Science Mission Directorate
ASTROPHYSICS
Organizational Chart

DIVISION MANAGEMENT
Dr. Mark Clampin
Director
Sandra Cauffman
Deputy Director

ADMINISTRATIVE SUPPORT
Jennifer Baker (C), Balam “Orby” Yavkin (C), Joshua Diaz Calo (C)

DIVISION LIAISONS
Resource Management
Elijah Owusu (Lead)
Jenna Robinson (Detail)
Jennifer Holt
Communications
Alice Fisher

Policy
Marliah Baker
OIIR
Peyton Blackstock
Program Support Specialist
Paola Ortiz Perez

CROSS CUTTING
Technologist
Mario Perez (Chief)
Dominic Benford (Deputy)
Executive Officer
Rhiannon Roberts (C)
Science Activation Lead
Hashima Hasan
APD Communications
Liz Landau (C - OCOMM Liaison)
Julie Stoltz (C - Strategic Integration & Engagement Lead)
Inclusion, Diversity, Equity, and Accessibility
David Morris (Lead)
Antonino Cucchiara (Deputy)

FLIGHT PROGRAMS
Associate Director
Joe Smith

PROGRAM EXECUTIVES
Rosa Avelas-Warren
Rachele Cocks
Lucien Cox
Julie Crooke
Ed Grego
Shahid Habib
Janet Letchworth
Lucas Paganini
Miles Skow
Mark Stilp

ASTROPHYSICS STRATEGIC MISSIONS
Program Director
Sandra Cauffman
Program Manager
Gatli Henning

RESOLUTION & ANALYSIS
Associate Director
Eric Smith
R&A Lead
Roopesh Ojha

PROGRAM EXECUTIVES
Alessandra Aloisi (D)
Megan Andsell
Dominic Benford
Valerie Crossnaughton
Antonino Cucchiara (C)
Doris Daou
Michael Garcia (D)
Thomas Hams (C)
Hashima Hasan
Stefan Imrimer

RESEARCH PROGRAM SPECIALIST
Ingrid Farrell (C)

PROGRAM SUPPORT
Ed Grego
Lucas Paganini
Miles Skow

Tony Comberatore (C), Andre Davis (C)
Recognition

• Dr. Jane Rigby, Senior Project Scientist for JWST, received Medal of Freedom for work on Webb

• Marcia Rieke, Professor at the University of Arizona and PI for the near-infrared camera (NIRCam), awarded Gruber Cosmology Prize for work on Hubble and Webb
XRISM Resolve Data

Centaurus galaxy cluster

Vela X-1 high-mass X-ray binary

Courtesy: XRISM science Team
A thermal emission spectrum of the super-Earth exoplanet 55 Cancri e, captured by Webb's NIRCam, GRISM Spectrometer and MIRI Low-Resolution Spectrometer, shows that the planet may be surrounded by an atmosphere rich in carbon dioxide or carbon monoxide and other volatiles, not just vaporized rock.
Webb Finds Most Distant Known Galaxy

Credit: NASA, ESA, CSA, STScI, Brant Robertson (UC Santa Cruz), Ben Johnson (CfA), Sandro Tacchella (Cambridge), Phill Cargile (CfA)
Budget
Astrophysics Priorities

Explore/Innovate/Partner/Inspire

• 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, and the selection of an Astrophysics Probe mission.

• Ensure successful completion of the Roman Space Telescope, within the Agency commitment (cost/schedule)

• Protect international partnerships such as the Laser Interferometer Space Antenna (LISA), a gravitational wave mission.
Astrophysics FY24 Budget Decisions

• Maintain Agency commitment to delivery of Roman
• Maintain Explorer missions in development (SPHEREx and COSI)
• Proceed with newest MIDEX: UV explorer (UVEX)
• Review underway for Probe Mission (AO FY23)
• International partnerships:
  • LISA transitions to management by Explorers office following ESA adoption (January 2024)
  • ATHENA investments are being restructured in response to ESA program reformulation
• Technology investments for Habitable Worlds Observatory
• Reductions to operational cost of large, extended-operations missions
  • Chandra (25 years)
  • Hubble (34 years)
## FY25 President’s Budget

<table>
<thead>
<tr>
<th>Category</th>
<th>Actual 2023</th>
<th>CR 2024</th>
<th>Request 2025</th>
<th>2026</th>
<th>Out-Years 2027</th>
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The APD will host an Operations Paradigm Change Review (OPCR) of the CXO and HST missions in 2024. The OPCR will assess proposed options for approaches to continue operations of missions in the extended operations phase, with reduced funding as proposed in the FY2025 President’s Budget. The purpose of the review is to assist NASA in assessing the potential for limited scientific productivity and decreased operating efficiency of the HST and CXO missions under the current and future budget realities. NASA will use the findings from the OPCR to:

- Define an implementation approach consistent with astrophysics strategic objectives,
- Prioritize the operating mode(s),
- Provide programmatic direction to the missions and projects concerned for FY25, FY26 and FY27; and
- Issue initial funding guidelines for FY28 and FY29 (possibly to be revisited in the 2025 Senior Review).

NASA actions resulting from the OPCR could include authorizing a mission to; maintain the status quo; restructure the project; or terminate an ongoing science mission.
Mission Updates
Nancy Grace Roman
Space Telescope

Recent Accomplishments

• First light optical tests of the telescope achieved first light.

• Completed the OTA Pre-Environmental Review on Feb 7, 2024.

• Wide Field Instrument (WFI) completed its second and last thermal vacuum test and is proceeding to EMC testing.

Upcoming 2024 Milestones

• August: WFI delivery to GSFC

• October: Optical Telescope Assembly (OTA) delivery to GSFC

The entire optics system for Roman consists of 10 mirrors, including the 7.9-foot (2.4 meter) primary mirror seen at the base of this image called the Imaging Optical Assembly (IOA). Engineers recently integrated and tested the IOA at L3Harris Technologies in Rochester, NY. Credit: NASA/Chris Gunn

Roman WFI recently underwent vibration and acoustics testing and successfully completed its second and final thermal vacuum test in May.
Roman Space Telescope
Coronagraph (CGI)

- CGI successfully delivered to GSFC on May 19 after completing ambient testing.
- Performance meets requirements in both modes, the Hybrid-Lytot and Shaped Pupil Coronagraph.

Sequence of high-order wavefront sensing and control iterations
Astrophysics Probes

• Astrophysics Probe AO called for:
  - X-Ray or Far-IR imaging/spectroscopy mission concepts
  - Per Astro2020 recommendation

• Astrophysics Probe Announcement of Opportunity (AO) status:
  - Selection for competitive Phase A studies: Q4 CY 2024 (target)
  - Concept study reports due: Q4 CY 2025 (target)
  - Down-selection: Q2 CY 2026 (target)
  - AO-Required Launch Readiness Date: NLT July 2032
GUSTO Targeted Deep Sky Survey

- The GUSTO mission had a successful flight, launched on a balloon from McMurdo on Dec. 30, 2023.

- GUSTO survey covered 62.5 deg$^2$ in the Galactic plane and 12,750 line of sights in the LMC.

NGC 3603

[CII] Line

Courtesy Dr. C. Walker
Univ Arizona
**SPHEREx**

**Science**

- 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 $>3 \times 10^8$ galaxies along with $>10^8$ stars

**Recent accomplishments**

- SPHEREx observatory is fully assembled with the payload mated to spacecraft at BAE.

**Upcoming Milestones**

- Beginning thermal vacuum testing early June 2024.
- LRD remains February 2025.
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

Recent Achievements
• KDP-C successfully held on April 16

Upcoming Milestones
• December 2024: Critical Design Review (CDR)
MIDEX Selection: UVEX

- MIDEX mission the Ultraviolet Explorer (UVEX) has been selected to continue into Phase B.
  - PI: Dr. Fiona Harrison

- UVEX Science
  - Sensitive wide-field imaging in 2 UV bands
  - High angular resolution
  - Broadband UV spectroscopy
  - All-sky survey
  - Rapid pointing capability
LISA
Laser Interferometer Space Antenna

Mission
• ESA/NASA partnership to build & operate first space-based gravitational wave observatory

Status
• LISA adopted by ESA on Jan 25, 2024

• NASA is now establishing a LISA project office at GSFC
  - NASA plans to transition to phase B in late CY24

• NASA contributions
  - Laser systems,
  - Telescopes,
  - Charge management devices
  - Science data center
Pioneers

- **Aspera**: IGM Inflow/outflow from galaxies via OVI 10^5K emission line imaging. PI Carlos Vargas
  - Launch date: 10/2025

- **Pandora**: Multiwavelength Characterization of Exoplanets and their Host Stars
  - Launch date: 03/2025

- **StarBurst**: Gamma-ray ASM, Simultaneous detection of NS/NS mergers with LIGO
  - Launch date: 12/2025
  - CDR held on April 2-3, 2024

- **PUEO**: A Long-duration Balloon-borne Instrument for Particle Astrophysics at the Highest Energies
  - Launch date: 12/2025 in Antarctica

- **TIGERISS**: Measuring ultra-heavy (r-process) cosmic rays on ISS
  - Launch readiness date: 09/2026
  - Delta SRR/MDR completed on 2/15/2024. dPMP to be held in late May.

- **Landolt**: Absolute stellar photometry to <0.5%, PI Peter Plavchan, George Mason University
  - New Pioneers 2022 selection, started March 2024
BurstCube: Launched March 21, 2024

- Primary goal is to detect, localize, and characterize short Gamma-ray Bursts (sGRBs)
  - April 18: BurstCube deployed
  - April 22: Commissioning is in progress.
  - May 31: Data collection is ongoing
Update on Hubble Gyro Resolution

• Gyro 3 grew increasingly problematic since late 2023 significantly increasing interruptions to science.

• Transition to one gyro science (OGS) operational mode was announced June 4.
  • Uses a larger solar exclusion angle and will take more time to acquire science targets
  • Expect to schedule ~500 fewer science orbits per year
  • Field of Regard at any one time will be reduced from ~82% to ~50% (comparable to Webb), the total sky will remain available over the course of the year

• The team is working to return Hubble to consistent science operations over the next several weeks
The NASA Scientific Balloon provides rapid, low-cost access to near-space for all NASA science.

In addition to the cutting-edge science yield, the program provides excellent technology maturation and training for NASA's future missions launch location and flight profile are driven by science needs.

Recent Achievements
- December 31, 2023: GUSTO Explorer mission launched
- January 1, 2024: 60 MCF Qualification Flight IV
- May 27, 2024: Launch of HELIX from Sweden first of 4 payloads

Upcoming Milestones
- Early May to mid-July 2024: Sweden and Ft. Sumner Campaigns
- ~August to October 2024: Ft. Sumner Campaign
Towards a Cloud-Based Solution for APD

- Major NASA archives already have downloadable data in AWS cloud
- NASA Astrophysics is developing the Fornax initiative, a cloud-based system that brings together data, open-source software, and computing so that researchers can focus on science: https://pcos.gsfc.nasa.gov/Fornax/
  - Collaboration of the NASA astrophysics archives IRSA, MAST, and HEASARC with GSFC Astrophysics Project Division
  - Accessible by users with a wide range of expertise
  - Scalable and deployable to other cloud environments to meet the changing needs of the Astronomical community
- New solution enables multi-wavelength, time-domain, big-data and compute-intensive astronomy
- Aligned with NASA SMD consolidation of science core infrastructure
Astrophysics Postdoctoral Fellowships for 2024

• The NASA Hubble Fellowship Program fosters excellence and inclusive leadership in astrophysics by supporting a diverse group of exceptionally promising and innovative early-career astrophysicists.

• Out of 520 applicants, NASA Hubble Fellowship Program (NHFP) recently announced 24 new fellows to its 2024 roster.

• The NHFP remains one of the most prestigious post-doctoral opportunity available to recent graduates.
GOMAP/Habitable Worlds Observatory
What Is Habitable Worlds Observatory (HWO)?

NASA’s next flagship mission concept recommended by Astro2020 Decadal Survey

First telescope designed to search for signs of life on planets outside our solar system

Large-aperture UV / Optical / NIR observatory performing transformative astrophysics
Habitable Worlds Observatory

**Decadal Recommendations → 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 maturing the technologies prior to formulation
FY24 Appropriation : Next Steps

FY24 Conference Language Report

**Habitable Worlds Observatory Appropriation**
The Senate Report language regarding “Habitable Worlds Observatory” is adopted and the agreement provides no less than $10,000,000 for the mission. In addition, the agreement directs NASA to establish a Habitable Worlds Observatory project office at Goddard Space Flight Center to leverage expertise in astrophysics and segmented mirror technology.

**Habitable Worlds Observatory Direction**
The Committee supports the Great Observatory Maturation Program (GOMAP) as recommended by the Decadal Survey on Astronomy and Astrophysics, “Pathways to Discovery in Astronomy and Astrophysics for the 2020s” [Astro2020]. GOMAP will mature science and technologies needed for future flagship missions starting with the Habitable Worlds Observatory to observe habitable exoplanets. In order to cement continued American leadership in astronomy, the Committee provides the requested level for GOMAP to implement the Astro2020 recommendations. NASA is encouraged to articulate funding for GOMAP separately in future budget requests.
FY24 Appropriation: Resulting Changes

- The START Terms of Reference (TOR) require the START disband once the Project Office is stood up, however the activities initiated by the START and the TAG will continue through CY24
  - This provision in the TOR allows NASA to minimize conflicts as it formulates industry calls and science team solicitations
  - START chairs will transition to provide input to the PO directly during this transition period
  - START members will continue working as HWO Working Groups co-chairs and members
FY24 Appropriation: Resulting Changes

• Working Groups
  • All Working Groups will continue as community efforts to complete the Science Case Development Documents (SCDD’s)
  • We will remunerate all Working Group co-chairs for their leadership efforts starting with the establishment of the Project Office through 2024
  • During this phase, Working Group chairs will interface with the Project Office, which will lead regular meetings
  • If you are a Working Group member (inc. international), you won’t experience any changes with the exception of industry members
UV Science and Instrumentation Workshop
On the Way to the NASA Habitable Worlds Observatory and Beyond

Held on May 7-9 at JPL with 183 participants.