National Aeronautics and Space Administration

NASA

EXPLORE SOLAR SYSTEM & BEYOND

R&A Update

APAC Meeting | October 15, 2021

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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, salaries) for faster grantees funding
- No ROSES-2020 and ROSES-2021 solicitations were canceled, two had delayed due date
- Coordinating due dates with other Divisions to avoid due dates that are too close, and that PIs and institutions are overburdened with too many due dates around the same time
- Since the start of the pandemic, 31 R&A peer reviews have been conducted as virtual reviews
- All peer reviews until Dec are virtual with no adverse effect on the quality of the reviews
- ADAP and NuSTAR Cycle 6 were our pilot programs for dual-anonymous peer reviews last year
- 12 R&A peer reviews have been and more will be conducted dual-anonymously to help focus panel discussions on the scientific/technical merit of proposals and to steer discussions away from PIs, teams, and institutions
- PIs are notified and funding is released to PIs just as fast as during previous years

R&A Accommodation due to COVID-19

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 2020 to mitigate the damage from the pandemic on the careers of early career researchers for currently funded R&A investigation.

- 33 augmentation requests were received in Astrophysics
- $21k to $1M range, $125k median request amount
- $3.4M total approved for selections = 88% of requested amount
- PIs were notified 57 days after submission of requests for augmented extension

R&A Program Officers continue to reach out to currently funded PIs and are working with them to protect the most vulnerable team members (early career: students, postdocs, non-tenured faculty)

R&A Accommodation due to COVID-19

Peer Review Format for Virtual Reviews:

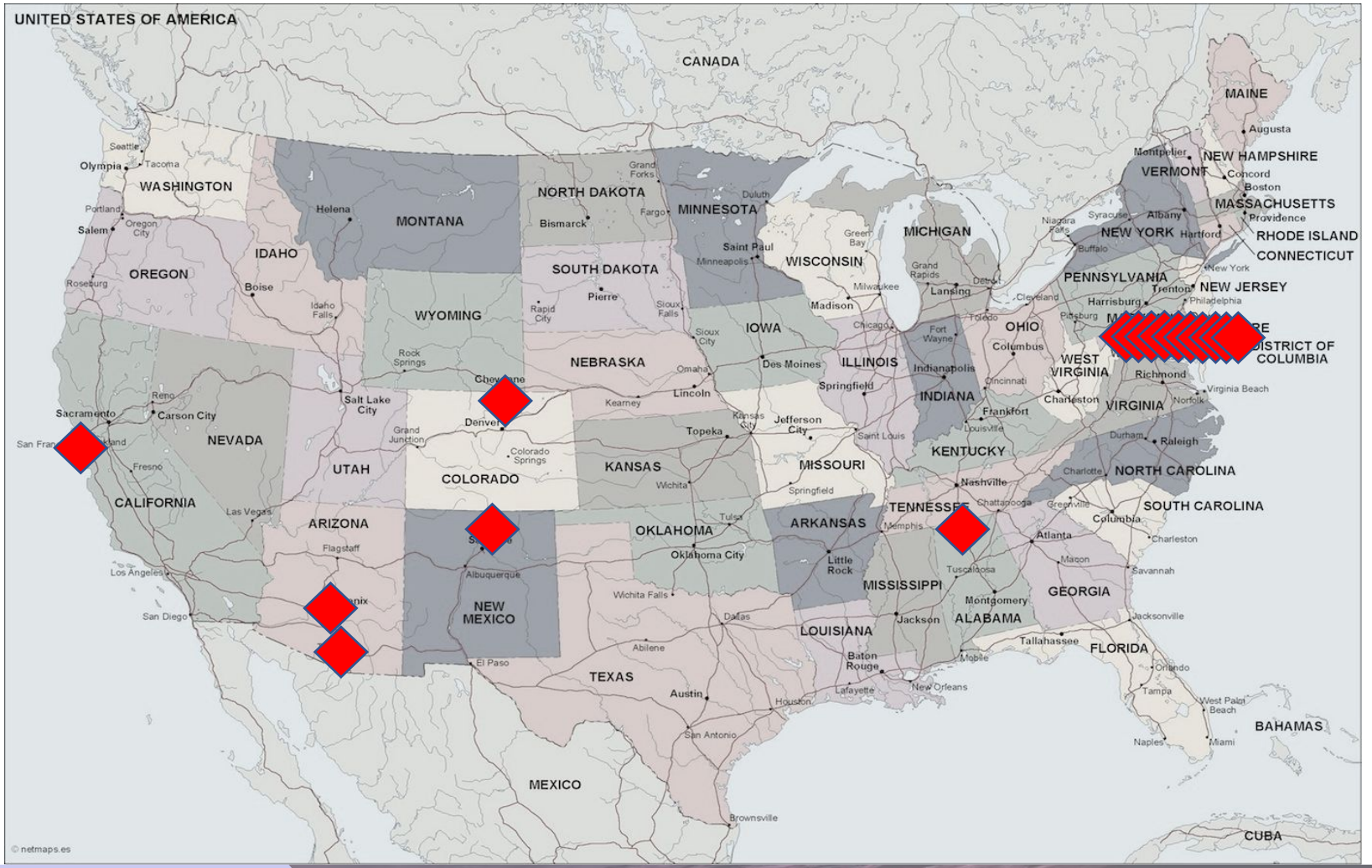
- All peer reviews are being conducted virtually until December
- More panels with fewer proposals (~10 proposals per panel) and 5-7 reviewers per panel
- Using Google Meet for virtual panel rooms, Google Drive for sharing docs and working on summary evaluations of proposals, and Slack to communicate on asynchronous workdays
- 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 asynchronous 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

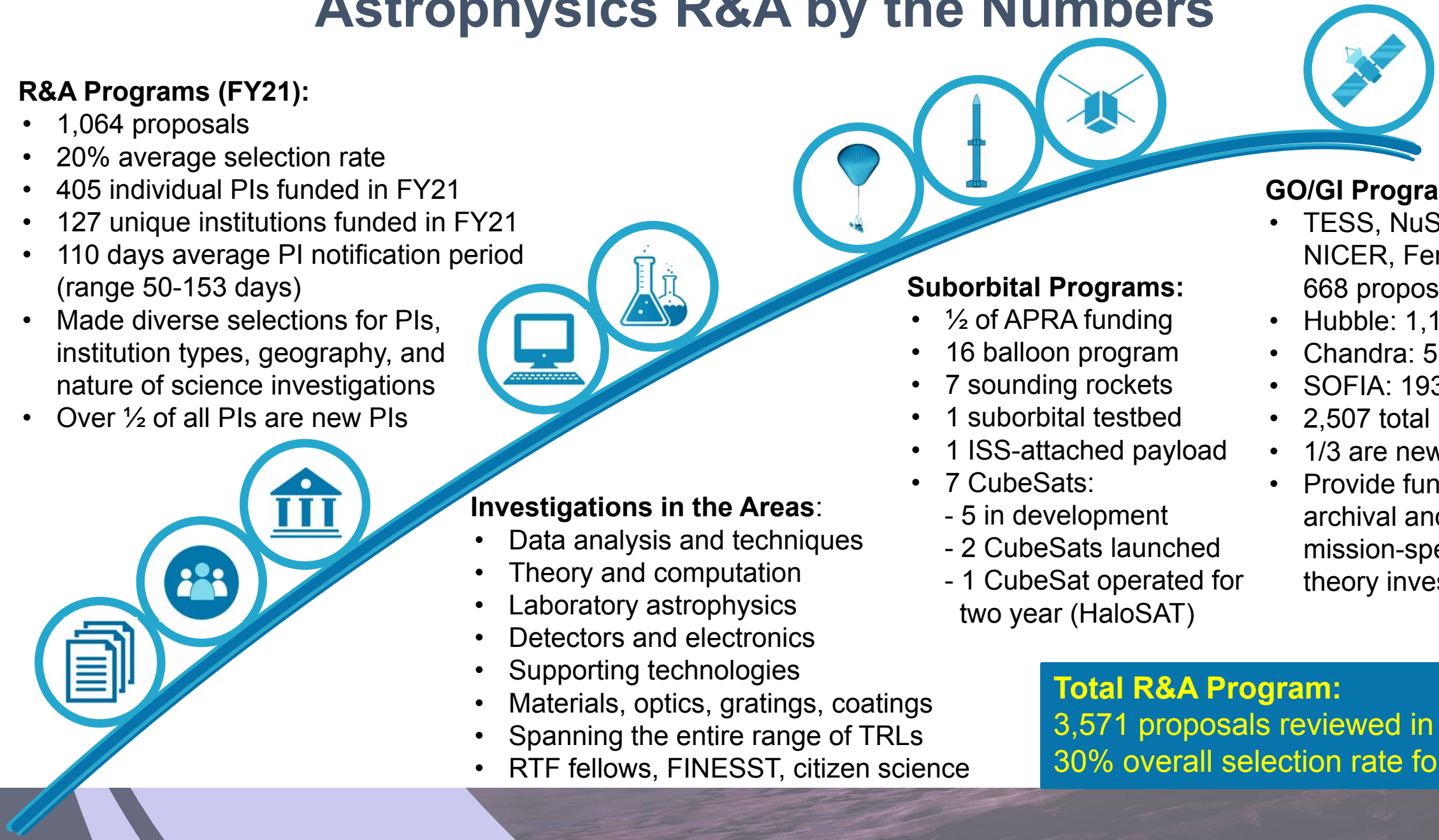
R&A Accommodation due to COVID-19

R&A management and supporting work at NASA HQ continues as normal via telework



16 HQ R&A Program Scientists working remotely in 9 different states spanning 3 time zones

Astrophysics R&A by the Numbers



R&A Programs (FY21):
- 1,064 proposals
- 20% average selection rate
- 405 individual PIs funded in FY21
- 127 unique institutions funded in FY21
- 110 days average PI notification period (range 50-153 days)
- Made diverse selections for PIs, institution types, geography, and nature of science investigations
- Over ½ of all PIs are new PIs

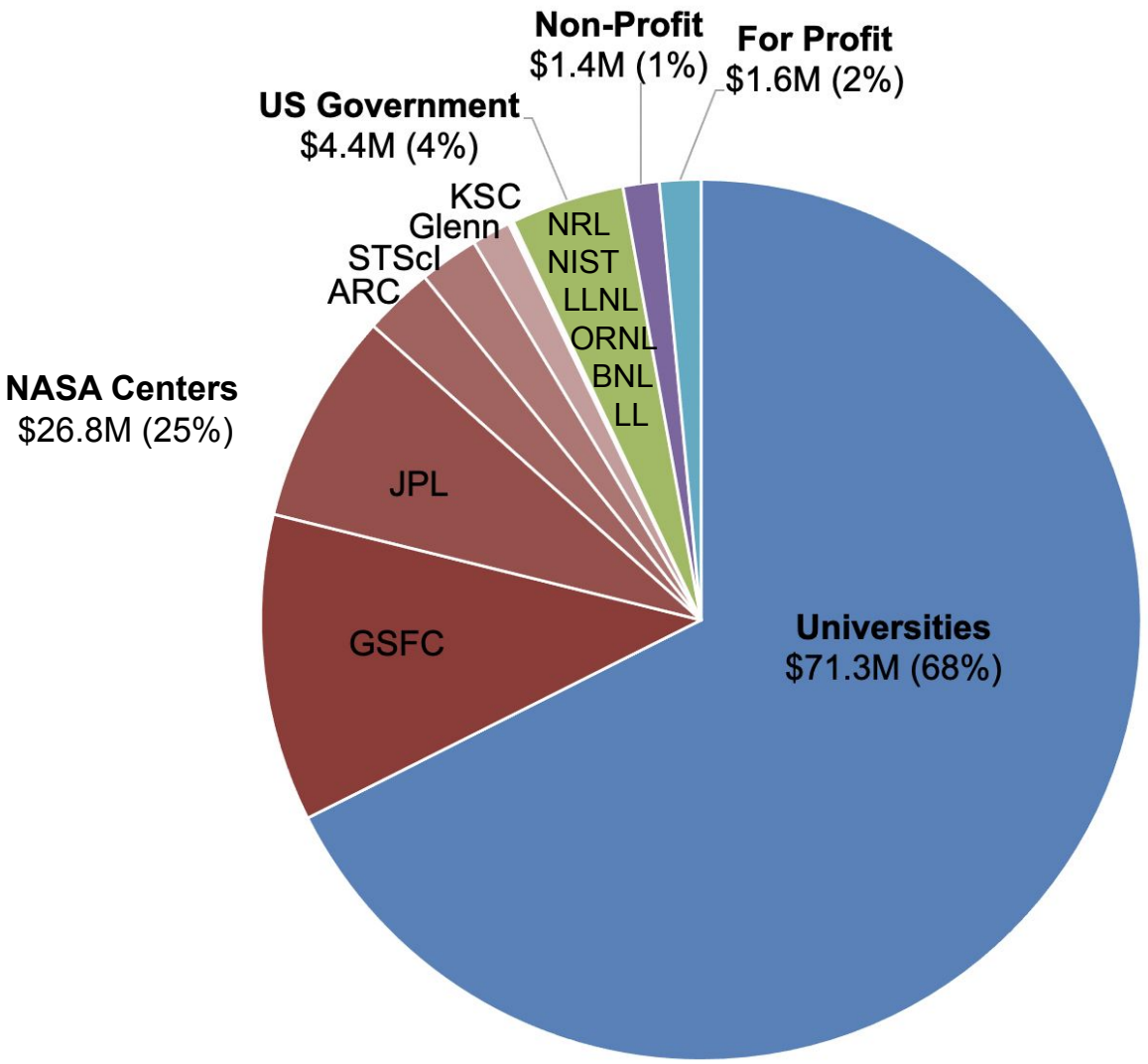
Investigations in the Areas:
- Data analysis and techniques
- Theory and computation
- Laboratory astrophysics
- Detectors and electronics
- Supporting technologies
- Materials, optics, gratings, coatings
- Spanning the entire range of TRLs
- RTF fellows, FINESST, citizen science

Suborbital Programs:
- ½ of APRA funding
- 16 balloon program
- 7 sounding rockets
- 1 suborbital testbed
- 1 ISS-attached payload
- 7 CubeSats:
  - 5 in development
  - 2 CubeSats launched
  - 1 CubeSat operated for two year (HaloSAT)

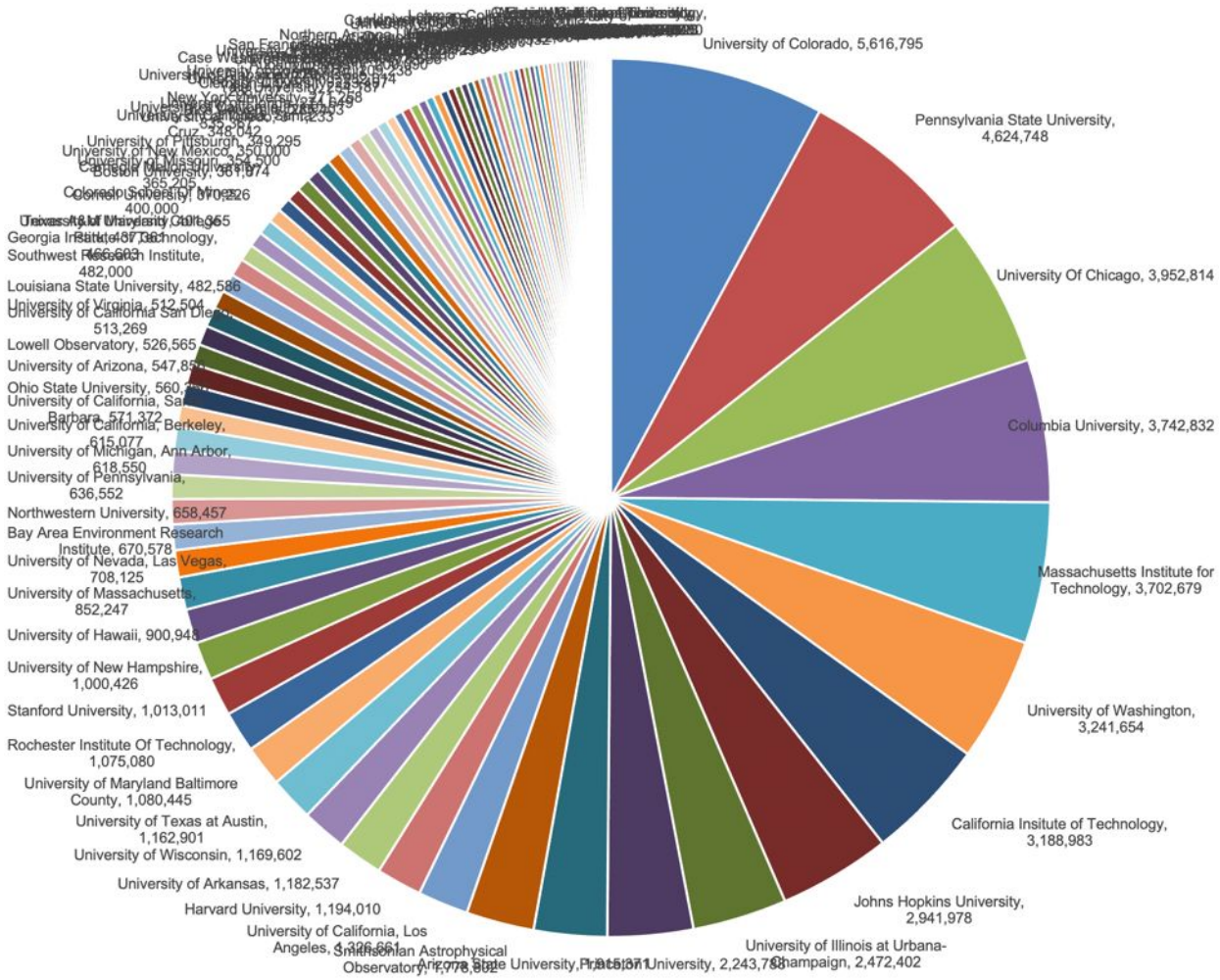
GO/GI Programs:
- TESS, NuSTAR, NICER, Fermi, Swift: 668 proposals (46%)
- Hubble: 1,129 (16%)
- Chandra: 517 (30%)
- SOFIA: 193 (28%)
- 2,507 total proposals
- 1/3 are new PIs
- Provide funding for archival and mission-specific theory investigations

Total R&A Program:
3,571 proposals reviewed in one year
30% overall selection rate for R&A

R&A Primary Partners



102 University Partners



* of $105M in FY21, excluding GO/GI programs

Recent R&A Initiatives

- **Exoplanet Research Program Consolidation**: all exoplanet investigations are now under XRP, ramping up funding from $4M in FY19 to $7.3M in FY22
- **Laboratory Astrophysics**: starting in ROSES-20, capital equipment purchases are eligible under APRA. Ramping up funding for Lab Astro from $1.4M in FY21 to $3.6M in FY24, and capital equipment from $500k in FY21 to $1M/year in FY23
- **FINESST**: doubled funding and selection rate for graduate student program in ROSES-20. Starting in ROSES-22, student stipend will increase from $45k to $50k/year for three years
- **Citizen Science**: cross-divisional SMD solicitation for Citizen Science Seed Funding
- **Data Management Plan**: now part of the intrinsic merit evaluation of proposals
- **Open Source, Tools, Frameworks, and Libraries** support through cross-divisional SMD solicitation
- **Code of Conduct** for peer reviews: Astrophysics Division code is now adopted for all SMD reviews
- **Bias training** is provided for all peer reviewers before the start of peer reviews
- **Inclusion, Diversity, Equity, and Accessibility**: established IDEA taskforce for Astrophysics R&A, implementing recommendations of SMD's Anti-Racism Action Group
- **Inclusion Plan** implemented as a pilot program for this year's Astrophysics Theory Program (ATP) to increase the diversities of the proposing teams

Astrophysics Theory Inclusion Plan Pilot Program (I)

ROSES-21 was amended to add the following change to the Astrophysics Theory Program (ATP):

All proposals were required to include an inclusion plan and to address:

- Plans for creating and sustaining a positive and inclusive working environment for those carrying out the proposed investigation
- Contributions the proposed investigation will make to the training and development of a diverse and inclusive scientific workforce

The inclusion plan was evaluated for adequacy and completeness including the following factors:

- Does the inclusion plan adequately communicate the goal of a positive and inclusive working environment for the investigation team? Does the inclusion plan provide adequate processes for creating and sustaining a positive and inclusive working environment for the investigation team? Are these processes likely to be successful in achieving the goal?
- Does the inclusion plan adequately describe the contribution of the proposed investigation to the training and development of a diverse and inclusive workforce? Does the inclusion plan provide an adequate plan for achieving the identified contribution? Is the plan likely to be successful in realizing the identified contribution?

Astrophysics Theory Inclusion Plan Pilot Program (II)

The inclusion plans were evaluated during the ATP peer review by two independent panels:

- **20 science panels** evaluated all 184 Inclusion Plans and captured their findings as strength and weaknesses in a separate Inclusion Plan evaluation form
- **4 inclusion panels** performed more in-depth evaluations of 40 Inclusion Plans. These panels consisted of astrophysicists with significant experience in improving diversity, equity, and inclusion and DEI experts (social scientists, education professionals, HBCU department chairs, DEI consultants, academic DEI directors and presidents, etc.)

The collective evaluations will be provided to the proposers as part of the panel review summaries

The panels' findings will not be folded into the adjectival ratings or selection recommendations in the current ROSES cycle but may in future cycles

NASA plans to invite comments from proposers regarding this pilot process after they receive their review comments

Astrophysics Theory Inclusion Plan Pilot Program (III)

Main Goals of the Inclusion Plan Pilot Program:

- Send a strong signal to the proposing community that inclusion is one of NASA's core values and that we expect NASA-funded PIs to support it and to create inclusive work environments
- Learn from the PIs responses about their understanding of DEI (which varied greatly)
- Learn whether panels of scientists can competently evaluate inclusion plans, using DEI expert panels as control groups
- Solicit extensive feedback from the panels on how we can improve on this pilot program

NASA has not yet analyzed the outcome of the pilot program and no decision has been made whether to expand the pilot program to other ROSES elements in ROSES-2022.

Data Management Plan

Proposals require a Data Management Plan (DMP) or an explanation of why one is not necessary given the nature of the work (e.g., no data produced for hardware).

The DMP should describe whether and how data generated through the course of the proposed research will be shared and preserved, or why data sharing and/or preservation are not possible or scientifically appropriate.

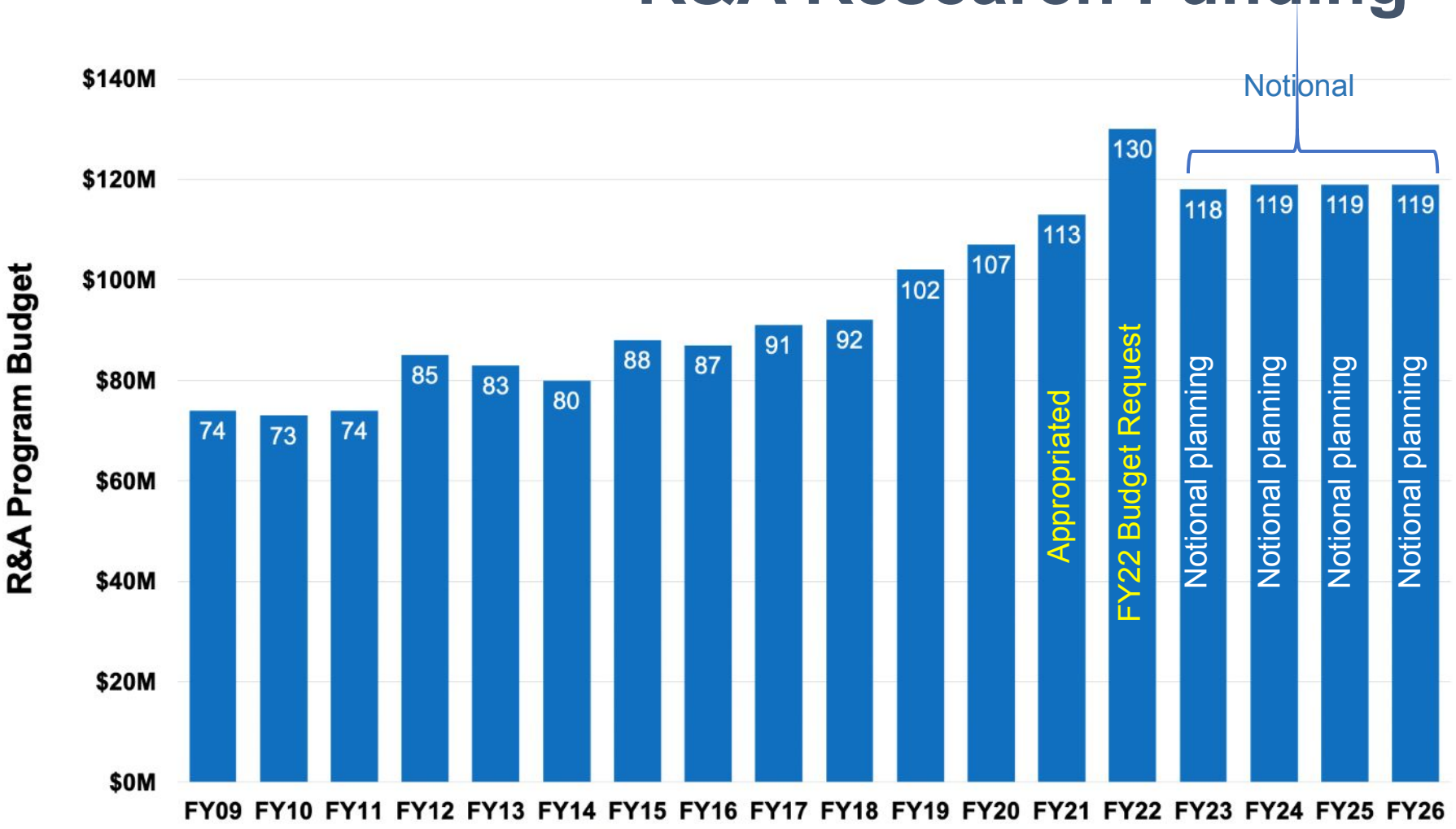
DMPs must provide a plan for making research data that underlie the results in peer-reviewed publications digitally accessible at the time of publication or within a reasonable time period after publication. This requirement could be met by including the data as supplementary information to the published article, through NASA archives, or other means.

Software, whether a stand-alone program, an enhancement to existing code, or a module that interfaces with existing codes, created as part of a ROSES award, should be made publicly available when it is practical and feasible to do so, and when there is scientific utility in doing so.

See ROSES DMP FAQ for more details:

https://science.nasa.gov/researchers/sara/faqs/dmp-faq-roses/

R&A Research Funding



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

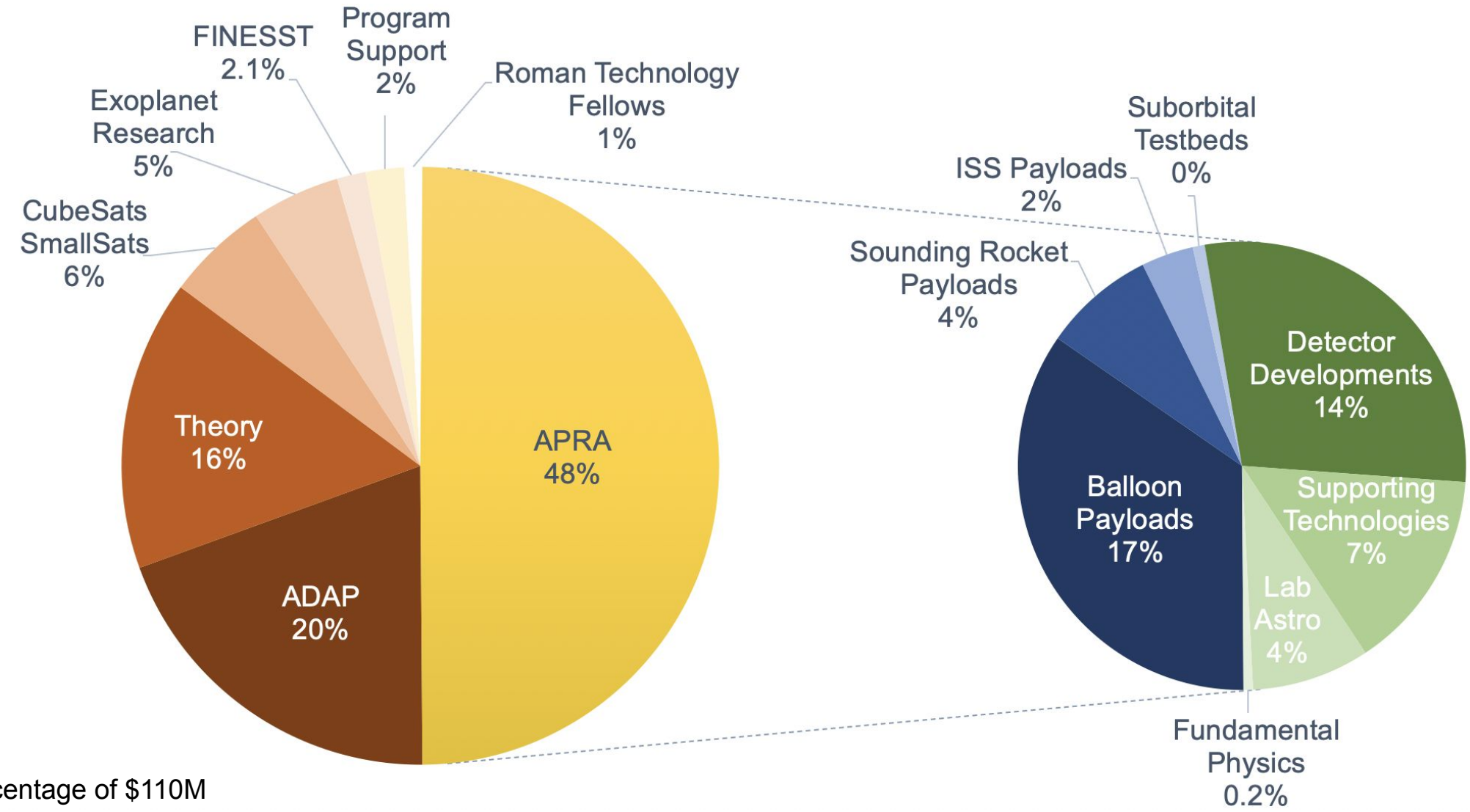
Since the last Decadal Survey:
+38% R&A funding growth

Notional Planning:
+60% over 17 years

For the last 12 months (FY21), the selection rates were 20% for R&A programs and 46% for mission's General Observer and General Investigator (GO/GI) programs*, with a total average selection rate of 30% for all our ROSES programs

* Does not include Hubble, Chandra, SOFIA

Balance of R&A Elements



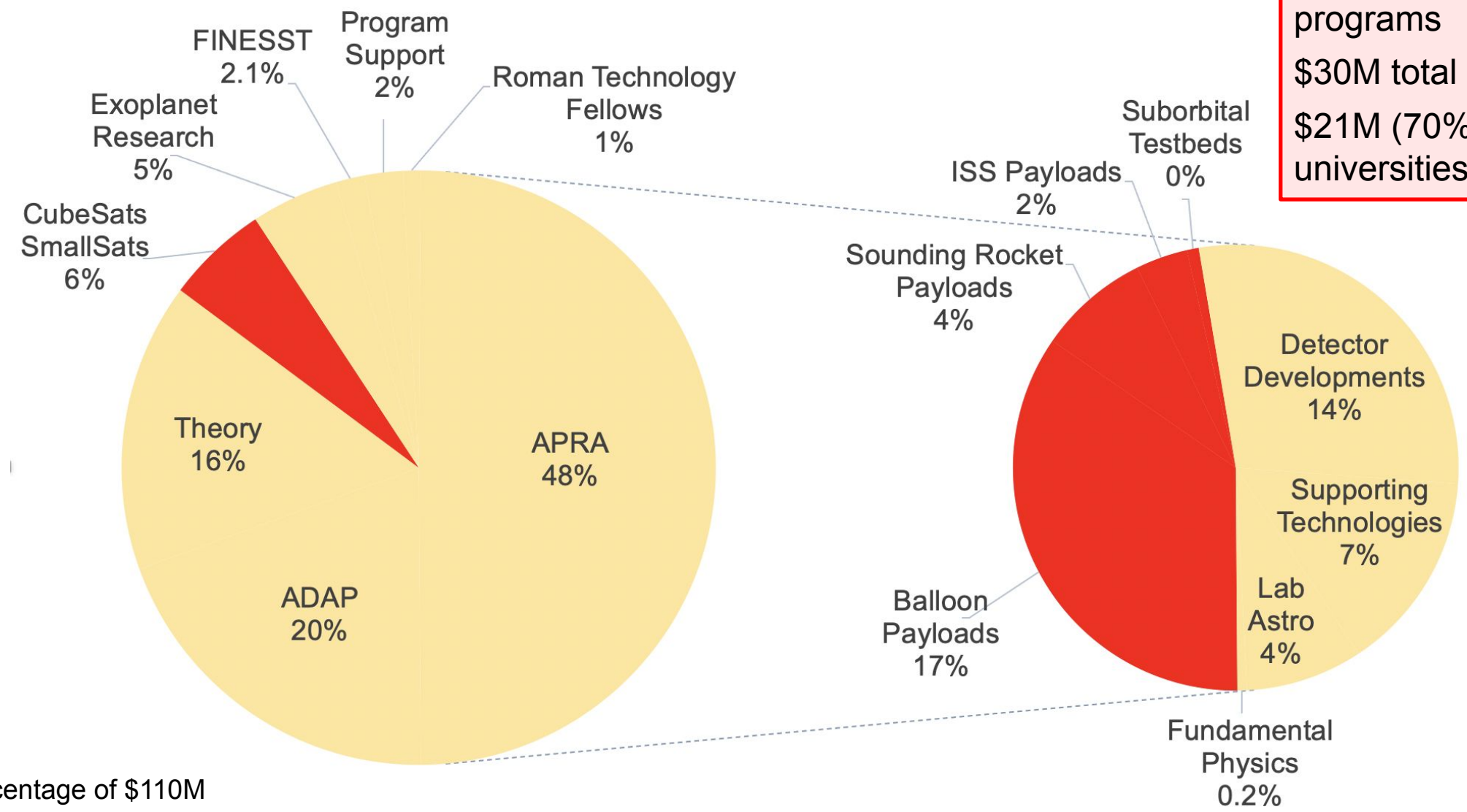
* FY21 percentage of $110M

Balance of R&A Elements

½ of APRA funding is invested in suborbital programs

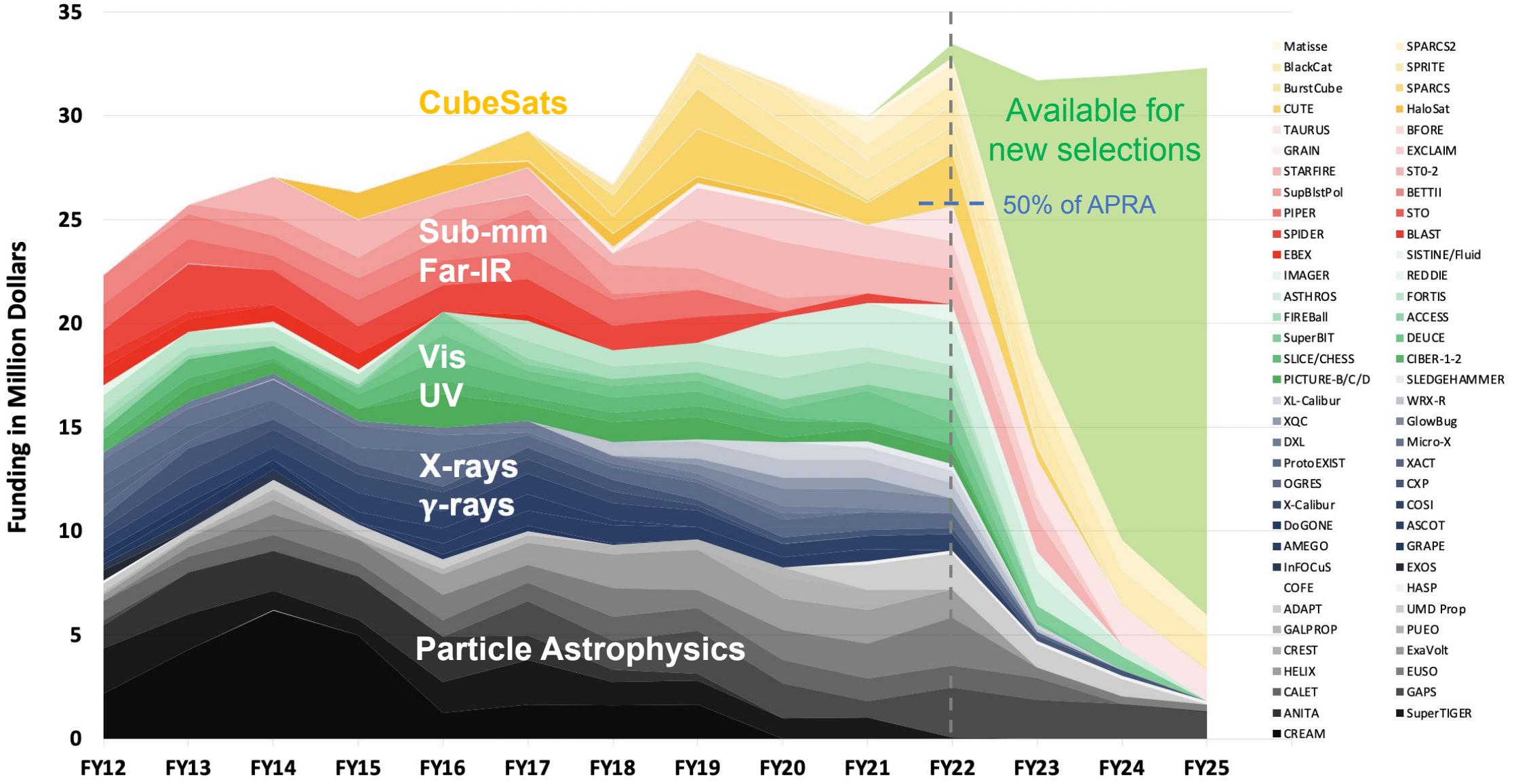
$30M total

$21M (70%) goes to universities

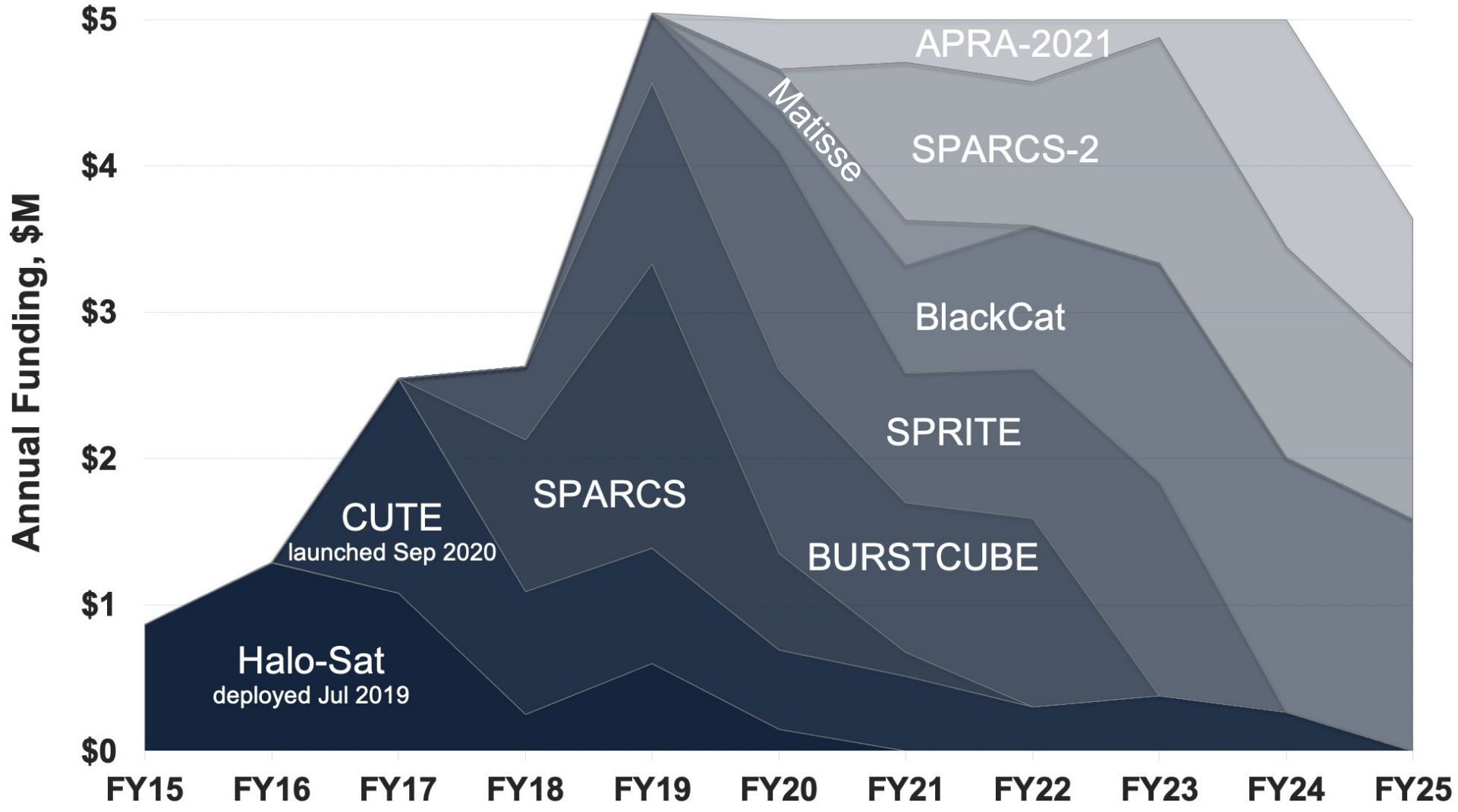


* FY21 percentage of $110M

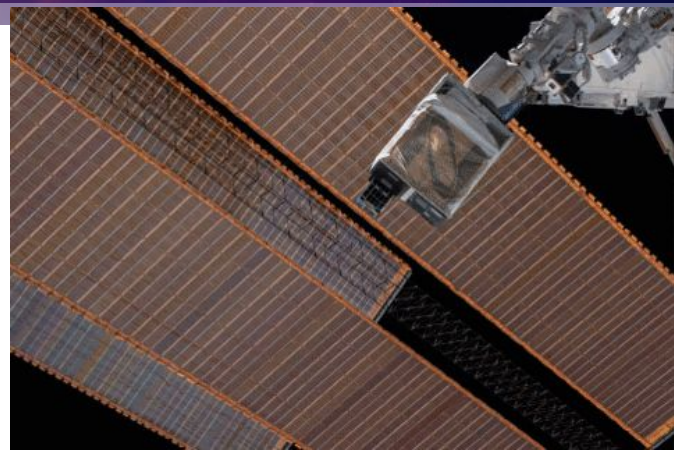
Suborbital Program Funding



CubeSat Cadence



HaloSat – A CubeSat to Study the Hot Galactic Halo

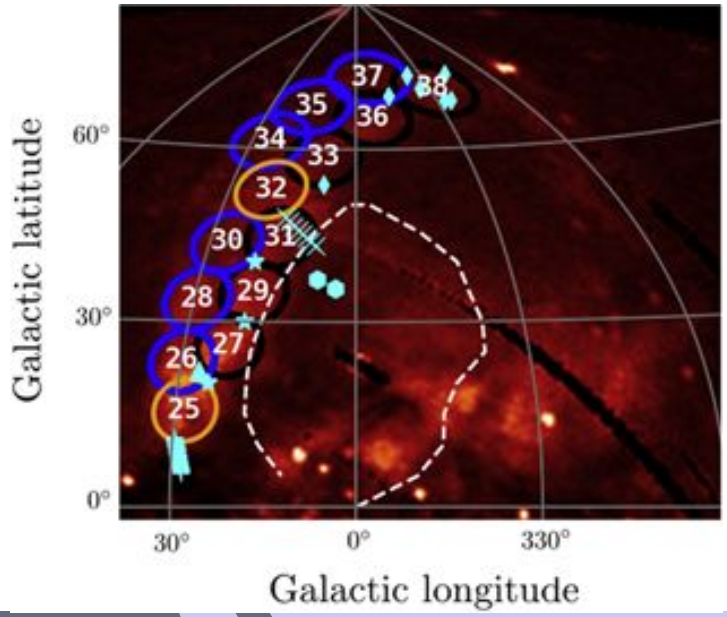


First CubeSat funded by Astrophysics

- 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.

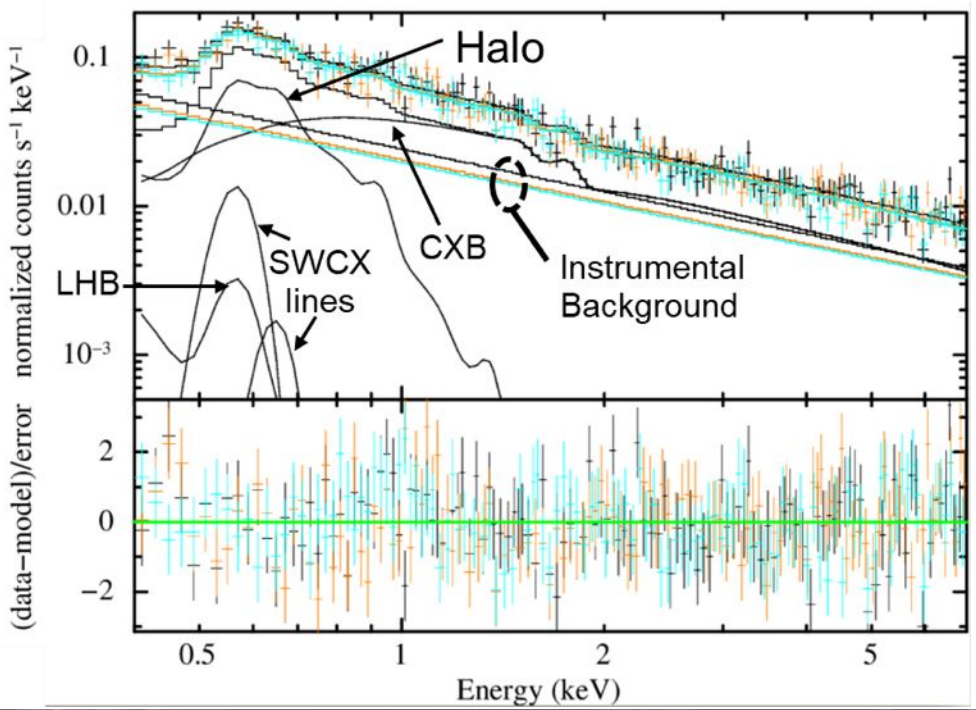
Student and early career researcher training:

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



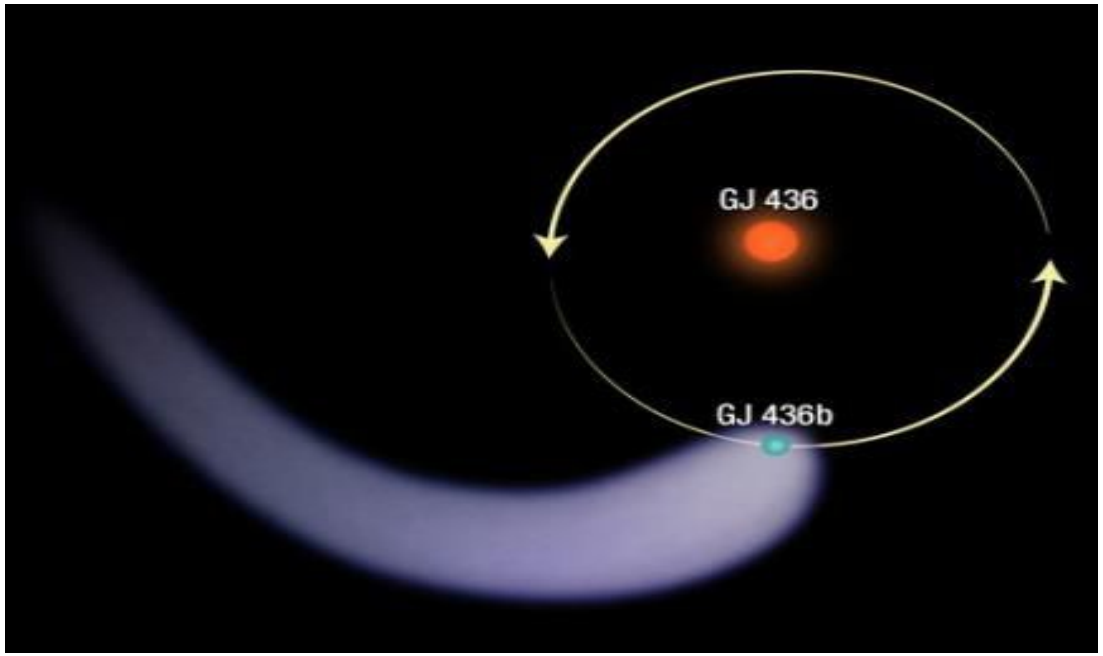
Science highlights:

- "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
- Ten refereed papers (3 by grad, 3 by undergrad), three more in prep.



CUTE – Colorado Ultraviolet Transit Experiment

Grad Student Arika Egan (center) and PM Nick DeCicco (left) insert CUTE in launch deployment canister at VAFB. Photo courtesy K. France



Science Objectives: The Colorado Ultraviolet Transit Experiment (CUTE) will take multiple medium resolution UV spectra of hot Jupiters during transit, in order to measure the composition of the atmosphere being ablated away. Magnetic fields may be detected via the presence of tori or bow shocks.

Sep 27: Launched as ride share with Landsat-9 primary payload
Sep 28: CUTE deployed, opened solar arrays, communicated with the ground

Suborbital Achievements – Sounding Rockets

- Both the Sounding Rockets and Balloon Program have developed a process to resume launches with covid-safe protocol
- In FY21 the Sounding Rocket had 12 successful COUS launches (2 Astrophysics: **DEUCE**, **CIBER-2**)
- In the next 7 months there are 4 more Astrophysics Sounding Rocket launches scheduled: **SISTINE 2**, K. France , 11/8/21, WSMR; **DXL 3**, M. Galeazzi, 12/6/21, WI; **Micro-X**, E. Figueroa, 04/01/22, WSMR; **tREXS**, R. McEntaffer 05/23/22, WSMR
- The Sounding Rocket Program Office is preparing a launch campaign June/July 2022 from Equatorial Launch Australia with three payloads are Astrophysics payloads: **XQC**, D. McCammon, **SISTINE** K. France, **DEUCE** B. Fleming

Setup of mobile Sounding Rocket range support equipment at Equatorial Launch Australia

Suborbital Achievements – Balloons

- The Balloon Program conducted successful Spring and Fall Fort Sumner, NM campaigns with 10 balloon launches in FY21 plus a crew chief training of a super pressure balloon replica inflation exercise ahead of the upcoming NZ super-pressure campaign
- For FY22 the Balloon Program is supporting the Fall Fort Sumner, NM campaign plus two international campaigns in Wanaka, NZ and Esrange, Sweden
- Wanaka, NZ (March-April 2022) up to 2 super-pressure balloon launches: **SuperBIT**/W. Jones, test platform
- Esrange, Sweden (May-Jun 2022) 4 science payloads: APD **XL-Calibur**/H. Krawczynski; **HELIX**/S. Wakely
- See backup slides for FY22 Balloon Program flight manifest

Right: Practice inflation of a super-pressure balloon replica in Ft Sumner. The small balloon on top is a tow balloon that carries the weight of the metal balloon closeout plate until the super pressure balloon is sufficiently inflated to support the load.

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, NICER, TESS

Mission Science and Instrumentation

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

Cross Divisional

- Exoplanets Research Program (XRP)
- Topical Workshops, Symposia and Conferences (TWSC)
- Citizen Science Seed Funding Program
- Graduate Student Research Awards (FINESST)
- Support for Open Source, Tools, Frameworks and Libraries
- Supplemental Open Source Software Awards

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, 2021

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

R&A Astro2020 Decadal Survey Preparations

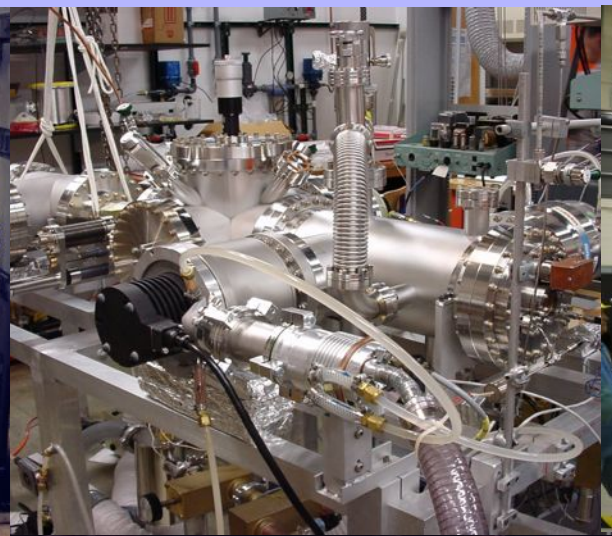
The ROSES-21 Strategic Astrophysics Technology (SAT) investigations solicitation was amended in Sep 2021 to include SAT. Non-mandatory SAT NOIs due on Nov 19 and proposal due date on Dec 16 to allow PIs to respond to Decadal Survey priorities. Currently funded SAT PIs received bridge funding to protect their workforce.

A new solicitation will be included in ROSES-22 (to be released on Feb 14) for Preparatory R&A Science Investigations to meet Astro2020 goals.

NASA will hold internal R&A strategy meetings in Nov+Dec after the Astro2020 Decadal Survey recommendations have been released to address Decadal Survey priorities in R&A.




Questions?


Backup Slides

FY22 Balloon Program Office
Flight Manifest

Goddard Space Flight Center — Wallops Flight Facility

Mission	Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Wanaka, New Zealand	***Austral Fall '22***												
Fairbrother / WFF / SPB SN08/ Jones / PU / SuperBIT	Qual. Flight / SuperBIT (PO)						◊						
Fairbrother / WFF / SPB SN07	Qualification Flight							◊					
Esrange, Sweden	***Summer '22***												
Roth / WFF/ 60 MCF Test / Sample / MSU / BOOMS	Qual. Flight / BOOMS (PB)								◊				
Krawczynski / WUSTL / XL-Calibur	Astrophysics								◊				
Wakely / UC / HELIX	Heliophysics									◊			
Solanki / MPS / SUNRISE-III	Heliophysics									◊			
Fort Sumner, New Mexico	***Fall '22***												
Salter / CSBF / CSBF Test Flight Salter	Test Flight											◊	
Kogut / GSFC / BOBCAT	IR, Submillimeter, Radio											◊	
Zhou / UCLA / BALBOA	Heliophysics (ETF)											◊	
Fries / JSC / CDCP	Solar System (ETF) [H/L]											◊	
Boering / UCB / MATTADOR-TF	Upper Atmosphere											◊	
Guzik / LSU / HASP	Student Outreach												◊
Mullenax / CSBF / CSBF TF Mullenax	Test Flight												◊
Switzer / GSFC / EXCLAIM	IR, Submillimeter, Radio												◊
Martin / CalTech / FIREBall-II	UV and Visible												◊
Young / SWRI / THAI-SPICE	UV and Visible												◊
Kogut / GSFC / PIPER	IR, Submillimeter, Radio												◊
Chakrabarti / UMASS / PICTURE-C	UV and Visible												◊

FY22 Balloon Program Office
Flight Manifest - Piggybacks

Goddard Space Flight Center — Wallops Flight Facility

Mission	Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Esrange, Sweden	***Summer '22***												
Bowman / SNL / Infralite	Infrasound									◊			
Yoder / WFF / DINGO	Tech Demo									◊			
Fort Sumner, New Mexico	***Fall '22***												
Agee-DeHart / Idoodlelearning.com / CiS	Student Outreach											◊	
Bailey / VT / GLO	Heliophysics											◊	
Jackson / UC / ASHI	Heliophysics											◊	
Sewell / NCAR / DIMS	Heliophysics											◊	
Fritts / GATS / PMC-Turbo	Upper Atmosphere											◊	

Primary missions supporting piggybacks during FY21 campaigns:

Sweden

Wakely / UC / HELIX
- Bowman / SNL / Infralite
- Yoder/WFF/DINGO

Fall Ft. Sumner

Salter / CSBF / CSBF Test Flight
- Agee-DeHart/Idoodlelearning.com/CIS
- Bailey / VT / GLO
- Jackson / UC/ ASHI
- Sewell / NCAR / DIMS

Zhou / UCLA / BALBOA
- Fritts / GATS / PMC-Turbo

Chakrabarti / UMASS / PICTURE-C
- Chakrabarti / UMASS / CoMIC