

National Aeronautics and
Space Administration



EXPLORE SOLAR SYSTEM & BEYOND

NASA Town Hall

AAS 240th Meeting | June 13, 2022

Paul Hertz

Director, Astrophysics Division
Science Mission Directorate

 @NASAUniverse @NASAExoplanets @NASAWebb

NASA Headquarters Staff in Attendance

Thomas Zurbuchen
Manuel Bautista
Sandra Cauffman
Kristen Erickson
Michael Garcia
Douglas Hudgins
Elizabeth Landeau
Mario Perez
Gregory Robinson
Sanaz Vahidinia

Paul Hertz
Dominic Benford
Valerie Connaughton
Alise Fischer
Hashima Hasan
Hannah Jang-Condell
William Latter
Natasha Pinol
Kartik Sheth
Nicolle Zellner

Terri Brandt
Doris Daou
Galen Fowler
Denise Hill
Patricia Knezek
Joshua Pepper
Haley Reed
Eric Smith

Charts posted at <http://science.nasa.gov/astrophysics/documents>



The NASA Team

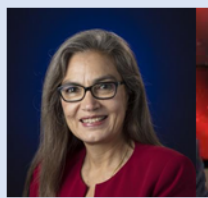


NASA Astrophysics Division

Division Director

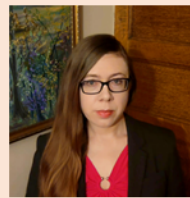


Paul Hertz
Astrophysics Division
Director



Sandra Cauffman
Astrophysics Division
Deputy Director

Program Executives



Rachele Cocks
Dep COSI, Dep
Ariel/CASE CubeSats



E. Lucien Cox
SOFIA, GUSTO,
XRISM, ExEP



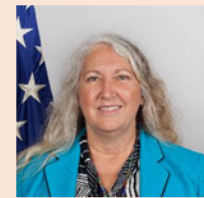
Julie Crooke
GOMAP



Ed Griego
Roman, CGI



Shahid Habib
PCOS/COR, ARIEL,
Athena, Euclid, LISA,
UltraSat



Janet Letchworth
Operating Missions,
Decadal



Mark Sistilli
Explorers Program
SPHEREx, COSI
Balloons

Cross Cutting



Eric Smith
Chief Scientist
Webb
Precursor Sci



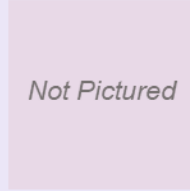
Vacant
Assoc Dir for Flight
ASM Program Manager



Mario Perez
Chief Technologist
SAT, RTF, ISFM, Swift



Omid Noroozian
Deputy Chief
Technologist



Lisa Wainio
Information Manager,
Public Affairs Liaison

Administrative Support



Jennifer Baker
Administrative
Assistant



Ingrid Farrell
Program Support
Specialist



Kelly Johnson
Administrative
Assistant



Sara Schwartzman
Program Support
Specialist

Program Scientists



Manuel Bautista



Dominic Benford
Roman, CGI, APRA
Lead



Terri Brandt
COSI Dep
APRA Dep
Pioneers Dep
Precursor Sci



Valerie Connaughton
APRA (High Energy)
XRISM, UltraSat, XMM,
TDAMM, PCOS
Program



Antonino Cucchiara



Michael Garcia
APRA (UV/Visible),
SmallSats/Pioneers
Hubble



Thomas Hams
APRA (CR, Fund.
Phys.)
Rockets/Balloons
GUSTO, LISA



Hashima Hasan
Education/Comms,
Citizen Science, Archives,
Advisory Committees,
NuSTAR, Keck



Douglas Hudgins
ExEP Program
ADAP Lead
TESS Dep, ARIEL



Stefan Immler
Astrophysics
Research Program
Mgr, Chandra, ART-
XC



Hannah Jang-Condell
XRP, TESS
ExEP, Explorers



Patricia Knezek
Explorers Program
Astrophysics Probe
SOFIA, Hubble Fellows



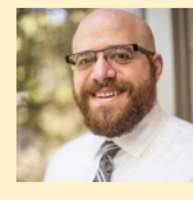
William Latter
APRA (Lab Astro)
SPHEREx, Fermi



Sangeeta Malhotra
Roman/CGI Dep
ATP/TCAN Dep



Roopesh Ojha
Data Lead, NICER,
HEC, AI/ML



Joshua Pepper
Deputy TESS, Deputy
ADAP, Deputy ExEP



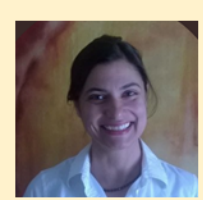
Kartik Sheth
Inclusion Plans
Technical assessments



Linda Sparke
2021 MIDEX/MO,
Archives, COSI



Eric Tollestrup
APRA (IR/Submm)
Euclid, IXPE, COR
Program



Sanaz Vahidinia
ATP/TCAN Lead

Join the NASA Team at Headquarters

NASA is seeking permanent and visiting Ph.D.-level scientists to serve as Program Scientists in the Astrophysics Division at NASA Headquarters in Washington, DC. With a budget of \$1.6 billion annually, the Division is responsible for the nation's space-based astrophysics program.

NASA Program Scientists

- manage scientific research grants programs and the proposal review process;
- serve as the Headquarters science lead for missions;
- implement NASA's response to the 2020 Decadal Survey;
- gain insight into Federal astrophysics policy and programs;
- run scientific programs with multimillion-dollar budgets, and
- contribute to a culture of diversity, equity, and inclusion.

Talk to any of the NASA HQ staff to learn more.

This summer (date TBD), NASA will advertise for program scientists across SMD.

- The ad will be open on [USAJobs.gov](https://www.usajobs.gov) for <5 days
- Subscribe to [USAJobs.gov](https://www.usajobs.gov) for an alert
- NASA will advertise through mailing lists (next page) and AAS Job Register

This summer (date TBD), NASA will advertise for astrophysics visiting scientists

- Visiting scientists spend 2-6 years at NASA before returning to their permanent job
- NASA will advertise through mailing lists (next page) and AAS Job Register



Keep Connected with NASA

NSPIRES mailing list – information about NASA solicitations

<https://nspires.nasaprs.com/>

Cosmic Origins mailing list, Exoplanet Exploration mailing list, Physics of the Cosmos mailing list – information about NASA missions and science

<https://cor.gsfc.nasa.gov/cornews-mailing-list.php>

<https://exoplanets.nasa.gov/exep/exopag/announcementList/>

<https://pcos.gsfc.nasa.gov/pcosnews-mailing-list.php>

NASA Astrophysics Federal Advisory Committees

Astrophysics Advisory Committee (APAC)

<https://science.nasa.gov/researchers/nac/science-advisory-committees/apac>

NASEM Committee on Astronomy and Astrophysics (CAA)

http://sites.nationalacademies.org/bpa/bpa_048755

Astronomy and Astrophysics Advisory Committee (AAAC)

<https://www.nsf.gov/mps/ast/aaac.jsp>

Sign up to be a panel reviewer:

<https://science.nasa.gov/researchers/volunteer-review-panels>

Importance of Inclusion, Diversity, Equity, Accessibility (IDEA)

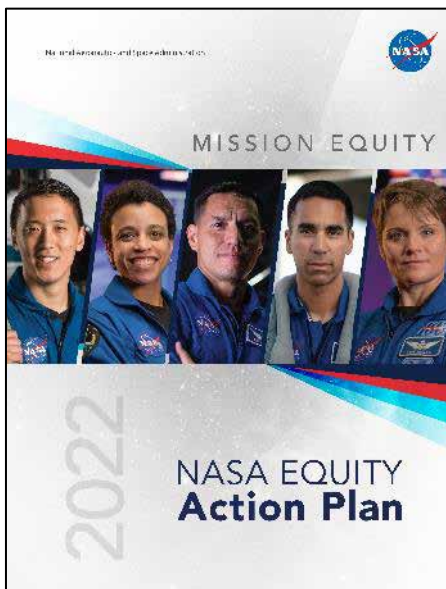
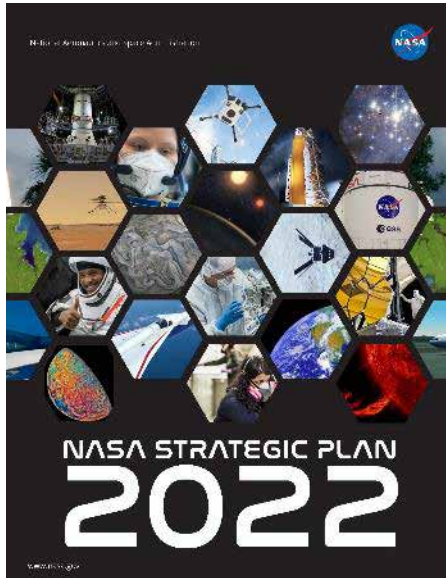


“The panel [on the State of the Profession and Societal Impacts] asserts that fundamentally, the pursuit of science, and scientific excellence, is inseparable from the humans who animate it.”

- *Pathways to Discovery in Astronomy and Astrophysics for the 2020s*

NASA is committed to integrating inclusion, diversity, equity, and accessibility (IDEA) into all activities (missions, programs, reviews, internal matters, etc.)

Inclusion & Diversity of Thought



Strategic Objective 4.1: Attract and develop a talented and diverse workforce. Cultivate a diverse, motivated, and highly qualified workforce through modernizing our Human Capital processes and systems, increasing our workforce agility and flexibilities, and implementing a robust Inclusion, Diversity, Equity, and Accessibility (IDEA) approach to ensure systematic and sustainable fairness, impartiality, and equity in our business practices.

NASA is continuing its journey towards equity. To this end, NASA has established four foundational focus areas:

- Increase Integration and Utilization of Contractors and Businesses from Underserved Communities to Expand Equity in NASA's Procurement Process
- Enhance Grants and Cooperative Agreements to Advance Opportunities, Access, and Representation for Underserved Communities
- Leverage Earth Science and Socioeconomic Data to Help Mitigate Environmental Challenges in Underserved Communities
- Advance External Civil Rights Compliance and Expand Access to Limited English Proficient (LEP) Populations within Underserved Communities

Building Excellent NASA Teams Requires Inclusion & Diversity



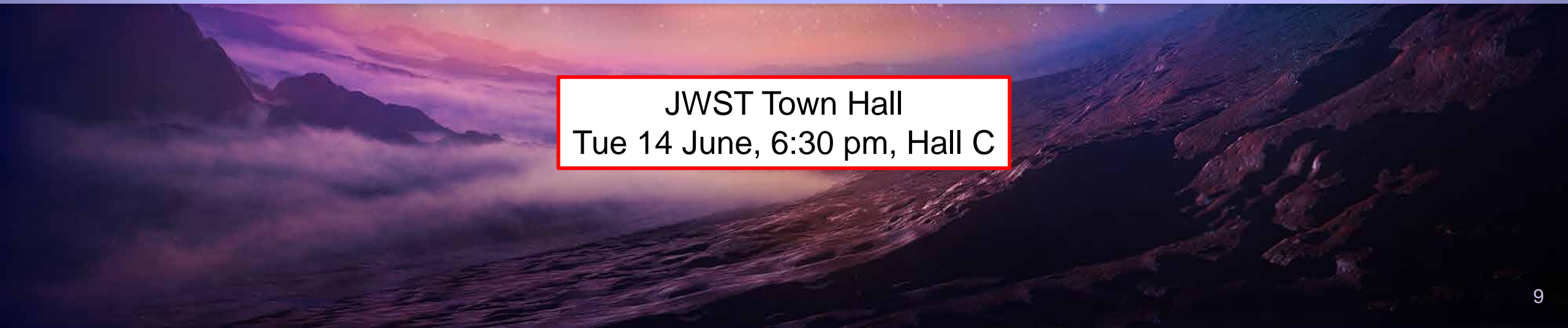
- IDEA is infused throughout everything we do. It is not a standalone or separate activity.
- Astrophysics has pioneered and piloted IDEA activities that are now adopted across SMD:
 1. Inclusion Plans adopted in ROSES elements across all SMD
 2. Code of Conduct now adopted for panel reviews
 3. [Dual Anonymous Peer Reviews](#) adopted
 4. Inclusion Criteria in Senior Review adopted across all SMD divisions *
 5. Increasing diversity expected across all SMD divisions
- Other SMD
 - 7. Additional initiatives are being considered for inclusion in the FY24 NASA budget request *
 - 8. Publication of demographics of ROSES proposers and awardees *
 - 9. Report data on proposal submissions and success rates *
 - 10. Bridge Program funded for better engagement with MSIs *
 - 10. [National Academies study](#) of barriers to inclusion in mission leadership
 - 11. [National Academies study](#) of demographic data required to assess the health of the community *
 - 12. Regular participation at meetings such as SACNAS and NSBP
 - 13. PI Launchpad to incubate next generation of diverse leaders for missions *
 - 14. IDEA criteria being added to Announcements of Opportunity *

* Responsive to an Astro2020 Decadal Survey recommendation

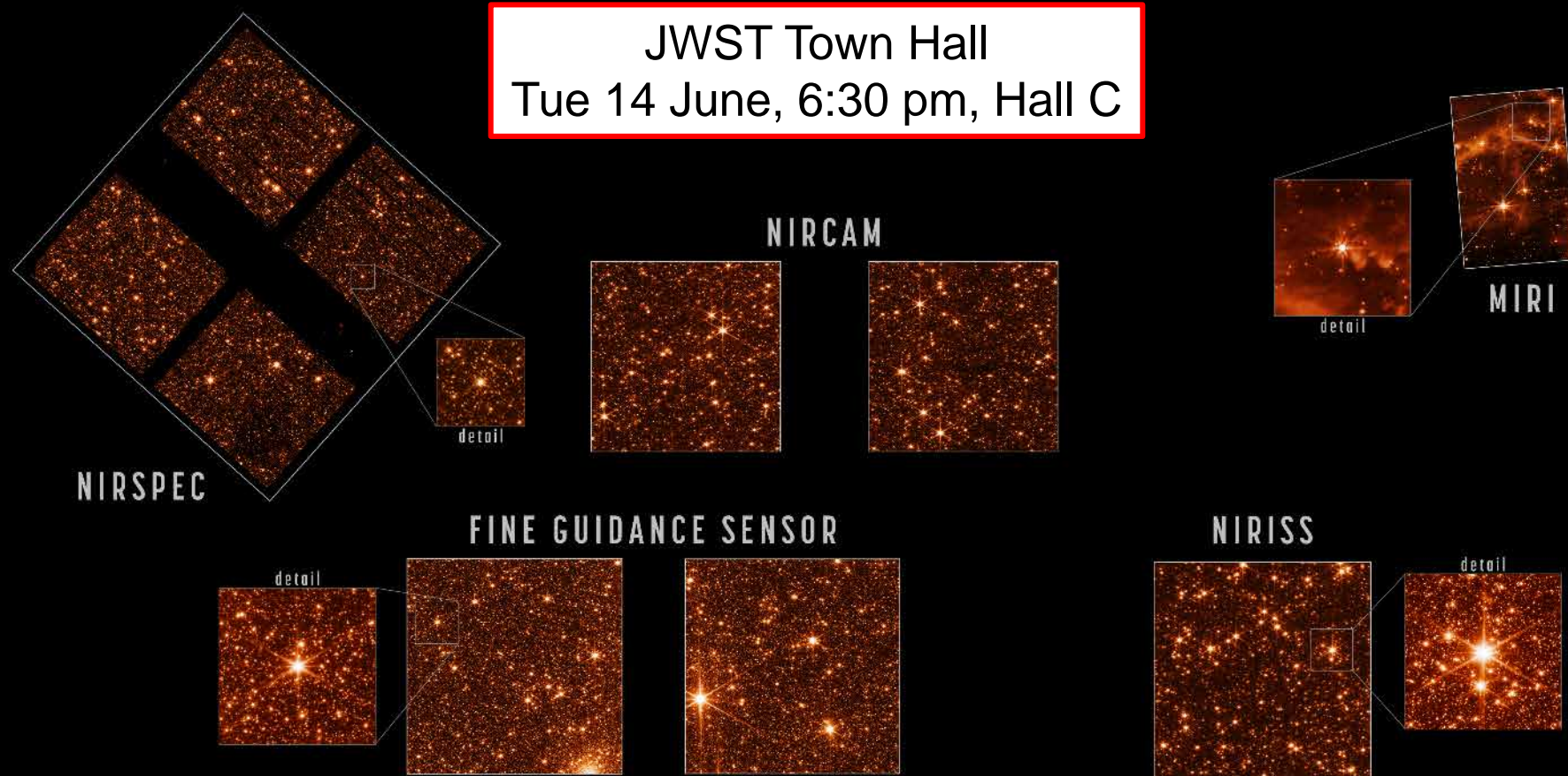


James Webb Space Telescope Update

JWST Town Hall
Tue 14 June, 6:30 pm, Hall C



JWST Optical Performance Better than Requirements!



NIRCam (2 micron), NIRSpec (1.1 micron), NIRISS (1.5 micron), and MIRI (7.7 micron)

Commissioning Timeline

The CAST lays out each step of JWST commissioning.

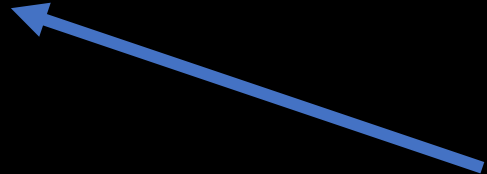
(CAST = Commissioning Activity Sequence Timeline)

There are 730 high-level steps in the timeline.

These are broken down into:

- ~2800 steps for deployments and spacecraft ✓
- ~5400 steps for the telescope ✓
- ~1500 steps for the science instruments

~20 steps left (99% complete)



JWST Town Hall

Tue 14 June, 6:30 pm, Hall C

Webb Cycle 1 Long Range Plan

The Cycle 1 Long Range Plans (LRP) was released to the public the week of 18-April-2022. It is a dynamic plan that will change with execution times as run, spacecraft anomalies, ToO's, etc.

LRP Cycle 1 Dates: 27-June-2023 to 2-July-2023

Category	Total Time [hrs]	Total Planned Time [hrs] (%)
GO	6090.1 ¹	5749.7 (94%)
GTO	3774.0 ²	3667 (98%)
ERS ³	529.5	529.5 (100%)
Cal	659.6	659.6 (100%)
Total	11023.2	10491.0 (95%)

¹Includes 200.5 hrs of ToO's which do not get planned until activation

²Includes 5.2 hrs of ToO's which do not get planned until activation

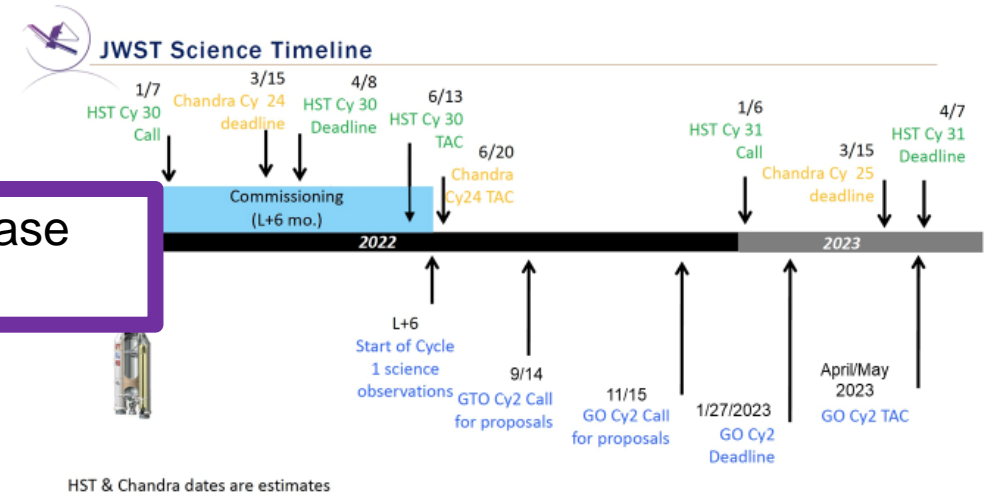
³Bulk of ERS programs are schedule in the first 5 months of Cycle 1

<https://www.stsci.edu/content/news/jwst/2022/schedule-for-cycle-1-science-operations-released>

Data courtesy N. Reid, STScI

17

Science Timeline



18

Keep up with JWST online

JWST homepage — nasa.gov/webb

JWST Blog — blogs.nasa.gov/webb

Where is JWST —

jwst.nasa.gov/content/webbLaunch/whereIsWebb.html

Twitter:

@NASAWebb, @JWSTObserver

Facebook:

nasawebb

YouTube:

NASAWebbTelescope

Flickr:

nasawebbtelescope

Instagram:

nasawebb



Program Updates – Research

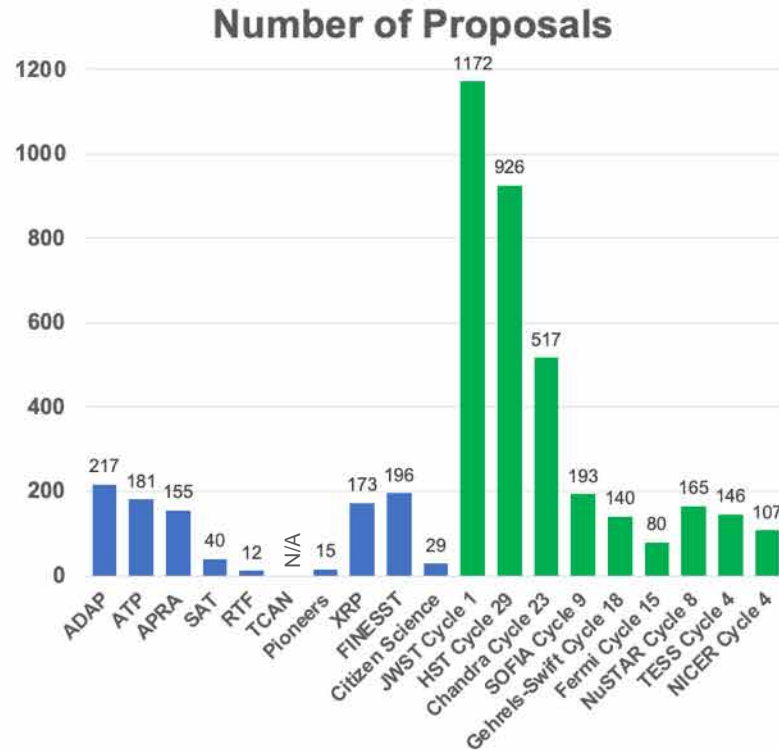


2022 Astrophysics Research Program Elements

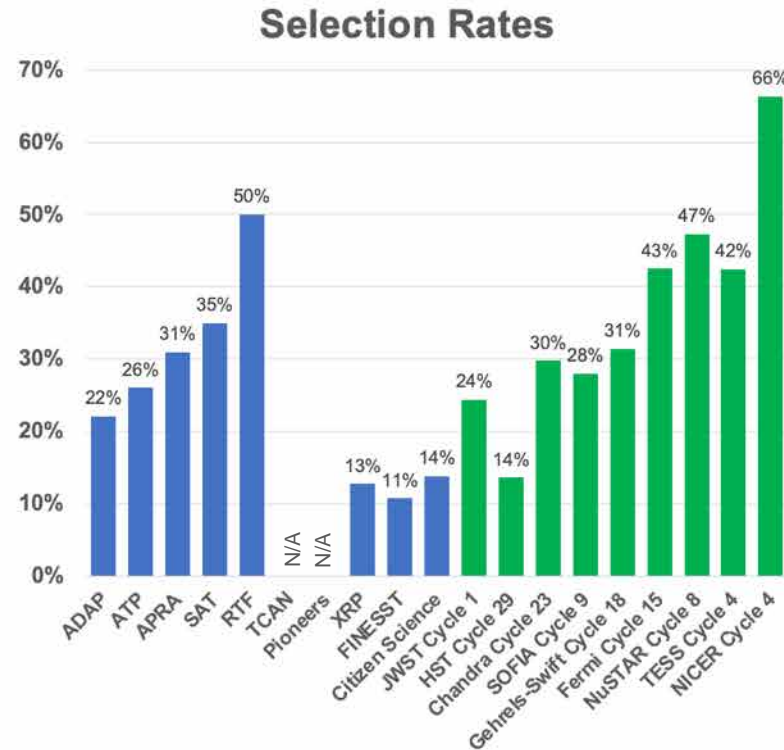
ROSES-22	Solicited Separately
Supporting Research and Technology <ul style="list-style-type: none"> • Astrophysics Research & Analysis (APRA) * • Strategic Astrophysics Technology (SAT) * • Theoretical and Computational Astrophysics Networks (TCAN) * • Roman Technology Fellowships (RTF) • Precursor Science Investigations for Astro2020 DS */** New 	<ul style="list-style-type: none"> • 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
Data Analysis <ul style="list-style-type: none"> • Astrophysics Data Analysis (ADAP) ** • GO/GI programs for Fermi, Swift, NuSTAR, TESS, NICER ** 	Not solicited in ROSES-22 <ul style="list-style-type: none"> • Astrophysics Theory Program (ATP), every other year • Astrophysics Explorers U.S. PIs (APEX USPI) is no longer solicited separately, now part of Astrophysics Research & Analysis (APRA)
Mission Science and Instrumentation <ul style="list-style-type: none"> • Astrophysics Pioneers (suborbital science investigations) * • Suborbital payloads solicited through APRA * • LISA Preparatory Science * • Roman Research and Support Opportunities New • XRISM Guest Scientist ** New • UltraSat Participating Scientist ** New 	Notice: <ul style="list-style-type: none"> * Proposals will require an inclusion plan for creating and sustaining a positive and inclusive working environment. Stay tuned for future announcement ** Proposals evaluated using dual-anonymous peer reviews
Cross Divisional <ul style="list-style-type: none"> • Exoplanets Research Program (XRP) ** • Topical Workshops, Symposia and Conferences (TWSC) • Citizen Science Seed Funding Program • Graduate Student Research Awards (FINESST) 	

Astrophysics R&A Selection Rates

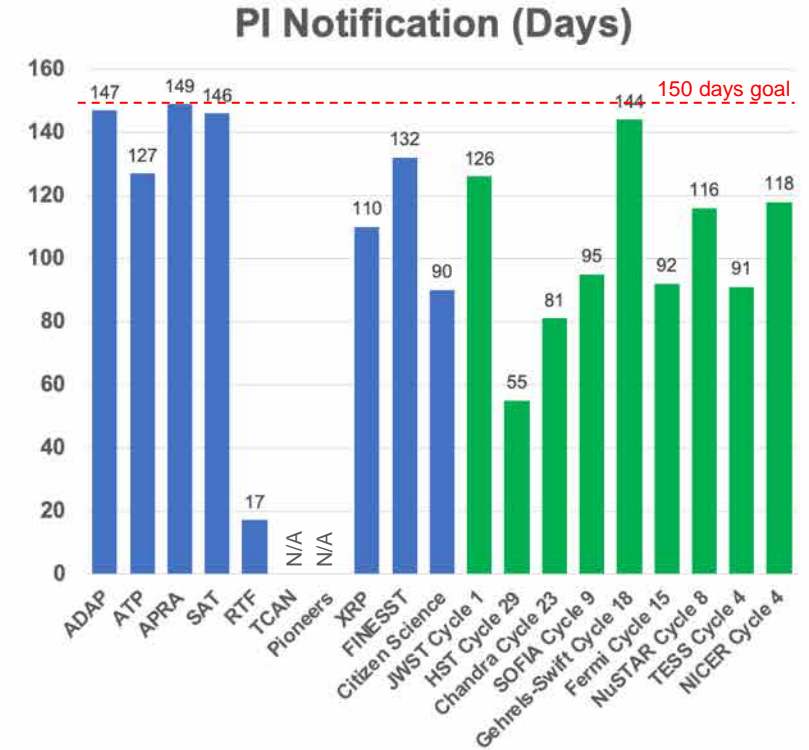
June 2021-2022



R&A: 1,018 proposals
 GO/GI: 3,446 proposals
 Total: 4,464 proposals

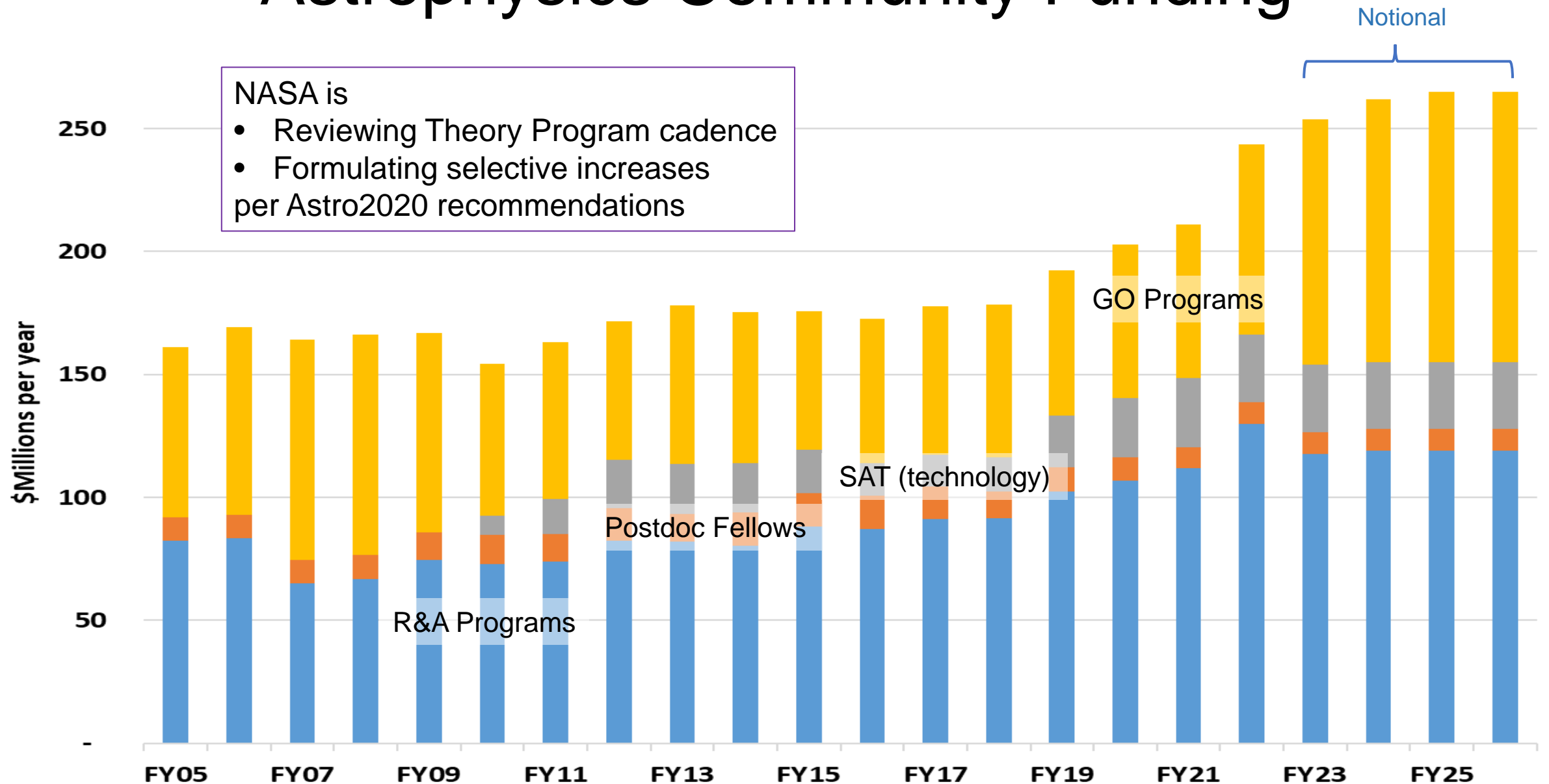


R&A: 20%
 GO/GI: 27%
 Average: 25%



80% of PI notification:
 R&A: 147 days
 GO/GI: 122 days

Astrophysics Community Funding



Nancy Grace Roman Technology Fellows Class of 2021

Brandon Chalifoux – U. Arizona – *X-ray telescope mirrors*



Jake Connors – NIST – *TES for far-IR astronomy*



Sona Hosseini – JPL – *Miniature UV spatial spectrometer*



Christopher Mendillo – U. Mass Lowell – *Exoplanet balloons*



Jonathan Pober – Brown U. – *Neutral hydrogen cosmology*



Paul Szypryt – U. Colorado – *TES for near-IR astronomy*



2022 NHFP Fellows

How does the universe work?
Einstein Fellows

How did we get here?
Hubble Fellows

Are we alone?
Sagan Fellows



NASA Hubble Fellowship Program

NASA Hubble Fellowship Program Review

The NASA Hubble Fellowship Program (NHFP) supports outstanding postdoctoral scientists pursuing independent research that contributes to NASA Astrophysics

- Merged the previously separate Einstein, Hubble, and Sagan Fellows programs in 2017

In the summer of 2021, NASA conducted the first programmatic review of its Hubble Fellowship Program since the original Hubble Fellowship Program was created over 30 years ago

Review focused on two main areas:

1. Success of the NHFP under its current structure
2. Diversity, equity, and inclusion of the program

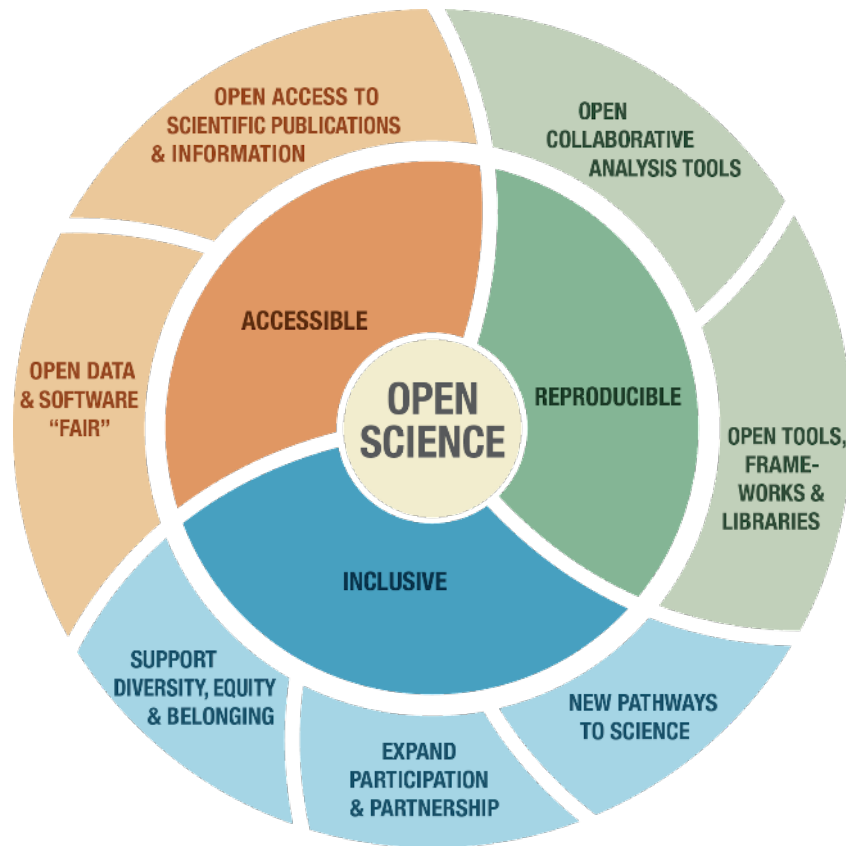
Panel convened comprised of a diverse group of astrophysicists and experts in diversity, equity, inclusion, and accessibility

- Co-chaired by Rita Sambruna, Deputy Director of the Astrophysics Division at GSFC, and Nicolle Zellner, Program Scientist in NASA HQ's Planetary Science Division
- The panel's report is available at <https://science.nasa.gov/astrophysics/documents>

Towards an Improved Hubble Fellowship Program
Splinter Session

Wed 15 Jun, 10:00 am, Conf Rm 204

Open-Source Science Accomplishments



- CHORUS agreement signed by NASA STI providing automatic compliance with open access to all publications by NASA authors accepted by CHORUS partner journals. CHORUS will also provide [metrics](#) for compliance.
- [SMD Policy Directive-41](#) is the first SMD-wide policy on data, software and information. RFI for SPD-41 update closed on March 4, informing revision of SPD-41a and language for ROSES-23.
- Astrophysics data policy, clarifying and providing specific guidance on data policy implementation specific to the division, is now in development with community input.
- Transform to Open Science Training (TOPST) element will solicit ROSES proposals to advance Open Science literacy in NASA's SMD enterprise through development of Open Science curriculum materials, capacity building with the implementation of summer schools, and virtual cohorts. release.

Science Information Policy Town Hall
Thu Jun 16, 1:00 pm, Sheraton Magnolia Rm

Questions to: <https://arc.cnf.io/sessions/r8zx/#!/dashboard>

Why Volunteer to Serve on a NASA Peer Review Panel?

Personal professional development:

- See how the whole review process works
- Learn what constitutes excellent proposals
- Network with your professional colleagues and NASA scientific staff

Institutional achievement:

- Improve at competing for NASA money
- Increase knowledge of NASA's research and technology programs

Investment in the future:

- Help select the most transformative science
- Ensure that all proposals receive a fair and competent review

All reviewers receive an honorarium from NASA

All reviews are virtual (with only a few case-by-case exceptions)

Sign up to be a panel reviewer:

<https://science.nasa.gov/researchers/volunteer-review-panels>

or contact a NASA program officer (for contact info, see

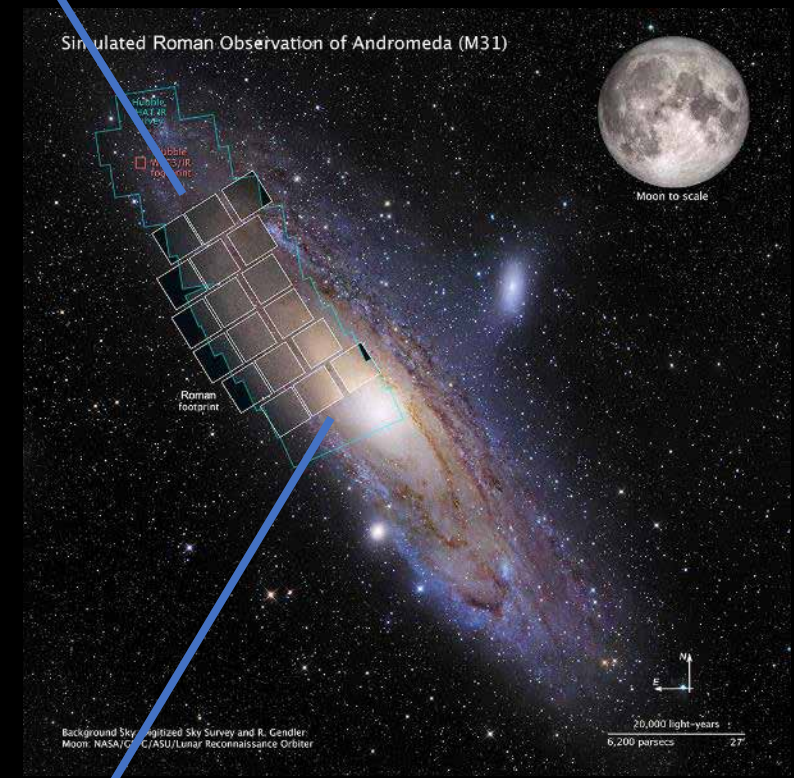
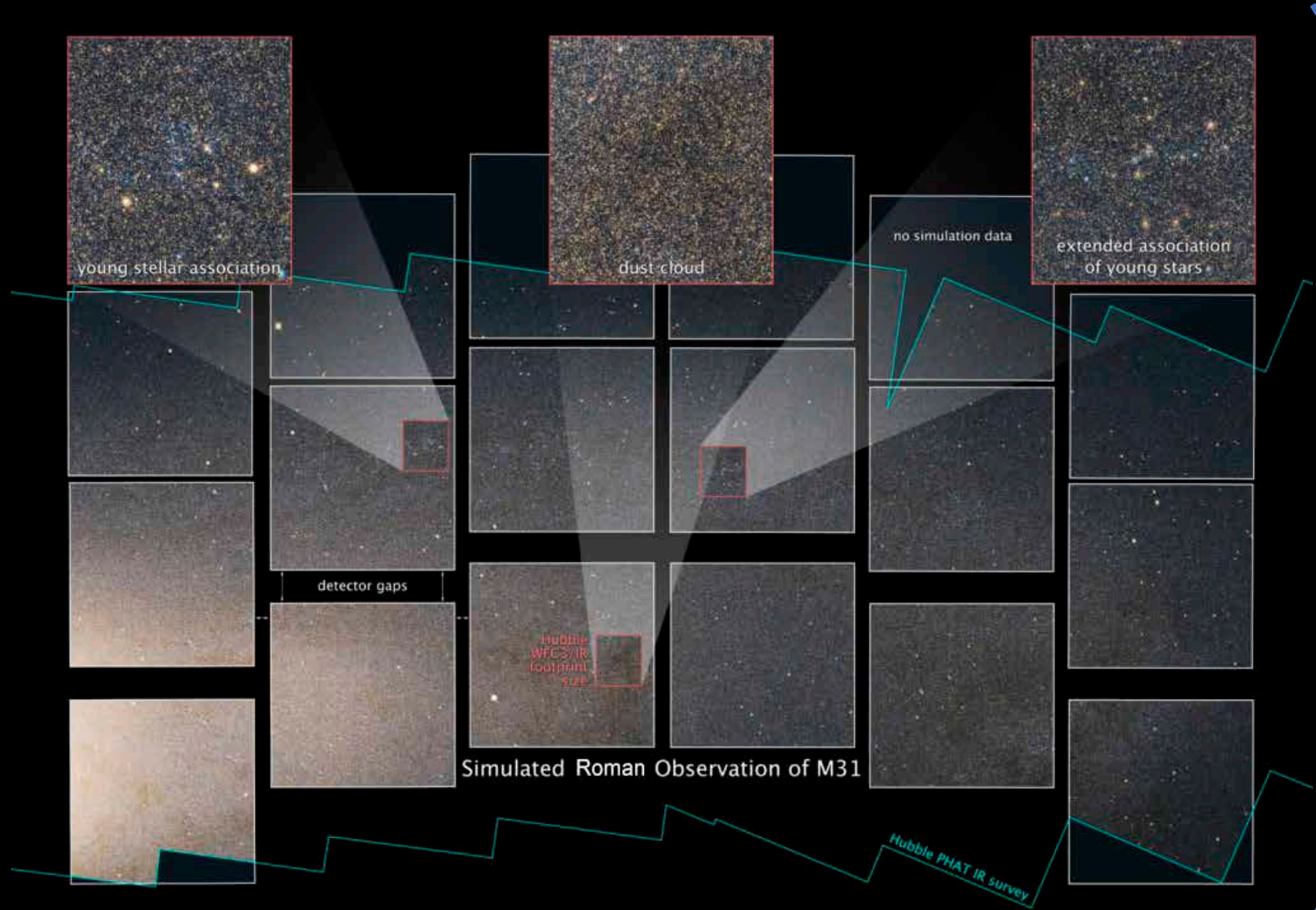
<https://science.nasa.gov/researchers/sara/program-officers-list>)



Program Update -- Missions



NANCY GRACE R.ÖMAN SPACE TELESCOPE



The Wide Field Instrument with its 300 Mpix infrared camera provides Hubble's resolution and sensitivity over 200x larger FOV – *flagship-level survey capability*

NANCY GRACE R.ÖMAN SPACE TELESCOPE

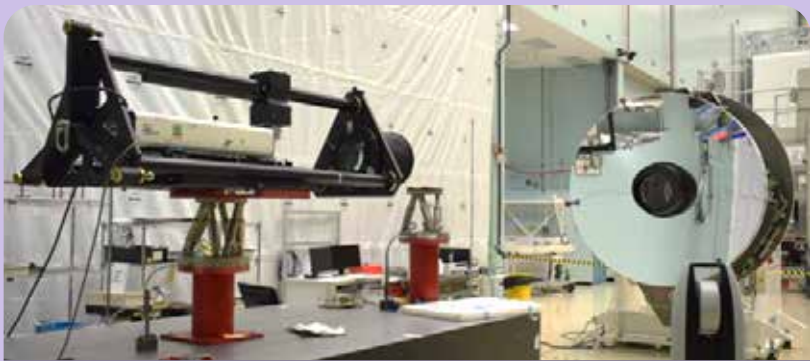
Optical Telescope Assembly Hardware



Tertiary Optical Mirror Assembly



Secondary Mirror Support Tube



Primary Mirror horizontal optical test

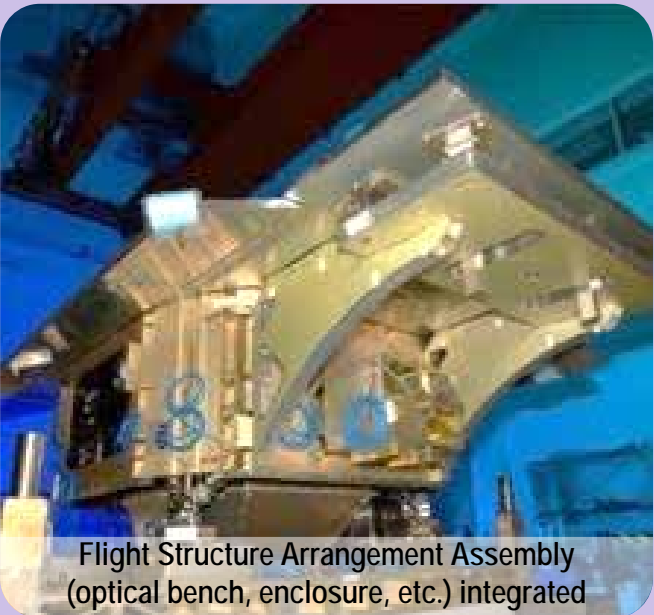


Forward Metering Shell w/thermal control hardware installed

Wide Field Instrument Hardware

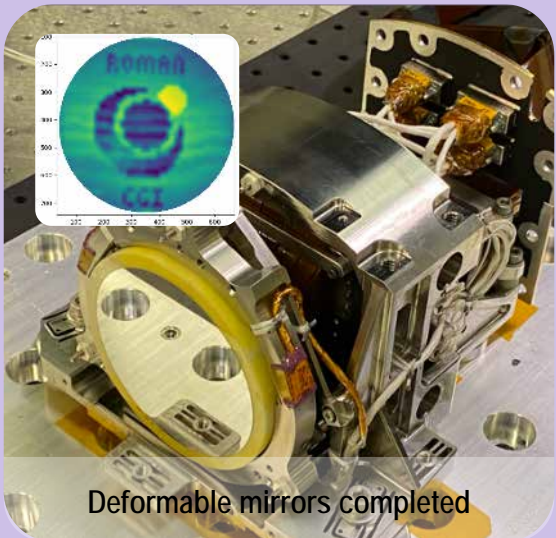


Flight Element Wheel Assembly completed; done thermal vac test



Flight Structure Arrangement Assembly (optical bench, enclosure, etc.) integrated

Coronagraph Instrument Technology Demonstration Hardware



Deformable mirrors completed



Optical Bench integration begun

ROMAN SPACE OBSERVER

Press spacebar to start

Visit the NASA booth to play
the console version of our
new Roman video game!

Or go to:
<https://roman.gsfc.nasa.gov/game>



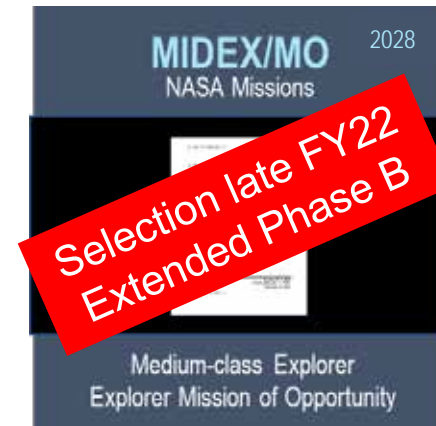
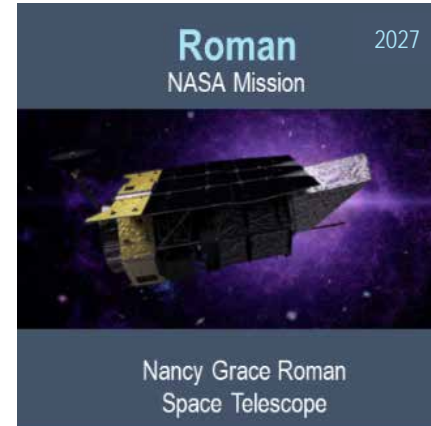
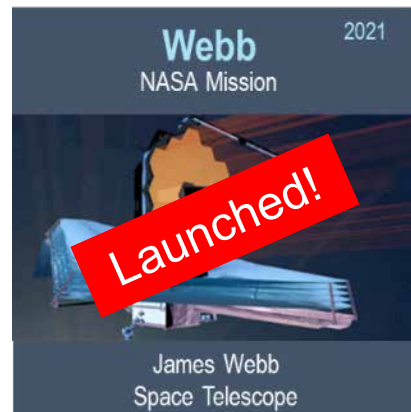
Roman Proposal Opportunities

- Roman will support Core Community Surveys and a variety of General Astrophysics surveys.
 - This is not a call for either kind of observing proposals.
 - Core community surveys will be defined by an open community process run by STScI and IPAC
- Nancy Grace Roman Space Telescope Research and Support Opportunities is being solicited as part of ROSES-2022. Draft posted; final call in ~month, proposals due ~90 days after.
- Open to small teams, large teams, or individuals. Seeking early career researchers; theorists, observers, data analysts. Opportunity for researchers at smaller institutions to participate on a major NASA mission.
- Proposal categories are:
 - Wide Field Instrument (WFI) Science – Science Teams to prepare for all types of WFI surveys
 - WFI Project Infrastructure Teams – Teams work with science centers to develop infrastructure in support of mission science goals
 - Coronagraph Community Participation Program – Investigators work with Coronagraph instrument team to plan and execute tech demo observations

Roman Solicitation Hyperwall
Wednesday 5:40pm NASA booth

Roman Space Telescope Town Hall
Thursday 12:45pm Ballroom D

Astrophysics Missions in Development



Launch dates are current project working dates through XRISM; Agency Baseline Commitment launch date could be later

Does not include Pioneers or CubeSats

ELECTROMAGNETIC SPECTRUM

RADIO/SUBMILLIMETER

INFRARED

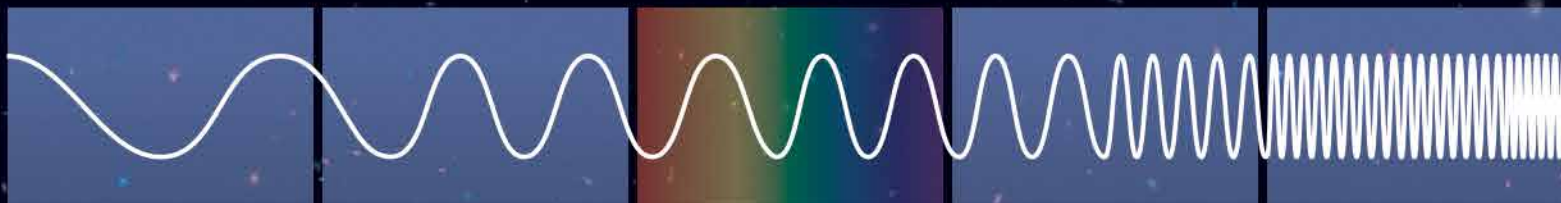
NEAR-INFRARED/
VISIBLE/ULTRAVIOLET

X-RAY

HARD X-RAY/
GAMMA-RAY

PARTICLE

GRAVITATIONAL WAVES



SOFIA



WEBB



TESS



HUBBLE



OPERATING MISSIONS

CHANDRA



NICER



XMM-NEWTON



IXPE



NUSTAR



FERMI



GEHRELS

SWIFT

MISSIONS IN DEVELOPMENT

GUSTO



SPHEREX

ARIEL ULTRASAT



ROMAN



EUCLID



XRISM



ATHENA



COSI



LISA



VERY SMALL AND SUBORBITAL MISSIONS

BALLOONS



BALLOONS



ROCKETS



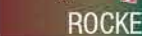
BALLOONS



CUBESATS

ASPERA

PANDORA



ROCKETS



ISS

CUBESATS

BALLOONS



CUBESATS

STARBURST

BALLOONS



PUEO



ISS

5 balloon payloads
2 sounding rocket payloads

2 Pioneers smallsats
6 balloon payloads
2 rocket payloads
3 cubesats

1 Pioneers smallsat
4 balloon payloads
4 sounding rocket payloads
2 cubesats 1 ISS experiment

1 Pioneers balloon
4 balloon payloads
1 ISS experiment

March 2022

Partner-led mission 28

Balloon Program

Campaigns cancelled due to COVID-19: Spring 2020 (New Zealand), Summer 2020 (Palestine TX), Fall 2020 (Ft Sumner NM), Winter 2020 (Antarctica), Spring 2021 (New Zealand), and Winter 2021 (Antarctica).

Successfully demonstrated Return to Flight using COVID-safe procedures with Spring and Fall **Ft Sumner NM** campaigns in 2021 launching 10 missions with 4 piggy-backs.

Wanaka, New Zealand super-pressure balloon campaign (Mar-May) launch attempt resulted in an abort due to an anomaly in non-NASA ground support equipment. For Spring 2023 two science missions planned for Wanaka.

Sweden Campaign is ongoing with two science payloads: Sunrise (heliophysics) and XL-Calibur (astrophysics) plus a 60 MCF qualification test flight. First Launch expected for Mid June.

The Fall **Fort Sumner, NM Campaign**, with launch window opening in Aug, has 9 missions plus 7 piggy-backs on the manifest.

The **Antarctica 2022/2023** long-duration balloon campaign has two science missions: SPIDER (astrophysics) and AESOP-lite (heliophysics) on the manifest. Due to delays in meeting payload milestones, the GUSTO mission slipped to the Antarctica 2023/2024 manifest.



HPD Sunrise payload



Pointing tests of APD XL-Calibur payload

Australia Sounding Rocket Campaign

XQC (X-ray Quantum Calorimeter Experiment)

PI – D McCammon / Univ. Wisconsin (ELA)

2022-06-26

The purpose of this mission is to measure the spectrum of the diffuse X-ray emission from the interstellar medium over the energy range 0.07 to 1 keV.

SISTINE (Sub-orbital Imaging Spectrograph for Transition Region Irradiance from Nearby Exoplanet Host Stars)

PI - K. France / Univ. Colorado (ELA)

2022-07-04

Measurements UV spectra of M and K type dwarf stars. Goals assist in identification and characterization of nearby habitable exoplanets and advance TRL for future missions, such as LUVOIR.

DEUCE (Dual-channel Extreme Ultraviolet Continuum Experiment)

PI – I. Fleming / Univ. of Colorado (ELA)

2022-07-12

Technology development for future UV missions, physics of re-ionization from B stars at extreme UV.



Equatorial Launch Australia (ELA) is a commercial launch site near Arnhem, Northern Territory. Launches planned for Jun/Jul 2022.



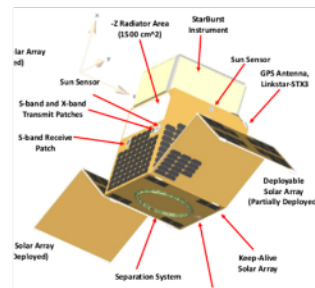
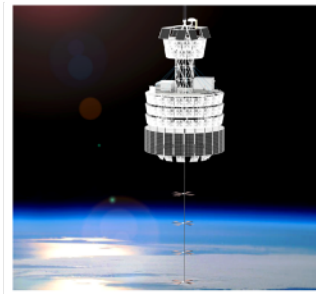
Images from the RSPO Site set-up travel in Oct 2021.

Astrophysics Pioneers

- A new class of small missions solicited annually in ROSES. Includes SmallSats, CubeSats >6U, major balloon payloads, modest ISS attached payloads, and cis-lunar payloads (via CLPS); \$20M maximum PI cost cap
- Fills in the gap between existing ROSES investigations (<\$10M for APRA) and existing Explorers MO investigations (~\$35M for SmallSats)

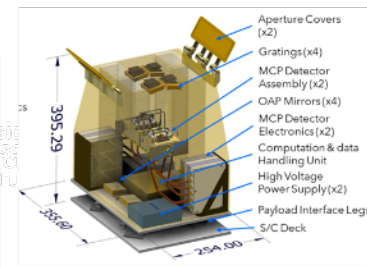
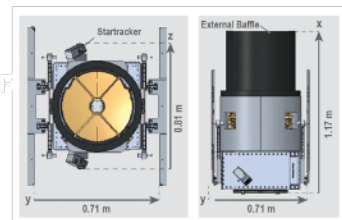
Astrophysics Pioneers – Cycle 1 Selections

PUEO: A Long-duration
Balloon-borne
Instrument for Particle
Astrophysics at the
Highest Energies
(PI Abigail Viereg, U. Chicago)
APPROVED for DEVELOPMENT



StarBurst:
Gamma-ray ASM,
Simultaneous
detection of NS/NS
mergers with LIGO
(PI Daniel Kocevski,
NASA MSFC)
APPROVED for DEVELOPMENT

Pandora:
Multiwavelength
Characterization of
Exoplanets and their
Host Stars
(PI Elisa Quintana,
NASA GSFC)
APPROVED for DEVELOPMENT



Aspera: IGM
Inflow/outflow from
galaxies via OVI
10⁵K emission line
imaging
(PI Carlos Vargas,
U. Arizona)
APPROVED for DEVELOPMENT

- ROSES-2020, 24 Proposals, 4 selected, all 4 passed gate review!
- ROSES-2021, 18 proposals received, review completed, selections soon
- ROSES-2022 proposals due March 16, 2023

Astrophysics Missions in Operations

<p>Hubble^{4/90} NASA Strategic Mission</p>  <p>EXTENDED</p> <p>Hubble Space Telescope</p>	<p>Chandra^{7/99} NASA Strategic Mission</p>  <p>EXTENDED</p> <p>Chandra X-ray Observatory</p>	<p>XMM-Newton^{12/99} ESA-led Mission</p>  <p>EXTENDED</p> <p>X-ray Multi Mirror - Newton</p>	<p>Gehrels Swift^{11/04} NASA MIDEX Mission</p>  <p>EXTENDED</p> <p>Neil Gehrels Swift Gamma-ray Burst Explorer</p>	<p>Fermi^{6/08} NASA Strategic Mission</p>  <p>EXTENDED</p> <p>Fermi Gamma-ray Space Telescope</p>	<p>NuSTAR^{6/12} NASA SMEX Mission</p>  <p>EXTENDED</p> <p>Nuclear Spectroscopic Telescope Array</p>
<p>SOFIA^{5/14} NASA Strategic Mission</p>  <p>Stratospheric Observatory for Infrared Astronomy</p>	<p>ISS-NICER^{6/17} NASA Explorers Miss. of Oppty</p>  <p>EXTENDED</p> <p>Neutron Star Interior Composition Explorer</p>	<p>TESS^{4/18} NASA MIDEX Mission</p>  <p>EXTENDED</p> <p>Transiting Exoplanet Survey Satellite</p>	<p>IXPE^{12/21} NASA SMEX Mission</p>  <p>Imaging X-ray Polarimetry Explorer</p>	<p>Webb^{12/21} NASA Strategic Mission</p>  <p>James Webb Space Telescope</p>	<p>Balloon Program Four Campaigns per Year</p>  <p>Managed by the Astrophysics Division</p>

Imaging X-ray Polarimetry Explorer (IXPE)

Launched Dec 9

Boom deployed Dec 15

Science started Jan 10

Special Session on IXPE Initial Results
Tuesday 14 June, 8:30 am in Con Rm 101

Positive, statistically significant detections of polarization!

CAS-A, 4U 0142, Mrk 501, Crab and Vela pulsar wind nebulae, Her X-1
Discovery papers to Nature, Science, and the Astrophysical Journal are in progress and/or have been submitted



SOFIA

SOFIA Town Hall
June 15 at 6:30pm in Ballroom C

The Decadal Survey recommended NASA end the SOFIA mission after its current mission extension.

On April 28, NASA and DLR (the German Space Agency) jointly announced that they will conclude the SOFIA mission, after a successful eight years of science.

SOFIA will finish out its scheduled operations for the 2022 fiscal year, followed by an orderly shutdown.

During FY 2022, SOFIA will carry out a full program of science operations including multiple deployments to the southern hemisphere.

During FY 2022, SOFIA will prioritize completing legacy surveys to establish an enduring archive of data for community use. Over 80% of Cycle 9 selected investigations will be completed; some selected proposals will not get conducted due to scheduling conflicts.

Airborne Astronomy Ambassadors (AAA), the SOFIA teachers-in-flight program, will continue to operate during FY 2022.

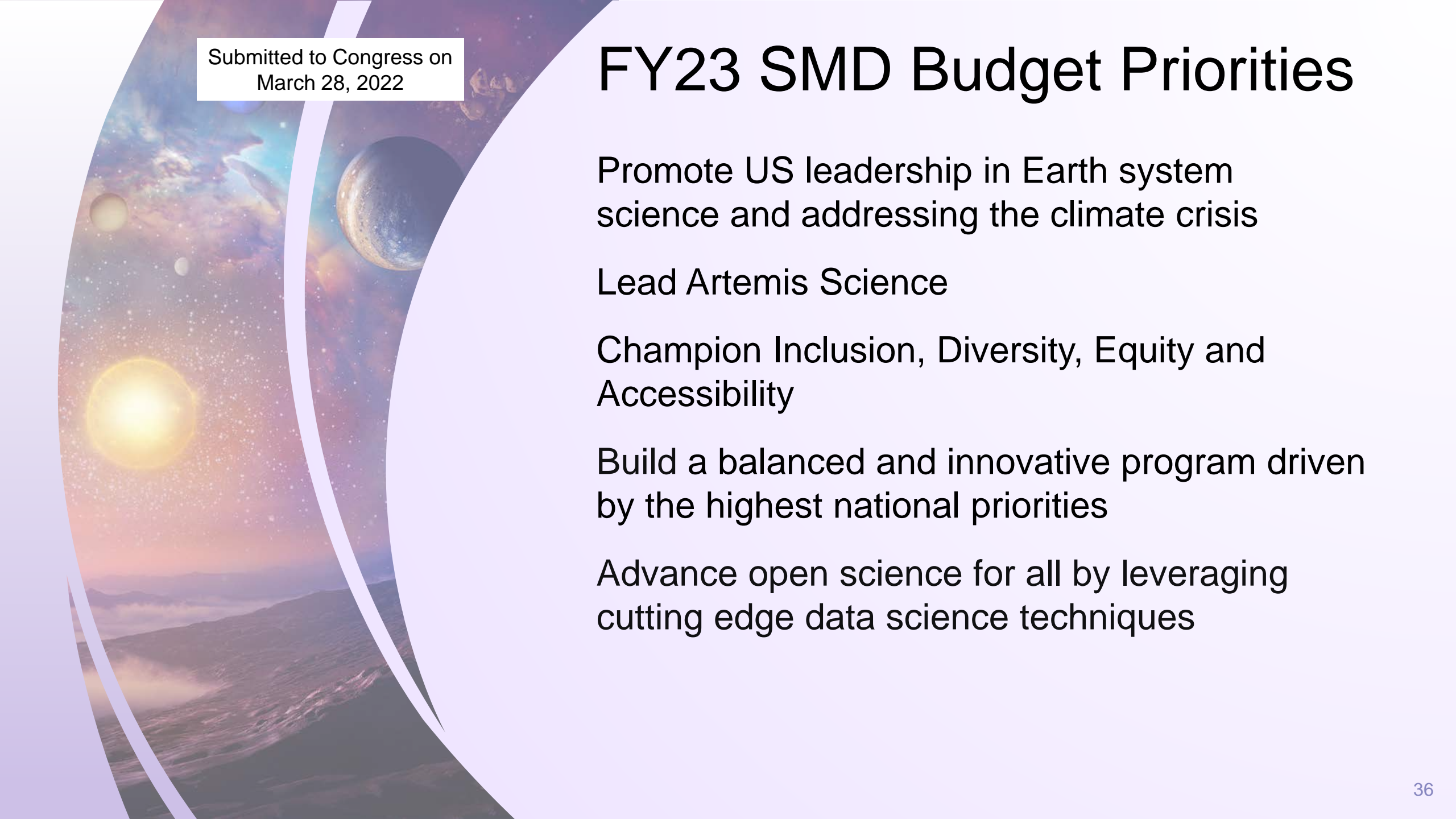
Proposals for Cycle 10 (FY 2023) were received earlier this year; no selections will be made from the Cycle 10 proposals.

The SOFIA project has been directed to develop a project closeout plan for FY 2023.



FY23 President's Budget Request





Submitted to Congress on
March 28, 2022

FY23 SMD Budget Priorities

Promote US leadership in Earth system science and addressing the climate crisis

Lead Artemis Science

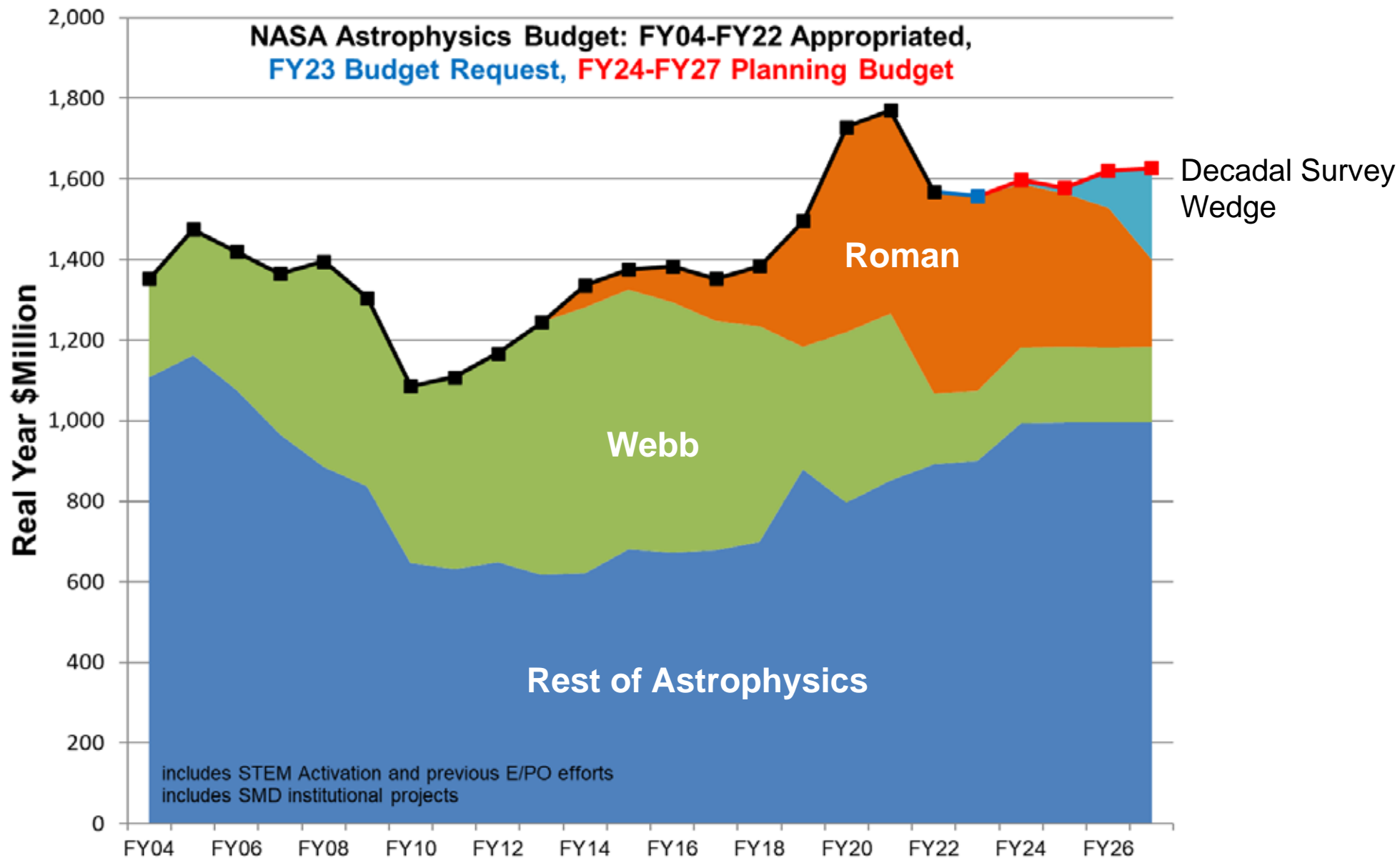
Champion Inclusion, Diversity, Equity and Accessibility

Build a balanced and innovative program driven by the highest national priorities

Advance open science for all by leveraging cutting edge data science techniques

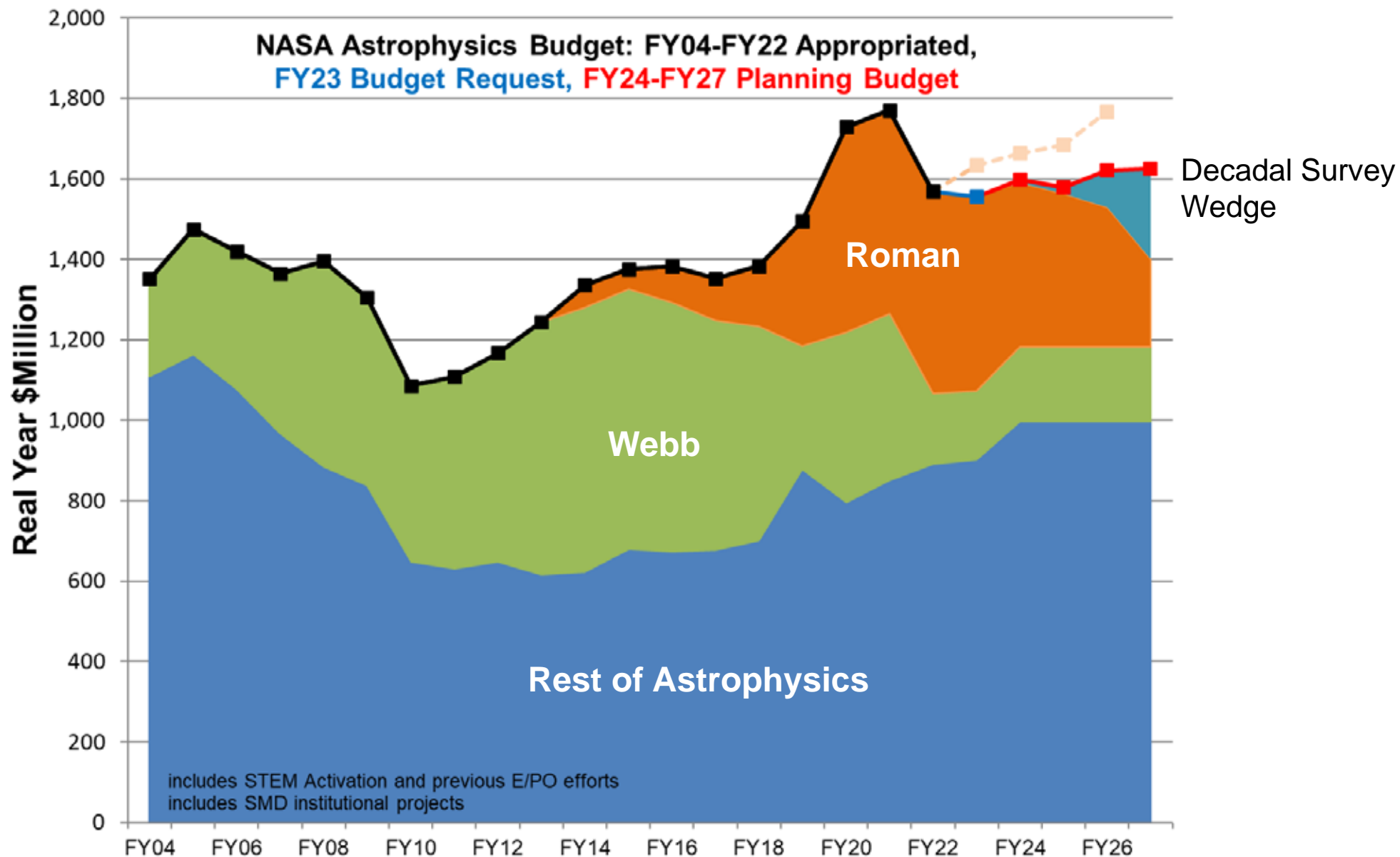
This Year

FY23 President's Budget Request

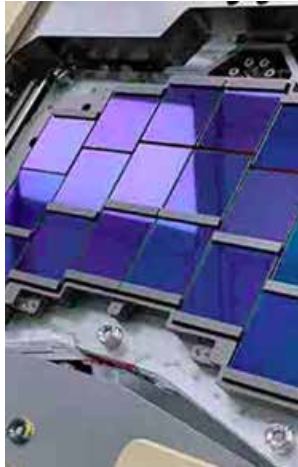


This Year

FY23 President's Budget Request



Astrophysics Budget Features



Increased funding planned compared to a year ago

- Additional Webb General Observer funding
- Roman adjusted for COVID impacts
- Additional Pioneer selections & increased Pioneers cadence
- Support Great Observatory Precursor Science and Time Domain Astrophysics infrastructure systems for Decadal Survey
- Includes bridge partnerships focused on minority serving institutions and Decadal Survey recommendations for increased inclusion
- SOFIA close out in FY23 per Decadal Survey recommendation

Same funding planned compared to a year ago

- Healthy R&A program
- Development of Astrophysics Explorers GUSTO and SPHEREx
- Development of contributions for JAXA-, ISA-, and ESA-led missions XRISM, ULTRASAT, Euclid, Ariel, Athena, and LISA
- Funded operating missions per Senior Review

Decreased funding planned compared to a year ago

- Extended Phase B for COSI, delayed development for next MIDEX
- Compared to the FY 2022 Budget request, delays a future Astrophysics Probe mission; AO release delayed from January 2023
- Delayed implementation of Decadal Survey recommendations



Implementing the 2020 Decadal Survey

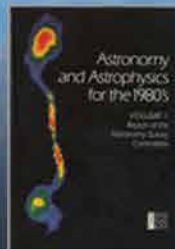


Astrophysics

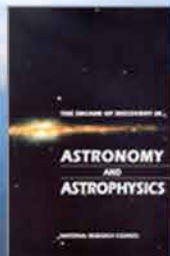
Decadal Survey Missions



1972
Decadal
Survey
Hubble



1982
Decadal
Survey
Chandra



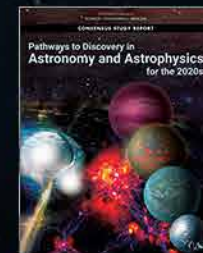
1991
Decadal
Survey
Spitzer



2001
Decadal
Survey
Webb



2010
Decadal
Survey
Roman



2021
Decadal
Survey

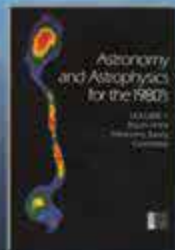
- We are bound by the budgets that we have
- First budget that is fully informed by the Decadal Survey will be the FY24 budget proposal, which will be formulated by NASA Astrophysics in Spring 2022 and submitted to Congress in February 2023

Astrophysics

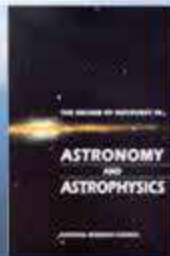
Decadal Survey Missions



1972
Decadal
Survey
Hubble



1982
Decadal
Survey
Chandra



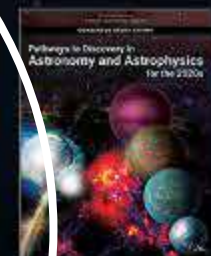
1991
Decadal
Survey
Spitzer



2001
Decadal
Survey
Webb



2010
Decadal
Survey
Roman



2021
Decadal
Survey

Waves of Great Observatories

- Wave 1: Hubble, Compton, Chandra, Spitzer
- Wave 2: Webb, Roman
- Wave 3: Astro2020 Future Great Observatories

Decadal Survey Implementation Update

Page	Recommendation	NASA Actions
3-22	IDEA workforce	SMD bridge program appropriated for FY22
3-23	Postdoc fellowships	Independent review conducted of NASA Bubble Fellowship Program to improve inclusivity
3-29	Proposal demographics	National Academies of Sciences, Engineering, and Medicine Education for Assessing the Health of the Nation: The Role of NASA Science Mission Directorate in the 21st Century "communities" underway
3-30	IDEA evaluation criteria	Required in 8 astrophysics ROSES elements
5-12	SOFIA	SOFIA will conclude its mission by September 30, 2022
6-8	APAC	APAC task force approved at March APAC meeting
7-11	Galaxy evolution program	Precursor science workshops in April and August 2022
7-19	Time domain program	Time domain workshop planned for August 2022
7-20	Astrophysics probes	AO announced for mid 2023
7-35	Roman science program review	CAA working group is conducting a non-advocate review

Additional initiatives are being considered for inclusion in the FY24 NASA budget request

Time Domain & Multi-Messenger Initiative

Operating Missions

Hubble
Chandra
Gehrels Swift
Fermi
CALET (w/ JAXA)
AMS (DOE mission)
NICER
TESS

Missions in Development

BurstCube (cubesat)
BlackCat (cubesat)
PUEO (balloon payload)
StarBurst (Pioneer)
UltraSat (w/ ISA)
COSI (SMEX)
Roman

Future Missions under study or being proposed

THESEUS (w/ ESA)
Proposed CubeSat
Proposed Pioneer
Proposed Mission of Opportunity
Proposed MIDEX
Future Probe



Time Domain & Multi-Messenger Initiative

Actions are being developed to address Time Domain Astrophysics and Multi Messenger (TDAMM) recommendations of the 2020 Decadal Survey

- Operating NASA missions continue to make significant contributions to TDAMM and NASA expects future missions to pursue this science:
 - NASA is making investments in infrastructure – transient alerts, data archives, communications, software – which are essential to maximize scientific return; funding for these investments is included in the FY23 budget request.
 - Responding to transient astrophysical phenomena involves multiple ground- and space-based assets and NASA is studying efficiencies in how to deploy its fleet
 - Astro 2020 urges TDAMM be addressed across agencies and NASA is standing up interagency and international working groups to address this coordination
- TDAMM will be an initiative with extensive interagency and international cooperation, shaped using broad community input
 - Prioritizing the science NASA should address. Community workshop this 22-24 August 2022: <https://pcos.gsfc.nasa.gov/TDAMM/>
 - Partner-led TDAMM missions with NASA contributions
 - NASA missions with international partner contributions



Future Great Observatories

Large observatories are a critical component of NASA's astrophysics portfolio

- The Decadal Survey recommends a compelling, feasible, timely portfolio of future great observatories that is part of a balanced Astrophysics program

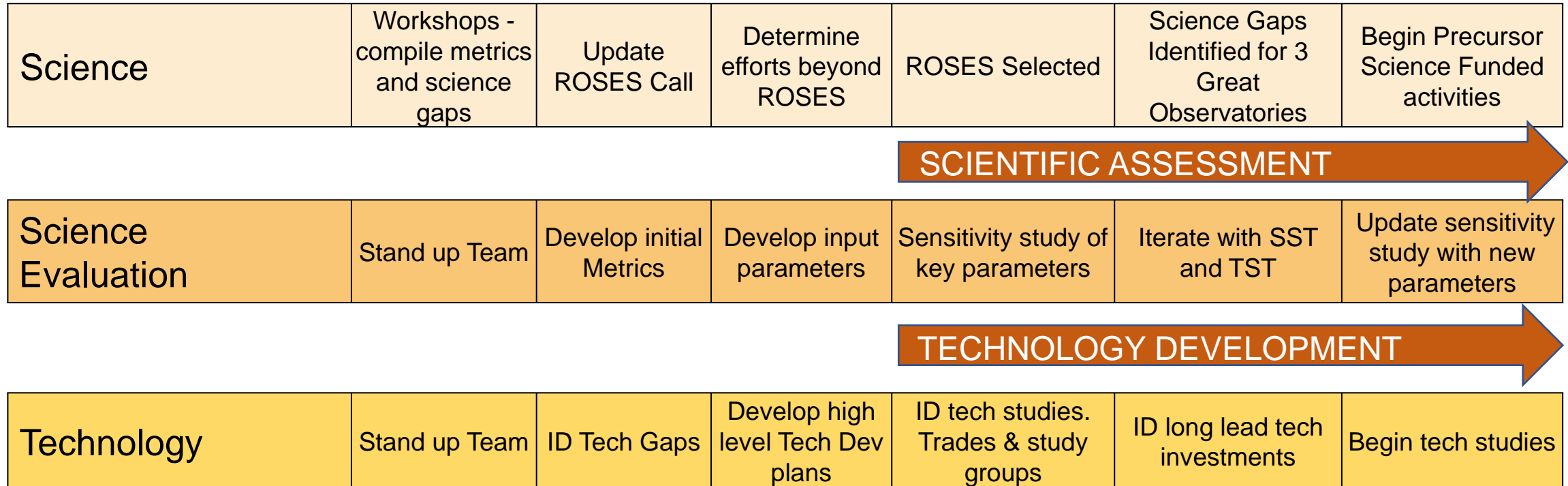
Today NASA's priority is ensuring mission success for Webb and Roman

- Webb completed telescope commissioning; science instrument commissioning is progressing well; preparations are underway for science to commence in July 2022.
- Roman is progressing well in Mission Phase C "Final Design and Fabrication" and is on track for a mid-2027 launch

Now is not the time to start a Future Great Observatory; now is the time to prepare NASA will take a deliberate, multi-stage planning and strategy approach to the next large observatory mission

- Stage 1 – Begin the Decadal Survey recommended "Great Observatories Maturation Program". Focus on enabling science and technology; begin Stage 1 now
- Stage 2 – Conduct Analysis of Alternatives (AoA) and science / technology / architecture trades; begin Stage 2 in a few years (driven by planning and budget availability)
- Stage 3 – Pre-formulation and decision to start the next Great Observatory; begin after Stage 2 AoA complete (Decadal Survey estimates 6 years for Stages 2 and 3)

STAGE 1 ACTIVITIES



Note: This is not a timeline; some activities within each lane occur in parallel
 There is cross-communication and cross-participation between activities in different rows
 ROSES call for precursor science investigations anticipated for January 2023

Next Steps for Stage 1

Community Participation via

Technology

- Update Gap lists: present at **June** AAS PAG meetings
- SAT proposals due **Dec 15**
- A TST will begin technology activities in CY22; numerous community Task Groups are expected to be stood up to help in CY23.
- Community technology workshop(s) in **CY 2023**



Great Observatories Mission and Technology Maturation Program (GOMAP)

Objectives

- GOMAP will co-develop and mature the science, mission architecture, and technologies for Astro2020's NASA flagships
- Engage stakeholders and leverage the entire multi-sector community: industry, academia, NASA centers, other agencies, and international partners
 - Support trade studies, technology development, integrated modelling, and other feedback via openly competed procurements
 - Host open, hybrid workshops with published outcomes
 - Majority (>80%) of funding will be competed
- Intentionally seek out, build upon, and leverage the IDEA community to enable an inclusive culture and broad participation by all as the missions evolve
 - Adopt affirmative codes of conduct
- Engage community groups in all mission phases for developing science requirements and priorities; thereafter, prevent science-scope creep
 - Continually engage new science community members as the activities evolve
- Communicate broadly to community for transparency and confidence in the process



Big Finish



What's next for Astrophysics?

I will be stepping down this summer after more than 10 years as Director of Astrophysics (the best job at NASA)

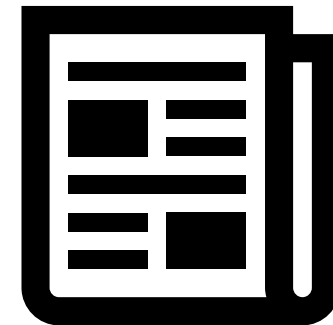
This is my last Joint PAG plenary address

Ten years makes me the longest serving Director of Astrophysics in the history of NASA

Once the new Director of Astrophysics is in place, I will move to the SMD Front Office as Senior Advisor to the SMD Associate Administrator

Applications are in and the review is underway to select the person who will lead NASA astrophysics in the upcoming era of

increasing inclusion and diversity,
growing R&A,
Webb science,
Roman development,
exoplanet characterization,
time domain and multi-messenger astrophysics,
dark energy and dark matter,
first Astrophysics Probe,
more Explorers / Pioneers / cubesats,
future great observatories,
and realizing Decadal Survey priorities





ASTROPHYSICS FLEET

PRE-FORMULATION

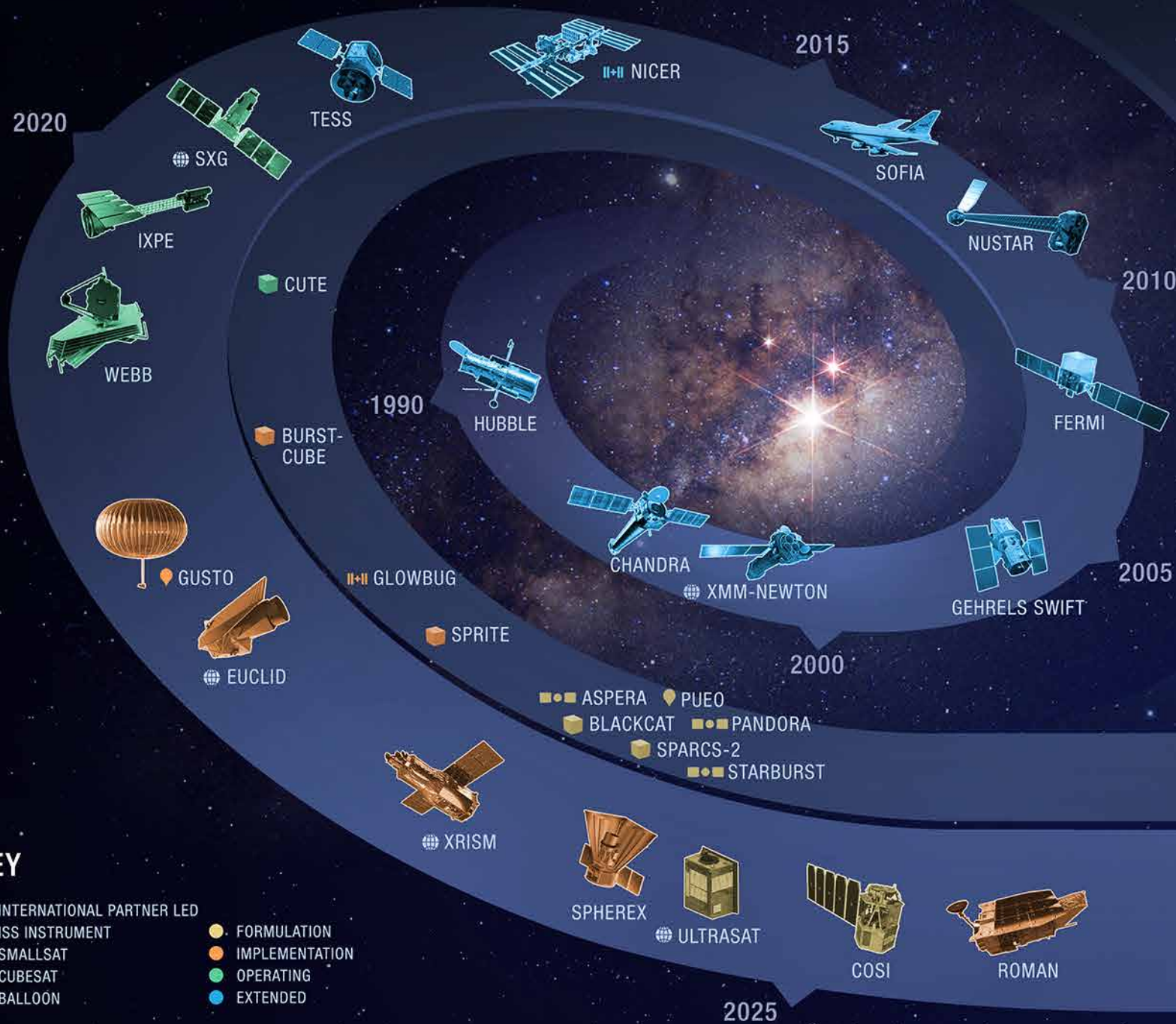
MIDEX/MO 2028
PROBE ~2030
ATHENA EARLY 2030s
LISA MID 2030s

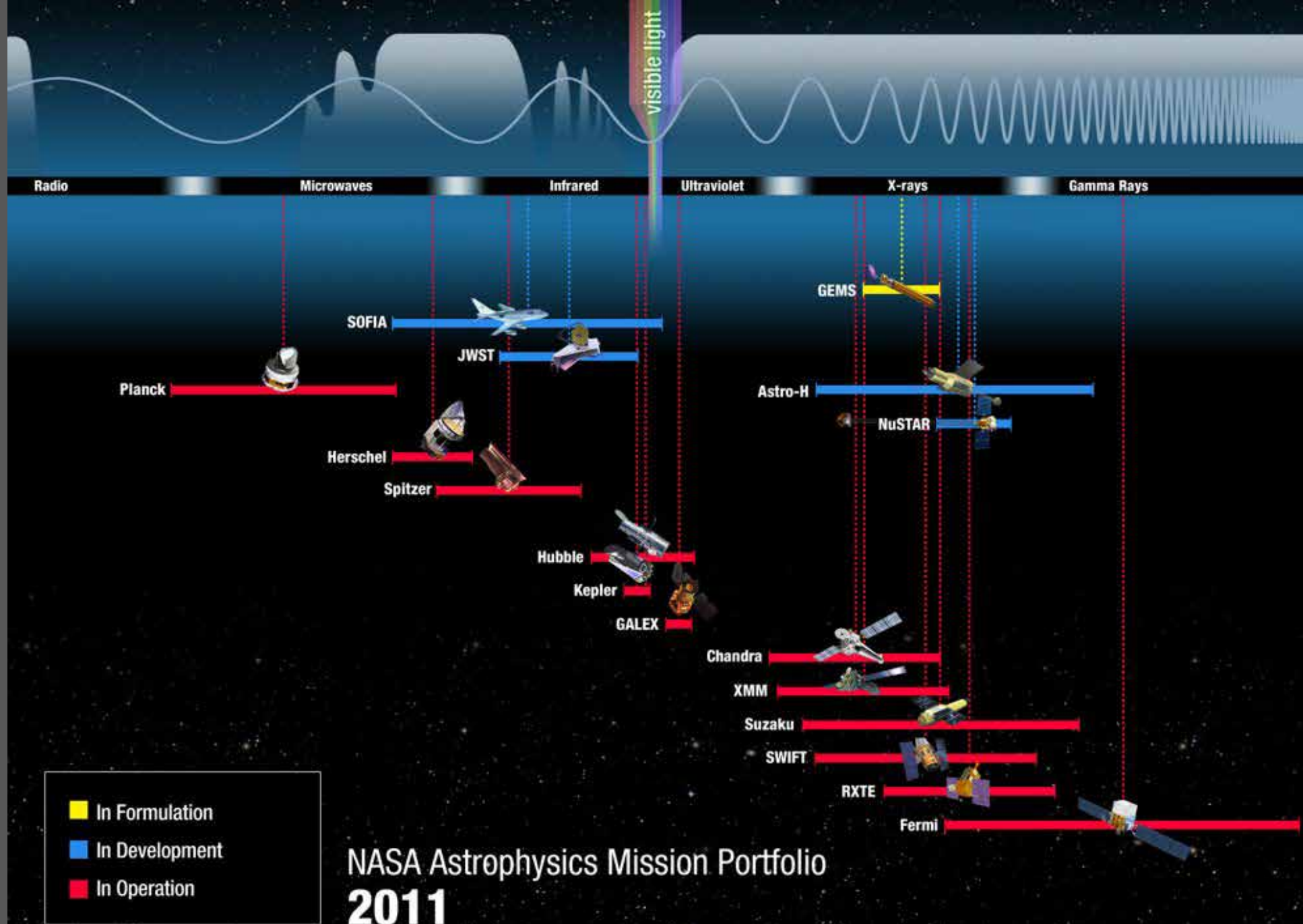
VERY SMALL MISSIONS

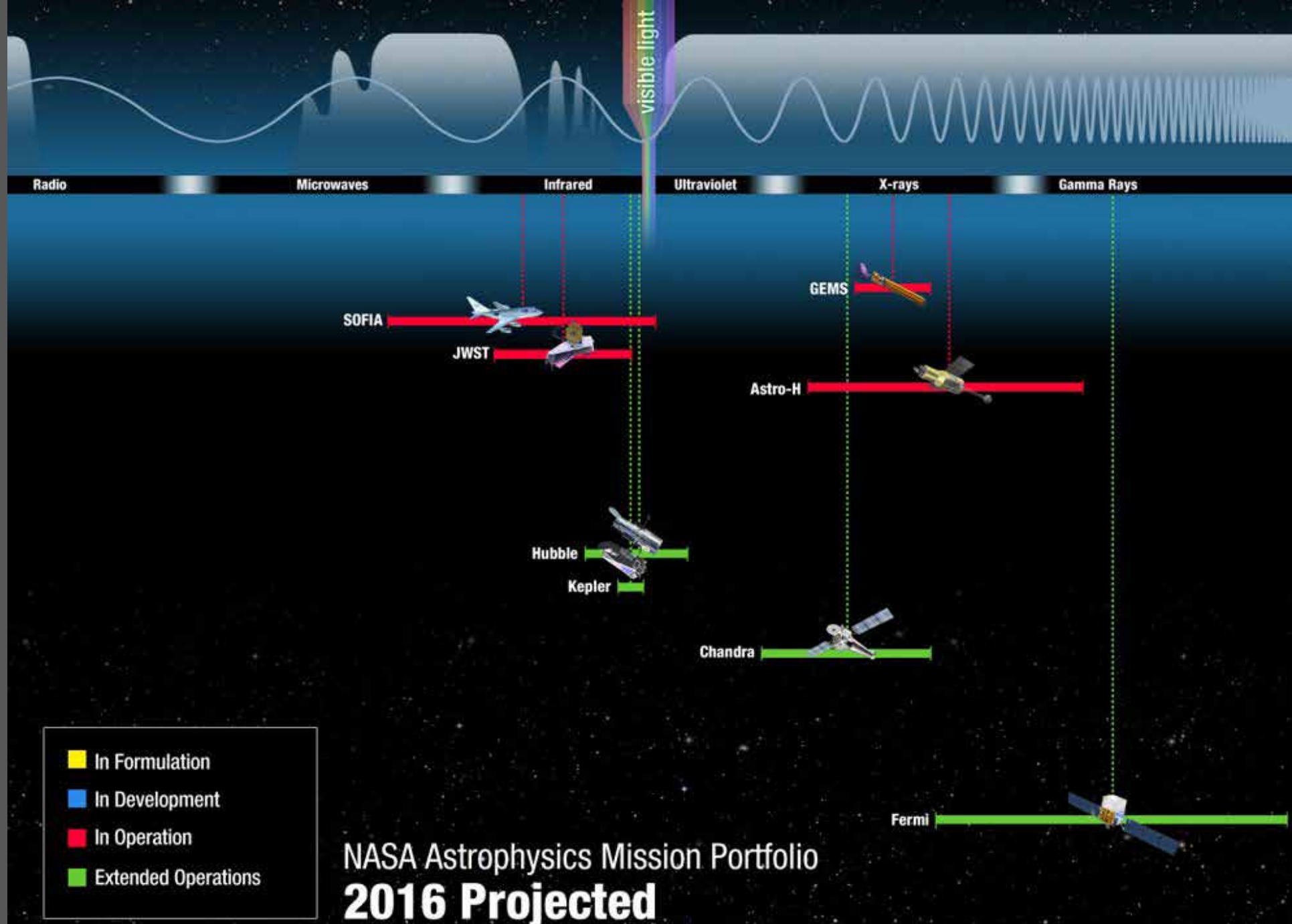
TRADITIONAL MISSIONS

KEY

- INTERNATIONAL PARTNER LED
- ISS INSTRUMENT
- SMALLSAT
- CUBESAT
- BALLOON
- FORMULATION
- IMPLEMENTATION
- OPERATING
- EXTENDED







ELECTROMAGNETIC SPECTRUM

RADIO/SUBMILLIMETER

INFRARED

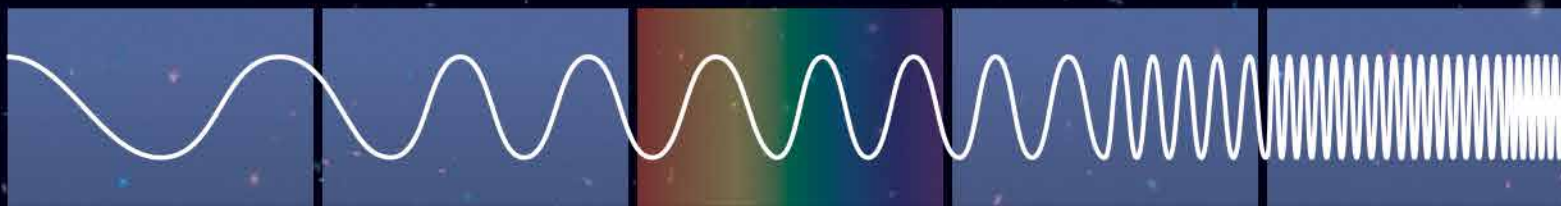
NEAR-INFRARED/
VISIBLE/ULTRAVIOLET

X-RAY

HARD X-RAY/
GAMMA-RAY

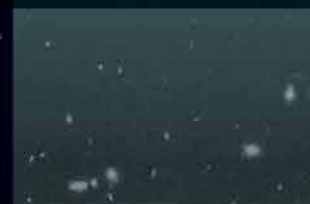
PARTICLE

GRAVITATIONAL WAVES

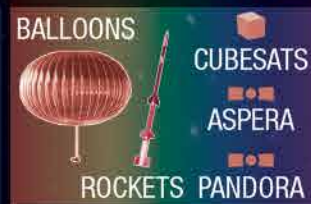


OPERATING MISSIONS

	2011	2022
Operating Missions	12	11
Missions in Development	4	10
Very Small Projects		38



VERY SMALL AND SUBORBITAL MISSIONS



5 balloon payloads
2 sounding rocket payloads

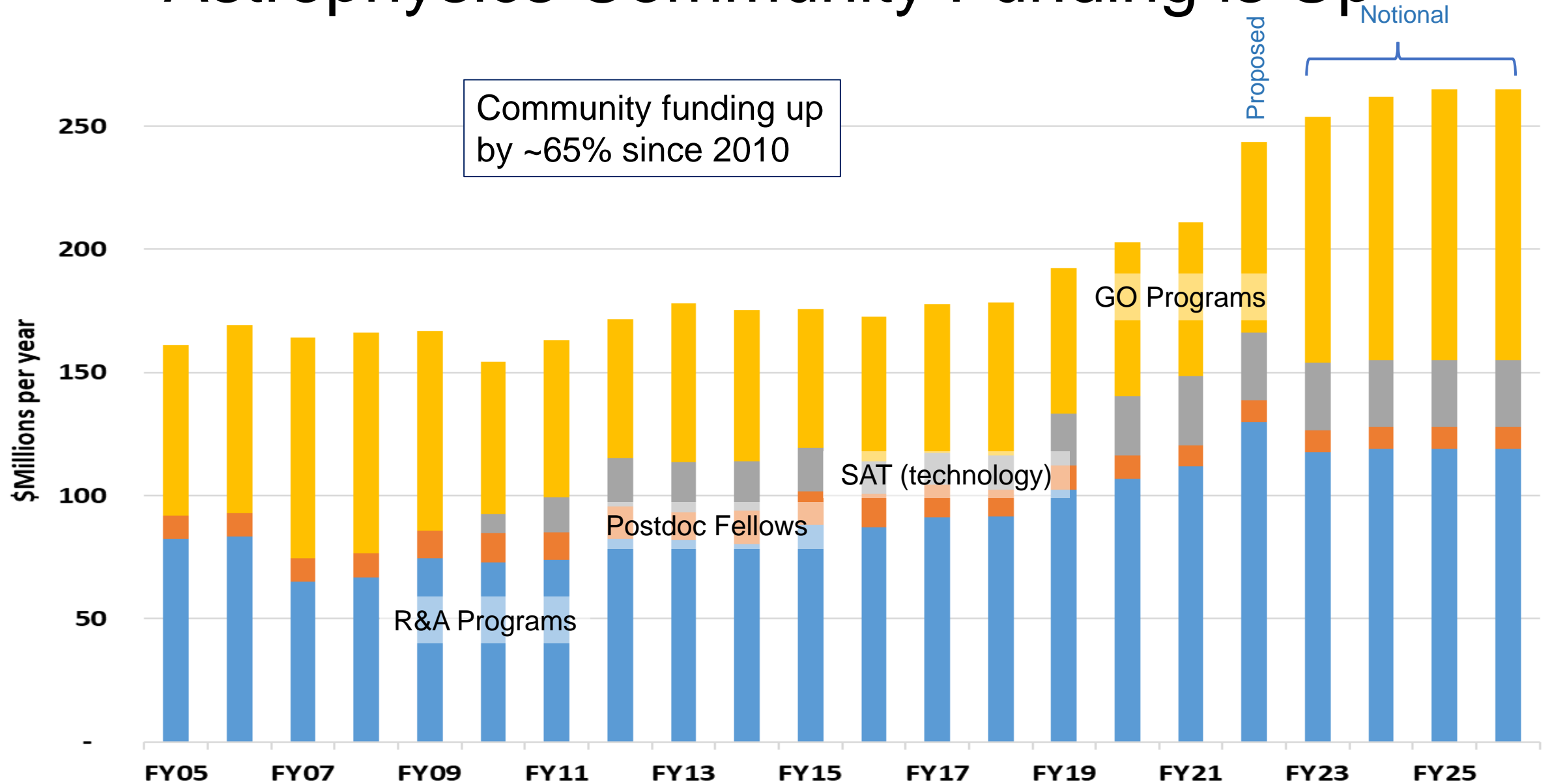
2 Pioneers smallsats
6 balloon payloads
2 rocket payloads
3 cubesats

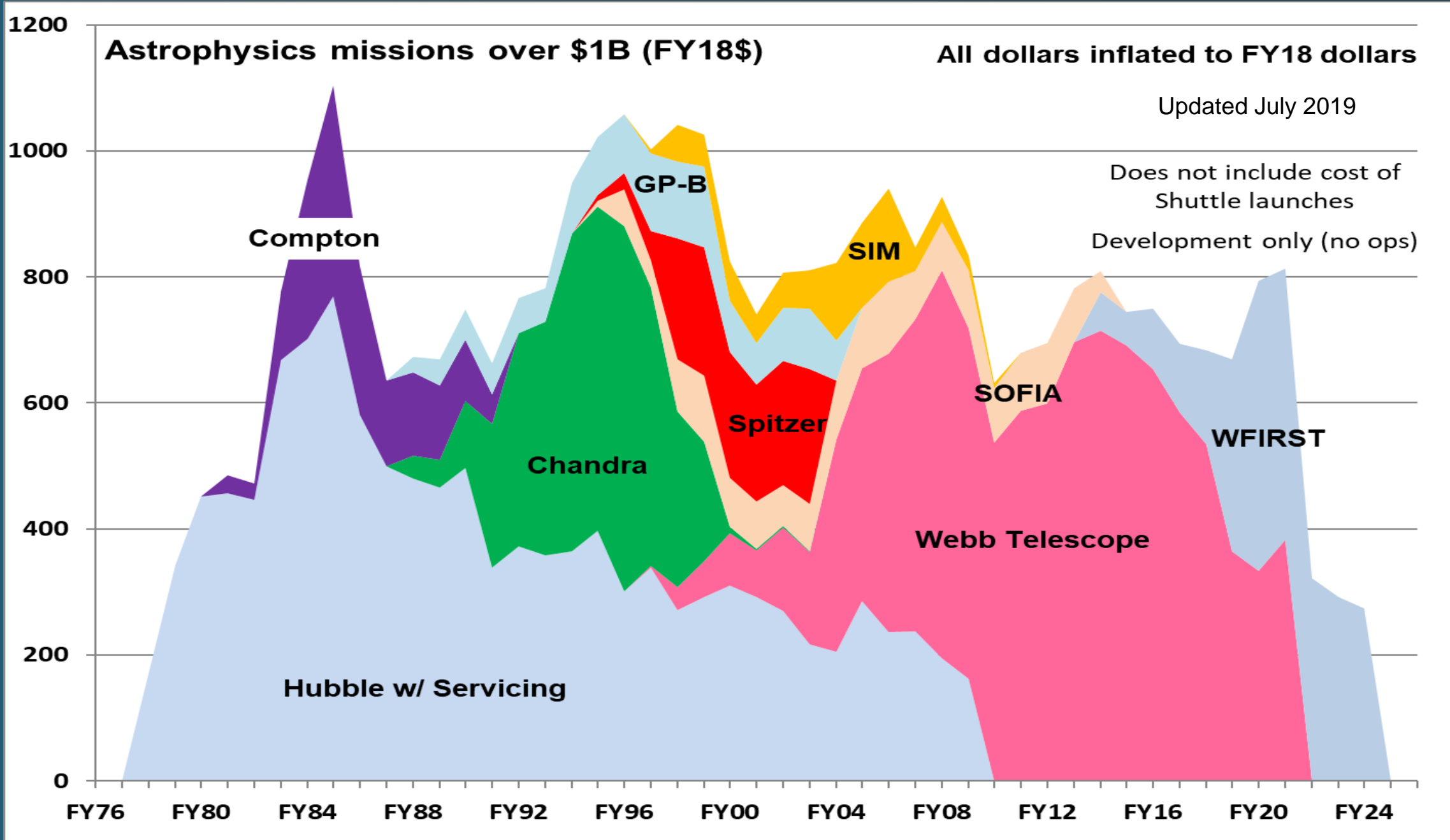
1 Pioneers smallsat
4 balloon payloads
4 sounding rocket payloads
2 cubesats 1 ISS experiment

1 Pioneers balloon
4 balloon payloads
1 ISS experiment

March 2022

Astrophysics Community Funding is Up





Astronomy and Astrophysics
in the New Millennium

Astro2000 realized

Finish the Program of Record

SIRTF (Spitzer), SOFIA, SIM (Gaia), MAP (WMAP), Planck

Large Initiatives

NGST (Webb) , Con-X (Athena), TPF

Medium Initiatives

GLAST (Fermi), LISA, EXIST (MAXI), ~~ARISE~~

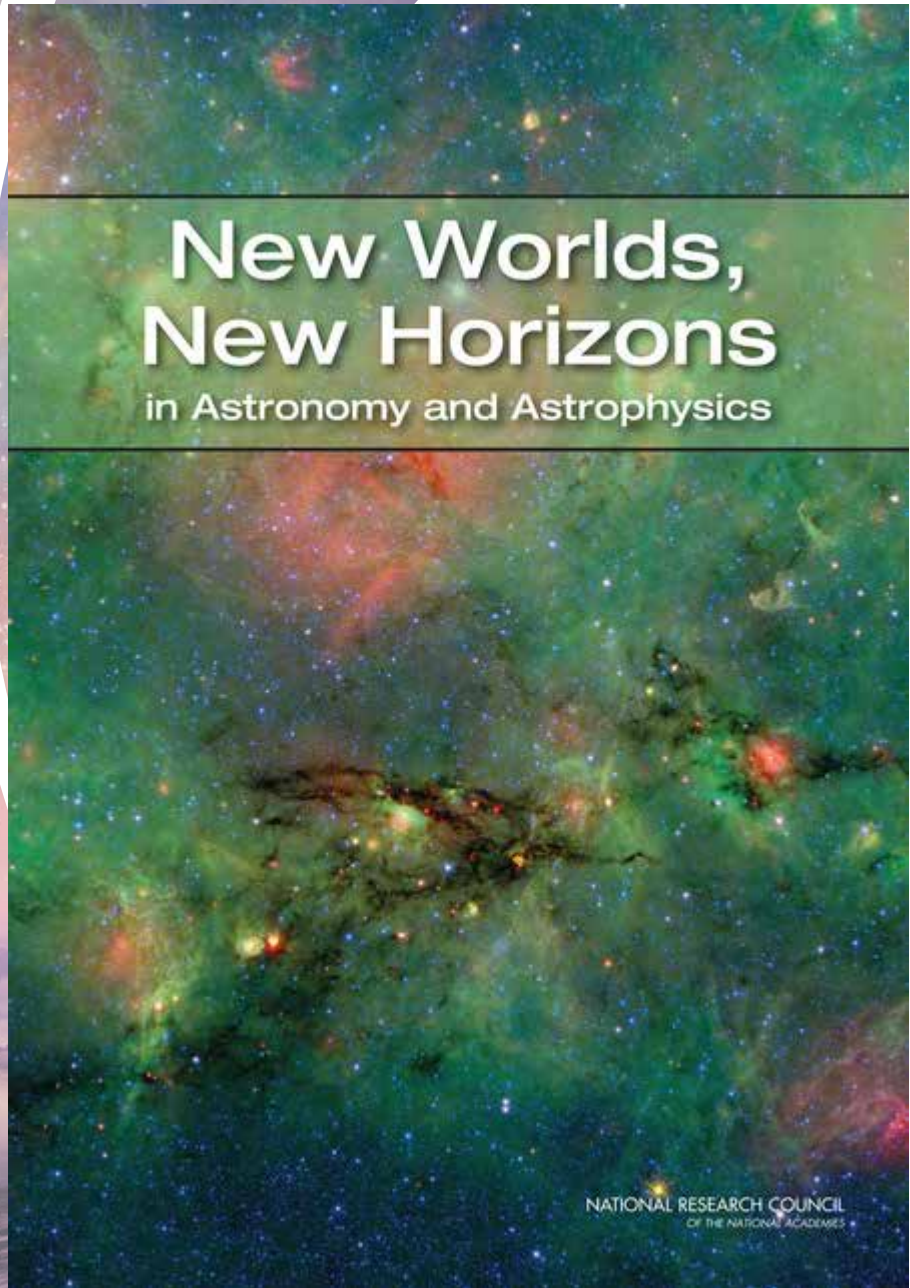
Legend:

In the current program

Subset of capabilities in the (international) current program

~~Not in the current program~~

NRC
National Research Council



Astro2010

Program of Record [Figure 6.3]

Webb, Small Explorers (NuSTAR, GEMS (IXPE))

Large Initiatives

WFIRST (Roman), Explorers, LISA, IXO (Athena)

Medium Initiatives

Exoplanet Technology, CMB Technology

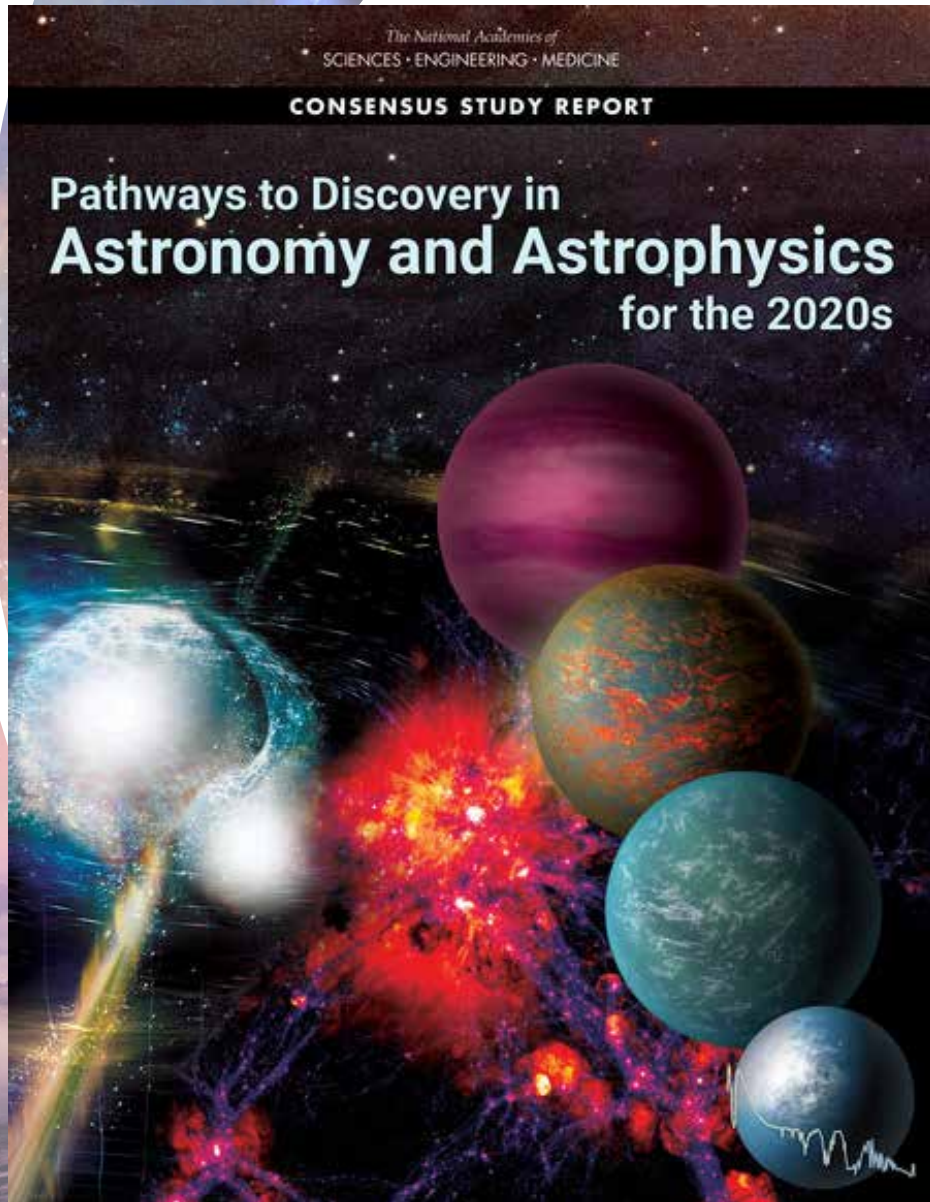
Legend:

In the current program

Subset of capabilities in the (international) current program

Not in the current program

Astro2020



Program of Record [Table 7.1]

End SOFIA, Explorers, Webb, Roman, Euclid, Athena, LISA

Enabling & Frontiers (Large) Initiatives

GOMAP, IR/O/UV Observatory, FIR & X-ray Observatories

Sustaining (Medium) Initiatives

TDAMM Follow-Up Program, Astrophysics Probe



Decadal Survey Goal

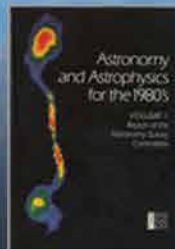
- NASA's highest aspiration for the 2020 Decadal Survey is that it be ambitious
 - The important science questions require new and ambitious capabilities
 - Ambitious missions prioritized by previous Decadal Surveys have always led to paradigm shifting discoveries about the universe
- If you plan to a diminishing budget, you get a diminishing program.
 - Great visions inspire great budgets.

Astrophysics

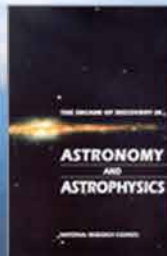
Decadal Survey Missions



1972
Decadal
Survey
Hubble



1982
Decadal
Survey
Chandra



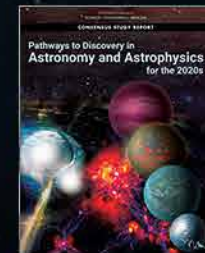
1991
Decadal
Survey
Spitzer



2001
Decadal
Survey
Webb



2010
Decadal
Survey
Roman



2021
Decadal
Survey

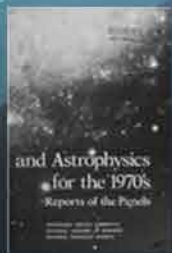
PH to Astrophysics Division (2012) – Create the Future

PH to Astro2020 (2019) – Carpe Posterum

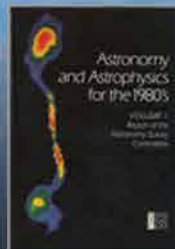
PH to everyone (2022) – We got what we asked for!

Astrophysics

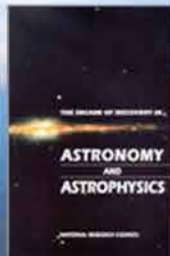
Decadal Survey Missions



1972
Decadal
Survey
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1982
Decadal
Survey
Chandra



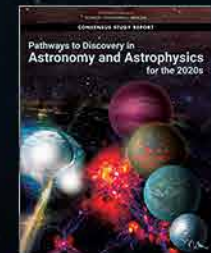
1991
Decadal
Survey
Spitzer



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Decadal
Survey
Webb



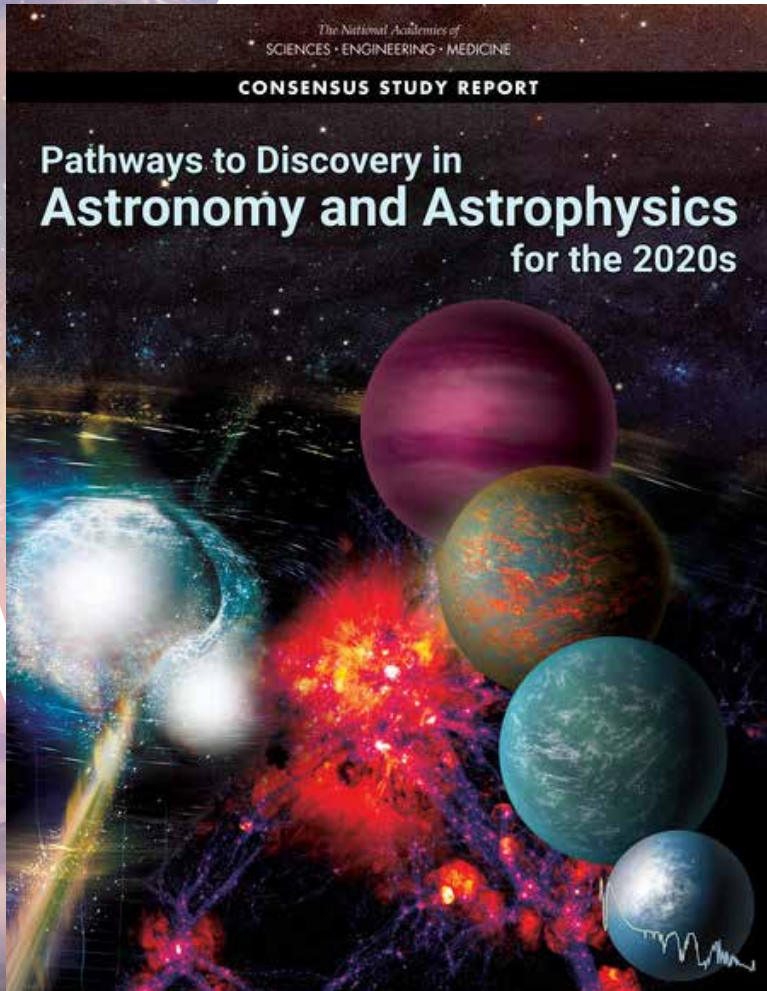
2010
Decadal
Survey
Roman



2021
Decadal
Survey

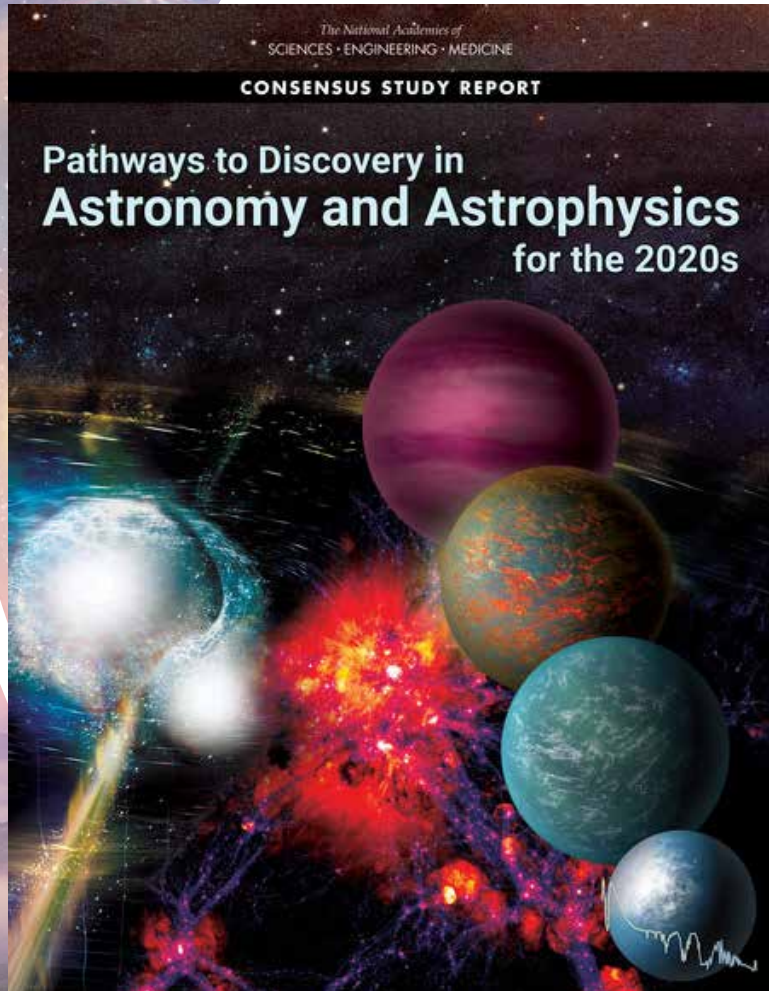
Thomas Zurbuchen, Associate Administrator for Science
“Astro2020 and Beyond: Carpe Posterum”
Tue 14 Jun @ 11:40 am in Hall C

Carpe Posterum: a How-To Guide



- Every decade has its challenges
 - The 2000s were a time of unbridled optimism and underrealized dreams. Yes, we did finally get JWST. But we don't have SIM or Con-X or TPF.
 - The 2010s began as a decade of austerity. But we're well on the way to building Roman. By the end of the year, we will have selected 5 Explorers and 4 Missions of Opportunity in 10 years. We have partnerships in LISA and Athena and XRISM (and Euclid and ARIEL). We made hard choices to defer a CMB mission and decline to participate in SPICA.
- It's time to begin the work of the 2020s!
 - We have an ambitious and inspiring Decadal Survey recommending investments to study the time domain universe, produce the first Astrophysics Probe, and characterize Earth 2.0.
 - We also have a reduced and flattened planning budget.
 - This feels like déjà vu all over again.

Carpe Posterum: a How-To Guide



- Astrophysics holds a key position in our culture. It is one of the most accessible sciences, is generally apolitical, and inspires people the world over.
 - The U.S. is the world leader in space astrophysics
- The goals of the 2020s will take the same hard work that it took to realize the dreams of previous decades and prior Decadal Surveys:
 - Unity of purpose for Decadal Survey priorities
 - Leverage all the diverse talent of the Nation
 - Focus on consistent messages to stakeholders
 - Diligence in controlling scope creep
 - Innovation in science, technology, and architecture
 - An “All of Humankind” approach

A surreal landscape featuring a person standing on a rocky cliff, arms raised in triumph. The scene is set against a backdrop of dramatic, dark clouds with a bright, glowing horizon. A large, crescent moon hangs in the sky, and a bright star or comet streaks across the upper right. A lightning bolt is visible on the left side of the image.

Carpe Posterum