National Aeronautics and Space Administration

NASA Astrophysics Update

Dr. Mark Clampin
Director, NASA's Astrophysics Division
Science Mission Directorate

Science Mission Directorate

ASTROPHYSICS

Organizational Chart

DIVISION MANAGEMENT

Dr. Mark Clampin
Director

Sandra Cauffman
Deputy Director

ADMINISTRATIVE SUPPORT
Jennifer Baker, Balam "Orby" Yaxkin, James Jackson

DIVISION LIAISONS

Resource Management
Elijah Owuor (Lead)
Jenna Robinson
Jennifer Holt

Communications
Alise Fisher

Policy
Mariah Baker

OIIR
Peyton Blackstock

Program Support Specialist
Paola Ortiz Perez

CROSS CUTTING

Technologist
Mario Perez (Chief)
Dominic Benford (Deputy)

Executive Officer
Rhiannon Roberts

Science Activation Lead
Hashima Hasan

APD Communications
Liz Landau (OCOMM)
Julie Stoltz (Strategic Communications)

Inclusion, Diversity, Equity, and Accessibility
David Morris (Lead)
Antonino Cucchiara (Deputy)

FLIGHT PROGRAMS

Associate Director
Joe Smith

PROGRAM EXECUTIVES

Rosa Avalos-Warren
Rachele Cocks
Lucien Cox
Julie Crooke
Ed Griego
Shahid Habib
Janet Letchworth
Lucas Paganini
Miles Skow
Mark Sistilli

RESEARCH & ANALYSIS

Associate Director
Eric Smith

R&A Lead
Roopesh Ojha

PROGRAM SCIENTISTS

Alessandra Aloisi
Megan Ansdell
Dominic Benford
Valerie Connaughton
Antonino Cucchiara
Doris Daou
Michael Garcia
Thomas Hams
Hashima Hasan
Stefan Immler
Hannah Jang-Condell
Patricia Knezek
David Morris
Roopesh Ojha
Joshua Pepper
Mario Perez
Pablo Saz Parkinson
Linda Sparke
Sanaz Vahidinia
John Wisniewski

RESEARCH PROGRAM SPECIALIST
Ingrid Farrell

ASTROPHYSICS STRATEGIC MISSIONS

Program Director
Sandra Cauffman

Program Manager
Garth Henning

PROGRAM EXECUTIVES

Ed Griego
Lucas Paganini
Miles Skow

PROGRAM SUPPORT
Tony Comberiate, Andre Davis

APD Changes 2024

Tahani Amer

Associate Director
Flight Programs

Joshua Diaz Calo

Sr. Project Support Specialist

APD →

Stefan Immler

Scientist Supervisor
Returned from OMB detail

Joe Smith

Associate Director
Flight Programs
Returned from detail

Pablo Saz Parkinson
Program Scientist
XMM, Pioneers, TDAMM, ADAP

James Jackson

Sr. Project Support Specialist

→ APD

Astrophysics by the NUMBERS

RESEARCH

~365 U.S. Science PIs Funded currently
~130 Individual Institutions Selected
~$145M Awarded Annually

TECHNOLOGY DEVELOPMENT

~$160M Invested Annually

SMALLSATS/CUBESATS

4 Science Missions Launched
4 Missions Complete
10 Science Missions in Development
8 Free-flying CubeSats
1 Supporting Technology Development Project
2 ISS-attached Science Missions

REFEREED PUBLICATIONS

>21,361 Hubble Publications (1991-Current)
>1,745 Webb Publications (July 2022-Current)
>10,091 Chandra Publications (1999-Current)

SOUNDING ROCKETS

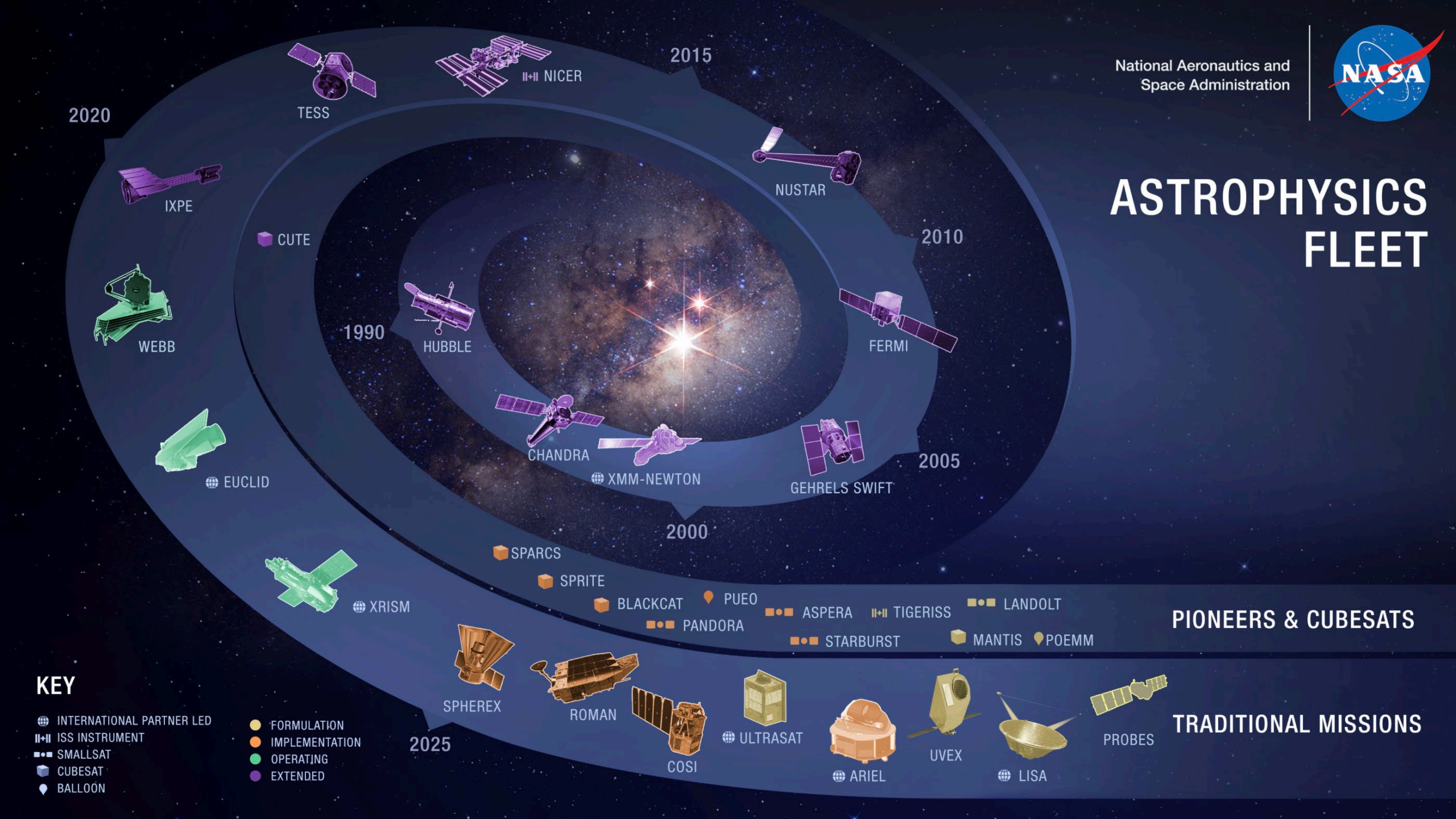
19 Science Missions Launched (Suborbital)
7 In Development

MISSION SUMMARY

15* Missions Operating
17* Missions in Development
2 Tech. Demos
***Including international partnerships**

BALLOONS

32** Suborbital Balloons Launched
***Includes APD, HPD, PSD, ESD, educational, & engineering missions*
21 Missions in Development


National Aeronautics and Space Administration
NASA
ASTROPHYSICS FLEET
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CUTE
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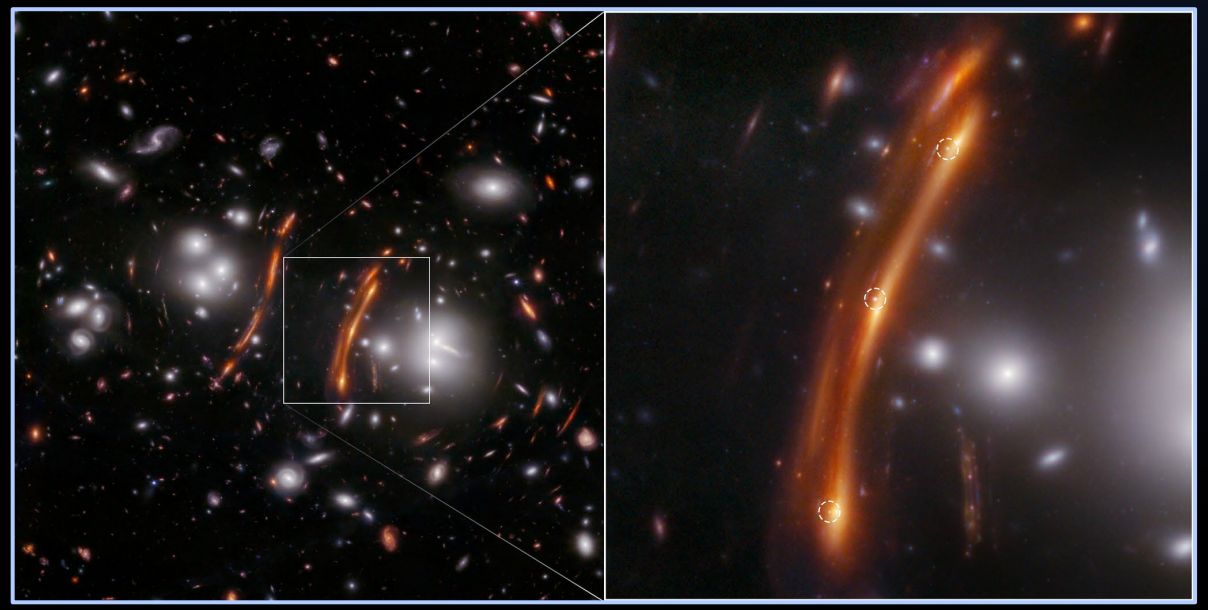
XRISM
SPARCS
SPRITE
BLACKCAT
PUEO
ASPERA
TIGERISS
LANDOLT
PANDORA
STARBURST
MANTIS
POEMM
PIONEERS & CUBESATS
SPHEREX
ROMAN
COSI
ULTRASAT
ARIEL
UVEX
LISA
PROBES
TRADITIONAL MISSIONS
KEY
INTERNATIONAL PARTNER LED
ISS INSTRUMENT
SMALLSAT
CUBESAT
BALLOON
FORMULATION
IMPLEMENTATION
OPERATING
EXTENDED

Science Highlights

James Webb Space Telescope: Status

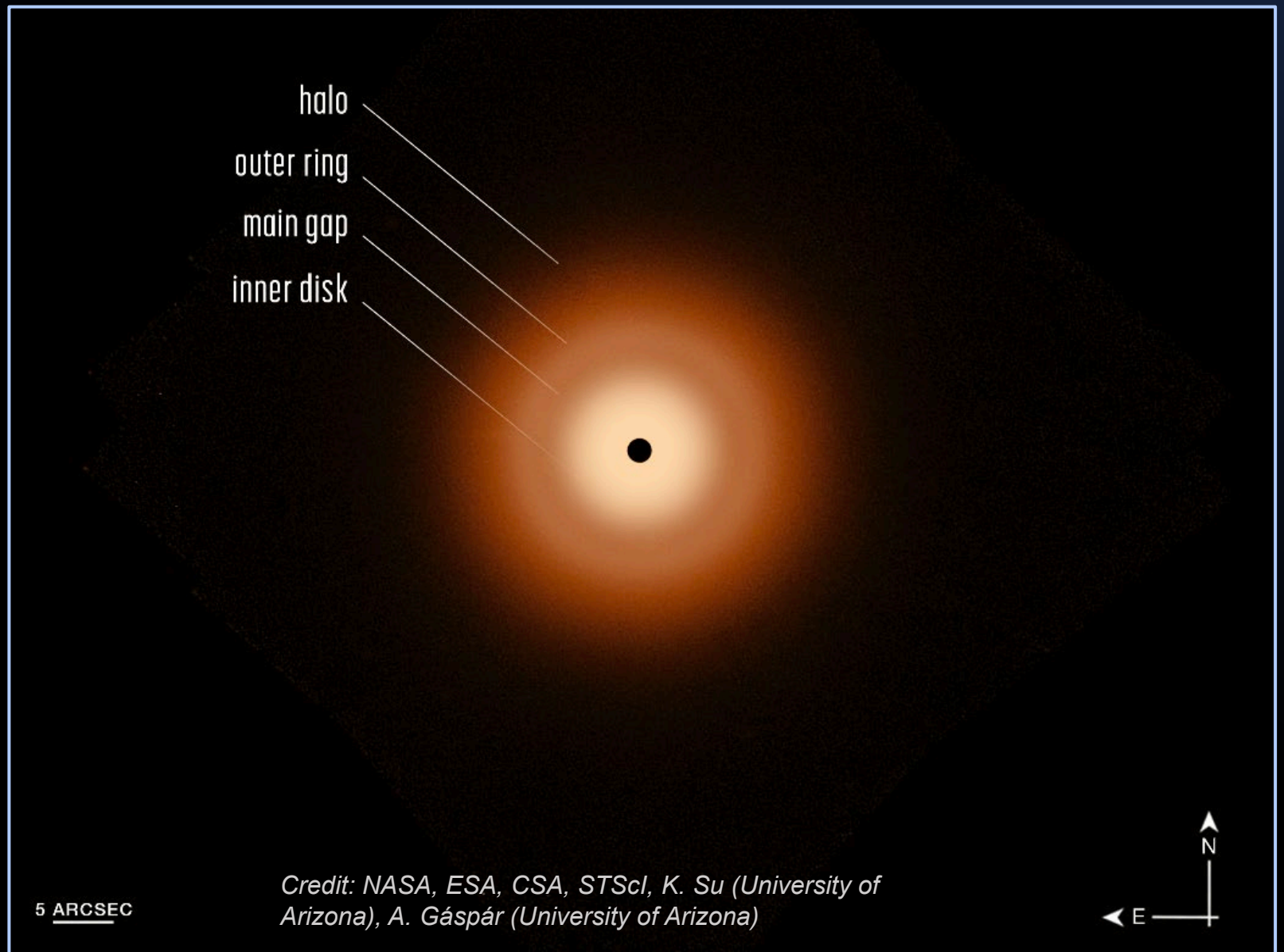
- Cycle 4: 2377 unique proposals (~78,000 hrs.) with a 9:1 oversubscription
- JWST currently has 947 published, refereed Webb publications from July 2022 – March 2024



Credit: NASA, ESA, CSA, STScI, B. Frye (University of Arizona), R. Windhorst (Arizona State University), S. Cohen (Arizona State University), J. D'Silva (University of Western Australia, Perth), A. Koekemoer (Space Telescope Science Institute), J. Summers (Arizona State University).

- Scientists are using Webb to measure the expansion of the universe, with a gravitationally lensed supernova SN H0pe.
  - Supernova H0pe was discovered from a comparison of Webb's image of a galaxy cluster with a Hubble observations.
  - "Trifold" images of this supernova allow the use the time delays, distance, and the gravitational lensing properties to generate a value for H_o.

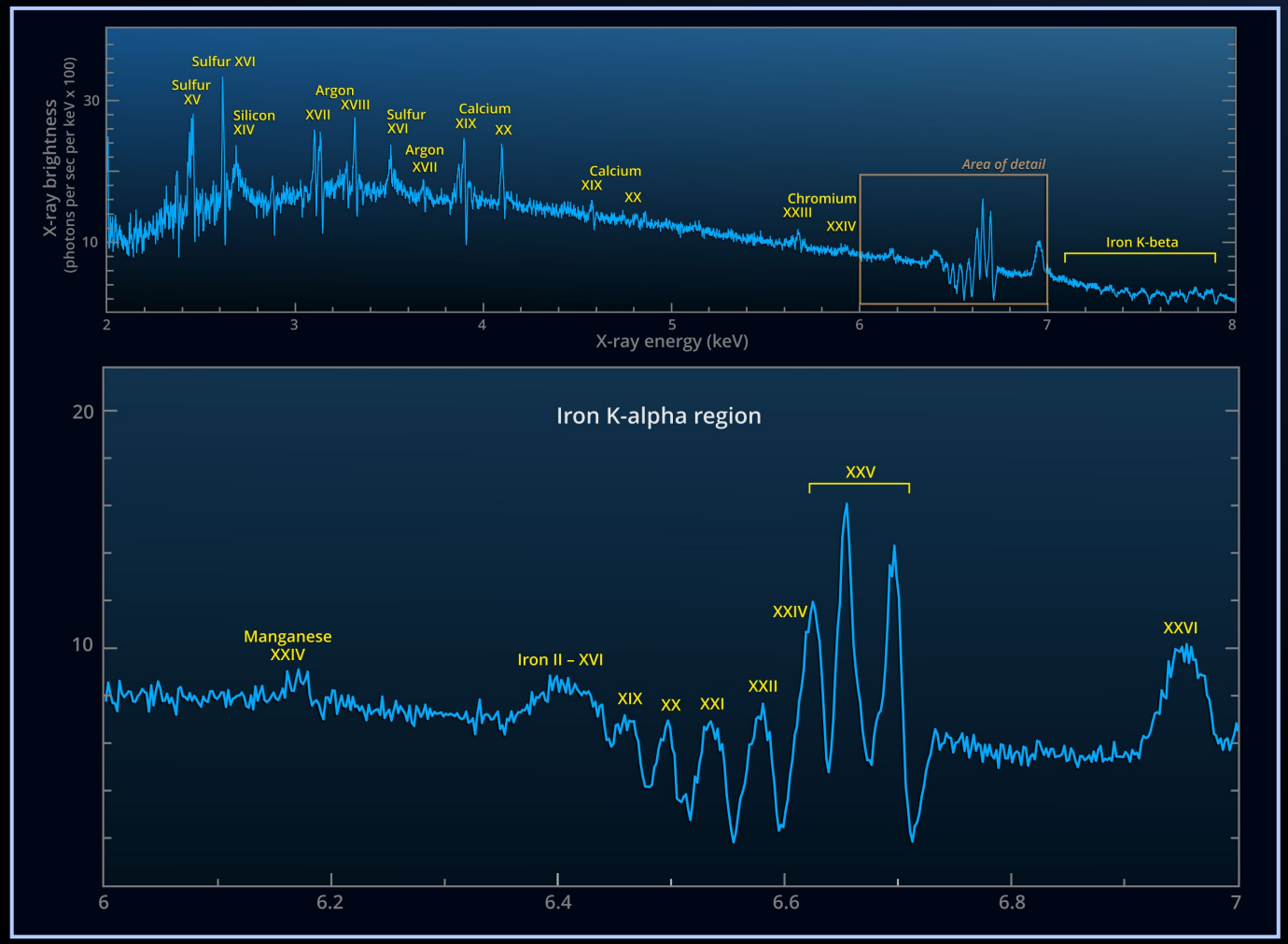
Webb Discovers Smooth Disk Around Vega



Credit: NASA, ESA, CSA, STScI, K. Su (University of Arizona), A. Gáspár (University of Arizona)

A team at the University of Arizona, Tucson used Hubble and James Webb space telescopes for an in-depth look at the nearly 100-billion-mile-diameter debris disk encircling Vega.

XRISM Resolve Spectrum of Cygnus X-3



- The XRISM/Resolve spectrum of Cygnus X-3 is the most detailed yet made.
  - The system is a high-mass X-ray binary consisting of a compact object (likely a black hole) and a Wolf-Rayet star.
  - High-resolution X-ray spectroscopy uniquely probes the system's gas dynamics and reveals a rich set of emission and absorption lines with complex profiles.
  - They indicate two gas components:
    - A background wind from the star
    - A turbulent structure — perhaps a wake carved into the wind — located close to the orbiting companion

TESS Spots Record-Breaking Stellar Triplets

TIC 290061484: A Triply Eclipsing Triple System with the Shortest Known Outer Period of 24.5 Days

- The authors used machine learning to sift through >100 million TESS light curves to identify eclipsing binaries, edge-on star systems that generate regular eclipses detectable by TESS.
- Working with a team of citizen scientists, they discovered the most compact triple-star system known to date. The inner two stars orbit each other every 1.8 days and the outer star orbits every 24.5 days.
- Photodynamical modeling suggests there is a distant, unseen fourth star that orbits every ~3200 days.
- In about 20 million years, all three components of the triple subsystem will merge and undergo a Type II supernova explosion, leaving a single

Six sectors of TESS data show deep regular eclipses every 1.8 days from the inner two stars of the triple system. Red arrows mark eclipses from the outer star that orbits every 24.5 days.

Budget

Astrophysics Priorities

- Maintain a **balanced portfolio** during this decade and the next, by balancing investments in missions under development and future missions, against funding for large missions in extended science operations.
- Investment to advance the Astro2020 Decadal Priorities, including technology maturation for the **Habitable Worlds Observatory**, selection of an **Astrophysics Probe** mission and Time Domain and Multi-Messenger astrophysics.
- Ensure successful completion of the **Roman Space Telescope,** within the Agency commitment
- Protect international **partnerships** such as the Laser Interferometer Space Antenna (LISA)
- Healthy R&A program

Federal Budget Process Overview

Date	Item
March CY	Program Planning & Budget Exercise instructions for FY+2 to projects (i.e., in CY XXXX, working FY XXXX+2)
May	Projects response to PPBE guidelines
July	SMD recommendations to NASA Office of the Chief Financial Officer (OCFO)
August	NASA budget decisions
September	NASA budget to Office of Management & Budget (OMB)
~November	OMB markup & pass back
~February CY+1	President's FY +1 budget announced
March CY+1	Congressional authorization committees
August CY+1	Congressional appropriations committees
September CY+1	Congressional conference committee
October CY+1	President signs budget (begins FY+1)

FY+2: Information is Not Public

FY+1: Information is Public

http://www.nasa.gov/news/budget/index.html

Astrophysics Division Budget Outlook

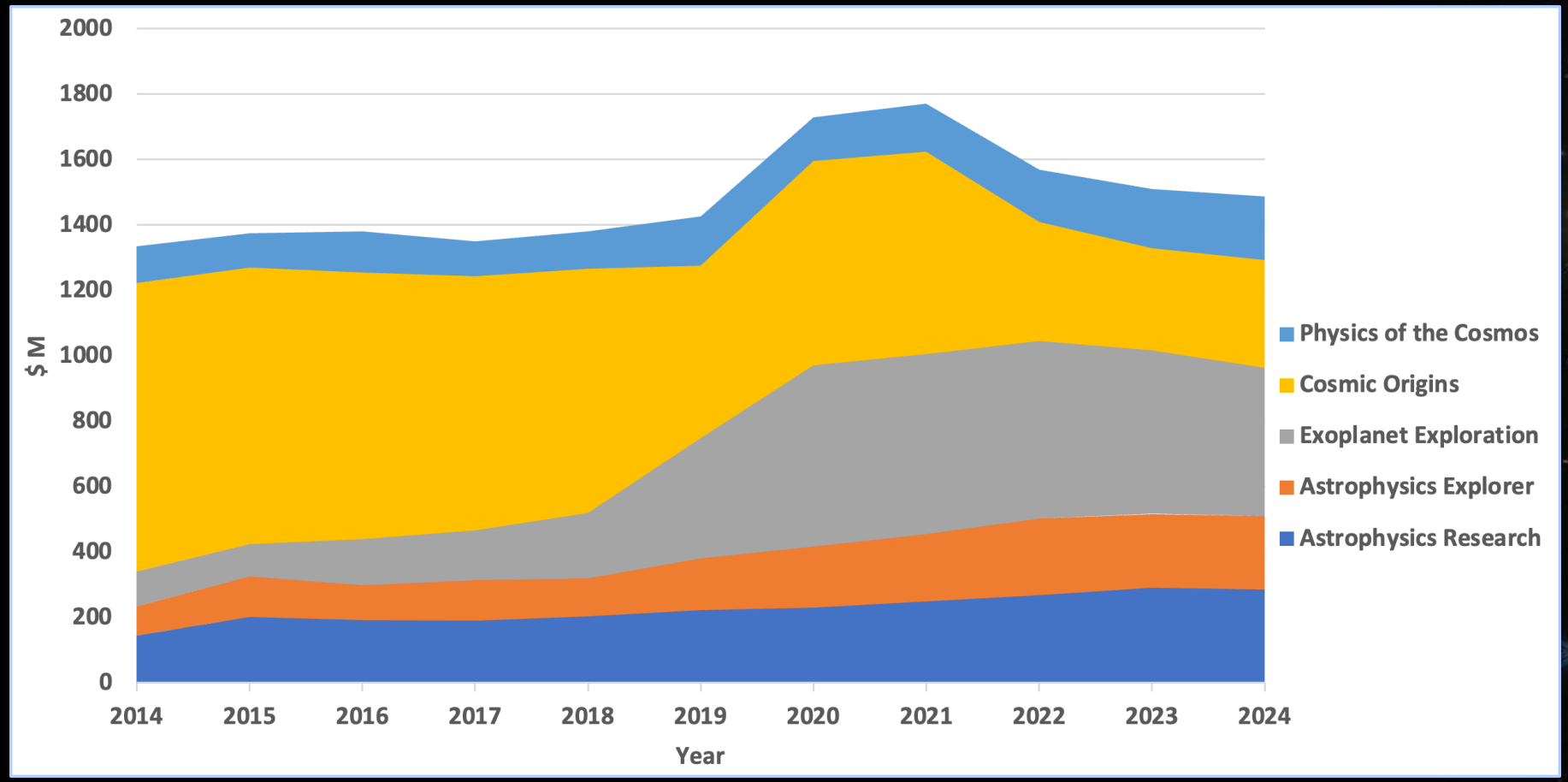
- Currently on Continuing Resolution until Dec 20th

- Key decisions on HST/Chandra have been suspended pending full FY25 appropriation
  - No further steps forward with Chandra or Hubble
  - Holding over implementation of OPCR findings
  - Tabled discussion of other Chandra/HST options such as archival proposal options

- FY26 & beyond are embargoed pending President's Budget for FY26

- FY25 full year appropriations bill is still pending

APD Budget: FY14 – FY24



- Roman Space Telescope FY24: $407 M
- Webb Space Telescope Operations FY24: $187 M

Senior Review

FY25 Senior Review of Operating Missions

The 2025 Senior Review includes the following missions:

Chandra	**Hubble**
Fermi	**NuStar**
IXPE	**TESS**
Swift	**XMM Newton**

**NICER is excluded, and will be reviewed after a planned repair NET January 2025.*

Timeline

- August 5, 2024: FY25 Astrophysics Senior Review Final Call for Proposals
- December 12, 2024: Senior Review final proposals due

Strategy

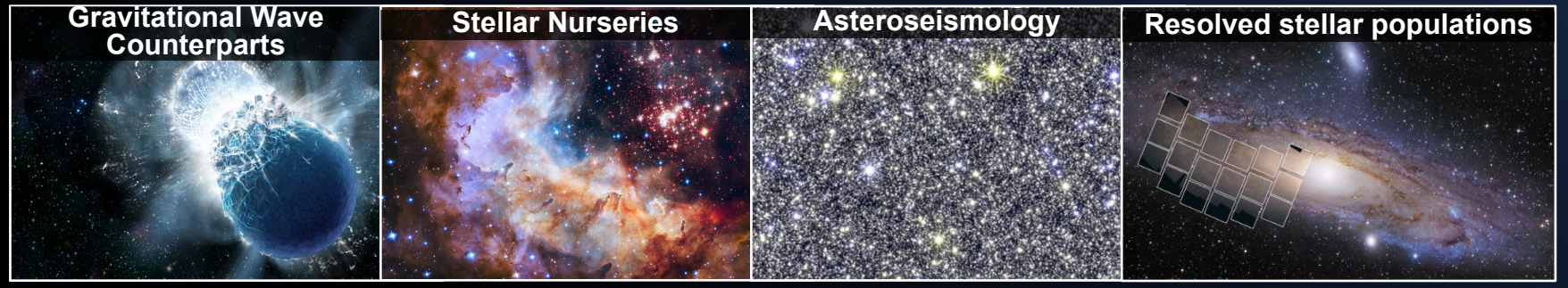
- Schedule designed to provide recommendations for input to FY27 Budget process
- Proposals are being prepared using FY25 President's Budget Request
- A single panel will review all the proposals together
- OPCR findings will be provided to the review committee

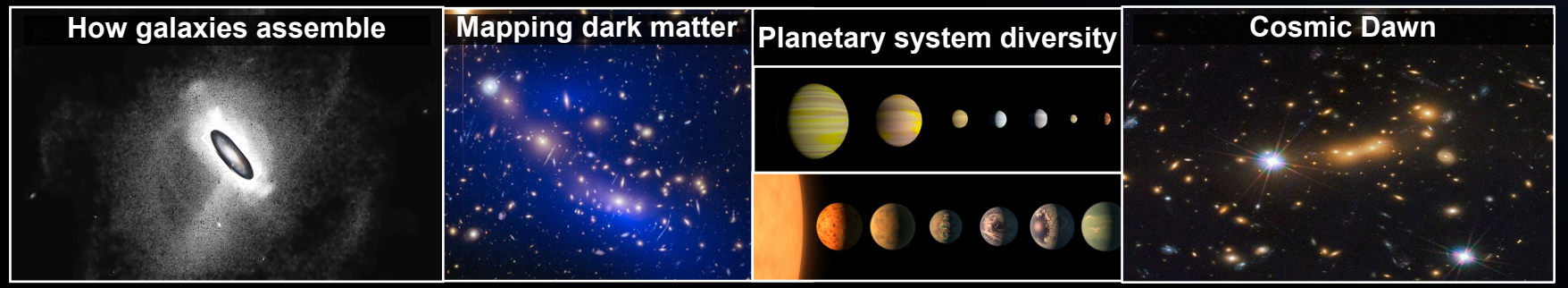
Missions

Nancy Grace Roman Space Telescope

Science

- Using a wide field instrument, Roman will conduct a survey to study the nature of dark energy and dark matter.





Nancy Grace Roman Space Telescope

Status

- The telescope's thermal vacuum (TVAC) testing completed.
- Successful Systems Integration Review in Sept. 2024.
- Amended solicitation for Roman preparatory forthcoming.
- The project remains on cost and schedule.
- Positive OIG report

Near-Term Milestones

- January 2025: Key Decision Point KDP-D
- September 2026: KDP-E & Launch Readiness Review (LRR)

Roman's spacecraft bus in GSFC's clean room. Credit: NASA/Chris Gunn

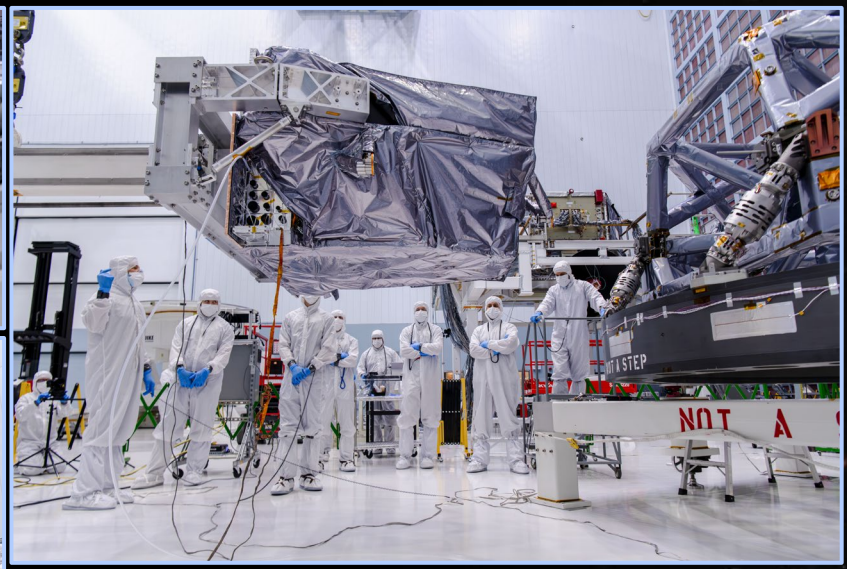
IOA arriving at GSFC

Imaging Optical Assembly (IOA) in Chamber A

Roman Instruments

- WFI, delivered on August 7th, has completed final closeouts and is ready for integration into the Integrated Payload Assembly (IPA).
- CGI was delivered to GSFC on May 19th, meeting performance requirements in both the Hybrid-Lyot and Shaped Pupil modes. CGI has been integrated into the Instrument Carrier.

The Wide Field Instrument upon delivery to the clean room at NASA's GSFC.



The Coronagraph Instrument, Roman's Technology Demonstration.

Roman Community Support

- APD has implemented a change in policy to align with SMD practice and consider science community funding outside the mission life cycle cost cap, as is already done in other divisions and for non-strategic APD missions.
- Paradigm for Roman is different from ‘pointed observatory’ approach; most science will be done with data entirely or substantially from its major surveys: need to support data analysis with this dataset.
  - Sky coverage, number of galaxies + stars + everything else to study will be orders of magnitude larger than with Webb or Hubble, so every observation will have many users;
  - Productivity limited by people, not data!
- *Primarily*, this science funding will provide grants for scientists via Roman General Investigator calls.
  - Calls annually beginning FY26
  - Mix of data-driven research (leveraging Roman’s large surveys), observations, and blends of those
  - Analogous to Webb and Hubble GO funding, but with more emphasis on data-driven research
- *Secondarily*, this supports funding of the Roman cloud computing capability for large projects.
  - Anticipating large, compute-intensive proposals that require resources beyond those already available in the Roman Science Platform
  - Costs include data ingress, data egress, compute cycles
  - New cost element for science from an APD mission

Roman Pipelines and Data Processing

- Roman's large surveys and associated large data volumes are the defining feature of the mission
  - Compute demands mean pipelines must produce broadly useful high level data products
  - Including Robust calibrated data, image cutouts, catalogs, light curves, spectra etc.

- Most processing and archives are in the cloud
  - Provides large volumes of compute on demand (enabling efficient reprocessing capability)
  - Roman Science Platform provides convenient cloud-based analysis environment for users

- Simple operations
  - One instrument with two observing modes
    - Reduced pipeline complexity relative to JWST
  - 3 core community surveys and <30 General Astrophysics Surveys
    - Survey specific processing/ reprocessing

Roman Pipelines and Data Processing

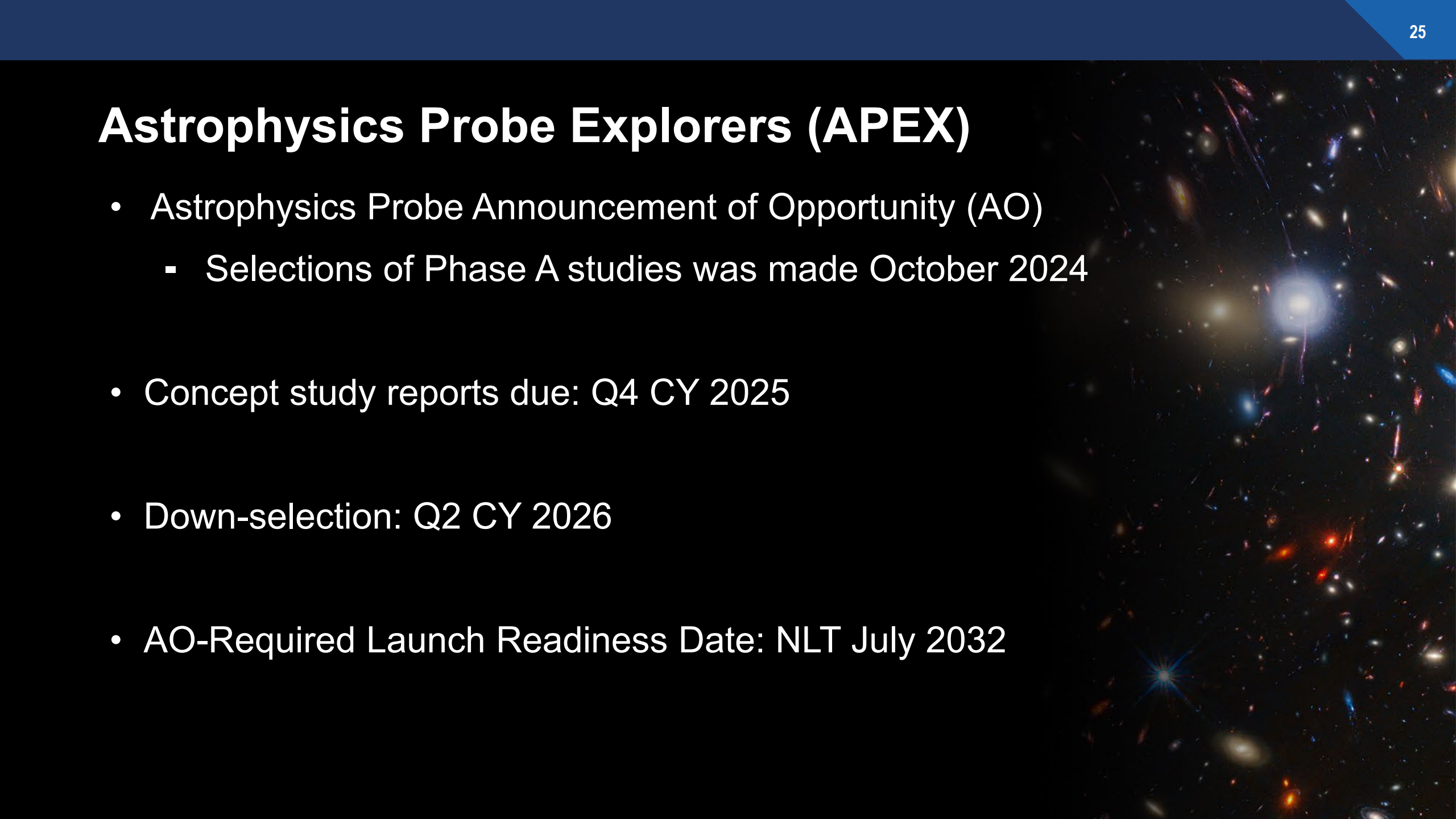
- Calibration pipeline will be well vetted prior to launch
  - Pipeline implemented early (already available and code is in the public domain)
  - In-depth process for science validation by scientists in Roman Telescope Branch
    - E.g. development “scrums” led by STScI scientists

- Distributed science operations (STScI, IPAC and Project Infrastructure Teams)
  - Provides early experience serving, sharing and using data across institutional boundaries, acting as a pipe cleaner for external users of Roman data

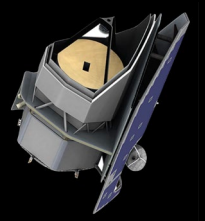
- Adopting lessons learned from Euclid

Astrophysics Probe Explorers (APEX)

- Astrophysics Probe Announcement of Opportunity (AO)
  - Selections of Phase A studies was made October 2024
- Concept study reports due: Q4 CY 2025
- Down-selection: Q2 CY 2026
- AO-Required Launch Readiness Date: NLT July 2032



PRIMA

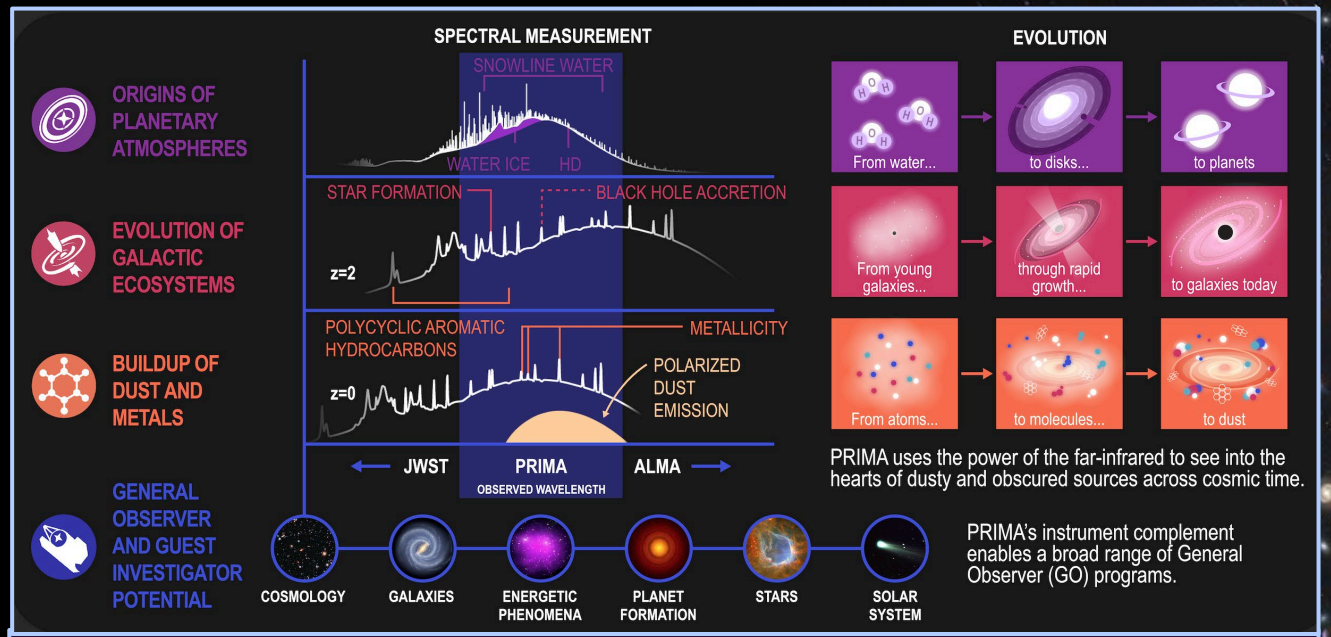


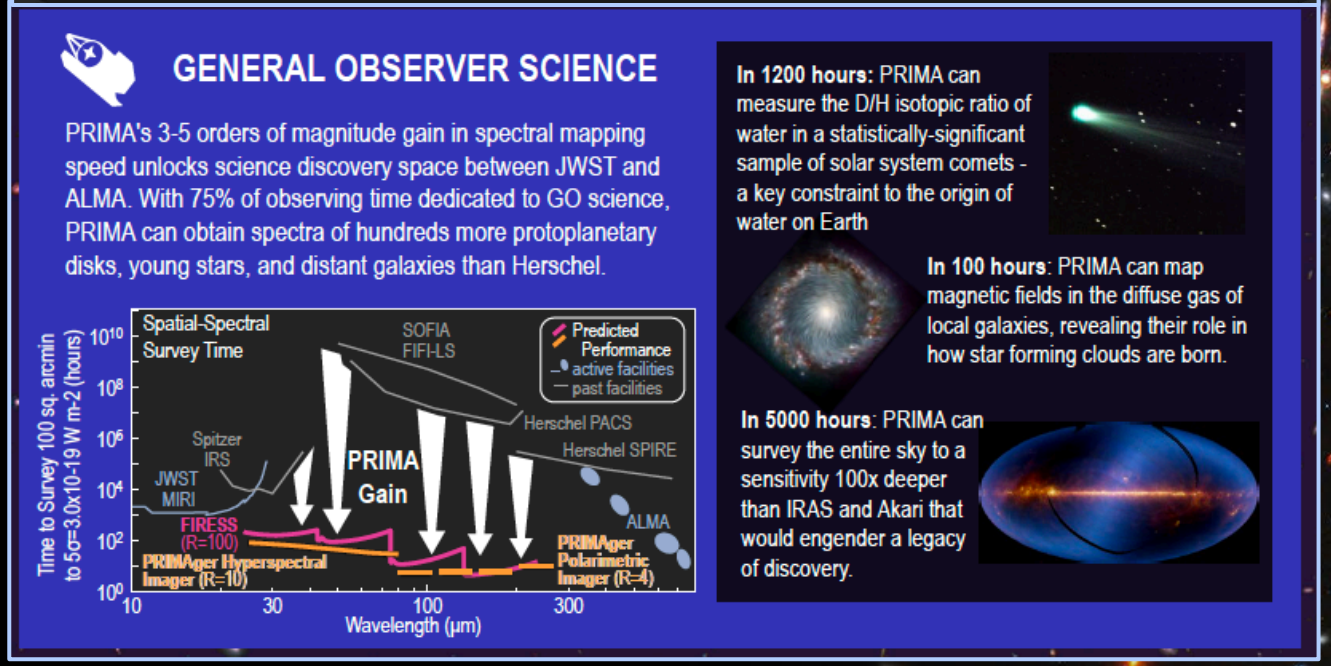
P.I. Jason Glenn (GSFC)

PRIMA offers far-infrared observations at a sensitivity several orders of magnitude better than prior state-of-the-art.

PRIMA has two instruments.

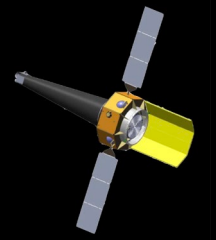
- *FIRESS* is a multimode spectrometer with a bandpass of 24-235 μm at R > 85 & a high resolution mode of R > 2000 over the whole band and 4400 at 112 μm.
- *PRIMAger* is a hyperspectral imager from 28-84 μm with R=10 & polarimetric imaging in 4 bands from 80-261 μm.



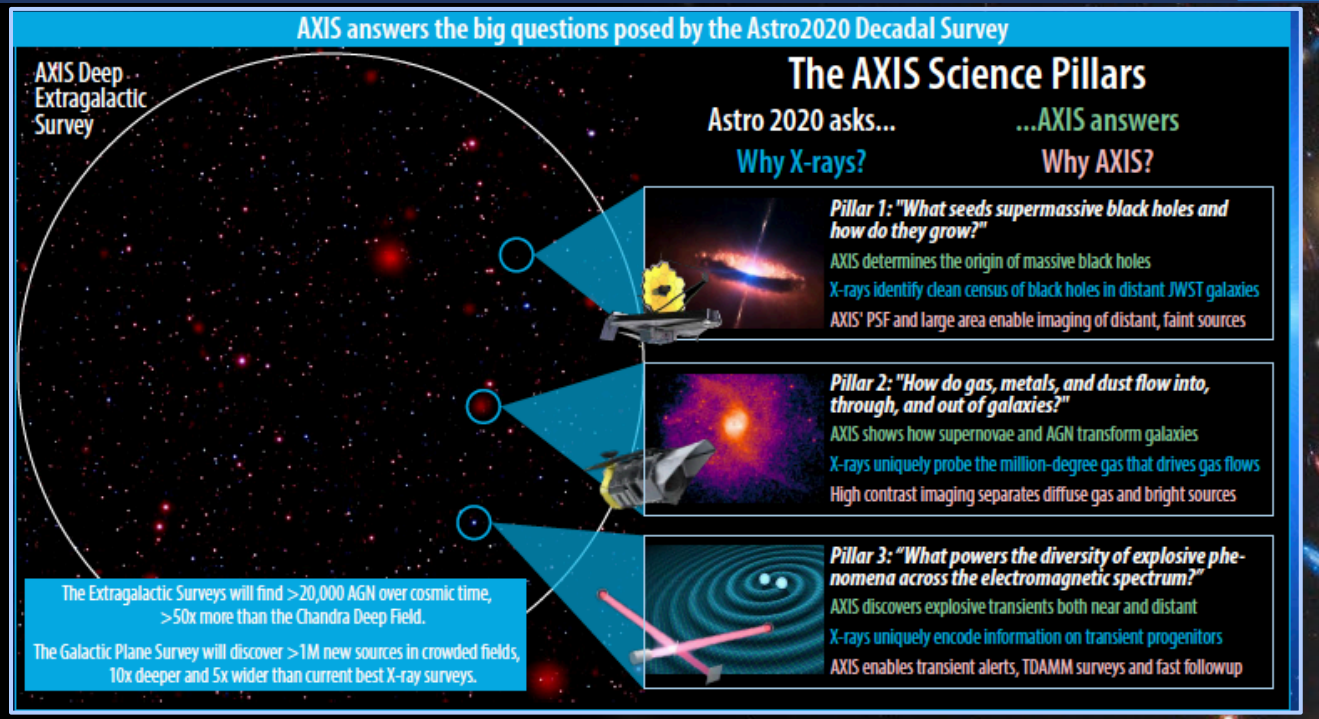


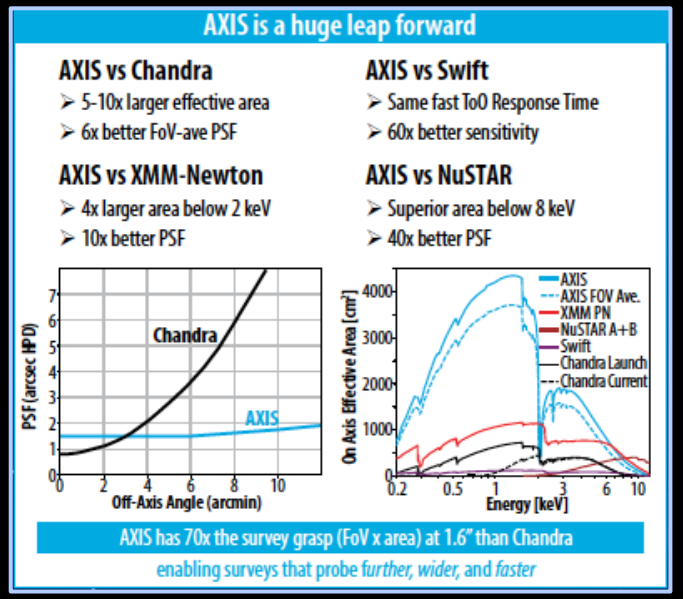
AXIS

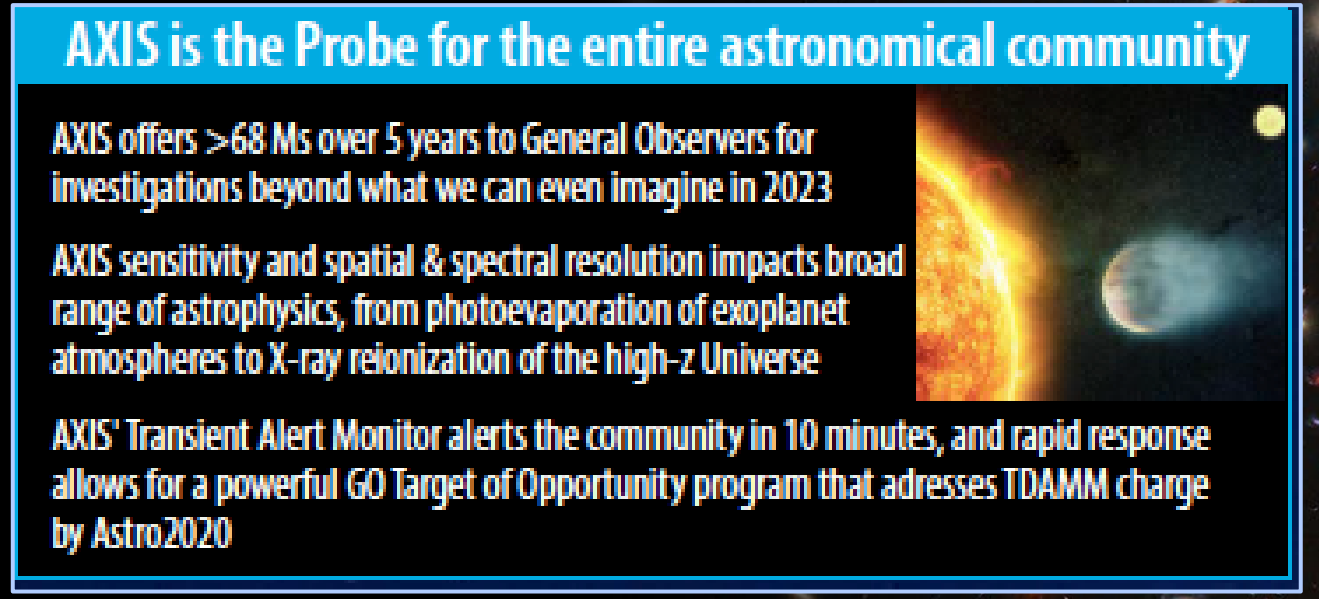
P.I. Chris Reynolds



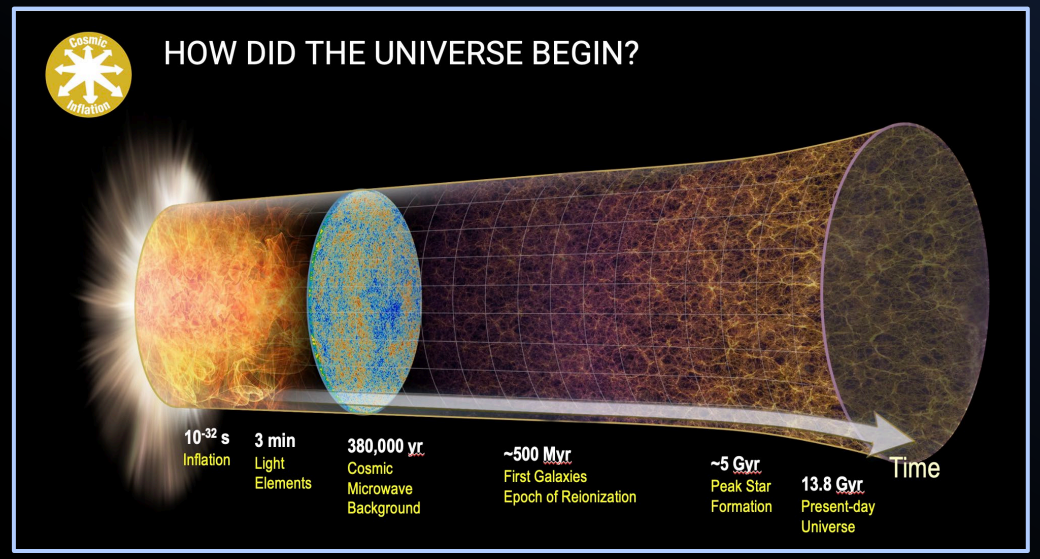
AXIS offers state-of-the-art X-ray spatial resolution with much greater field of view and sensitivity. AXIS is a high spatial resolution (<1.5" Half Power Diameter) X-ray imaging observatory with a 0.3-10 keV bandpass and 24 arcmin diameter field of view. It has an effective area FOV-average of 3600 cm^2 (1keV) and 570 cm^2 (6keV).

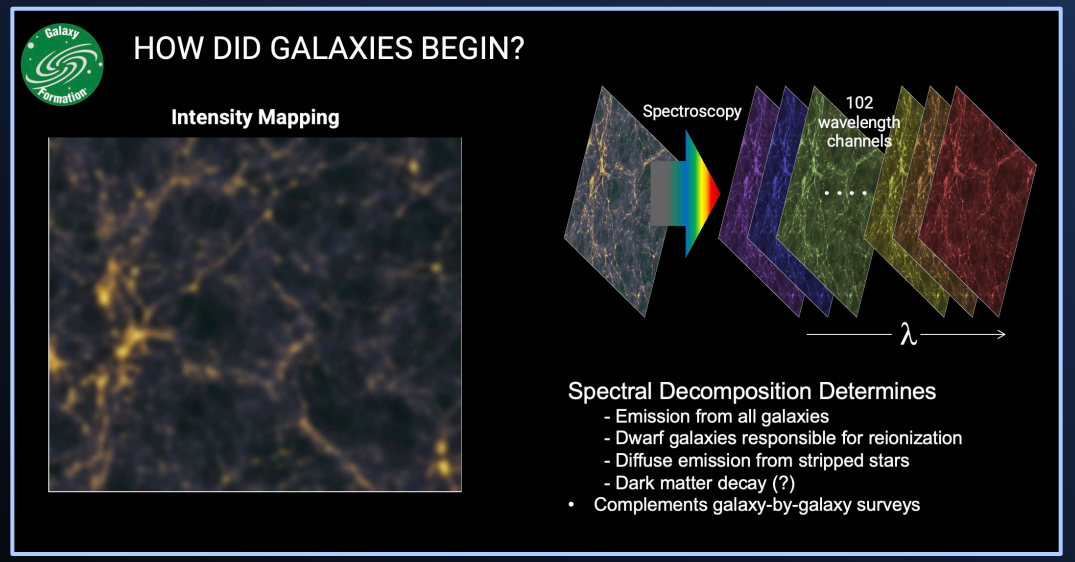






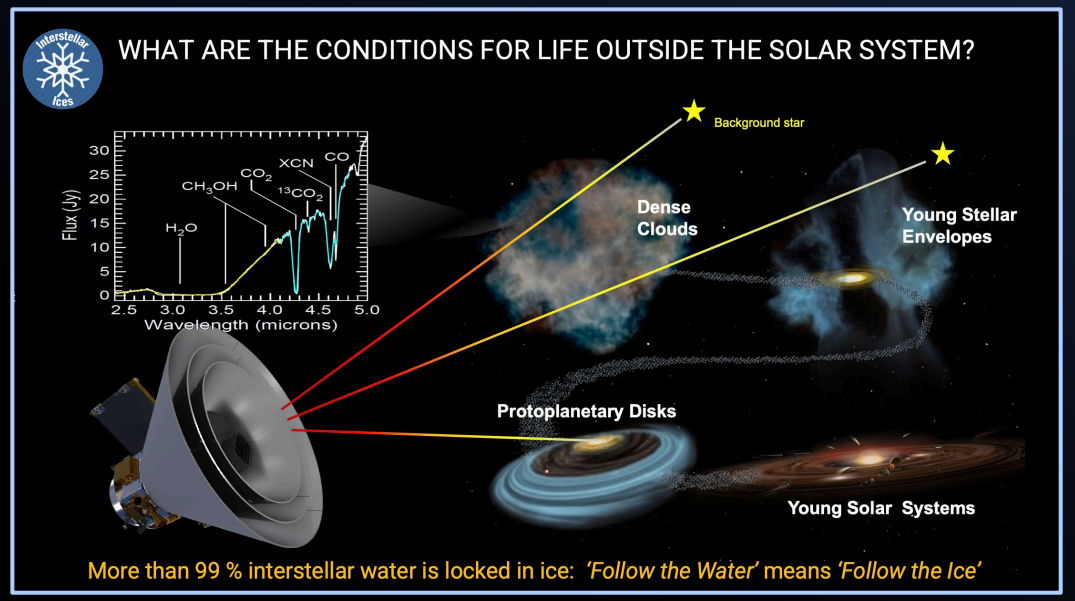
SPHEREx: Science Areas





SPHEREx will map entire sky in near-infrared light to study the origin of stars, galaxies, and the chemical composition of the universe.

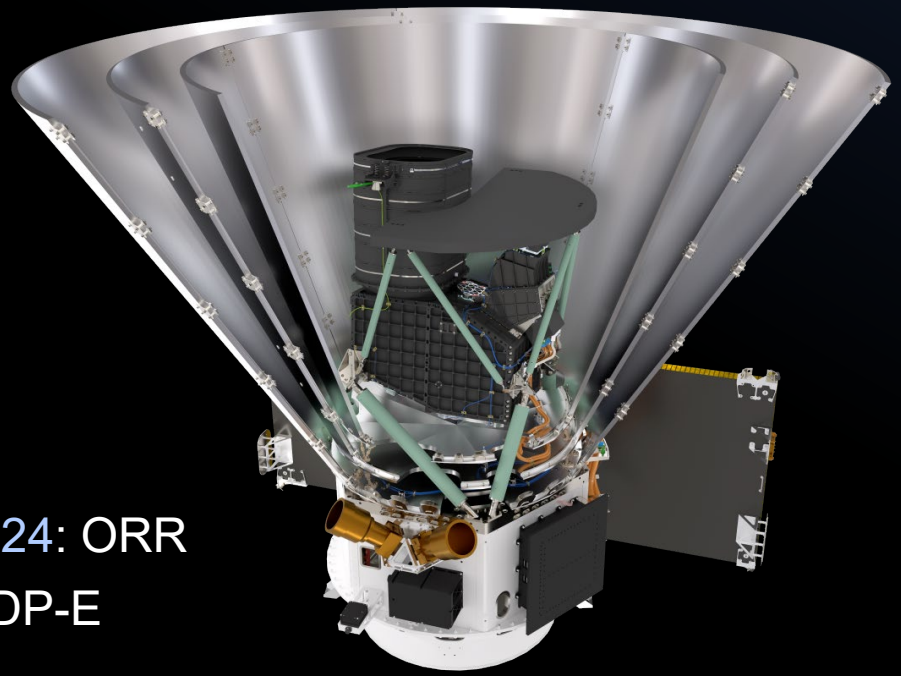
- Origin of the Universe
- Origin and History of Galaxies
- Origin of Water in Planetary Systems
- First All-sky Infrared Spectral Survey
- Over a two-year mission SPHEREx will collect data on >3x10^8 galaxies along with >10^8 stars



SPHEREx

Status

- Reaction wheels have been reworked and re-integrated into the spacecraft
- Regression testing completed
- Maintaining schedule towards launch



Upcoming Milestones

- December 10-12, 2024: ORR
- February 4, 2025: KDP-E
- April 2025: LRD

SPHEREx observatory being lifted and installed onto the vibration table, in the Z-axis configuration, at BAE Systems in Boulder CO in early August 2024.

COSI

The Compton Spectrometer and Imager

Science

- Source of 511 keV γ-ray lines, the signature of positron annihilation
- Reveal galactic element formation
- Insight into extreme environments with polarization
- Probe the physics of multi-messenger events

Status

- The second of 16 flight germanium detectors successfully was completed (current schedule calls for all 16 flight detectors completion by mid-2025).
- SpaceX Falcon 9 selected as the COSI LV in July 2024.

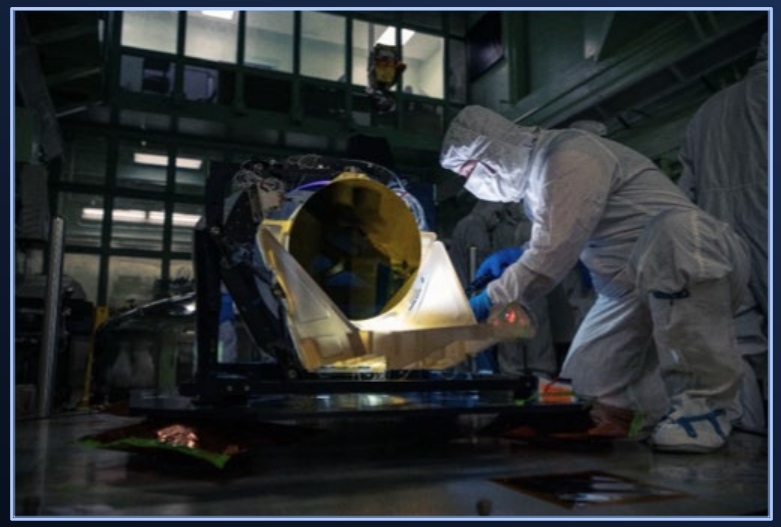
Upcoming Milestones

- December 4-6, 2024: COSI CDR at Northrup Grumman (Dulles, VA)
- August 2026: SIR
- September 2026: KDP-D
- August 27, 2027: LRD

LISA
Laser Interferometer Space Antenna

Status

- January 25, 2024: ESA adopted the mission and is now in a process to finalize the industrial contractor for the construction and integration of the spacecraft.
- August 1, 2024: NASA established a project office at GSFC.
- NASA is providing key technological subsystems such as lasers, telescope and charge management devices for the 3-spacecraft constellation.
- NASA technologies have now mostly achieved TRL 5 stage after a significant investment in resources with plans to achieve TRL6 for all technologies by Mission PDR.
- NASA plans to initiate a production of multiple copies of these technologies after a successful completion of KDP-B milestone review in March 2025.
- ESA with the help of NASA has established a formal science team where NASA has one third membership



EDU1 being inspected at GSFC after delivery from L3Harris

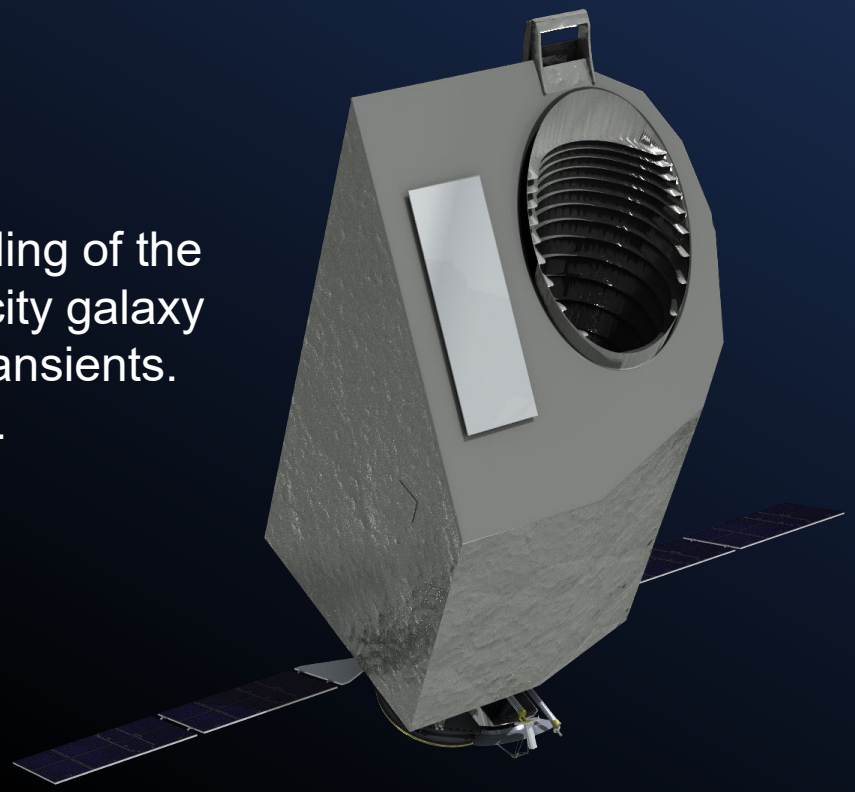
Upcoming Milestones

- January 2025: NASA Systems Requirement Review
- March 2025: NASA KDP-B

UVEX
UltraViolet Explorer

Status

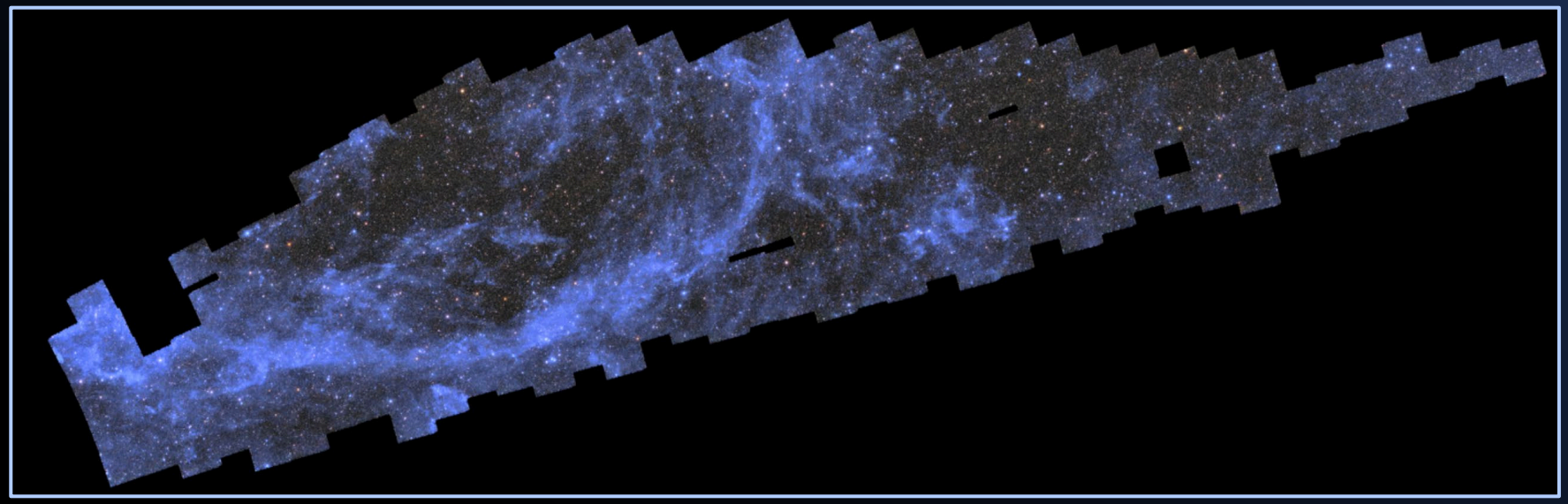
- UVEX selected as next astrophysics medium-class explorer.
  - Principal investigator: Fiona Harrison at Caltech.
  - UVEX will address outstanding questions in our understanding of the Universe, including the nature of the low-mass, low-metallicity galaxy population and the early ultraviolet emission of explosive transients. UVEX will also leave a rich legacy of all-sky ultraviolet data.
  - Team is making good forward progress in phase B



Upcoming Milestones

- February 2025: Systems Requirement Review

Euclid



ESA released new images of Euclid data on Oct 15, 2024 at IAC in Milan.

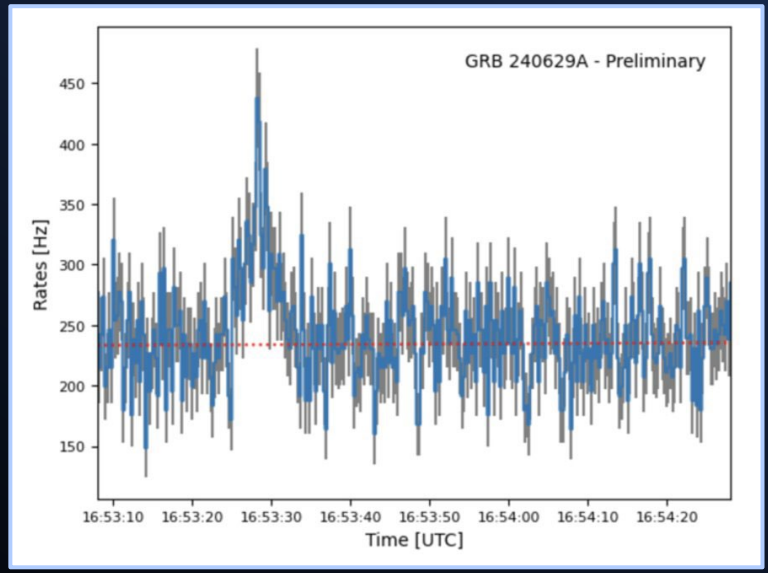
Status

- The second de-icing operation on the Folding Mirror M3 (FoM3) was successfully completed.
- NASA and ESA are updating and extending the MOU.
- Next data release Quick Release (QR1) March 2025 50 deg.^{2}
- NASA's Early General Investigative Program (EGIP) call was released under ROSES 2024.
  - August 22, 2024: NOI due date
  - October 3, 2024: Full proposals due date
  - ~March 2025: Start date

CubeSats, SmallSats, Balloons and ISS Payloads

- CUTE
  - 2021: Launched
  - Proposal was submitted for extended operations and awarded.

- BurstCube (Completed)
  - 6U CubeSat designed to detect Gamma-ray Bursts with 4 CsI detectors read out with SiPMs.
  - March 21, 2024: Launched on CRS-30 to ISS
  - April 18, 2024: Deployed from ISS
  - Detected at least one GRB
  - GRB 240629A (GCN Circular 37340)
  - Searching through data for other detections.
  - Sep. 16, 2024: Reentered the atmosphere
  - Technical issues reduced the mission duration.



CubeSats, SmallSats, Balloons and ISS Payloads

- Pandora (SmallSat): Multiwavelength Characterization of Exoplanets and their Host Stars
  - Launch date: 09/2025
  - Completed flight integration of the Near-Infrared Detector Assembly (NIRDA) detector. The payload electronics module (PEM) was assembled and tested. The flight cryocooler electronics (CCE) were received and verified.
- PUEO (Balloon): A Long-duration Balloon-borne Instrument for Particle Astrophysics at the Highest Energies
  - Launch date: 12/2025 in Antarctica
  - All flight antennas have been tested. Completed RF chain thermal test.
- Aspera (SmallSat): IGM Inflow/outflow from galaxies via OVI 10^5K emission line imaging
  - Launch date: 02/2026
  - CDR dPMP occurred on 07/22/2024, approval is pending open actions from dPMP.
- StarBurst (SmallSat): Gamma-ray ASM, Simultaneous detection of NS/NS mergers with LIGO
  - Launch date: ~Mid 2027
  - CDR dPMP completed. The Integration & Testing facility has been identified, TVAC and vibration testing facilities costs are within expectations.

CubeSats, SmallSats, Balloons and ISS Payloads

- TIGERISS (ISS): Measuring ultra-heavy (r-process) cosmic rays on ISS
  - Launch date: 02/2027
  - SRR/MDR dPMP took place on 8/27/24 at HQ. APD formally submitted ISS location request to SMD/DAAP on 08/27.
  - Submitted the TIGERISS overview to the ISS POC. ISS Payload Integration Manager (PIM) assignment has been requested from ISS.
- Landolt (SmallSat): Absolute stellar photometry to <0.5%, PI Peter Plavchan, George Mason University
  - Launch date: 2028
  - Interagency Agreement (IAA) process in underway.
- POEMM (Balloon): High resolution FIR tomography of protoplanetary disks, PI Gordon Stacey, Cornell
  - Launch 12/2029 from Antarctica (TBD)
  - Start date TBD

NASA Scientific Balloon Program

Recent Achievements

- Sweden Campaign
  - Successful completed with 4 primary science payloads:
    - HELIX, XL-Calibur, SUNRISE III, BOOMS
    - The flights have met the science success criteria.
    - All payloads have been recovered.
- September 2024: The Ft. Sumner Balloon Campaign completed on 25 September, all 7 flight-ready payloads flew and met or exceeded their comprehensive flight requirements. One payload delayed for one year.
  - August 21: TinMan (Hand launch), August 22: Salter Test flight, August 28: HASP, August 31: EXCITE, September 4: HASP 2.0, September 23: TIM, and September 24: DR-TES.

Upcoming Milestones

- December 1-January 5: Antarctica LDB Campaign
  - APD GAPS (General Antiparticle Spectrometer, PI Hailey, U Columbia) payload
- May 2025: Wanaka, NZ Super-pressure Balloon Campaign
  - HPD HiWind (PI Wu, NACR, Boulder) payload
  - BPO test flight

HASP1 Student Payloads at Work

HASP1 students on the flightline. Over 125 High School, Undergraduate and Graduate Students participating this year.

Time-Domain Multimessenger Astrophysics (TDAMM)

- October 3, 2024: The international agency TDAMM working group met for the 3rd time with representatives from 3 US funding agencies and 11 countries discussing recently-launched missions and progress on coordinating TDAMM activities between space and ground observatories.
- September 23-26, 2024: The 3rd TDAMM workshop was held at Louisiana State University, sponsored by LSU, NASA, DoE and NSF, to discuss multidisciplinary science enabled through TDAMM observations, and the facilities and infrastructure needed to maximize scientific return. A White Paper will be written for consideration by the Agencies by year end.
- Fall 2025: The 4th TDAMM workshop will be held, hosted by NASA's Physics of the Cosmos TDAMM pilot initiative, ACROSS. This workshop will develop community-driven coordinated observation plans for space and ground facilities based on specific TDAMM science cases.

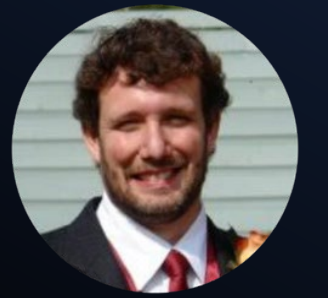
HWO Update

HWO Leadership

NASA HQ Leadership

Program Executive	Program Scientist	Deputy Program Scientist
		
Julie Crooke	*Megan Ansdell*	*Joshua Pepper*

HWO TMPO Leadership

Principal Architect	Project Manager	Mission System Engineer	Project Scientist (interim)	Pre-formulation Scientist (interim)	Pre-formulation Scientist (ex-officio)	Pre-formulation Architect (ex-officio)
						
Lee Feinberg GSFC	*J. Scott Smith* GSFC	*Mike Menzel* GSFC	*Giada Arney* GSFC	*Aki Roberge* GSFC	*Bertrand Mennesson* JPL	*John Ziemer* JPL

Habitable Worlds Observatory (HWO)

Recent Achievements

- May 31: ROSES grants awarded to 3 industry partners to develop HWO technologies.
- August 1: Established the HWO Technology Maturation Project Office (HWO TMPO) in response to direction from Congress
- August 12: HWO participation in NASA MOSAICS Program: New York Institute of Technology's Mechanical Engineering Department and Physics Department were selected for 2 MOSAIC awards. With mentors at GSFC.
- August: Boston Micromachines Corporation (BMC), ALPAO, and AOX will study how to build 96x96 deformable mirrors (DMs) for JPL, report coming March 2025.
- October 8: Splinter Session at DPS on HWO's status and mission planning, and HWO's potential for studying solar system bodies including icy worlds, giant planets, small bodies, etc.
- HWO Fall F2F (Oct. 22-24): Hosted in Rochester, NY, with tours of L3Harris. HWO TMPO updates included science, systems engineering, modeling, mentorship, technology, and look-ahead schedule.

Upcoming Events and Milestones

- Winter AAS (Jan. 2025): 90-min special session on HWO progress and current activities. 4-hour splinter session discussing Working Group science cases, including future science teams and Working Group status and plans forward.

HWO Technology Development

- The HWO Technology Plan is organized along three ***tracks***:
  - Coronagraph System Technologies (CST)
  - Ultra-stable Telescope System Technologies (UTST)
  - High-sensitivity UV and Instrument Technologies (HUVIT)

Gaps will be classified as one of the following:

- **Technology Gap*:*** An element for which the required function/performance, form, fit, environment, or interface is novel or not bounded by existing demonstration.

- **Engineering Gap*:*** An element for which the required function/performance is bounded by existing demonstration, but not necessarily in the same form, fit, environment, or interface as needed for HWO.

- **Modeling / Testbed / Facility Gap*:*** A capability needed to support the development or modeling of a critical technology element or improve the manufacturability, testability, yield, or reliability of an element.

Habitable Worlds Observatory Community Science

AI for NASA flagship missions: a vision for the Habitable Worlds Observatory	The Search for Life on Exoplanets (including both gaseous and surface biosignatures)
Generative AI for Overall Mission Effectiveness at the Habitable Worlds Observatory	Characterizing Prebiotic Planets
AI/ML in the context of integrated modeling and uncertainty quantification for HWO	Characterizing Technosignatures
Habitable worlds observatory: AI/ML Models and Tools for Processing and Analysis of Observational Data	The origin of water and planetary system architecture
Using HWO to Decipher Multi-phase AGN-driven Outflows and Their Multiscale Impact	Survivability of liquid surface ocean on rocky planets
Exploring the Quiescent Black Hole Population with HWO	Retention of volatiles on rocky planets
The IMBH Mass and Spin Functions measured with HWO	Disk winds and protoplanetary disk evolution
Probing Energy Extraction from Black Holes with HWO	Protoplanet detections and mass growth/loss
Imaging the Dusty Torus around SMBH with HWO	Debris disks and their properties
Spatially Resolving the Fundamental Elements of Reionization in Galaxies with HWO	Exozodi
Modeling Lyman Continuum Escape with HWO	Linking planets atmospheric compostions back to origins (with the emphasis on Oxygen)
Tracking Cosmic Reionization via Green Pea Galaxies with HWO	Investigating ocean world habitability
Calibrating Lyman Continuum Indirect Estimators with HWO	When and where did the giant planets form?
Revealing the shape of the SED of Ionizing Radiation with HWO	Long term monitoring of giant planet atmospheres and aurorae
HWO Measurements of The Evolution of the Ionizing Photon Luminosity Function	Occurrence and orbital separation distribution of small exoplanets
Counting Extremely Faint Galaxies with HWO to Measure the Dark Matter Power Spectrum	Prevalence of post-disk dynamical evolution
Observing the Small-scale Power Spectrum of Dark Matter with Perturbed Einstein Rings Using HWO	How atmospheres of small planets evolve with time
Measuring SMBH Merger Timescales with HWO	Relationship between planetary system architectures and host star properties
A High Spatial and Spectral Resolution Absorption Map of the Inner CGM Enabled by HWO	Characterize composition of gaseous planet atmospheres in reflected light
Characterizing the Disk - CGM Interface with HWO	Characterization of clouds and photochemical haze
Characterizing the Morphology and Spatial Distribution of the CGM via Emission Line Mapping with HWO	Distinguish between large rocky planets, water worlds, and gas dwarfs
Dust extinction curves in the Milky Way and Local Group galaxies	Distinguish types of rocky planets
The cosmic build-up of dust using UV-spectroscopy-based depletions in local volume galaxies	Identify rocky planets with liquid-water oceans
Probing the Full Depth of ISM Properties with a UV-IFU	Characterize transiting exoplanets
UV fluorescence in Star Forming regions	Observations of atmospheric escape in exoplanets
Investigating accretion mechanism through outflows and proper motions at AU scales in nearby star forming regions	Identifying Cold Ocean Planets and characterizing their geologic activity
Massive Stars in Metal-Poor Environments	Survey for the Smallest Trans-Neptunian Objects
White Dwarfs as Probes of Fundamental Astrophysics	The nature of the astrophysical r-process
Resolved Stellar Populations in Nearby Galaxies	r-Process Elements
Gravitational Wave progenitor systems (Re-drawing the evolution of [binary] massive star)	Flash Spectroscopy of CCSNe
The first stars	Distance Ladder 3.0
Modeling atmospheres of stars from O to M in the UV	The Formation of Star Clusters

HWO Mentorship and Coaching Program Opportunities

Habitable Worlds Observatory Internships

Current Call for Summer 2025 projects has been announced!

Traditional project-based mentoring via intern.nasa.gov with HWO-sponsored projects & HWO mentors

Modeled after Europa Clipper Internship Program (ICONS)

HWO partners with NASA's MOSAICS Program

Two awards with NYIT and NASA GSFC announced 8/24!

HWO establishes relationships with institutions historically under-resourced in the NASA funding system.

HWO leverages

MOSAICS

Mentorship and Opportunities in STEM with Academic Institutions for Community Success

HWO Mentor + Coaching Program

Coming Soon!

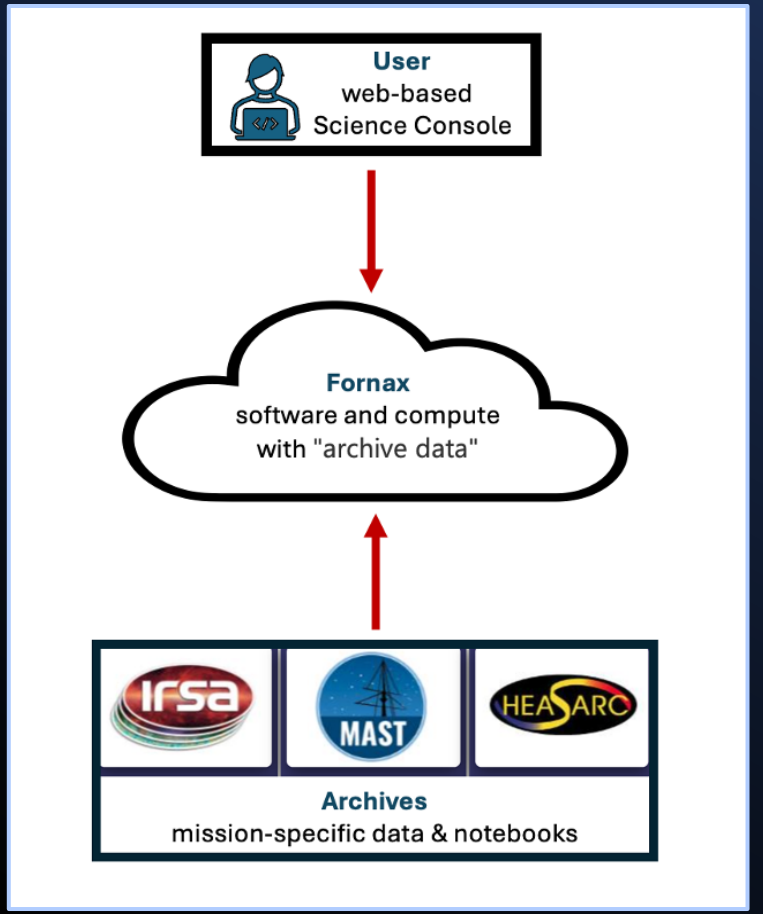
HWO Mentorship & Coaching Program being developed by the HWO IDEA & Mentorship Working Group, HWO Project Office

A new multi -optional, -level of effort, HWO mentor-coaching program to meet students where they are

Fornax and Open Science

Fornax and Open Science Updates

- APD is developing the science platform **Fornax**, a cloud-based solution that brings together data, open-source software, and computing so that researchers can focus on science https://pcos.gsfc.nasa.gov/Fornax/
  - External Review of Fornax Architecture is 21 Nov 2024 @ GSFC
  - Fornax expects to be open for beta users in Summer/Fall 2025
- Science Mission Directorate (SMD) has set up two new projects (in pre-formulation) related to unified infrastructure and open science
  - Science Cloud Infrastructure Project (SCIP) @ Goddard
  - Data and Analysis Service Project (DASP) @ Ames
- APD supported "NASA Science Data Repositories Workshop" at Caltech/IPAC in Pasadena on Sep 25-27, 2024



Simulated Roman and Rubin images free to download

https://irsa.ipac.caltech.edu/data/theory/openuniverse2024/overview.html

NASA/IPAC INFRARED SCIENCE ARCHIVE

IRSA | DATA SETS | SEARCH | TOOLS | HELP Login

OpenUniverse 2024 Simulated Roman & Rubin Images: Preview

Overview

OpenUniverse2024 is a project to simulate spatially overlapping imaging surveys to be carried out by the Nancy Grace Roman Telescope and the Vera C. Rubin Observatory. The simulations were carried out on Argonne's Theta cluster and consist of:

1. The LSST ELAIS-S1 Deep Drilling Field (DDF)
2. The Roman Time-Domain Survey (TDS) shifted to overlap the ELAIS region and LSST DDF
3. Overlapping LSST Wide-Fast-Deep (WFD) survey (with rolling cadence)
4. Overlapping Roman Wide-Area Survey (WAS) in the same region
5. A deep-field calibration region of the Roman WAS in the same region

This data preview release consists of a subset of data from each of the five categories above.

If you use OpenUniverse 2024 Preview data, please cite the dataset Digital Object Identifier (DOI): 10.26131/IRSA569. Also include the "How to Cite" text listed on the OpenUniverse2024 AWS Open Data Registry page.

Jump to documentation.

Review of the NASA Postdoctoral Program (NPP)

Review of the NASA Postdoctoral Program (NPP)

- NPP Purpose: “Identify and continue the career development of promising STEM researchers in disciplines of interest to NASA, so that a pool of highly skilled professionals is available to fill the future workforce needs of NASA, industry, academia, and related institutions.”

- NASA Postdoctoral Program Independent Study Team: “Identify ways the NPP may be enhanced in its effectiveness and to reflect on the merit of current objectives.”

- From 9/2023 to 9/2024 an Independent Study Team reviewed the NASA Postdoctoral Program
  - Co-Chaired by Steve Cummer (Duke U) and Stefanie Milam (GSFC)
  - Questions may be directed to Study Director Paul Hertz (NASA HQ) (paul.hertz@nasa.gov)
- Status
  - Input gathered from wide variety of community stakeholders
  - Site visits at NASA Centers, a public call for input from the NASA science community, and face-to-face sessions (in person, hybrid, and virtual) with members of the community
  - NASA has received the draft report from the Independent Study Team and is formulating its response
  - Report and Response will be made public
  - More information on the NASA Postdoctoral program is available at https://science.nasa.gov/nasa-postdoc-program and https://npp.orau.org/

Technology

Amendments to SAT and RTF

- SAT-24 amendment to be released soon, with no significant change in eligible missions.
  - Planning budget reduced from $10M to $5M for the first year of new selections.
  - Expecting *not to solicit* new proposals in SAT-25.
  - Funding will be allocated to SAT-24 and SAT-26 to permit acceptable selection rates.
- Roman Technology Fellowships are very popular, but selection rate has exceeded budget; starting in APRA-24 and SAT-24, RTF applications will now also be evaluated for merit. Proposers should expect ~half of APRA/SAT proposals with RTF applications will be awarded for grant funding without accompanying Fellowship.

IOP Publishing J. Phys. Photonics 5 (2023) 042501 https://doi.org/10.1088/2515-7647/ace869

Journal of Physics: Photonics

ROADMAP

2023 Astrophotonics Roadmap: pathways to realizing multi-functional integrated astrophotonic instruments

OPEN ACCESS

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SMD and APD Technology Approach

1. SMD Chief Technologists are prioritizing SMD needs to present them to STMD for future investments (see next chart with SMD priorities against technology taxonomy).
2. SMD and APD are reaching out to other government agencies (OGAs) to leverage investments and find common areas of interest for collaboration. Meetings were held with OGAs including the Space Force, DARPA and other DoD agencies. Common identified areas of interests are: Micro-thrusters, Micro-meteoroids mitigation, Quantum inspired telescope imaging, Optical-Atomic system integration and calibration, etc.
   a) Under the CT4LT contract, Northrop Grumman will be working on micro-meteoroids mitigation, and this is creating interest on our OGA partners.
   b) The NASA Meteoroid Environment Office at MSFC is being incorporated in these collaborations with OGAs and industry, by increasing their visibility and their potential contributions.

Technical Areas	SMD Requests for STMD Investments in FY25 – Proposed 10/2/24
TX01 Propulsion	Micro-thrusters (HPD, APD)
TX08 Sensors	**Quantum sensing component technology** (APD, BPS, ESD); **Low TRL improvements to photon detection, energy resolution & scaling to large low-SWaP arrays** (APD, PSD, HPD, ESD)
TX10 Autonomy	**AutoNav demo** (PSD, HPD, ESD, APD, ESSIO) *(increased priority)*
TX12 Structures	**Ultra-Stable Structures** *(was Disturbance Free Payload)* **Tech Demo** (APD, ESD, BPS); **Micrometeoroid-robust deployable membranes and baffles** (APD, ESD)
TX14 Thermal	Low-vi**bration cryogenic cooling for single photon detectors** (APD)

- **Bold Text: Highest priority**
- Regular Text: High priority
- Change from last year

IDEA

IDEA Initiatives updates – Inclusion plans

- In 2024 three R&A programs continued to pilot Inclusion Plan requirement as part of their proposal requirements:
  - The Inclusion Plan requirements were aligned across SMD (in the Summary of solicitations)
  - ATP, SAT and APRA received a total of XX Inclusion Plans combined
  - APD adopted the same evaluation criteria and process for all IP received

- The IPs received show that APD socialization of the pilot and the sharing of resources is making a difference:
  - IPs in 2024 are in general more detailed and aligned with the requirements and the core value of Inclusion
  - Information gathering from science panelists and chairs is generally positive
  - Information gathering from the IP evaluator is also encouraging (NASA/APD is moving the needle)

- There will be a Special Session on APD inclusion plans lessons learned at the AAS245

- In ROSES 2025 at least 4 solicitation will require inclusion plan (still pilot, not included in the overall proposal rating)
- APD will continue to improve from the 2024 lessons learned, especially on the feedbacks to Pis and the evaluation process

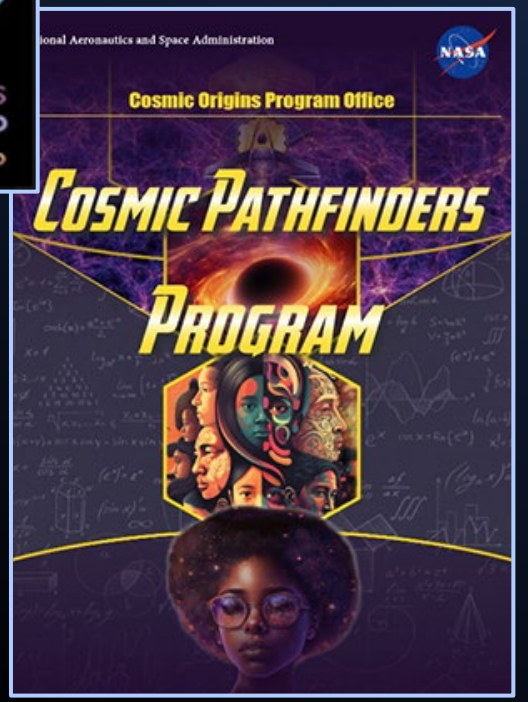
IDEA Initiatives updates – Community Engagement

- APD has actively partnered with the SMD Research Initiation Award and the MOSAICS program.
  - In 2024 RIA 20% of all received proposals are relevant to Astro (more than any other divisions)
  - In the last two MOSAICS seed grant calls 4-5 new PIs were proposing research relevant to APD
- We continue to engage with MSI/R2 institutions whenever possible to make sure they are aware of funding programs that may benefit their faculty and students (e.g. FINESST, ADAP, MOSAICS, RIA)
- APD Program Scientists are engaged with other NASA entities (MUREP, OSTEM, Space Grant) that focus on broadening the participation into the NASA research and educational ecosystem.
- APD proposed GRAD-STAR program to replace FINESST has been presented at the NASA Advisory Committee and has been receiving good feedbacks.

Cosmic Origins & Physics of the Cosmos IDEA Highlights

Initiatives

- 20+ public engagement talks & 10+ hosted events in 2024
- PhysCOS Early Career Workshop
- Cosmic Pathfinders Program
- AWESOM Science Analysis Group
- COR Science Team: Small Steps, Giant Leaps NASA Podcast – Episode 139



Cosmic Pathfinders Program Highlights

- 560+ STUDENTS & EARLY CAREERS REACHED GLOBALLY!
- Developing professional society collaborations (AAS, APS, NSBP, AIP)
- 15 anticipated university chapters for Fall 2024

Cosmic Origins & Physics of the Cosmos IDEA Highlights

Cosmic Pathfinders Program Activity

- Hack your career session | AAS 243 splinter session | attendance ~35
- Astro Careers Roadmap Workshop | virtual | attendance ~40
- How do you “SciComm”? Science Communications in the world of social media | virtual | attendance ~40
- Social Media engagement (personal accounts): >20,000 unique interactions!
- Calculating your confidence: Building a spacetime calculator iPhone App | Invited session | attendance ~80

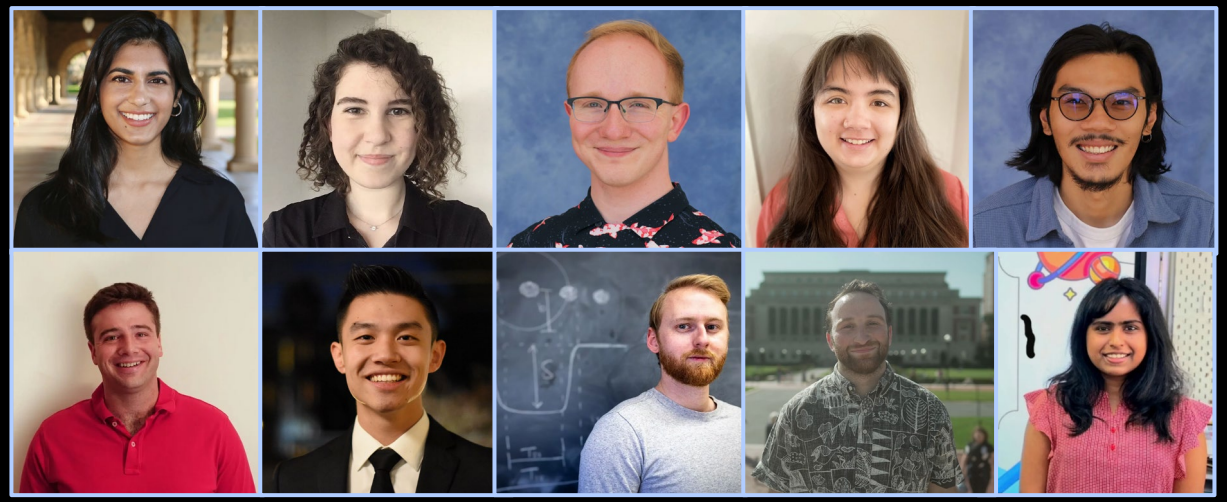
Conference Engagement

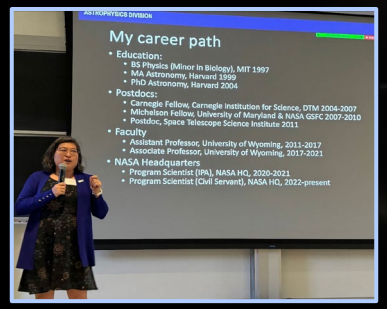
- SACNAS: Session -- ”The Art of Storytelling in STEM: Intersection of Science Communication, Culture, and Art”; table in the NASA booth
- NSBP: NASA Big Science Hour; Exhibitor Booth
- AAS: COPAG, PhysPAG, Joint PAG, Cosmic Pathfinders splinter sessions
- APS March/April: Exhibitor Booth
- NASA GSFC – JHU interaction day
- NASA GSFC – Early Career Science Forum

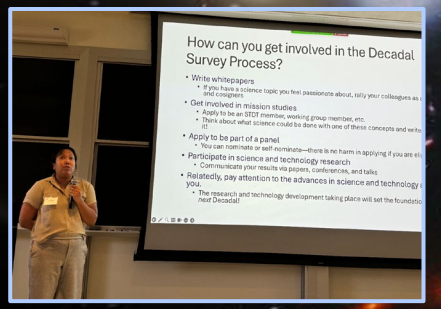
ExEP's IDEA Program At a Glance

1. Professional development programs + early career opportunities (with funding)
   - ExoExplorers: Year-long program for ~10 grad students & postdocs to give a research talk, with regular professional development activities
   - Astrophysics Mission Design School: 3-month-long workshop for ~15 grad students/postdocs/junior faculty to learn about the formulation process. Modeled after the long-running planetary science NASA mission design school
   - Professional Tools & Opportunities (PROTO) Workshop: Open workshop on the nuts and bolts of working with NASA (e.g. careers, grants, formulation) and the context for involvement with HWO (e.g. understanding the decadal)
2. Dedicated IDEA staff (ExEP Science Ambassador)
3. Systematic internal and external reviews (Minority Serving Institution engagement review)
4. Integration with scientific community
   - ExoPAG meetings + Early Career Talks: Featuring funded travel awards for student and postdoc talks
   - 5 Minute Formulation: 1 on 1 feedback for proposers with ideas at AAS
5. Broad, tailored public and community outreach
   - Outreach beyond traditional communities: Bilingual talks & activities, Science Communication education
   - Art Engagement: Student art challenges, Museum Art Exhibit (Getty PST.art)
   - Inclusive media representation: Featuring scientists from underrepresented backgrounds

ExoExplorers - 2024 (4th Cohort)

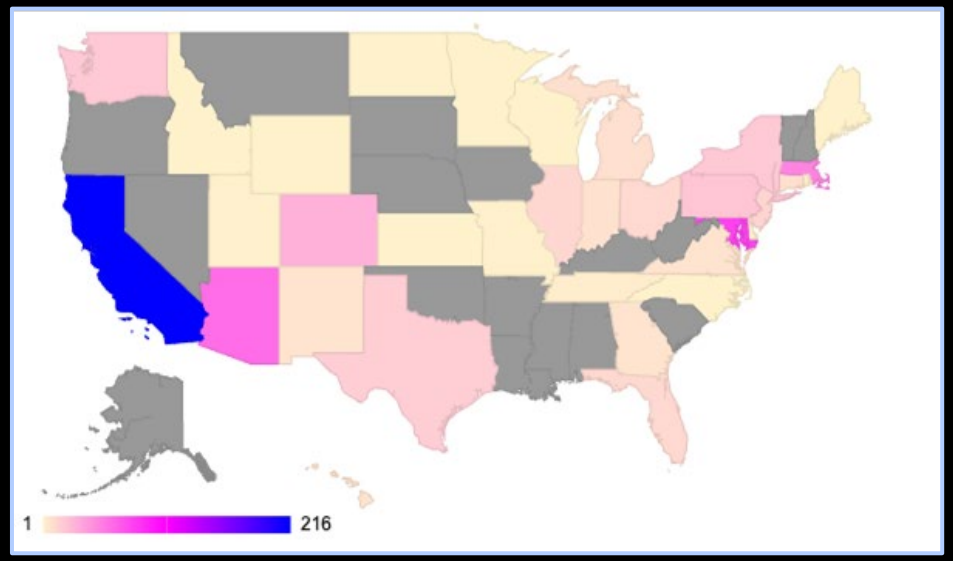






PROTO + Sagan Summer Workshop Participants

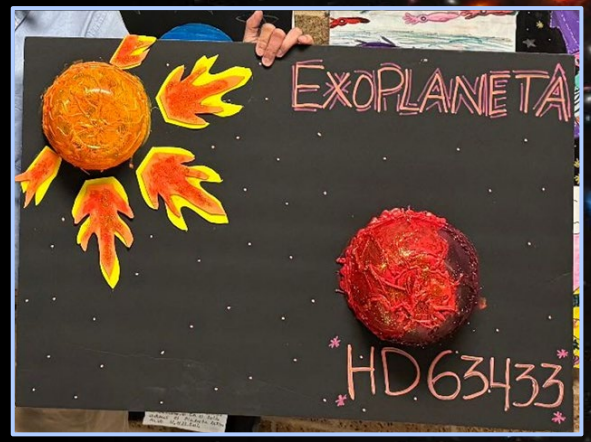
Identifying gaps in institutions reached Via ExoPAG mailing list membership



Inclusive Representation

Expanding how we engage others

Community-specific outreach (e.g. Bilingual)



SSERVI

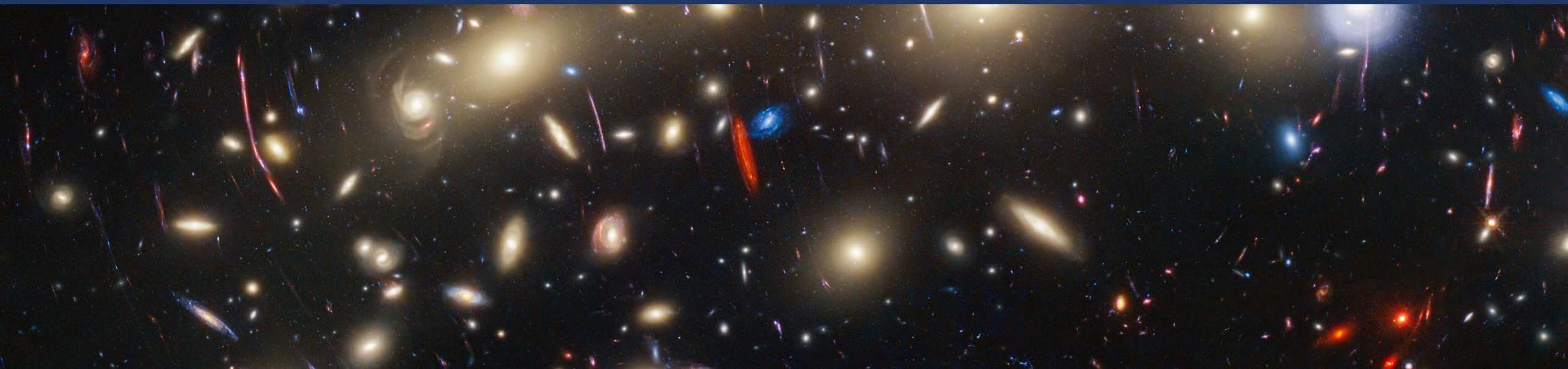
SSERVI Research Opportunity in Astrophysics

- The Solar System Exploration Research Virtual Institute is a lunar research-focused institute initially called the NASA Lunar Science Institute, which began operations in 2008.
  - SSERVI has been jointly funded by SMD and ESDMD since its inception.

- SSERVI's research portfolio includes science enabled by the Moon.
  - Past astrophysics-focused research efforts have included long-wavelength cosmology.

- The Astrophysics Division may support highly rated proposals with astrophysics enabled by the Moon in SSERVI's soon to be released Cooperative Agreement Notice.
  - Draft SSERVI CAN-5 intended for release late CY24 for community comment
  - Further information on SSERVI available at https://sservi.nasa.gov/

THANK YOU!



APAC Recommendations

Chandra/Hubble Operations Paradigm Change Review

Recommendation	Response

The APAC understands that flagship missions do end and recognizes the difficult task of balancing the portfolio amid a highly constrained budget. However, NASA's own OPCR committee found that both Chandra and Hubble are "highly streamlined after years of improvements, while both missions remain heavily oversubscribed, scientifically productive, and synergistic with current and future ground- and space-based observatories, including JWST and Roman. The APAC recommends that budget cuts to Chandra and Hubble be kept at the minimum possible level, and that the irreversibility of workforce layoffs be given greater priority in making budget trades. Clearly, investment in future missions and balancing the portfolio is important, but the community-wide damage done by irreversible cuts to two operating and highly productive Great Observatories now can have lasting effects that far outweigh the benefits of accelerated technology maturation for a facility that may be decades away from launch. We recommend that APD take all reasonable action to preserve the unique science capabilities of these two operating Great Observatories, and to retain the resources needed to support the analysis and publication of their science output. Both chambers of Congress, through a House Authorization bill and two Commerce, Justice, Science Appropriations bills, have expressed clear opposition to reductions in Chandra's operating budget. The APAC recommends that APD take no irreversible action with regards to Chandra and Hubble staff until completion of the next Senior Review, which should come at a time when we will have more clarity as to the FY25 Appropriations process.	• OPCR findings included options that maintained unique science/operations of both observatories and addressed the concerns of APAC.
	
	• APAC notes that *reductions to operating missions are to accelerate technology maturation for a facility that may be decades away from launch.*
	  • The reductions are to maintain a balanced portfolio in an environment where the APD budget is relatively flat over 5 years.
	  • Maintaining balance includes;
	  • Missions in development and formulation
	  • Research and Analysis
	  - (e.g. GI programs, R&A including APRA, Balloons and Rockets).
	
	• APD has timed the Senior Review to provide input to next year's budget process.

Chandra/Hubble Operations Paradigm Change Review

Recommendations	Responses
Further, the APAC recommends that, going forward, APD follow more transparent procedures for large changes to the budget, priorities, and mission portfolio. The APAC strongly recommends that APD defer making major, irreversible choices until they are absolutely required to, and to defer to established community processes such as the Senior Review, mid-Decadal, and Decadal Surveys.	• APD has communicated budget challenges consistent with embargo rules. • APD has deferred making major changes until forced to do so by the budget. • APD is implementing Decadal Recommendations and currently conducting a Senior Review. • APD employs the community established processes. However, as we have discussed previously, Senior Reviews are predicated on the budget forecast at the time of the reviews. • The current Senior Review proposals are working to FY25 PBR budget guidance.

APD Tech Dev and Small-Mission Balance

Recommendation	Response
APAC recommends APD consider adding a technology-maturation Small-Mission (CubeSat-class at ~$10M level) program to the APD portfolio. Rather than including this opportunity under the SAT Program[1], APD should consider including this under Pioneers[2]. The APAC also recommends that APD discuss synergies with STMD for technology maturation missions[3], in general, as an opportunity to partner on common technology goals for the Agency.	1. Following this recommendation, APD has not yet implemented a modification to SAT-24 to incorporate a tech demo flight opportunity. We will move forward when the budget permits. 2. APD will take this under advisement for a potential aspect of future Pioneers opportunities. At present, the mandatory NOI due date is 1/24/2025 and 90 days before this is 10/26/2024, so such a scope modification at this time would be inconsiderate. 3. APD will undertake this. APAC should be aware that APD already influences the solicitation and awards of STMD's Early Stage Innovation, Early Career Faculty, SBIR/STTR, and NASA Innovative Advanced Concepts programs. It is worth noting that STMD's technology development mandate is aimed at technologies that are useful beyond the missions of a single division, and ideally beyond a single directorate.

APD Tech Dev and Small-Mission Balance

Recommendation	Response
The APAC also recommends that APD edit the wording in the APRA and SAT solicitations[1] to make the difference between the two opportunities more apparent and to better delineate which types of efforts should be proposed to each. As HWO technology development migrates to within the purview of HWO Project Office, one consideration for the SAT would be to include future strategic flagship, probe,[2] and TDAMM mission technologies[3] in this call. APAC requests that these changes be made available to proposers well before Notice of Intent is due[4]. A presentation at the Spring APAC meeting on this topic is requested.	1. The SAT-24 solicitation has amplified language on the technology readiness level and applicable/excluded missions to provide more contrast between it and the APRA solicitation. 2. In response to the HWO recommendation, future SAT solicitations will be adjusted. If there is a separate, mission-led proposal opportunity made available to the community, then SAT would include the technologies mentioned (future flagship, probe, and potentially TDAMM). 3. APD notes that the option to submit TDAMM-related technology gaps is possible during the PhysCos/COR technology prioritization process. 4. The APRA, SAT, and RTF amendments should be public well before the APAC meeting!

TDAMM COMMS SAG Report

Recommendation	Response
APAC recommends that APD work with the Program Office to provide a viable solution for the TDAMM community (high-coverage, high-bandwidth, low-latency communications in Low Earth Orbit (LEO) and non-LEO orbits during the operational gap between TDRSS and CSP. The APAC recommends APD investigate the possibility of distributing a Request of Information or Request for Proposals (RFI/RFP) to industry to identify and select an industry partner(s) who can accommodate NASA's TDAMM needs during this time.	The future of space communications is an agency-level issue not a division-level issue. The agency is developing agreements with commercial providers to show they can fulfil the agency needs in the post-TDRSS world.

TDAMM COMMS SAG Report

Recommendation	Response
APAC recommends that APD consider a trade study to determine the value of removing the cost of comms from the PI-Managed Mission cost and offering it as a service (in much the same way that balloons and launches are removed from PI-Managed Mission costs of suborbital flights) to selected TDAMM missions. Potential value of removing these costs from the PIs, puts the burden of negotiating costs on APD, rather than on proposing teams and provides consistency of cost between competing missions.	APD has taken this recommendation under advisement and is looking at what might be possible.

SCaN Overview of Commercial Space Relay Transition

Recommendation	Response
APAC recommends that APD establish a dedicated representative to work with the SCaN Program Office to take into account TDAMM operations as CSP comes online to establish requirements and develop a cost model that is consistent with missions at all scales.	APD has a representative to SCaN – Rosa Avalos-Warren. Rosa has provided SCaN with the continuing TDRSS and other space communication requirements for operating missions, in particular Fermi and Swift, as well as the Space Communications Science Analysis Group report on TDAMM science drivers for future TDAMM missions. These documents from Rosa are provided as input to the science requirements documents currently being developed, and Rosa meets regularly with the groups involved in drafting these requirements. In addition, discussions on TDAMM/science alert use case analysis is in progress.

SPHEREx

Recommendation	Response
The APAC recommends that the current data and level 1-3 analysis plan be more clearly defined given the complexities of the analysis of a large data set with a large number of channels in each pixel over all sky.	The Level 1 - Level 3 data and analysis plan, including processing steps, data products, data and software release plans, and personnel roles and responsibilities are described in the SPHEREx Science Data Center Operations Concept document (current version = 4.0.1; 2024-05-16). These plans have been reviewed annually at IPAC-led peer reviews, and reports on these plans have been presented at PDR, CDR, and SIR.
The team should demonstrate the readiness of the suggested methodology to identify sources with a mission level simulation.	The Ices, Cosmology, and EBL teams are testing their methodologies using, in part, a 1-year simulation from the SPHEREx Sky Simulator to test their respective end-to-end L4 analysis pipelines.
Further, the APAC recommends the mission develop a more detailed level 4 analysis plan, as the launch date is quickly approaching.	The Ices, Cosmology, and EBL Level 4 science pipelines and analysis plans were presented and reviewed during the Level-4 Science Peer Review on Sept 23-24, 2024. Level-4 peer reviews have been held by the team annually since selection.

STAR Grant

Recommendation	Response
The APAC recommends that APD implement the STAR Grant as soon as is feasible. Of the changes mentioned in the presentation, the APAC recommends: 1) adopting tracks that separate early researchers from those with thesis research well underway; 2) increasing the award amount; 3) exploring a full panel review; and 4) requiring a budget only from students with awards. The APAC recommends against limiting the number of proposals submitted from each institution, as this may have the counterproductive effect of reducing submissions from under-resourced institutions that may lack the infrastructure for internal proposal evaluations. To broaden participation beyond R1 Primarily White Institutions (PWIs), APD may consider exploring a Campus Champion model, in which designees at institutions are responsible for raising awareness about STAR and assisting with the application process.	APD has worked with SMD leadership to make sure that a separate program from Astrophysics does not impact FINESST for other divisions: • APD has presented the program to the SMD leadership • APD offered to help other Divisions to create their own stand-alone solicitations if they want to • APD has responded to the criticisms from SMD leadership and FINESST divisional program scientists • APD is coordinating with PSD and ESD who also see great benefit from a separate early career support program. Currently, the program is **on-hold**, due to the need to coordinate with other divisions either a single FINESST-like solicitation or several division-focused stand-alone ones.

AWESOM

Recommendation	Response
APAC recommends that instead of, or in addition to, the planned survey distribution method, AWESOM leads reach out to the National Society of Black Physicists (NSBP), the National Society of Hispanic Physicists (NSHP), and the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) for distribution, as well as conduct the survey at society conferences. Coordination with COPAG and HWO to advertise and administer the survey at NSBP/NSHP and SACNAS conferences is encouraged. APAC notes that given the restrictions from the state legislature on DEI-related activities in a number of states, we recommend using the language, such as “expand the range of institutions and backgrounds for members of the community contributing to NASA astrophysics” rather than the word “DEI.”	The presentation from the AWESOM SAG at the last APAC meeting was unfortunately interrupted so that the status was not fully reported and the presenter unable to respond to APAC queries at that time. The group looks forward to presenting their findings in the future. The survey is probably about 90% done, and we are getting back to Liz Litzler (the person who was hired to craft the survey) on a few things, and then we will be ready to deploy it. The study has been reformulated to "how to expand the range of institutions and backgrounds for members of the community contributing to NASA astrophysics. The SAG will focus specifically on engagement with research and training programs." Submitted a special Session to the AAS to discuss results.


QUESTIONS?