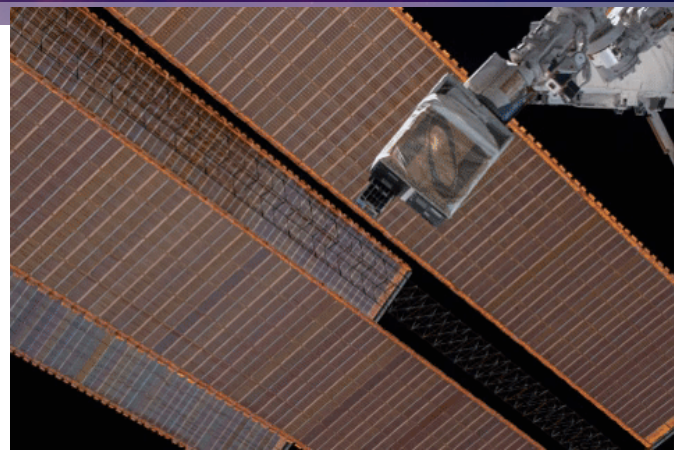
Astrophysics Flight Programs

Last Update: March 16, 2021



* Already had a flight

HaloSat – A CubeSat to Study the Hot Galactic Halo

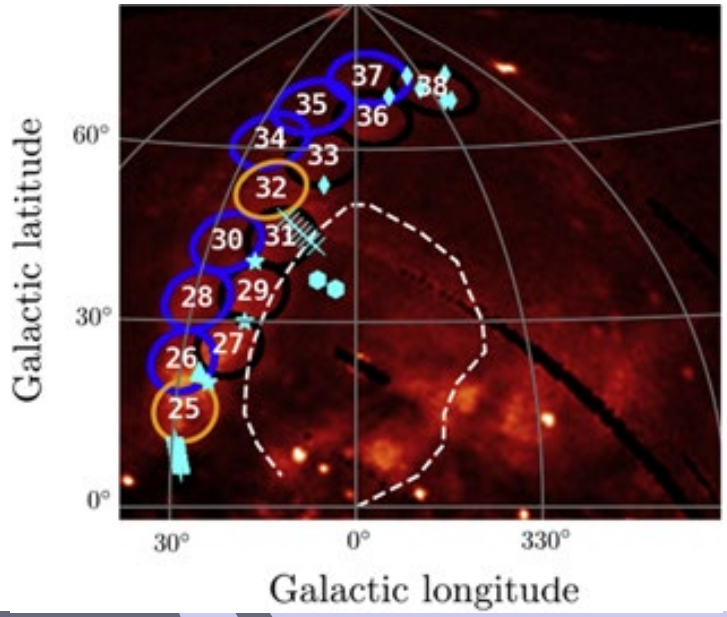


First CubeSat funded by Astrophysics.

- PI Philip Kaaret (U of Iowa), collaborators at GSFC, Johns Hopkins, LATMOS.
- Funding start 1/2016, launch 5/2018, deployed 7/2018, re-entry 1/2021.
- Two full sky surveys over two years of science operations.

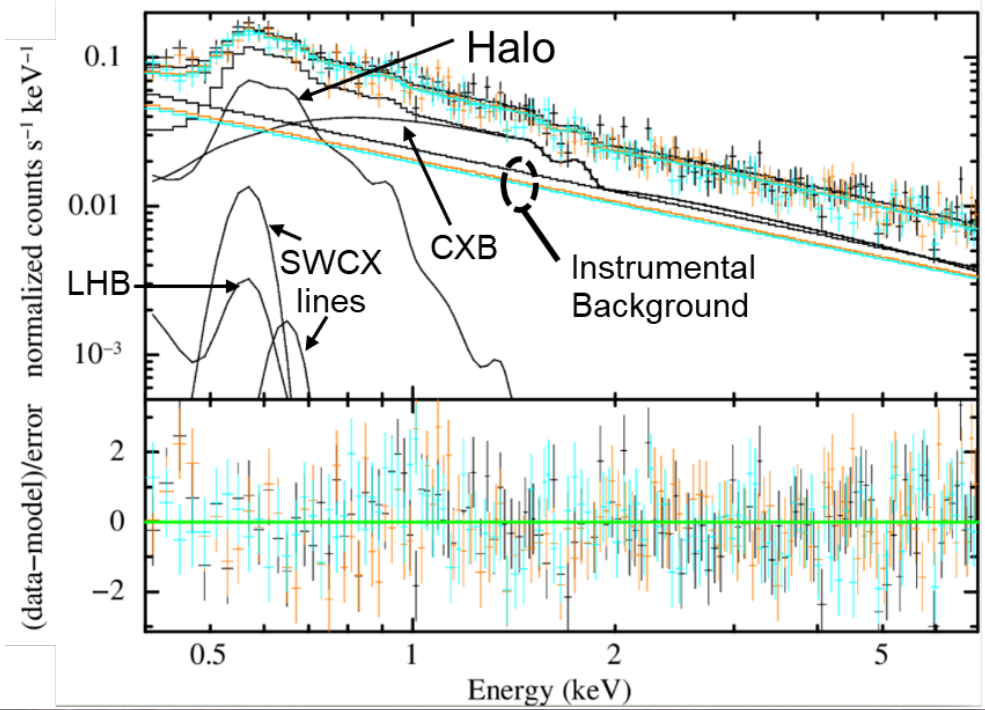
Student and early career researcher training:

- PhDs: one complete (postdoc on BlackCat), two in progress. One Masters in progress.
- Postdocs: one now at GSFC/UMBC, one now at GSFC/CCMC.
- Undergraduates: seven in Physics, four in Engineering.



Science highlights:

- "A disk-dominated and clumpy circumgalactic medium of the Milky Way seen in X-ray emission" – Nature Astronomy
- "An Analysis of the North Polar Spur Using HaloSat" – ApJ
- "A HaloSat Analysis of the Cygnus Superbubble" – ApJ
- Eight refereed papers (3 by grad, 2 by undergrad), four more in prep.



R&A Accommodation due to COVID-19

- R&A management and supporting work at NASA HQ continues as normal via telework.
- OMB provided agencies with additional flexibilities for grants assisting the response to COVID-19, which allowed NASA to remove barriers (e.g., progress reports) for faster grantees funding.
- R&A Program Officers have reached out to currently funded PIs and are working with them to protect the most vulnerable team members (early career: students, postdocs, non-tenured faculty).
- First R&A Town Hall held at the AAS on Jan 13, 2021, to allow for better addressing PI questions.
- No ROSES-20 solicitations were canceled, TCAN, ADAP solicitations had delayed proposal due dates.
- Coordinating due dates with other Divisions to avoid that due dates are too close, and that PIs and institutions are overburdened with too many due dates around the same time.
- All peer reviews until Dec are conducted virtually with no adverse effect on the quality of the reviews.
- Since the start of the pandemic, 17 R&A peer reviews have been conducted as virtual reviews.
- NuSTAR Cycle 6 and ADAP were our pilot programs for dual-anonymous peer reviews.
- Going forward, more R&A peer reviews will be dual-anonymous to help focus panel discussions on the scientific/technical merit of proposals and to steer discussions away from PIs/teams/institutions.
- PIs are notified and funding is released to PIs just as fast as during previous years.

R&A Accommodation due to COVID-19

Peer Review Format for Virtual Reviews:

- All peer reviews are being conducted virtually.
- More panels with fewer proposals (~10 proposals per panel) and 5-7 reviewers per panel.
- Using Google Meet for virtual panel rooms, Google Drive for sharing docs and working on summary evaluations of proposals, and Slack to communicate on “homework days.”
- To accommodate different times zones, childcare, teaching obligations, fatigue, etc., panels last longer than pre-COVID f2f peer reviews, meet three times for in-person panel discussions and use two homework days to work on evaluation writing assignments. During homework days, panels communicate by Slack, Google review tracking sheets, and can convene in Google Meet if desired.
- This virtual review format allows for more flexibility to accommodate reviewer’s schedule while preserving the quality of the proposal evaluation.

	Mo	Tu	Wd	Th	Fr
Week 1	A	B	A	B	A
Week 2	C	B	C	D	C
Week 3	E	D	E	D	E

Panel schedule for an R&A review with 5 groups of panels

SMD Post COVID Augmentations Solicitation

During the COVID-19 pandemic and the subsequent on-going economic disruptions, many members of the Science Mission Directorate's research and technology development community, especially early career researchers, are vulnerable to having their careers delayed or permanently disrupted.

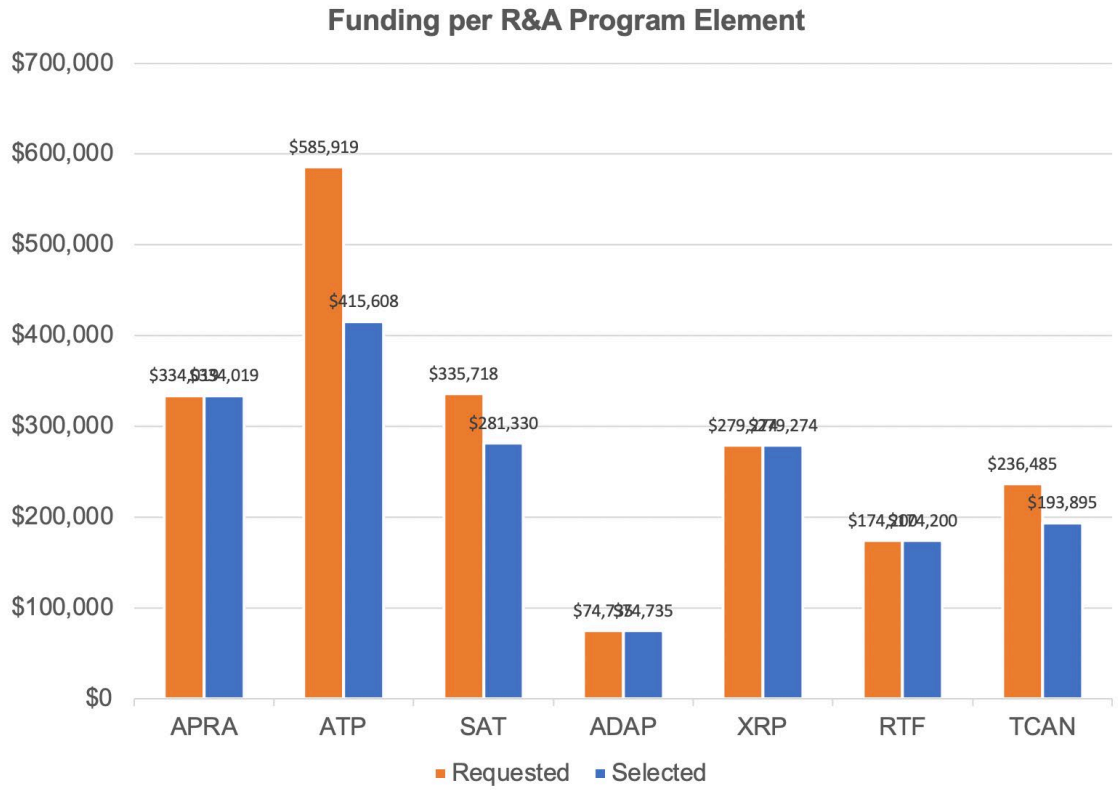
As a response, SMD released a post-COVID augmentation solicitation in December to mitigate the damage of the pandemic on the careers of early career researchers for currently funded R&A investigation. Two due dates:

Jan 4 proposal due date:

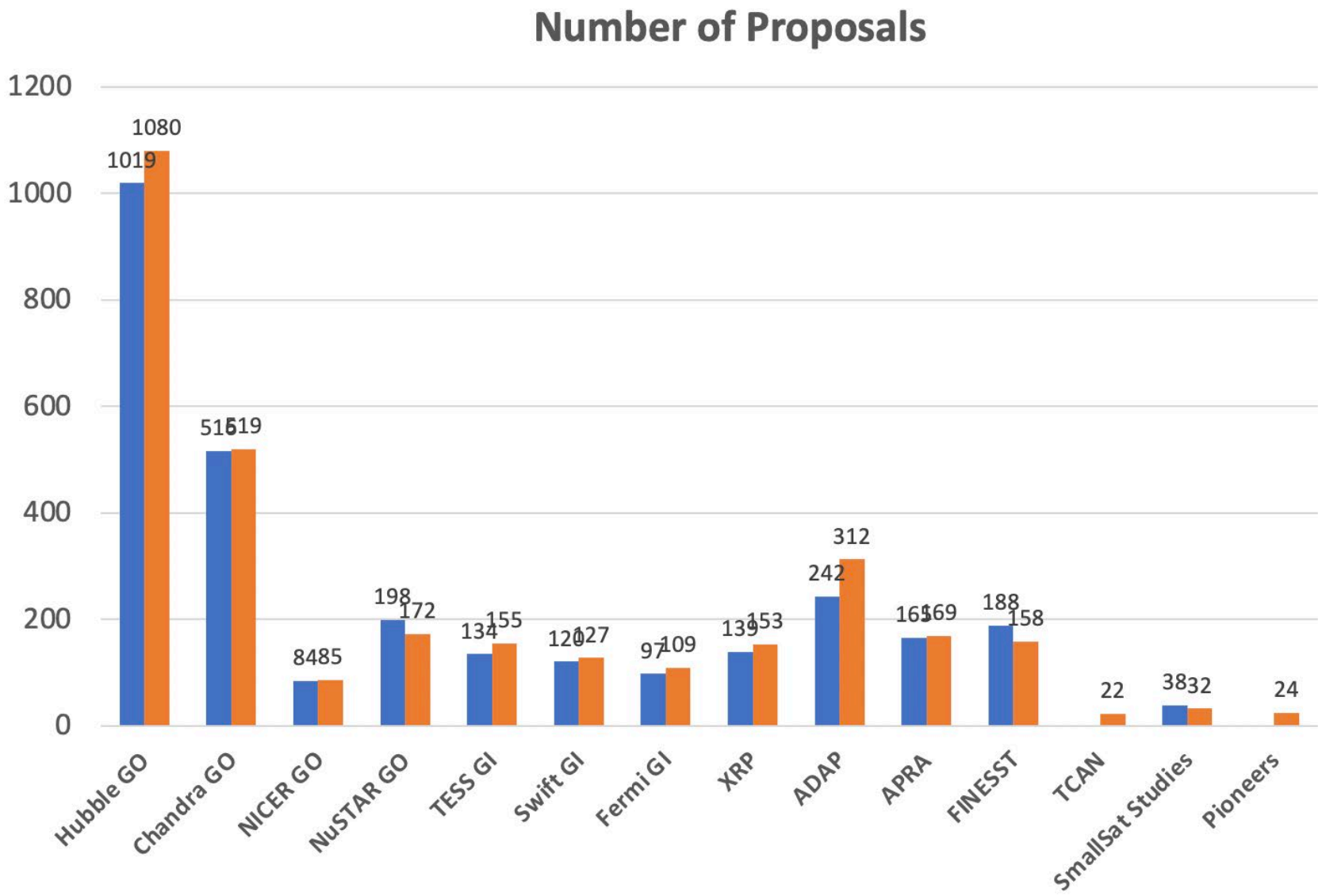
- 18 augmentation requests received in Astrophysics
- $64k to $674k range, $149k median request amount
- 4 requests were not eligible and declined
- $2.02M total funding requested for 16 eligible requests
- $1.75M total approved for selections = 87% of request
- PIs were notified 57 days after submission of requests

Mar 5 proposal due date:

- 14 augmentation requests received in Astrophysics, requesting $2.54M.
- $21k to $1.1M range, $85k median request amount



Before / After COVID

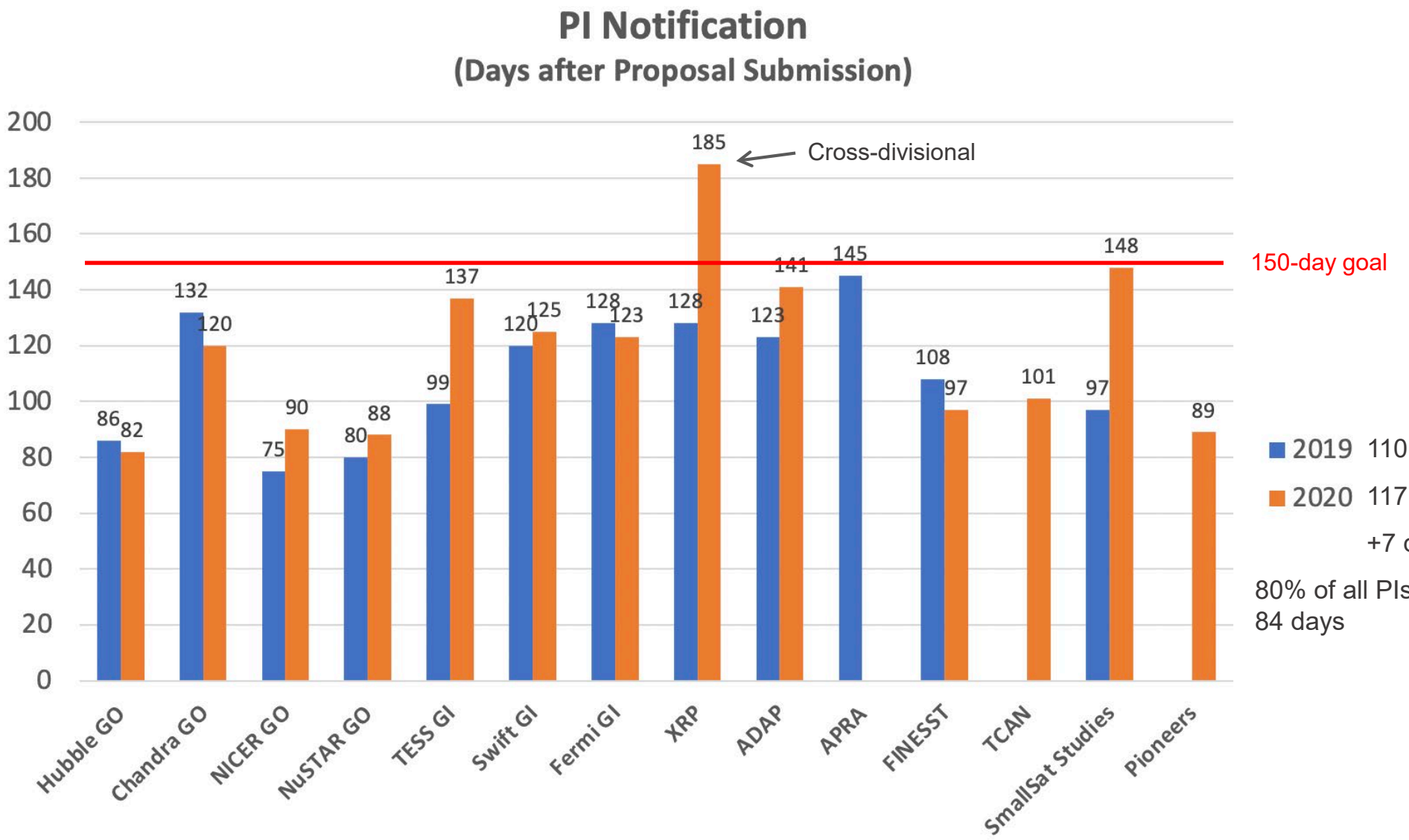


2019 2.940 proposals

2020 3,117 proposals

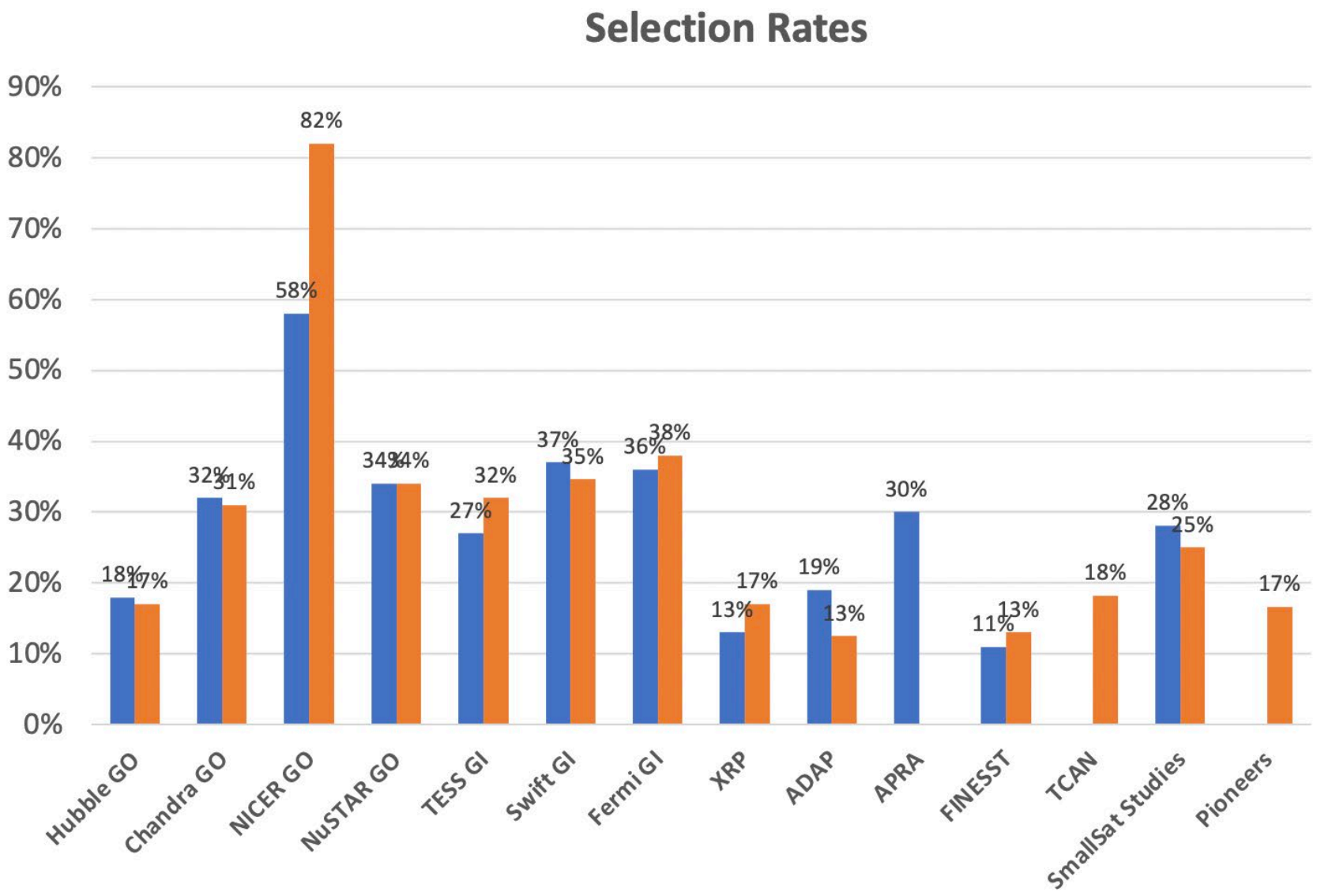
5% increase

Before / After COVID



80% of all PIs are notified in 84 days

Before / After COVID



2019 **29%**
GO/GI: 34%
R&A: 18%

2020 **29%**
GO/GI 39%
R&A: 18%

2021 Astrophysics Research Program Elements

ROSES-21:

Supporting Research and Technology

- Astrophysics Theory Program (ATP), every other year
- Astrophysics Research & Analysis (APRA)
- Strategic Astrophysics Technology (SAT)
- Roman Technology Fellowships (RTF)

Data Analysis

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

Mission Science and Instrumentation

- Astrophysics Pioneers (suborbital science investigations)
- Suborbital payloads solicited through APRA
- XRISM Guest Scientist New
- Roman Research and Support Opportunities New

Cross Divisional

- Exoplanets Research Program (XRP)
- Topical Workshops, Symposia and Conferences (TWSC)
- Citizen Science Seed Funding Program New
- Graduate Student Research Awards (FINESST)

Not in ROSES-21:

Separately Solicited

- GO/GI/Archive/Theory programs for Hubble, Chandra, SOFIA, Webb
- NASA Hubble Fellowship Program (NHFP)
- NASA Postdoctoral Program (NPP)
- Support for XMM-Newton U.S. PIs selected by ESA

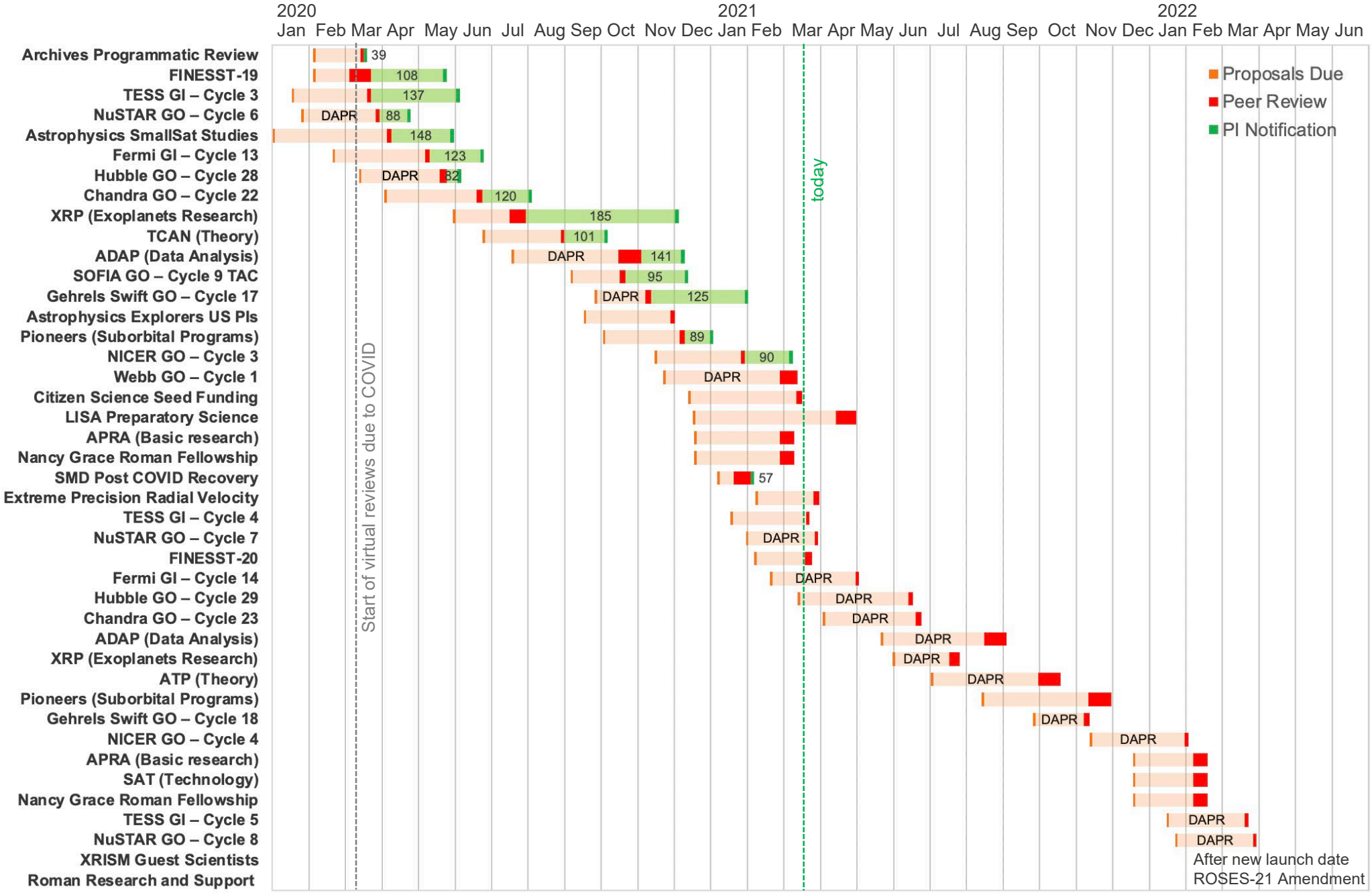
Not Solicited this Year

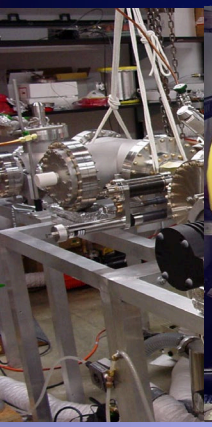
- Theoretical and Computational Astrophysics Networks (TCAN), every three years
- Astrophysics Explorers U.S. PIs (APEX USPI), every two to three years

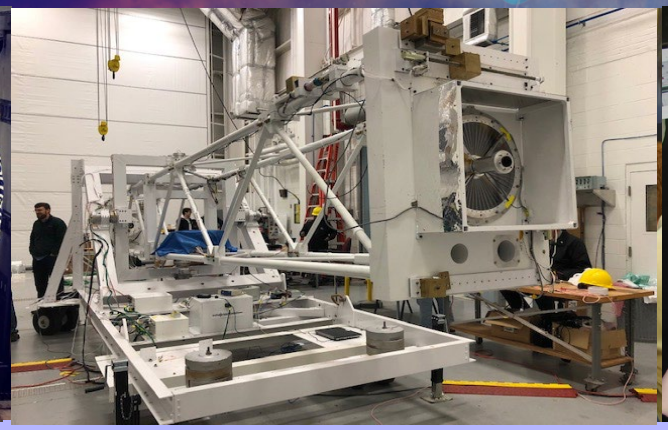
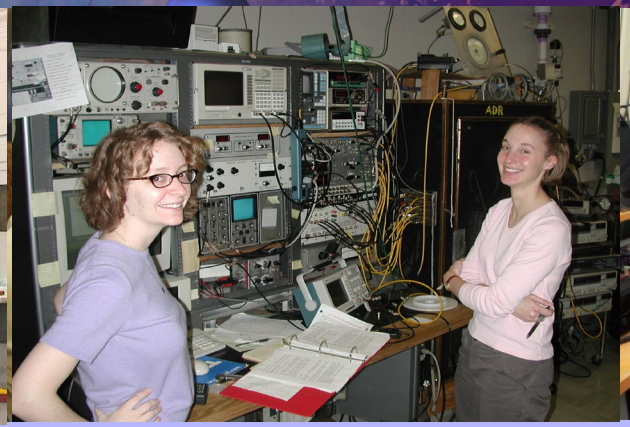
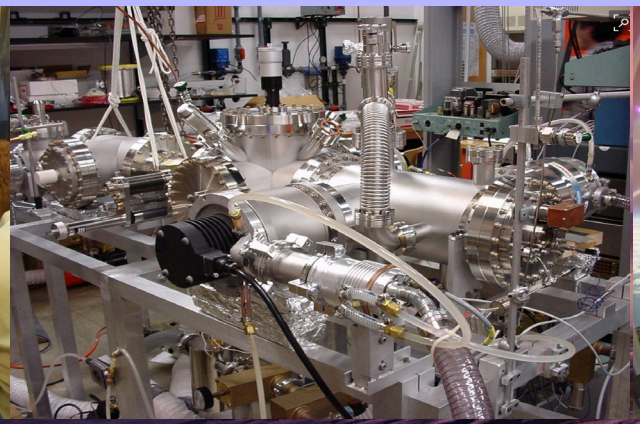
ROSES-21 was released on February 14.

Red: proposals evaluated using dual-anonymous peer reviews to mitigate biases and to steer discussions away from the proposing teams and institutions.

Astrophysics R&A Peer Review Schedule








Questions?