NASA Astrophysics Update

Space Studies Board | June 1, 2023

Dr. Mark Clampin
Director, Astrophysics Division
Science Mission Directorate

Science Mission Directorate

ASTROPHYSICS

Organizational Chart

DIVISION MANAGEMENT

Dr. Mark Clampin
Director

Sandra Cauffman
Deputy Director

ADMINISTRATIVE SUPPORT
Kelly Johnson, Jennifer Baker (C), Pamela King-Williams (C)

DIVISION LIAISONS

Resource Management
Elijah Owuor (Lead)
Danielle Gervalis
Jennifer Holt

Policy
Peter Meister (Lead)
Enida Santiago-Arce

Communications
Alise Fisher (Lead)

Program Support Specialist
Sara Schwartzman

CROSS CUTTING

Technologist
Mario Perez (Chief)
Omid Noroozian (Deputy)

APD Communications
Hashima Hasan (Lead)
Doris Daou (Deputy)
Liz Landau (C - OCOMM Liaison)
Natasha Pinol (C - Public Engagement Liaison)

Inclusion, Diversity, Equity, and Accessibility
Kartik Sheth (Lead)
Antonino Cucchiara (Deputy)

GOMAP Program
Julie Crooke (Executive)
Shawn Domagal-Goldman (Scientist)

APD Information Manager
Rhiannon Roberts (C)

FLIGHT PROGRAMS

Associate Director
Joseph Smith

PROGRAM EXECUTIVES

Rachele Cocks
Lucien Cox
Shahid Habib
Janet Letchworth
Mark Sistilli

RESEARCH & ANALYSIS

Associate Director
Eric Smith

R&A Lead
Stefan Immler

PROGRAM SCIENTISTS

Manuel Bautista
Dominic Benford
Valerie Connaughton
Antonino Cucchiara (C)
Doris Daou
Michael Garcia
Thomas Hams (C)
Hashima Hasan
Doug Hudgins
Stefan Immler
Hannah Jang-Condell
Patricia Knezek
Bill Latter
Sangeeta Malhortra
Roopesh Ojha
Joshua Pepper
Mario Perez
Kartik Sheth
Eric Smith
Linda Sparke
Sanaz Vahidinia
John Wisniewski

PROGRAM SUPPORT SPECIALIST
Ingrid Farrell (C)

ASTROPHYSICS STRATEGIC MISSIONS

Program Director
Sandra Cauffman

Program Manager (Acting)
Garth Henning

PROGRAM EXECUTIVES

Ed Griego
Lucas Paganini
Miles Skow

PROGRAM SUPPORT
Tony Comberiate (C), Andre Davis (C)

Legend
C - Contractor

Astrophysics by the NUMBERS

RESEARCH

~400 U.S. Science PIs Funded
~128 Individual Institutions Selected
~$135M Awarded Annually

TECHNOLOGY DEVELOPMENT

~$220M Invested Annually

SMALLSATS/ CUBESATS

2 Science Missions Launched
8 Science Missions in Development
1 ISS-attached Science Mission

REFEREED PUBLICATIONS

20,122 Total Publications
4,857 Hubble Publications (2017-2021)
101 JWST Publications (First 6 months)

SOUNDING ROCKETS

14 Science Missions Launched (Suborbital)
4 In Development

MISSIONS

11 Missions Operating
11 Missions in Development

BALLOONS

14 Suborbital Balloons Launched
20 Missions in Development

March 2023

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.)

Building Excellent NASA Teams Requires Inclusion & Diversity

* Responsive to an Astro2020 Decadal Survey recommendation

- 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 various ROSES elements across all SMD divisions *
  2. Standard language for an IP will be included in Roses23 *
  3. Code of Conduct now adopted for panel reviews across all SMD divisions
  4. Statement of Principles adopted for NASA Astrophysics (see next slide)
  5. Dual Anonymous Peer Reviews adopted across all SMD divisions
  6. Inclusion Criteria in Senior Reviews of Missions adopted across all SMD divisions *
  7. Increasing diversity of reviewers for all panels expected across all SMD divisions
  8. Collection, evaluation, and publication of demographics (ROSES) *
  9. Regularly report data on proposal submissions and success rates *
  10. SMD Bridge Program funded for better engagement with MSIs * **https://science.nasa.gov/smd-bridge-program**
  11. New approach to Community Engagement
- Have begun Community Engagement with virtual visit to Puerto Rico with more visits in the upcoming year.

NASA Astrophysics Statement of Principles

Purpose of this Statement of Principles:

The purpose of the Statement of Principles is to help NASA Astrophysics carry out community best practices to create an inclusive work environment. This document is not intended to nor can be a legal document, but rather a tool in the toolbox to shape crucial conversations around problematic actions.

Applicability:

- NASA Astrophysics personnel at NASA Headquarters (HQ) as well as NASA Astrophysics' Program Offices (POs) and associated support personnel, regardless of employer.
- Those who participate in meetings sponsored by NASA Astrophysics, such as conferences, workshops, panels, and Program Analysis Group (PAG) meetings.

https://science.nasa.gov/astrophysics/documents

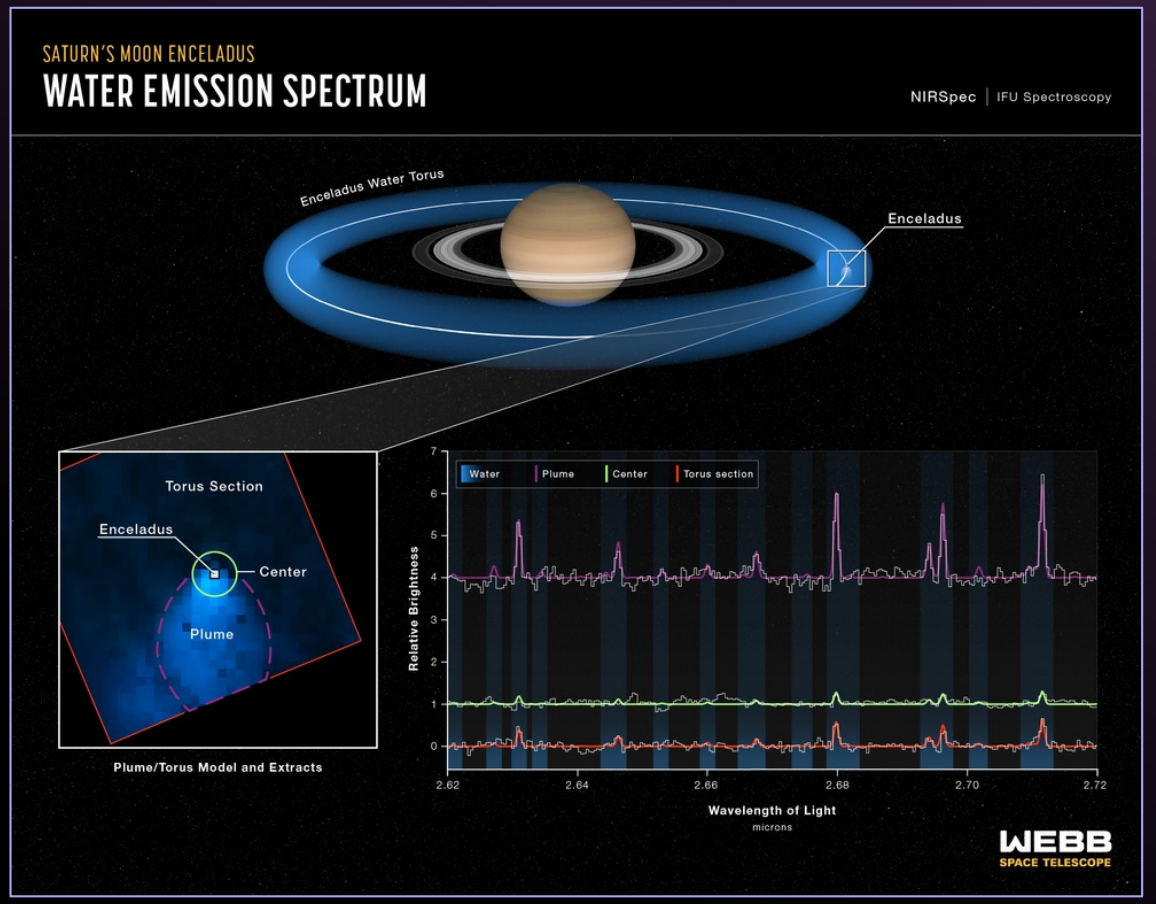
All activities organized or sponsored by NASA Astrophysics, such as meetings and panels, should adopt a code of conduct.

In addition, there are best practices that are described in the following 5 areas:

1) Professional Conduct
2) Communication
3) Training
4) Maintaining a Safe Space
5) Reporting

JWST Water Plume

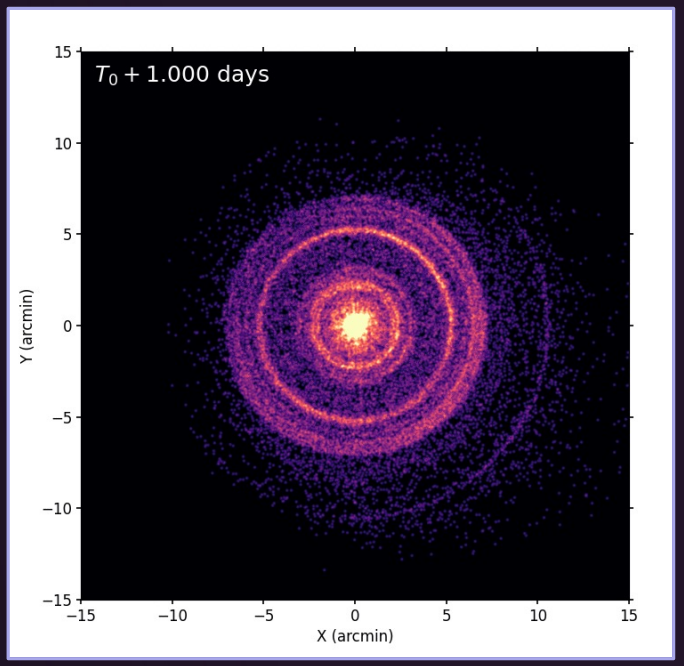
- Webb's instruments revealed details into how one of Saturn's moon's feeds a water supply to the entire system of the ringed planet.
- New images from Webb's NIRSpec (Near-Infrared Spectrograph) revealed a water vapor plume jetting from the southern pole of Enceladus, extending out more than 20 times the size of the moon itself.
- The Integral Field Unit (IFU) aboard NIRSpec also provided insights into how the water from Enceladus feeds the rest of its surrounding environment.



Credits: NASA, ESA, CSA, STScI, Leah Hustak (STScI)

NASA's Swift, Fermi Missions Detect Exceptional Cosmic Blast

- An unusually bright and long-lasting pulse of high-energy radiation that swept over Earth Sunday, October 9, 2022.
- The emission came from a gamma-ray burst (GRB) – the most powerful class of explosions in the universe – that ranks among the most luminous events known.
- Called GRB 221009A, the wave of X-rays and gamma rays triggered detectors aboard NASA's Fermi Gamma-ray Space Telescope , Neil Gehrels Swift Observatory, and Wind spacecraft, as well as others.
- This signal had traveled an estimated 1.9 billion years to reach Earth and provides new insights into stellar collapse, the birth of a black hole.



Swift s X Ray Telescope captured the afterglow of GRB 221009A about an hour after it was first detected. The bright rings form as a result of X rays scattered from otherwise unobservable dust layers within our galaxy that lie in the direction of the burst and expand over time as we observe scattering from larger and larger angles.

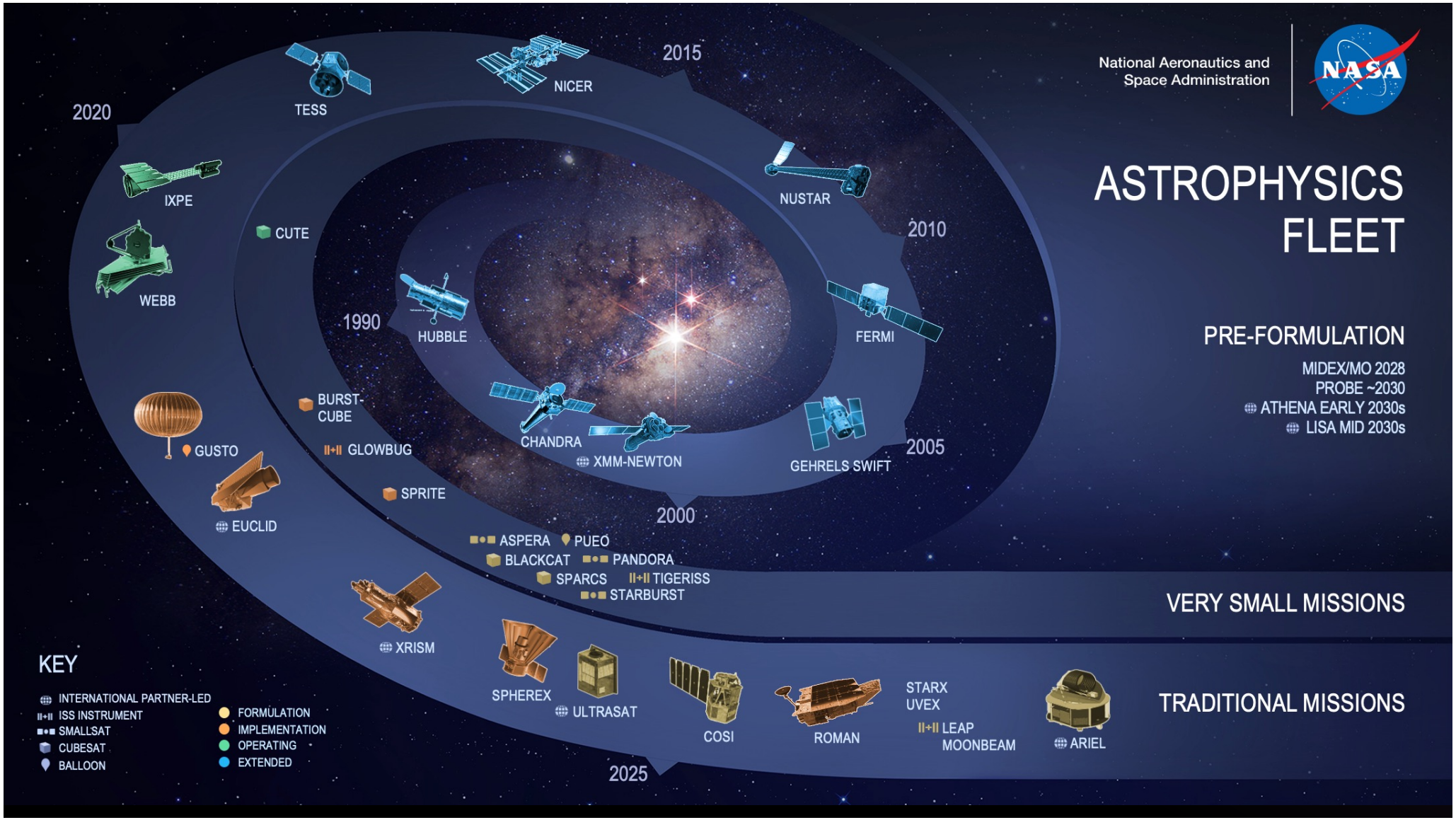
Budget

Astrophysics Budget

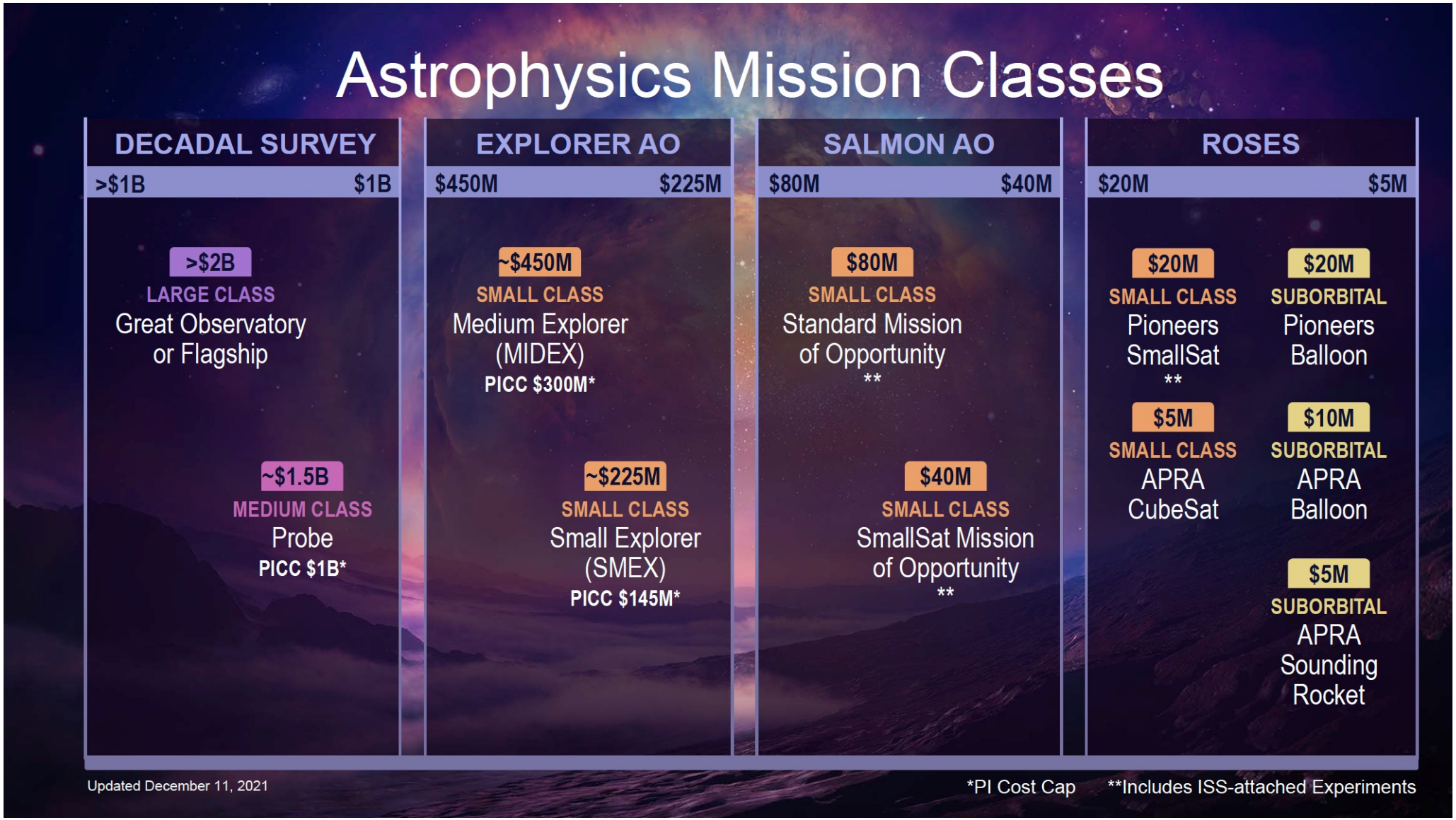
- FY23 appropriation $1510M, versus FY22 appropriation of $1589M.

- FY24 President's Budget:
  - FY24 request $1557M (FY23 PBR $1556M)
  - Modest decadal wedge begins in FY24 for technology maturation in support of Decadal Survey-recommended GOMAP for Habitable Worlds Observatory
  - Extend operating missions per Senior Review recommendations, including Hubble, Chandra and the Transiting Exoplanet Survey Satellite (TESS)
  - SOFIA close out budget FY23-25 permits responsible closeout, dispositioning of assets, data reprocessing and archiving, and career transition for early careers
  - Delays in Explorers program up to one year
  - Reduction in ATHENA funding pending ESA re-formulation activities

Mission Status


National Aeronautics and Space Administration
NASA
ASTROPHYSICS FLEET
2015
2020
2010
1990
2005
2000
2025
TESS
NICER
IXPE
NUSTAR
CUTE
WEBB
HUBBLE
FERMI
BURST-CUBE
GUSTO
GLOWBUG
CHANDRA
XMM-NEWTON
GEHRELS SWIFT
SPRITE
EUCLID
ASPERA
PUEO
BLACKCAT
PANDORA
SPARCS
TIGERISS
STARBURST
XRISM
SPHEREX
ULTRASAT
COSI
ROMAN
STARX
UVEX
LEAP
MOONBEAM
ARIEL
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

Astrophysics Mission Classes



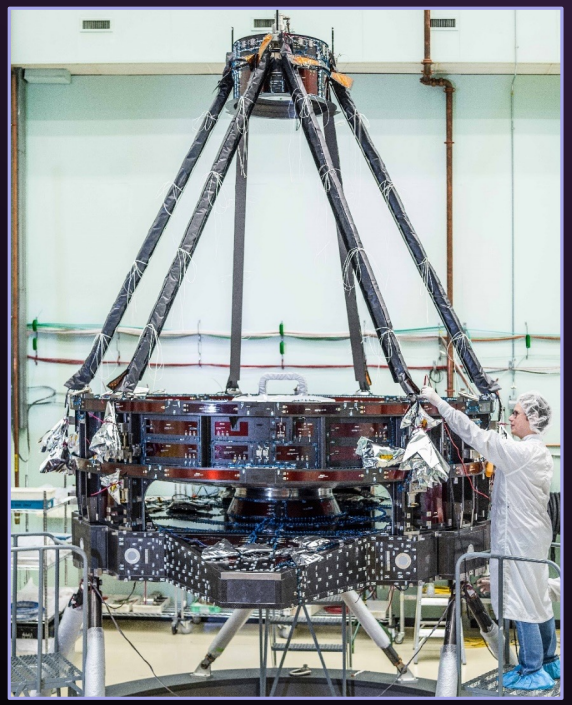
Updated December 11, 2021

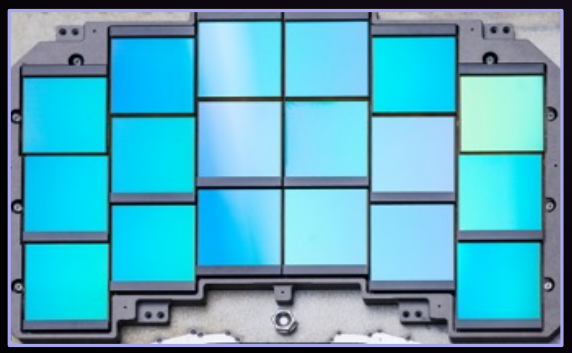
*PI Cost Cap **Includes ISS-attached Experiments

Roman Space Telescope

Features

- Determine the nature of the dark energy that is driving the current accelerating expansion of the universe
- Perform statistical census of exoplanetary systems through microlensing survey
- Survey the NIR sky with unprecedented sensitivity, scale, and efficiency



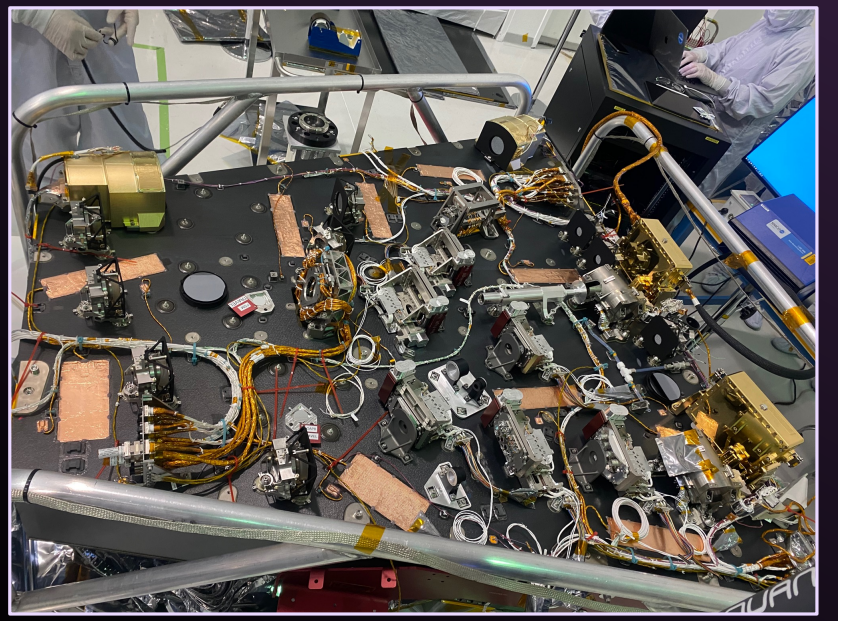


Important Milestones

Roman Coronagraph Instrument

Features

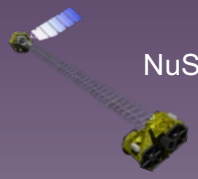
- Able to directly image gas giant exoplanets; pathfinder for future exo-Earth characterization
- Employs active optics to achieve 1000× better planet to host-star flux ratio
- < 1 year to instrument delivery
- All flight hardware @ JPL
- Optics bench fully populated
- Predicted performance:
  ~80% margin on our L1 requirement



Important Milestones

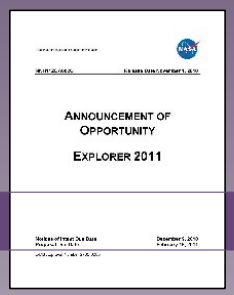
p

Ge



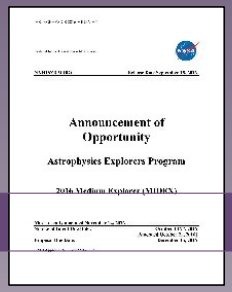
NuST

2025

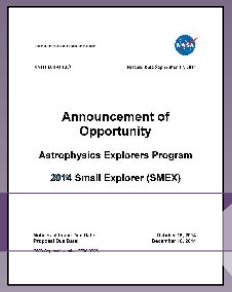


MIDEX 2011

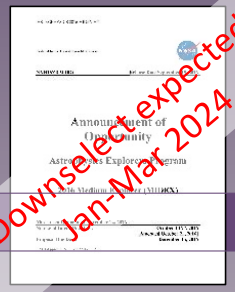
SMEX 2014



MIDEX 2016

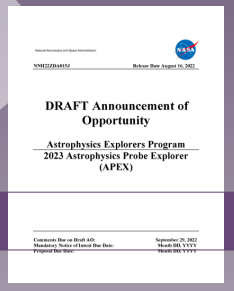


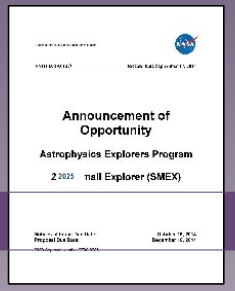
SMEX 2019



MIDEX 2021

Downselect expected Jan-Mar 2024





Small and Mid-Size Missions

TESS

IXPE

SPHEREx

COSI

STAR-X
UVEX

Directed 2013

Euclid

Missions of Opportunity

NICER

GUSTO

ARIEL

LEAP
MoonBEAM

Directed 2017

XRISM

ARIEL/CASE

Atmospheric Remote-sensing Infrared Exoplanet Large survey
Contribution to ARIEL Spectroscopy of Exoplanets

ESA and NASA Partnership

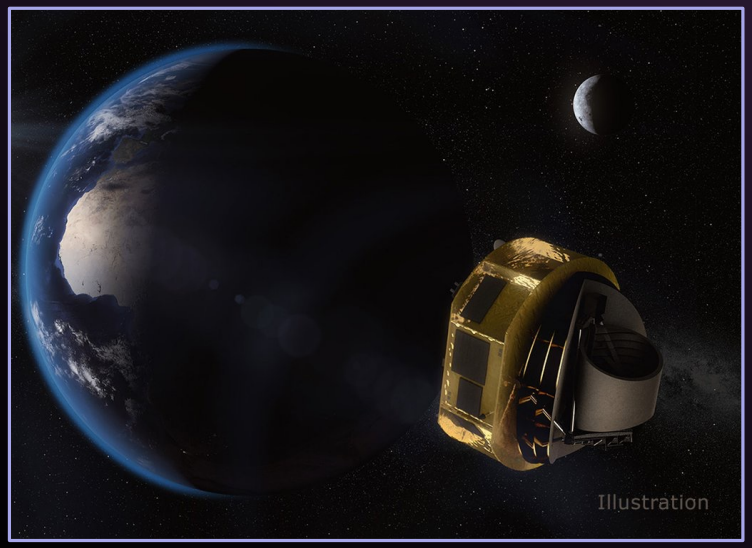
- ARIEL with the CASE, which provides the optical and near-infrared science capabilities and fine guidance sensors will survey and characterize the atmospheres of ~1000 exoplanets.

NASA Contributions:

- Detectors, cold front-end electronics & packaging
- Thermal Management
- Cryoflex cables for ARIEL Fine Guidance System
- Providing US participation in science team, mission survey design, and scientific discoveries

Status:

- Project entered Phase C in February 2023

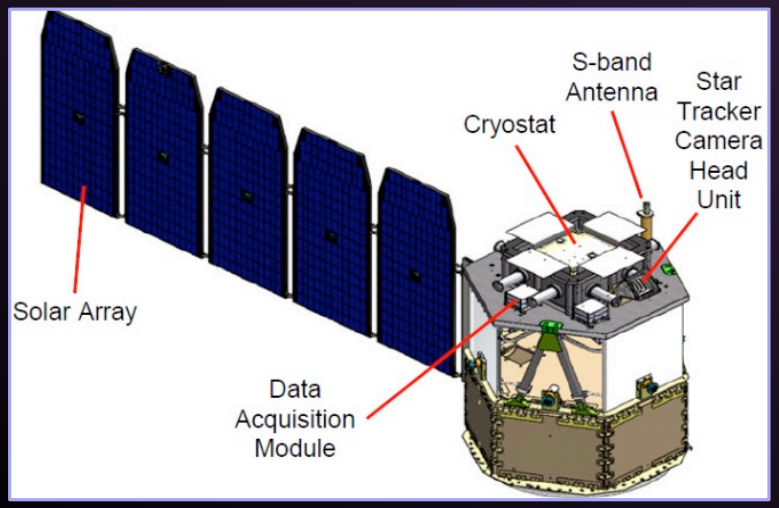


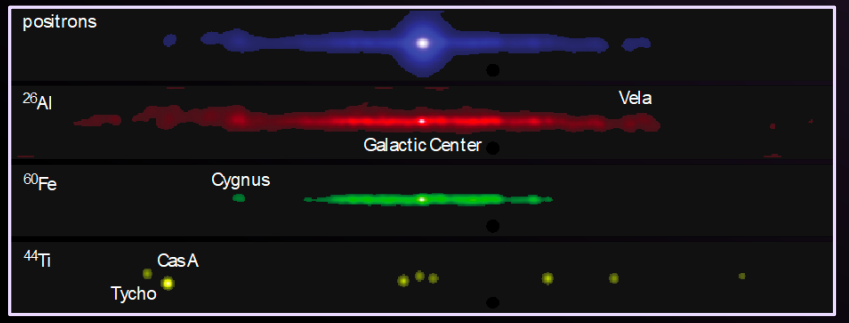
An artist s concept showing ARIEL in orbit.
Credit: ESA/STFC RAL Space/UCL/Europlanet Science Office

Compton Spectrometer and Imager (COSI)

- **PI: John Tomsick, UC Berkeley**
- COSI is Compton imaging spectrometer with cryogenic Ge detectors for 0.1-5 MeV gamma-rays
- COSI will provide an understanding of the positron excess; map ^{26}Al (half-life 60yr) to study element formation; make the first map of ^{60}Fe (half-life 2.6Myr, only source is core-collapsed SN) to trace past core collapse supernovae; and discover new young supernovae in ^{44}Ti (half-life 0.7Myr).
- COSI will use polarization to gain insight into extreme environments, such as accreting black holes (AGN and Galactic) and γ-ray bursts (GRBs).
- COSI will localize the γ-ray counterparts to GW events (short GRBs) and detect high-energy neutrino counterparts.
- System Requirements Review January 2023; Preliminary Design Review February 2023

Launch Readiness Date: 2027





Simulated Radioactive Milky Way

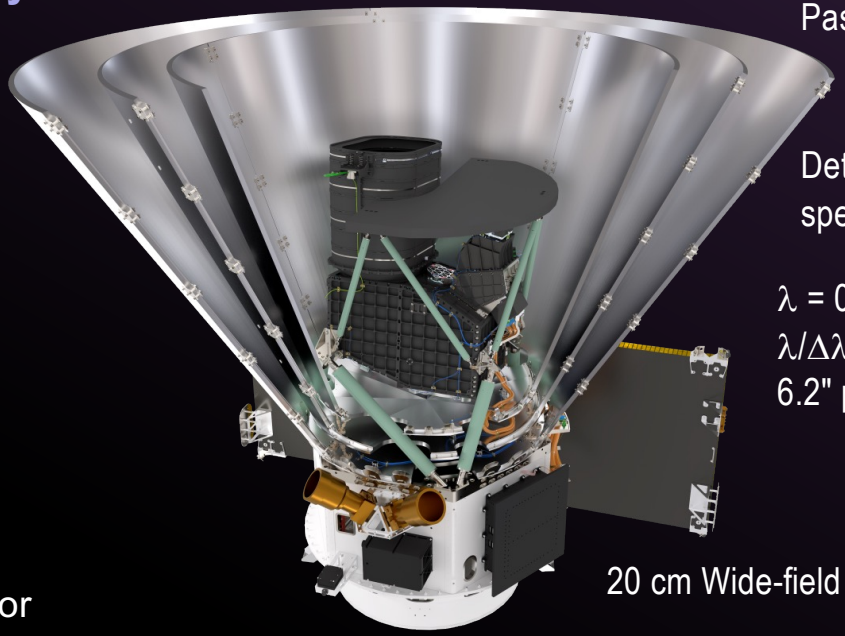
Sphere-X

An All-Sky Infrared Spectral Sky Survey

Small Mission, Big Science

- Origin of the Universe
- Origin and History of Galaxies
- Origin of Water in Planetary Systems
- First All-sky Infrared Spectral Survey

- Critical Design Review (CDR) successfully completed Jan 2022
- Systems Integration Review (SIR) planned for December 2023
- Current Agency launch readiness date is April 2025



GUSTO

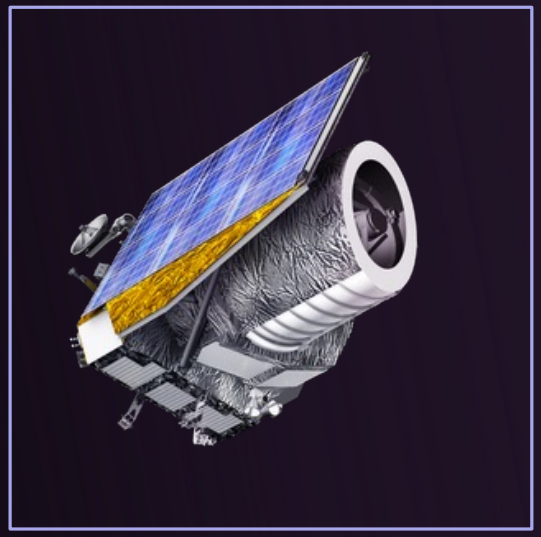
An All-Sky Infrared Spectral Sky Survey

Science Description	Project Description	Key Information
GUSTO will provide the first complete study of all phases of the stellar life cycle, from the formation of molecular clouds, through star birth and evolution, to the formation of gas clouds and the re-initiation of the cycle. GUSTO provides 500 times the angular and 1,000 times the velocity resolution of previous surveys of the Galaxy in [CII], [OI], and [NII].	Sub-orbital Balloon-borne 0.9 m Cassegrain telescope launched from Antarctica to study the Milky Way and the Large Magellanic Cloud.	**Mission Phase:** C **Launch Date:** 12/2023 **Mission Life:** 75 days **Category:** 3 **Class:** D Streamlined **Launch Vehicle:** Zero Pressure Balloon

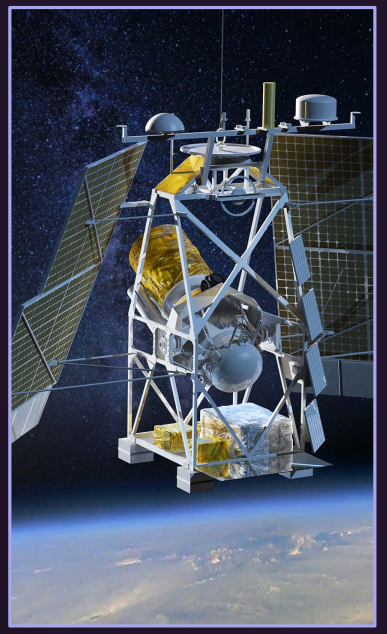
- GUSTO is scheduled to fly from Antarctica in December 2023

Astrophysics Division Launches: CY2024

XRISM:
Tanegeshima, Japan 2023



Euclid
Kennedy Space Center, July 2023



GUSTO (SMEX Balloon)
Antarctica December 2023

ATHENA

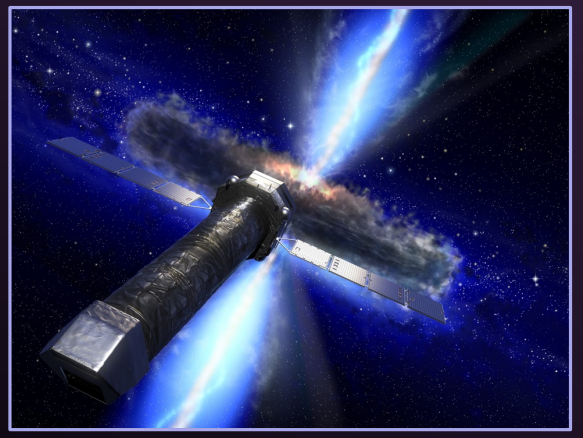
Advanced Telescope for High Energy Astrophysics

ESA and NASA Partnership

- ATHENA will look deep into the X-ray Universe, studying the evolution of super-massive black holes and hot gas in and out of galaxies over the life of the Universe.

Status:

- Mission is being reformulated by ESA, whilst retaining flagship-level science. NASA has reiterated support for Athena and willingness to reprioritize its contributions.
- Rachel Osten (STScI) and Lía Corrales (U. Michigan) selected as the NASA representatives to the Athena Science Redefinition Team (SRDT). Andy Ptak (NASA Athena PS) selected as Mission Redefinition Team (MRT) point-of-contact.



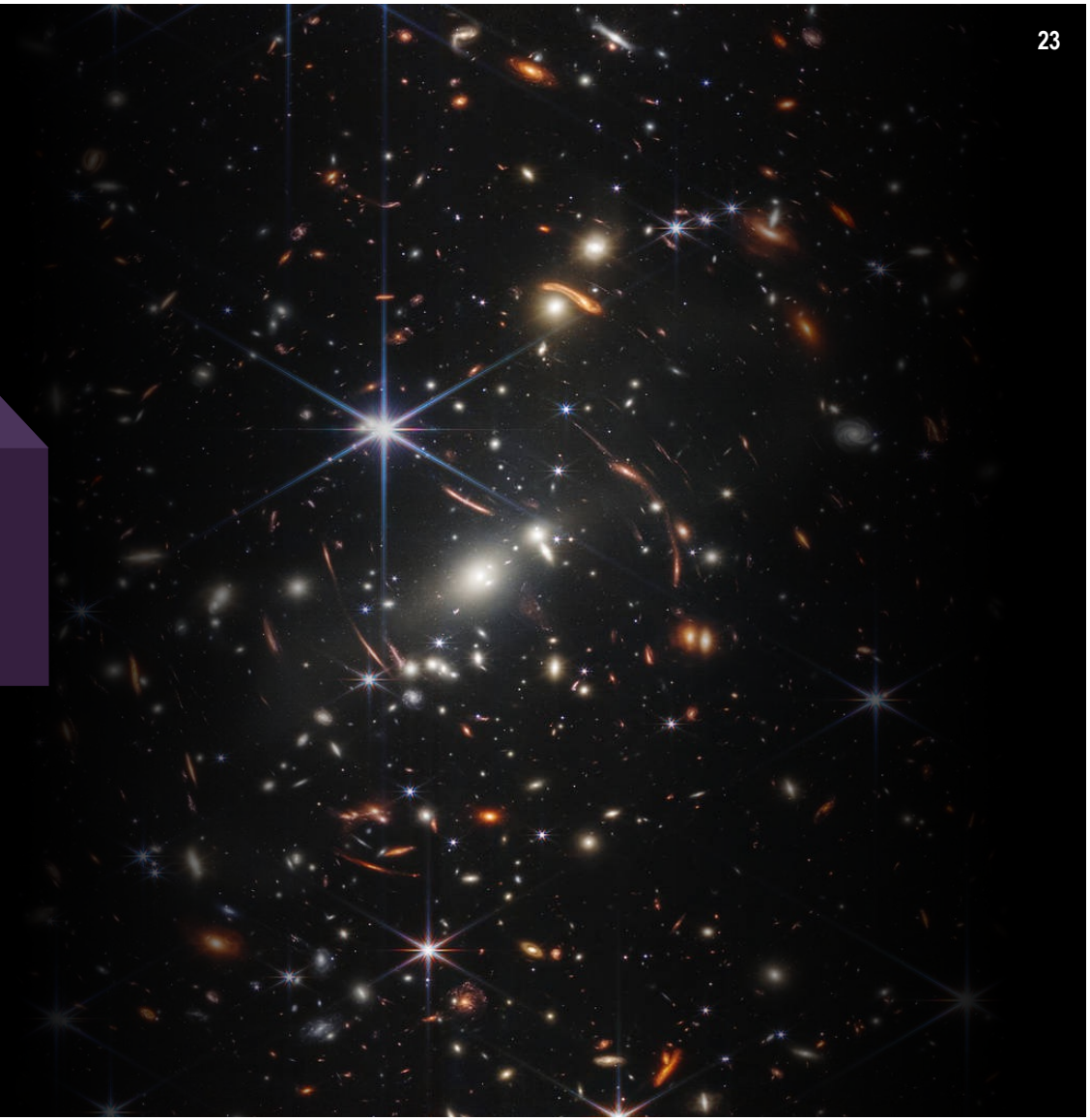
Artist's concept of ATHENA.
Credit: ESA

Current "NewAthena" mission concept

- Effectively dependent on the US contribution of a 50K -> 4K cryocooler to the X-IFU
- Mission profile results in reductions to performance relative to original Athena, but retains a large X-ray mirror, the X-IFU calorimeter with at least 4 eV energy resolution, and the Wide-Field Imager (WFI)

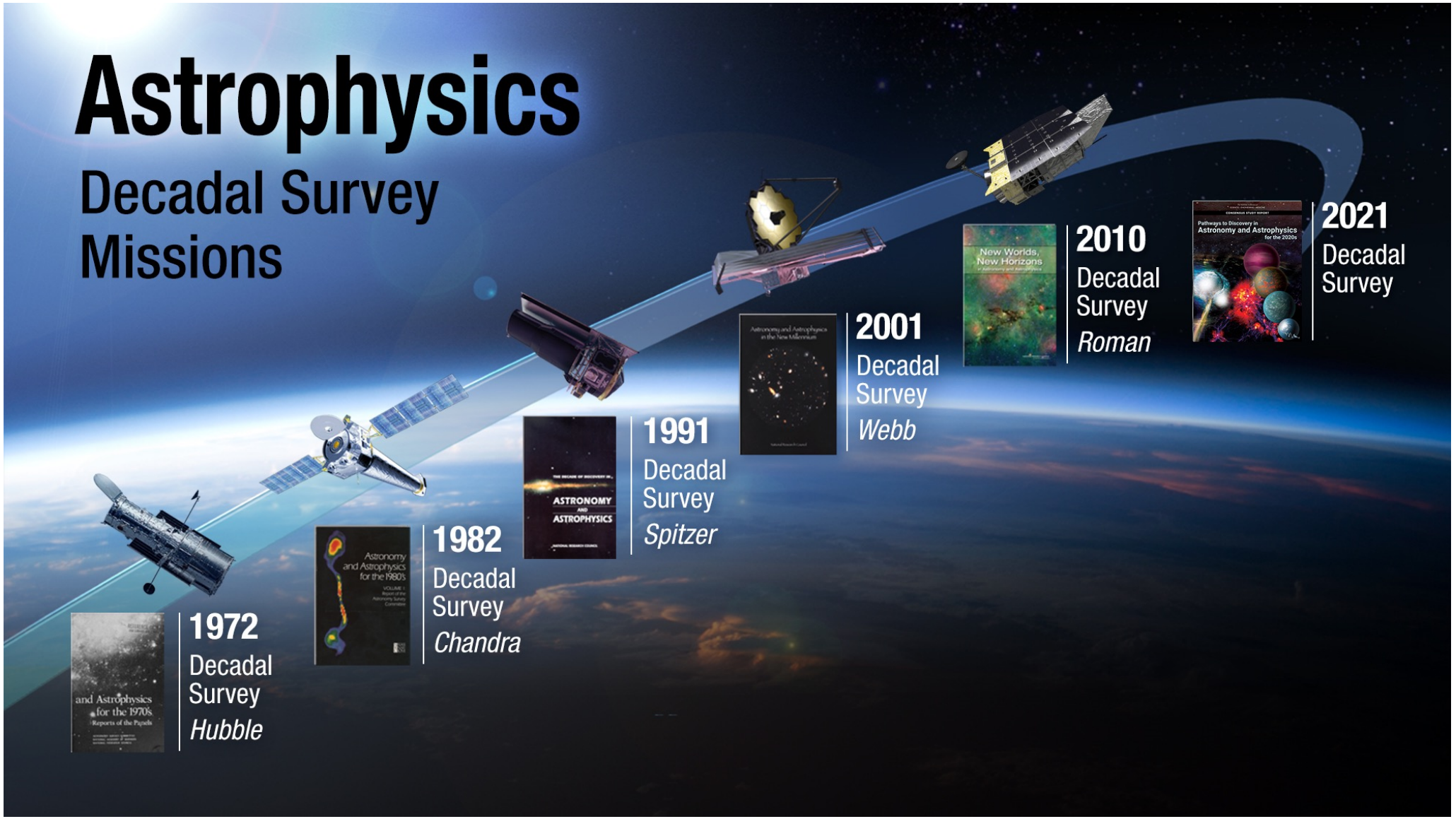
- Budget Impacts
  - In light of deferred Adoption date ~(2027) , FY24 PBR contains significant slowdown to Athena.
  - With planned switch to a crycooler as a NASA contribution, the FY24PBR Athena budget withdraws support for the XRCF testing element (FY25 onwards), with a significant reduction in FY24 for XRCF testing.

ASTRO2020 Forward Plan



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

Status of Astro2020 Key Recommendations

Key Mission Recommendations	Latest Action	Next Planned Action
Near-Infrared/Optical/Ultraviolet 6-m telescope with high-contrast imaging capability (part of GOMAP program)	Technology strategy	
Great Observatory Mission and Technology Maturation Program (GOMAP)	GOMAP discussions underway within NASA, Precursor Science workshops held April, October 2022	APAC Spring Meeting, March 29-30, 2023
Space-based time-domain and multi-messenger counterparts program (TDAMM)	APD conducted a 8/22-24/2022 Workshop	APAC Spring Meeting, March 29-30, 2023
Astrophysics Probe Mission	8/16/2022 Draft Call for Proposals	APAC Spring Meeting, March 29-30, 2023
End SOFIA operations by 2023	SOFIA operations ended. NASA's Press Release 9/30/2022	Action complete

APD Responses to Decadal

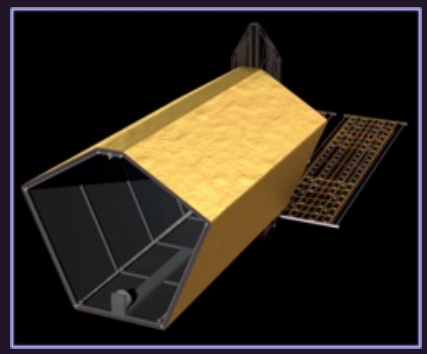
Pathways to Habitable Worlds: Astro2020

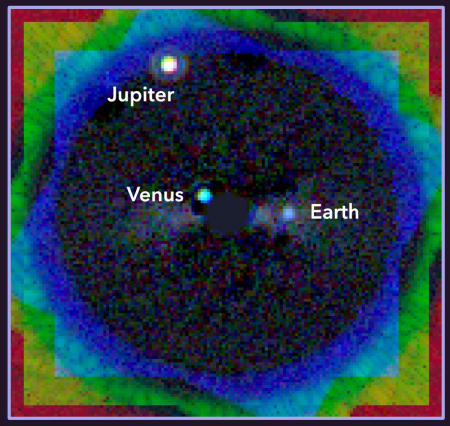
- **Are there habitable planets harboring life elsewhere in the universe?**

- **Primary recommendation:**
  - Space telescope, with ~6 meter aperture and coronagraphic imaging capability
  - Observe ~100 nearby sun-like stars, and detect potentially habitable planets
    - Survey habitable planet candidates for evidence of life
  - Conduct program of general astrophysics

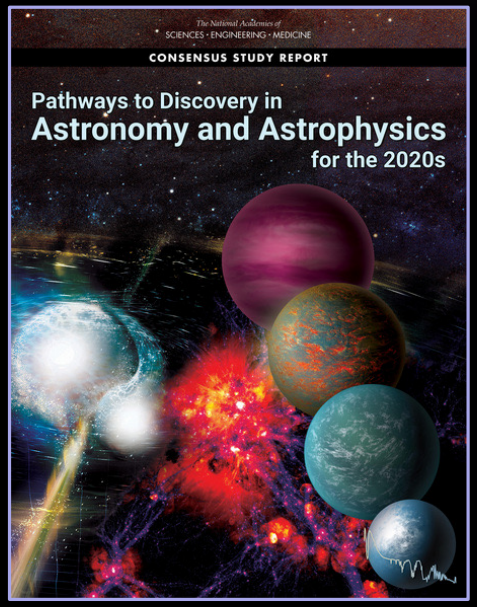
- Primary Technical requirements
  - Segmented mirror telescope w/active control of WFE achieving ~10s pm stability
  - Coronagraph achieving contrast levels of 10^{10}

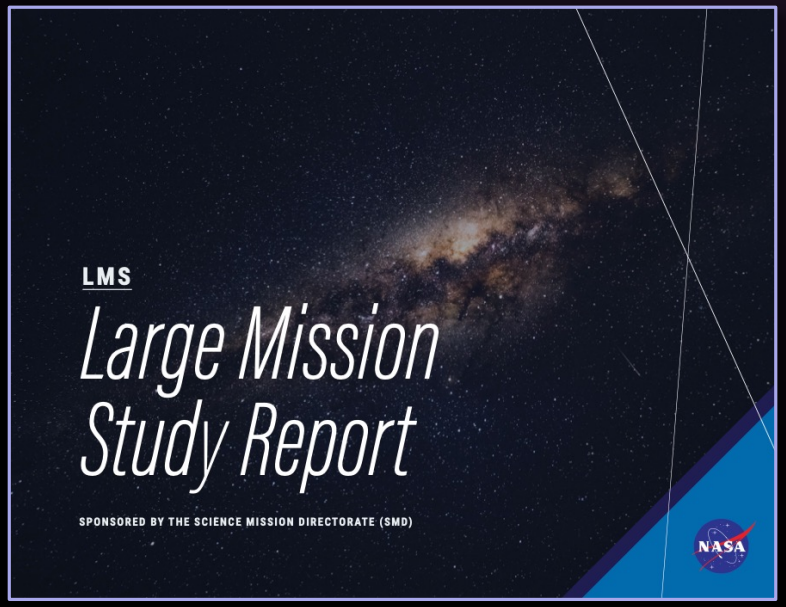
- **Habitable Worlds Observatory**





The Habitable Worlds Observatory:
Big Picture Strategy





The Habitable Worlds Observatory:
Big Picture Strategy

- **Build to schedule**: Mission Level 1 Requirement e.g. Planetary mission strategy
- **Evolve technology**:
  - Build upon current NASA investments and TRL-9 technology
  - Segmented optical telescope system from JWST
  - Coronagraph from Roman ‘s coronagraphic imager program
- **Next Generation Rockets**:
  - Larger telescope aperture sizes
  - Leverage opportunities offered by large fairings to facilitate mass & volume trades
- **Planned Servicing**: Robotic servicing at L2
- **Robust Margins**: Design with large scientific, technical, and programmatic margins
- **Mature technologies first**: Reduce risk by fully maturing the technologies prior to development phase.

The Habitable Worlds Observatory
Big Picture Strategy

ASTRO2020 recommendation and timescale drives a focused technology program

Telescope

- Large segmented mirror investments with ongoing technology development program
- Scalable to launcher fairing options & next 5 years of science metrics outcomes
- Legacy of JWST technology investments (TRL-9) and infrastructure
- JWST as an on-orbit testbed
- Industry capabilities
- Focus investments on technology tall-poles rather than investing in infrastructure

- **Coronagraph**
  - Significant investment in Roman coronagraph (future on-orbit testbed)
  - Significant investments through SAT & APRA coronagraph programs

The Habitable Worlds Observatory

Habitable Worlds: Primary Science Goal

- Survey nearby stars for habitable planets, and spectroscopically characterize them for evidence of life (biosignatures)

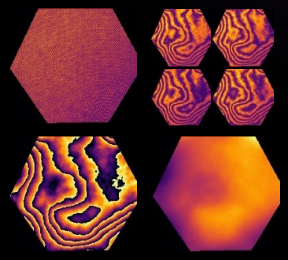
Observatory: General Astrophysics Program

Future Great Observatories

- Decadal Survey recommends future X-Ray and Far-IR future great observatories
  - Note that investments would begin towards the end of the decade per the Survey's recommendations
  - APD will maintain X-Ray/Far-IR technical capabilities this decade via:
    - SAT and APRA program investments
    - 2023 Probe solicitation for X-Ray and Far-IR mission concepts
    - Explorers program

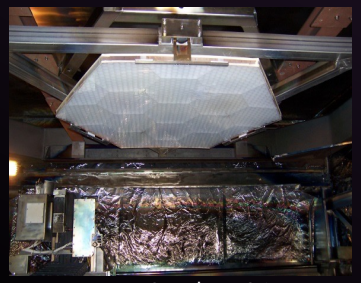
Astrophysics Technology Investments

Big Picture Strategy



Credit: NASA GSFC

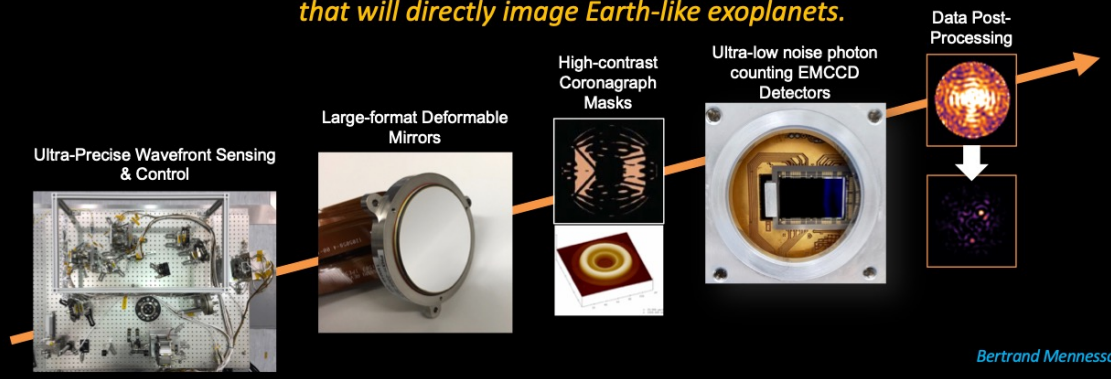
Picometer-scale dynamics measured with high-speed interferometry



Credit: L3/Harris

Lightweight ULE mirror segment

CGI is an advanced technology demonstrator for future missions that will directly image Earth-like exoplanets.



Astrophysics Probe

- On August 16, 2022 NASA issued a draft AO for a PI-led Astrophysics Probe for comment.
- The PI cost cap is $1B; AO requires a General Observer/Guest Investigator (GO/GI) Program during the 5-year prime mission. For a pointed observatory, 70% of observing time is allocated for GO. A survey observatory will make data available as soon as practicable.
- The target date for the final Probe AO remains July 2023
- This is a two-step AO: because the Probes are more complex than previous Explorers, and this is the first one, the competitive Phase A studies will last 12 months
- In response to the recommendation of Astro2020, Astrophysics will accept proposals for:
  - A far-infrared imaging and/or spectroscopy mission
  - An X-ray probe
- Proposing teams should check the Q&As frequently at https://explorers.larc.nasa.gov/2023APPROBE/

Release of final AO:	**July 2023 (target)**
Proposals due:	NET mid-November 2023

Time Domain and Multi-Messenger Astrophysics (TDAMM)

- Astro2020 Decadal Survey recommended Time-Domain and Multi-Messenger Astrophysics (TDAMM) as highest priority sustaining activity for NASA Astrophysics.
  - TDAMM contributions of current NASA fleet highlight the need to maintain and replace the workhorse missions.
  - Recommended strategic approach is to add space-based capabilities based on science priorities and status of complementary facilities.
    - e.g. gravitational-wave, neutrino, international e/m missions
  - Roman Space Telescope is a game changer for TDAMM: Opportunities for TDAM astrophysics in recent Roses call
  - New NASA missions address need for continuous monitoring for transients (X-Ray, Gamma-ray)
    - Smallsat missions (BurstCube, GlowBug,BlackCat, StarBurst)
    - Explorers: COSI (in development)
      - Star-X, UVEX, LEAP and MoonBeam (in Step-2 competitive downselect)
    - NASA partnership with Israel (ULTRASAT) adds sensitive wide-field UV monitoring
    - Planetary Mission NEO-Surveyor adds IR transient monitoring capability

Time Domain and Multi-Messenger Astrophysics (TDAMM)

- Conducting a study of coordinating TDAMM observations among NASA spacecraft using centralized proposal, and ToO initiation to make more efficient use of fleet
- NASA transient alert system
  - Modernizing in preparation for the Rubin era of ~10^6 alerts per night
  - Funding multi-mission and mission-design software tools for community use
  - Initiating discussions across Agencies e.g. LIGO w/NSF
- PhysCOS/COR hosted TDAMM workshop in Annapolis, MD. on August 22-24, 2022
  - White Paper recently delivered and posted
  - International agency meeting identified areas of collaboration
    - 2nd meeting International working group held 3/2023 to discuss coordination
- Through PhysCOS community groups, supporting new and upcoming Science Analysis Groups in the areas of Gamma-ray Transient Networks and Space Communications

TDAMM Report

TDAMM Workshop

2023 Astrophysics Research Solicitations

Supporting Research and Technologies			
Astrophysics Research & Analysis	APRA	IP	
Strategic Astrophysics Technology	SAT	IP	
Astrophysics Theory Program	ATP	IP	DAPR
Nancy Grace Roman Technology Fellowships	RTF		
Astrophysics Decadal Survey Precursor Science	ADSPS		DAPR
Data Analysis			
Astrophysics Data Analysis	ADAP		DAPR
Fermi, Swift, NuSTAR, NICER, TESS, **IXPE** New	GO/GI		DAPR
Mission Science and Instrumentation			
Astrophysics Pioneers (suborbital science)	Pioneers		DAPR
Suborbital payloads solicited through APRA	APRA	IP	DAPR
Roman Research and Opportunities	Roman	IP	DAPR
Cross Divisional			
Exoplanets Research Program	XRP		DAPR
Topical Workshops, Symposia and Conferences	TWSC		
Citizen Science Seed Funding Program	CSSFP		
Graduate Student Research Awards	FINESST		

Solicited Separately			
JWST, Hubble, Chandra GO/GI/Archive/Theory programs	GO/GI		DAPR
NASA Hubble Fellowship Program	NHFP		
NASA Postdoctoral Program	NPP		
Support for XMM-Newton U.S. PIs (selected by ESA)	XMM GO		
Not Solicited in ROSES-23			
Theoretical and Computational Astrophysics Networks, every other year	TCAN	IP	DAPR

IP: Proposals require an Inclusion Plan for creating and sustaining a positive and inclusive working environment.

Assessment of IP not part of adjectival rating / does not inform selection of proposals. However, funding only released after a satisfactory Inclusion Plan is accepted.

Inclusion Plan pilot program will continue in 2023 but likely not expand until later.

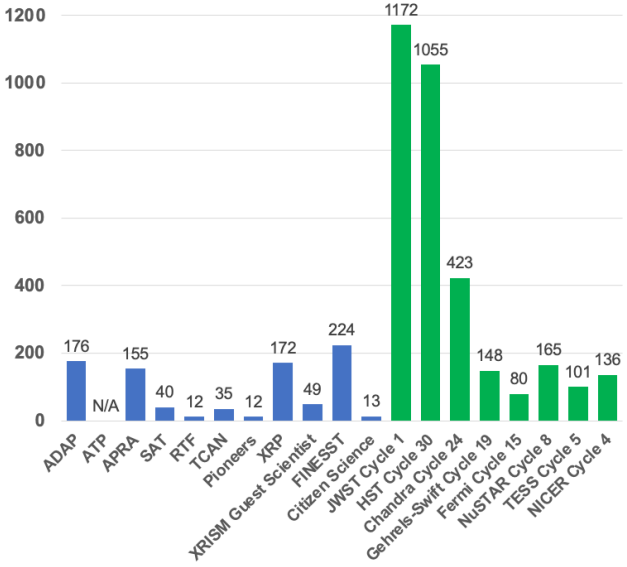
DAPR: Proposals evaluated using dual-anonymous peer reviews where panelists do not know the identities of the proposing teams and institutions.

THANK YOU

Astrophysics R&A Selection Rates

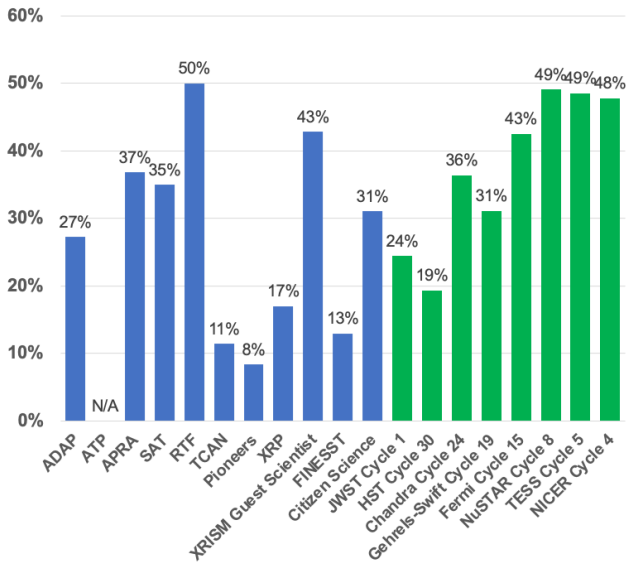
March 2022-2023

Number of Proposals



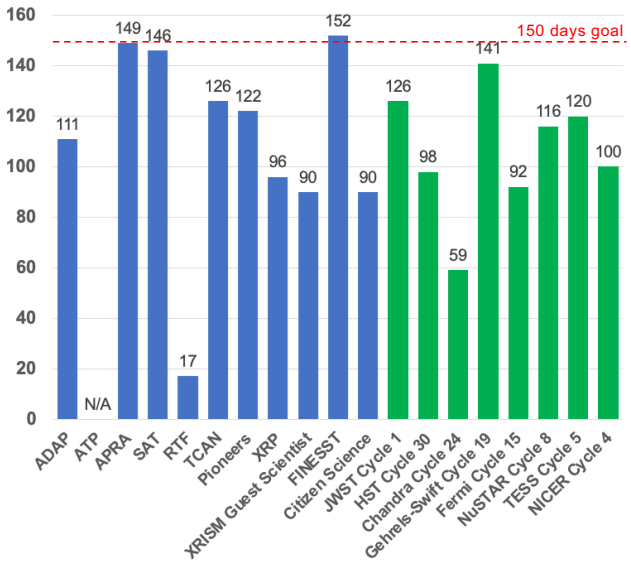
R&A: 888 proposals
GO/GI: 3,280 proposals
Total: 4,168 proposals

Selection Rates



R&A: 24% (19% last year)
GO/GI: 28%
Average: 27%

PI Notification (Days)



80% of PI notification:
R&A: 110 days
GO/GI: 107 days

* Only programs with selections made and PIs notified

Status of Science Data Policy

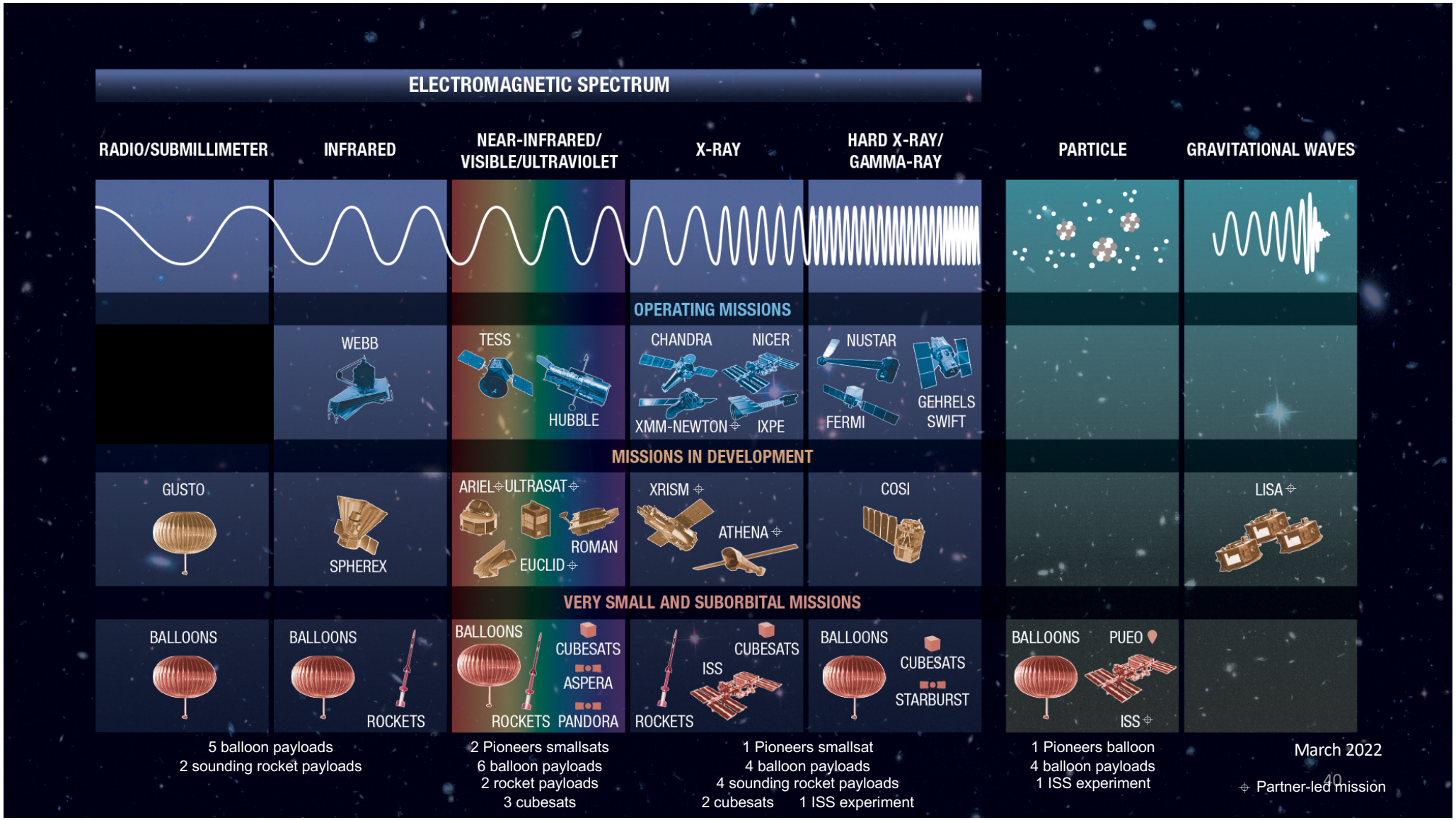
Year of Open Science

Science Data Policy and a Year of Open Science

- SMD has released SPD-41a: Scientific Information Policy for the Science Mission Directorate to provide guidance on the open sharing of publications, data, and software created in the pursuit of scientific knowledge.

- SMD has developed Open Science Guidelines that provide further guidance to the community on general implementation of SPD-41a.

- The Astrophysics Scientific Information Management Policy provides further clarification on the application of SPD-41a to the Astrophysics Division.


ELECTROMAGNETIC SPECTRUM
RADIO/SUBMILLIMETER
INFRARED
NEAR-INFRARED/ VISIBLE/ULTRAVIOLET
X-RAY
HARD X-RAY/ GAMMA-RAY
PARTICLE
GRAVITATIONAL WAVES
OPERATING MISSIONS
WEBB
TESS
HUBBLE
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
ROCKETS
PANDORA
ROCKETS
CUBESATS
ISS
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

JWST Awards To Date

- Public
  - Space Symposium
  - National Air and Space Museum
  - National Space Club and Foundation
  - Aviation Week
  - Bloomberg Businessweek
  - Popular Science
  - American Institute of Aeronautics and Astronautics
  - TIME
  - Explorers Club

- NASA/Science
  - George Rieke
  - Marcia Rieke
  - Charles Bowers
  - Randy Kimble
  - Gillian Wright
  - Pierre Ferruit
  - René Doyon
  - Jane Rigby
  - Michael McElwain
  - Massimo Stiavelli
  - JWST Project Science Team
  - JWST Science & Ops Center Development Team
  - JWST Science Operations Team

Cleanroom workers pose for a quick group photo with the James Webb Space Telescope mirrors on May 4th, 2016. Credit: NASA/Chris Gunn

Three Paths for Community Engagement with Roman

- Help define and shape core community surveys
  - Submit science pitch and/or white paper for Core Community Survey definition
    - Science pitch – few paragraphs describing science case for one of the community surveys, short questionnaire on survey parameters
      - Deadline 17 Feb 2023, low bar to entry to encourage high participation
    - White papers – several page document with details on science case, sketch of survey design and methods/metrics on how to evaluate science metric against survey parameters
      - Deadline summer, detail enables more meaningful evaluation

- Actively engage with mission partners and science community
  - Join Roman Technical Working Groups
    - Groups pursing topics of interest across many science areas
      - Two groups currently (calibration, software) but will add more after ROSES proposal selection
    - Simple web sign up page, rolling deadline, open to all
  - Plan to form community-led science collaborations later this year

- Obtain funding to prepare for and enhance Roman Science
  - Submit proposal to Roman ROSES solicitation
    - Funding to work on Roman science preparation (including engagement in technical working groups and survey definition)
    - Proposal deadline March 21 2023; another opportunity in 2025

Response to CAA report on Roman Observations

- **Committee of Astronomy and Astrophysics Report on Roman Space Telescope Observations**
  - Provided a set of 10 principles to guide NASA and Roman on the process for assigning mission observing time allocations

- **Some takeaways include**
  - Endorses community led approach to setting Roman observation program
  - Emphasizes importance of competitively balancing/awarding time between each of the three CCS and GA Surveys

- **We agree with the findings and conclusions in the CAA report**
  - The Roman mission (science centers + project) have developed and started implementing a plan to define the core community surveys that builds upon the principles laid out in the CAA report

Astrophysics Technology Program - FY23

Technology Inception & Experimentation APRA & RTF

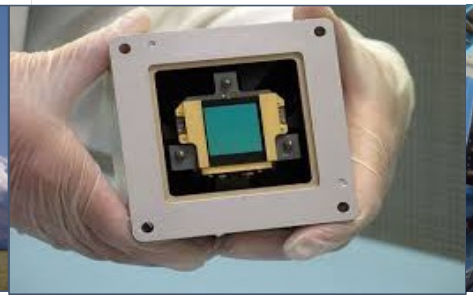
- *44 new technology projects awarded*
- *13 additional non-technology awards*
- *Average selection rate: 28%*
- *Portfolio:*
  - *Supporting Balloons, Sounding Rockets & CubeSats*
  - *Detectors across wavelengths*
  - *Mirrors, coatings and gratings*

Total: $55M

Technology Maturation SAT & ISFM

- *Portfolio has 36 active SAT & 10 ISFM projects*
- *14 new SAT projects awarded in FY23*
- *10 new ISFM projects (FY23-FY25)*
- *Next SAT solicitation planned in FY24 (ROSES-2023).*
- *Average SAT award: $1.8M (3 years)*
- *Average SAT selection rate: 32% (historically is ~30%)*

Total: $26M



Directed Technologies

- *Roman CGI ($42.5M)*
- *LISA ($29.6M)*
- *Athena ($16.2M)*
- *Euclid ($9.9M)*
- *NN-Explore – NEID ($3.3M)*

Total: $100M

Post-Decadal Initiatives

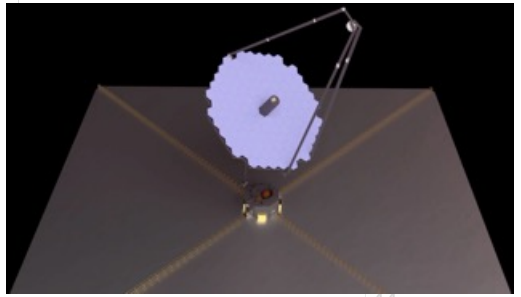
- *Coronagraph Testbed*
- *Ultra-stable Testbed*
- *Segmented Mirror Telescope Program (SMTP) – Industry Contract*

Total: $15M

Not technology elements:

- *TDAMM – $2M*
- *Precursor Science - $3M*

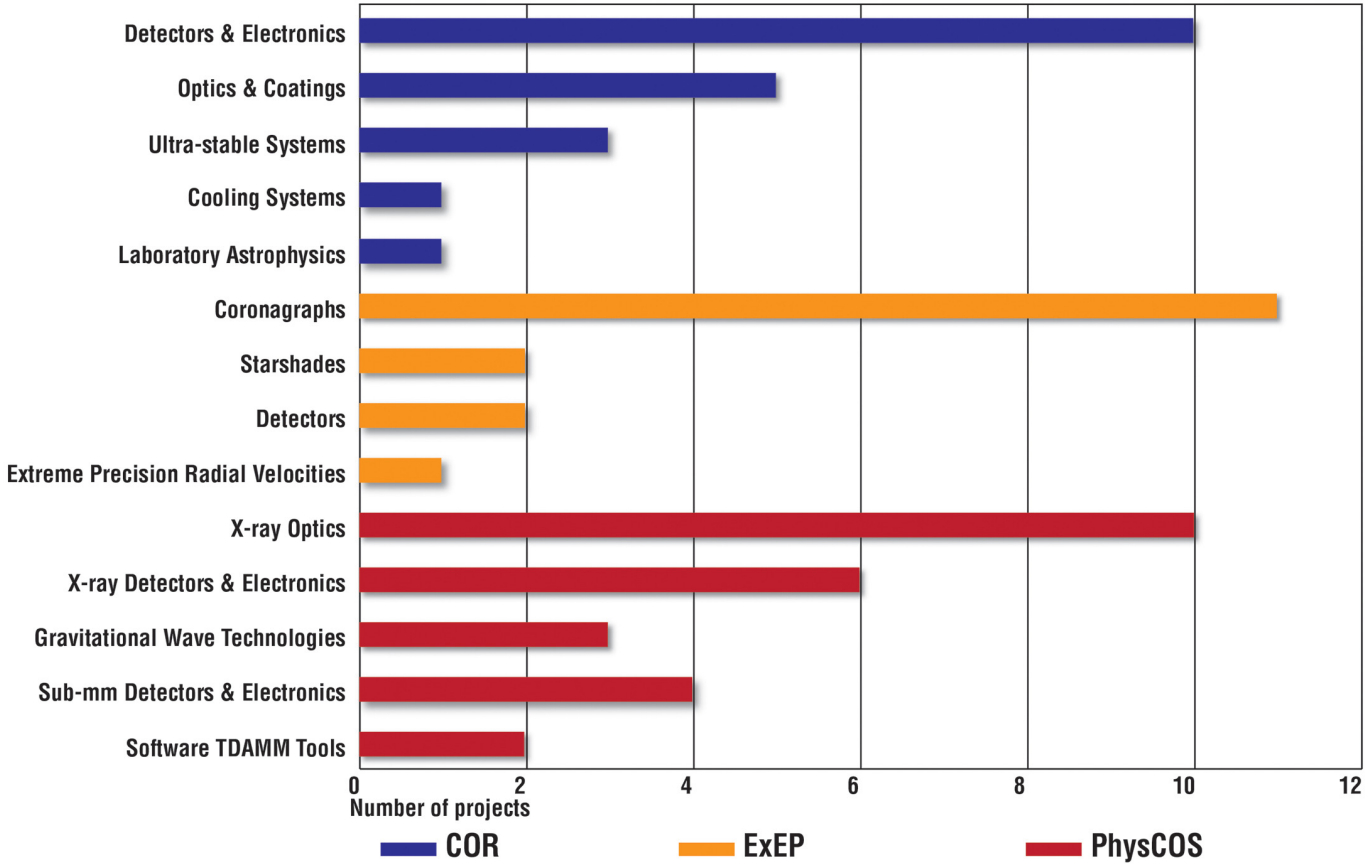
Total: $5M



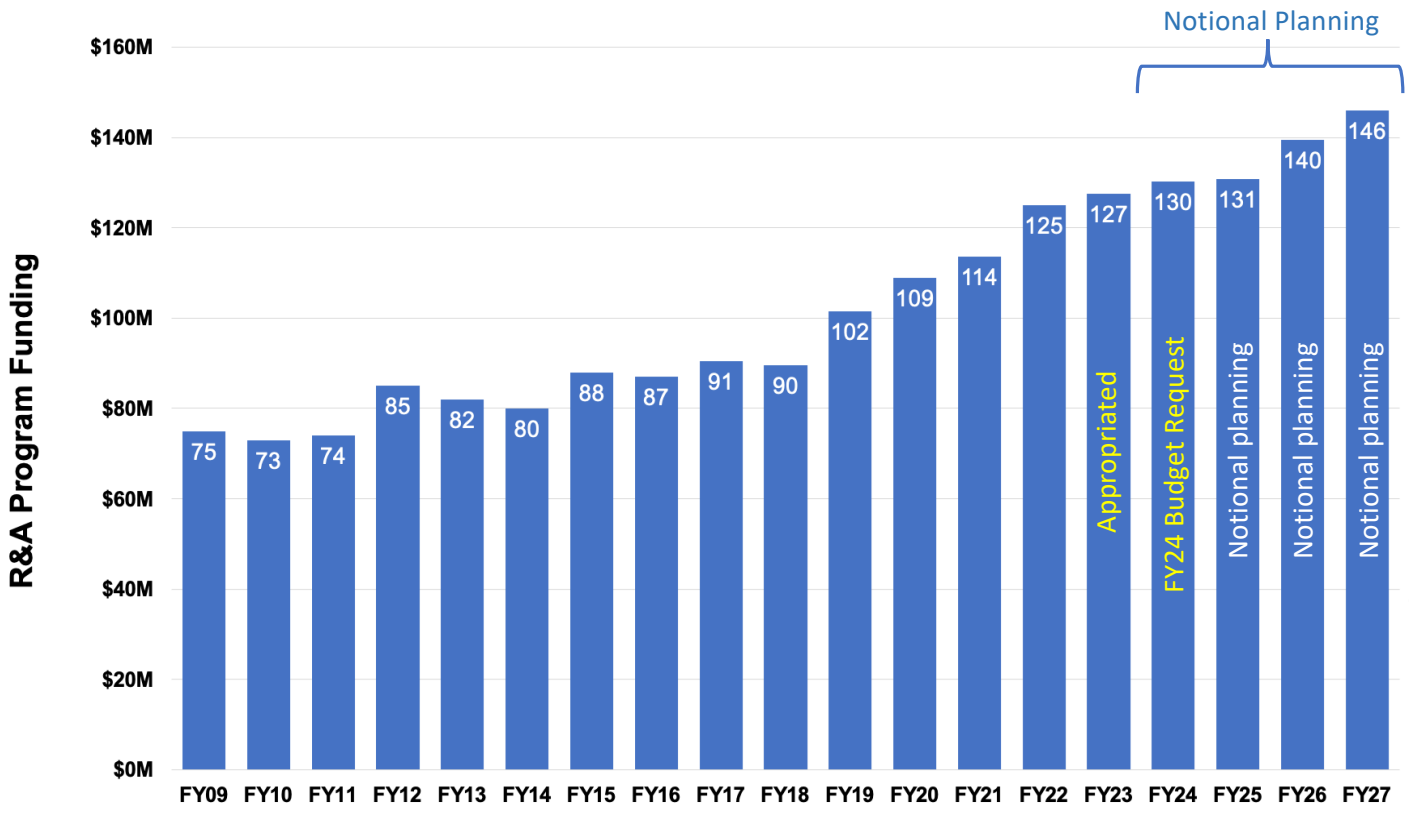
Current Strategic Technology Projects

- (SAT + ISFM - **building blocks)**

For more information see
http://www.astrostrategictech.us/



Research & Analysis Funding



The Astrophysics R&A Program has seen a sustained growth.

For the last 12 months, the selection rates were 24% for R&A programs and 28% for mission's General Observer and General Investigator (GO/GI) programs, with a total average selection rate of 27% for all Astrophysics ROSES programs.