

National Aeronautics and
Space Administration



EXPLORE SCIENCE

NASA Headquarters Update

ExoPAG #21 | Honolulu, HI | January 3, 2020

Douglas Hudgins (Douglas.M.Hudgins@nasa.gov)

ExoPAG Executive Secretary

Astrophysics Division, Science Mission Directorate

The background of the slide is a cosmic scene. The top half features a dark blue and black space filled with numerous small stars and a prominent, bright blue nebula on the right side. The bottom half is dominated by a warm, golden-yellow and orange glow, with a greenish nebula on the right side and many bright, multi-colored stars scattered throughout. A horizontal white band with a light blue gradient runs across the middle, containing the title text.

Personnel Changes

NASA Astrophysics Division

Division Director



Paul Hertz
Astrophysics Division Director



Jeff Volosin
Deputy Astrophysics Division Director *(Acting)*



Program Executives



E. Lucien Cox
SOFIA, GUSTO



Shahid Habib
COR, ExEP, PCOS Programs; **ARIEL**, Athena, Euclid, LISA



Jeff Hayes
Astrophysics Operating missions



David Jarrett
WFIRST, XRISM



Mark Sistilli
Astrophysics Explorers Program; IXPE, **SPHEREx**, Balloons

Cross Cutting



Eric Smith
Astrophysics Chief Scientist JWST



Jeanne Davis
Associate Director ASM Program Manager



Mario Perez
Astrophysics Chief Technologist, SAT, RTF



Not Pictured
Lisa Wainio
Information Manager

Administrative Support



Kelly Johnson
Administrative Assistant



Not Pictured
Mathew Riggs
Administrative Assistant



Not Pictured
Jackie Mackall
Program Support Specialist



Ingrid Farrell
Program Support Specialist

Program Scientists



Dominic Benford
APRA Lead WFIRST



Valerie Connaughton
APRA (High Energy) XRISM



Dan Evans
PCOS Program APRA (High Energy), Fermi



Michael Garcia
APRA (UV/Optical), CubeSats/SmallSats Hubble, Athena



Thomas Hams
APRA (Particle Astro) Rockets/Balloons GUSTO



Hashima Hasan
Education/Comms Astrophysics Archives Astro. Advisory Cmte.



Douglas Hudgins
ExEP Program ADAP Lead, **ARIEL**,



Stefan Immler
Astrophysics Research Program Manager Chandra, XMM



Patricia Knezek
APRA (UV/Optical)



William Latter
APRA (Lab Astro) Spitzer, SPHEREx



Mario Perez
COR Program APRA (UV/Optical)



Rita Sambruna
APRA (Fund. Phys.) ADAP, LISA, NICER, Decadal Studies



Evan Scannapieco
ATP, TCAN Lead, FINNest, Swift



Kartik Sheth
SOFIA, NHFP



Linda Sparke
Astrophysics Explorers Program



Martin Still
Accepted position in NSF/AST beginning 12/2019



Eric Tollestrup
APRA (IR/Submm) Euclid, IXPE

The ExoPAG Executive Committee (EC)

Name	Home
Michael Meyer (Chair)	Univ. of Michigan
Tom Barclay	NASA GSFC
Jessie Christiansen	Caltech
Rebecca Jensen-Clem	Univ. of California, Berkeley
Tiffany Kataria	JPL
Eliza Kempton*	Grinnell College
Josh Pepper	Lehigh Univ.
Dmitry Savransky	Cornell Univ.
Chris Stark	STScI
Johanna Teske*	Carnegie Institution
Vikki Meadows (past chair, ex officio)	Univ. of Washington
Douglas Hudgins (Exec. Sec., ex officio)	NASA HQ

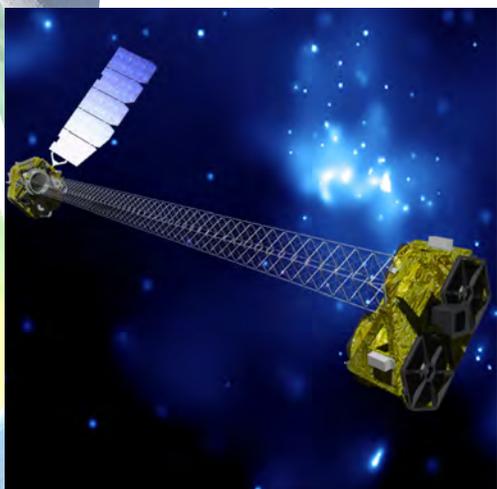
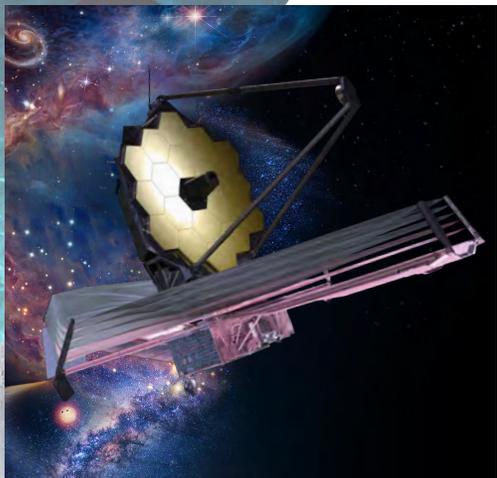
* - indicates current EC members who will complete their 3-year appointment and are scheduled to rotate off the EC in 2020.

New member Call for Nominations will be issued soon. If you are interested in serving on the ExoPAG EC, please take the opportunity discuss your interest with a member of the current EC or someone from NASA's ExEP.

The background of the slide is a composite of two cosmic images. The top half features a dark blue and black space filled with numerous small stars and a prominent, bright blue nebula on the right side. The bottom half features a warm orange and yellow space with many stars and a greenish-yellow nebula on the right side. A horizontal white band runs across the middle of the slide, containing the word "Budget" in a large, black, sans-serif font.

Budget

FY20 Appropriation



- FY20 appropriation for NASA Astrophysics (including Webb Telescope) is \$1.73B; up by \$233M from FY19 appropriation and by \$532M from FY20 President's Budget Request
- Fully funds Webb for replan to March 2021 LRD (\$423M)
- Fully funds WFIRST through KDP-C and into Phase C (NLT \$510.7M w/up to \$65M for coronagraph technology development; also reaffirms staying within \$3.2B cost cap)
- Specifies funding levels for Hubble, SOFIA, and Astrophysics Research Program.
- Provides adequate funding to continue will the rest of the planned Astrophysics programs and projects including:
 - Operating missions with GO programs as planned following the Senior Review
 - Development of Explorers missions (IXPE, GUSTO, SPHEREx) and international contributions (Euclid, XRISM, ARIEL, Athena, LISA)
 - Initiation of Phase A studies for selected SMEX and MO proposals
 - Continued technology development for the future

The background of the slide is a composite of two astronomical images. The top half features a dark blue and black space filled with numerous small, bright stars and a prominent, glowing blue nebula on the right side. The bottom half shows a similar starry field but with a warm, golden-yellow and greenish glow, suggesting a different spectral filter or a different region of space. The text is centered in a white horizontal band across the middle.

Research Program Update: ROSES 2019

Astrobiology Research

Initiated transition of the programmatic structure of the Astrobiology Program during FY2019.

- The NASA Astrobiology Institute (NAI) formally concluded at the end of 2019.
 - Over 20 years, NAI was extremely successful in establishing the field by supporting and catalyzing collaborative interdisciplinary research in astrobiology.
 - Today, the field of astrobiology has matured to the point that it no longer requires the centralized, “top-down” management structure that the NAI provided.
 - Transitioning to a Research Coordination Network (RCN) structure that is science-driven and involves lighter management oversight.
- The five RCNs will focus on different interdisciplinary science questions (see figure).
 - Researchers may elect to become a member of one or more RCNs once they have received funding for a relevant project



Research Coordination Networks

- **Nexus for Exoplanet System Science** - NExSS
- **Network for Life Detection** - NfoLD
- **Prebiotic Chemistry and Early Earth Environments** - PCE₃
- **Network for Ocean Worlds** - NOW
- **Earliest Cells to Multicellularity** - ECM

Astrobiology Research

Under the RCN model, funding is disconnected from the management structure. Accordingly, a new funding solicitation entitled, “Interdisciplinary Consortia for Astrobiology Research” (ICAR) has been released (ROSES 2019, App. C.23).

- Solicitation will be managed from NASA HQ.
- Solicits proposals for projects larger than the scope of individual research programs, i.e. large geographically-distributed teams executing five-year interdisciplinary research investigations that address a single, compelling question in astrobiology but within the scope of the new RCNs.
- Areas of Research Emphasis under ICAR 2019 are linked to RCN Topics:
 1. Exoplanet System Science - NExSS
 2. Prebiotic Chemistry and Early Earth Environments - PCE₃
 3. Earliest Cells and Multicellularity - ECM
- Selected proposals will become part of the Research Coordination Network
- Calls will occur on the order of every two years and will stagger RCN topics that will be included.



Targeted timing for ICAR Solicitation:

- Final Text Was Released Nov 25, 2019
- 1/31/20 Step 1 proposals due
- 4/3/20 Step 2 proposals due
- Fall 2020 new ICAR awards start



Research Program Update: ROSES 2020

Astrophysics ROSES 2020 Due Dates

	ROSES 2020 Program Element	NOIs due	Proposals due
D.1	Astrophysics Research Program Overview	N/A	N/A
D.2	Astrophysics Data Analysis	03/31/2020	05/19/2020
D.3	Astrophysics Research and Analysis	10/23/2020	12/17/2020
D.4	Astrophysics Theory Program	Not solicited this year	
D.5	Neil Gehrels Swift GI Cycle 17	N/A	09/25/2020
D.6	Fermi GI Cycle 14	N/A	02/19/2021
D.7	Strategic Astrophysics Technology	TBD	TBD
D.8	Nancy Grace Roman Technology Fellowships	See D.3	
D.9	NuSTAR GO Cycle 7	N/A	01/22/2021
D.10	TESS GI Cycle 4	N/A	01/15/2021
D.11	NICER GO Cycle 3	N/A	11/12/2020
D.12	XRISM Guest Scientist	TBD	TBD
D.13	U.S. Participating Investigator (XRISM)	TBD	TBD
D.14	Theoretical and Computational Astrophysics Networks	N/A	05/28/2020
E.2	Topical Workshops, Symposia, and Conferences	N/A	Rolling due date
E.3	Exoplanets Research	03/27/2020	05/29/2020

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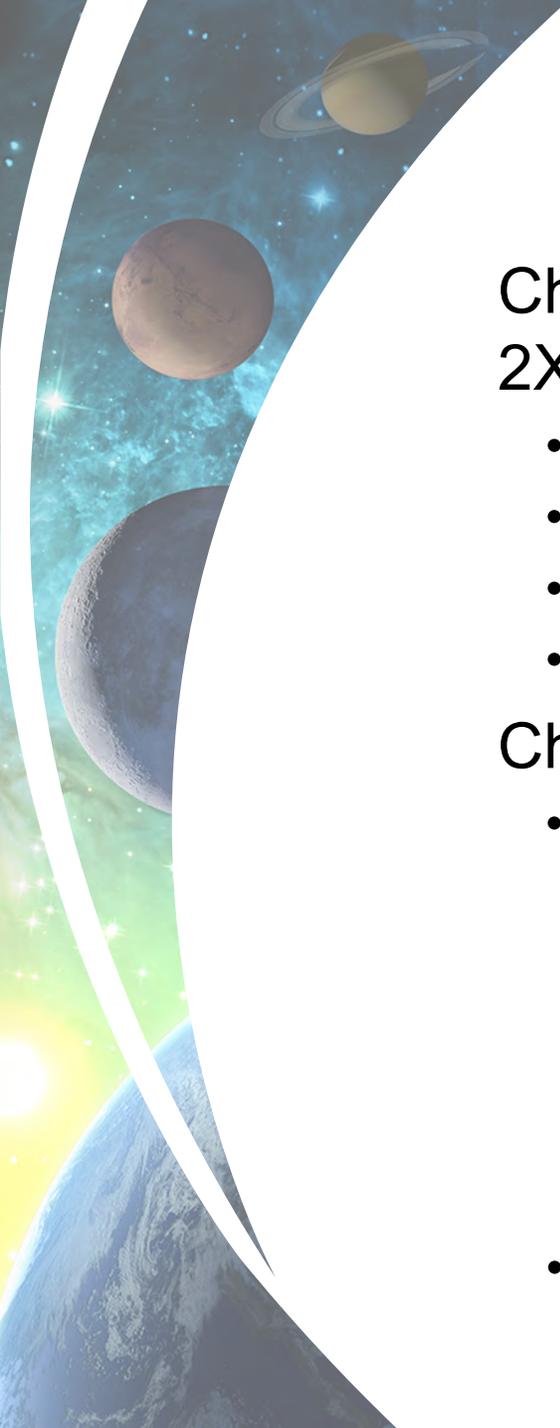
APRA and RTF have new due dates in the Fall.

The dates and constraints for SAT are still TBD.

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XRP has been expanded to include all exoplanet research. Exoplanet research is no longer solicited in ATP and ADAP.



Exoplanet Research Program (XRP)

Changes to the program under last solicitation (“Second” XRP or 2XRP-2018)

- Heliophysics and Earth Science joined the program
- Review managed collaboratively by all four divisions
- Selections are funding-blind (i.e. not tied to specific Divisions)
- 20 percent more proposals than last year!

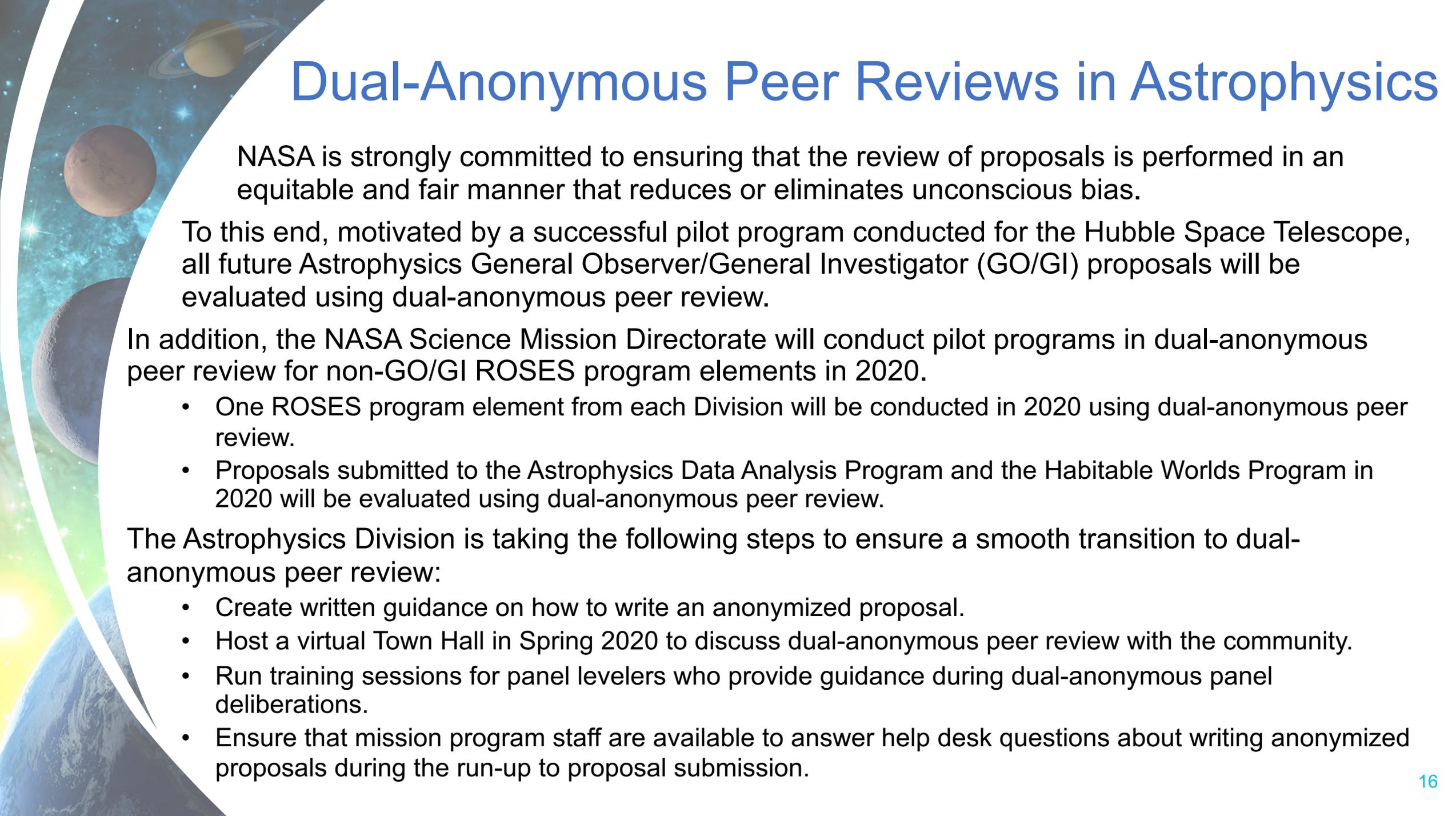
Changes coming in ROSES-20:

- Consolidation of exoplanet research proposals into XRP
 - Within Astrophysics (Appendix D): Exoplanet-related proposals from ADAP, ATP, etc. will move into XRP
 - Funding will move between programs to enable this
 - Exoplanet-related proposals will still be permitted in TCAN
 - Within Planetary Science (Appendix C): Exoplanet proposals in Habitable Worlds will move into XRP (better definition of the line between the two)
- Additional cross-divisional collaboration encouraged (Heliophysics and Earth Science participation, in particular)

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ADAP and the GO/GI programs will be conducted using dual anonymous peer review.



Dual-Anonymous Peer Reviews in Astrophysics

NASA is strongly committed to ensuring that the review of proposals is performed in an equitable and fair manner that reduces or eliminates unconscious bias.

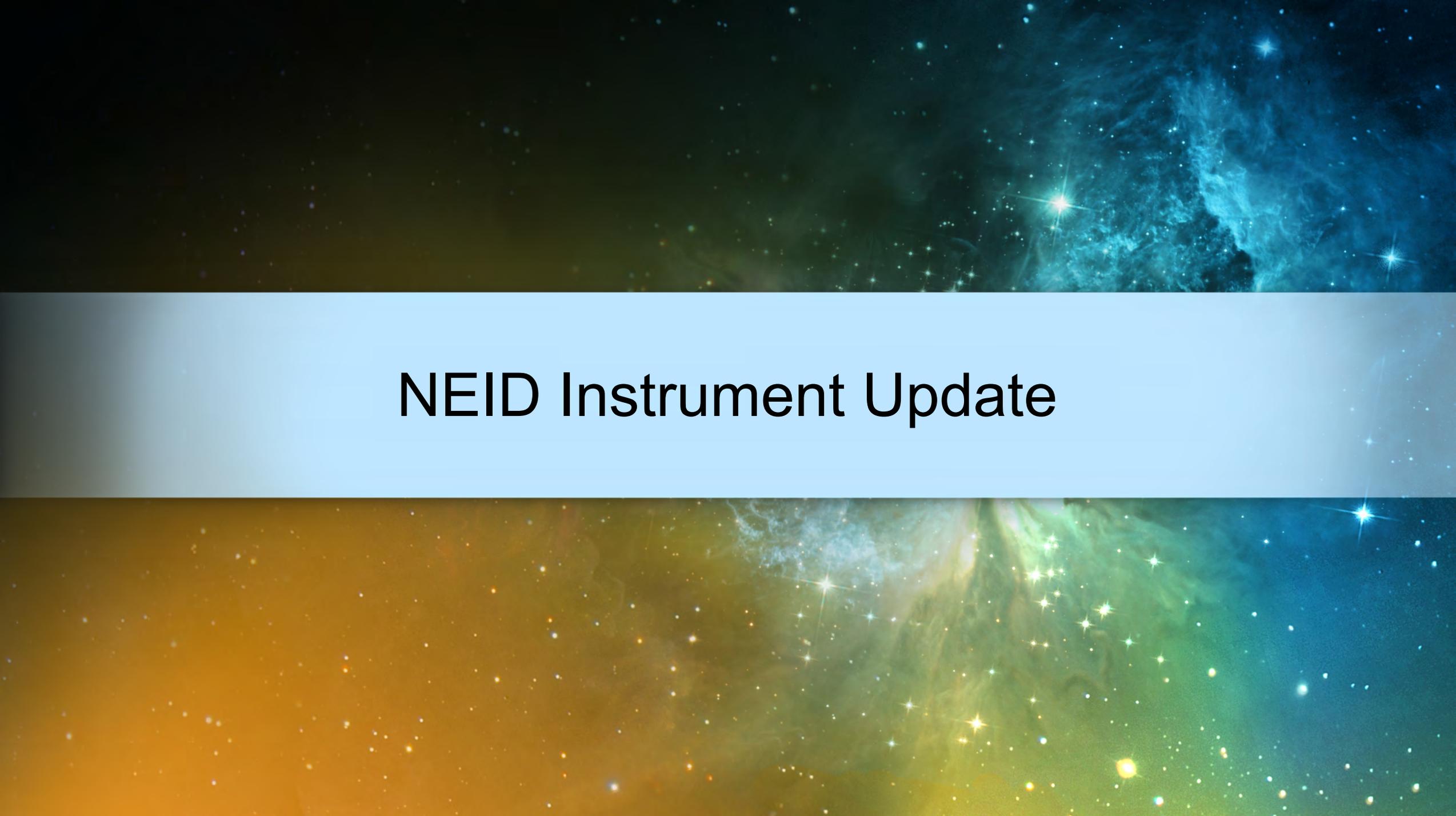
To this end, motivated by a successful pilot program conducted for the Hubble Space Telescope, all future Astrophysics General Observer/General Investigator (GO/GI) proposals will be evaluated using dual-anonymous peer review.

In addition, the NASA Science Mission Directorate will conduct pilot programs in dual-anonymous peer review for non-GO/GI ROSES program elements in 2020.

- One ROSES program element from each Division will be conducted in 2020 using dual-anonymous peer review.
- Proposals submitted to the Astrophysics Data Analysis Program and the Habitable Worlds Program in 2020 will be evaluated using dual-anonymous peer review.

The Astrophysics Division is taking the following steps to ensure a smooth transition to dual-anonymous peer review:

- Create written guidance on how to write an anonymized proposal.
- Host a virtual Town Hall in Spring 2020 to discuss dual-anonymous peer review with the community.
- Run training sessions for panel levelers who provide guidance during dual-anonymous panel deliberations.
- Ensure that mission program staff are available to answer help desk questions about writing anonymized proposals during the run-up to proposal submission.



NEID Instrument Update

NEID Accomplishments

Sept. 17-18 NEID pre-ship review; recommendation to proceed with shipping hardware to Kitt Peak.

October 15 Port Adapter for WIYN Telescope shipped from U. Wisconsin.

October 24 Port Adapter installed on WIYN Telescope.



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- November 1 Laser Frequency Comb shipped from Penn State. (Arrived Nov. 4)

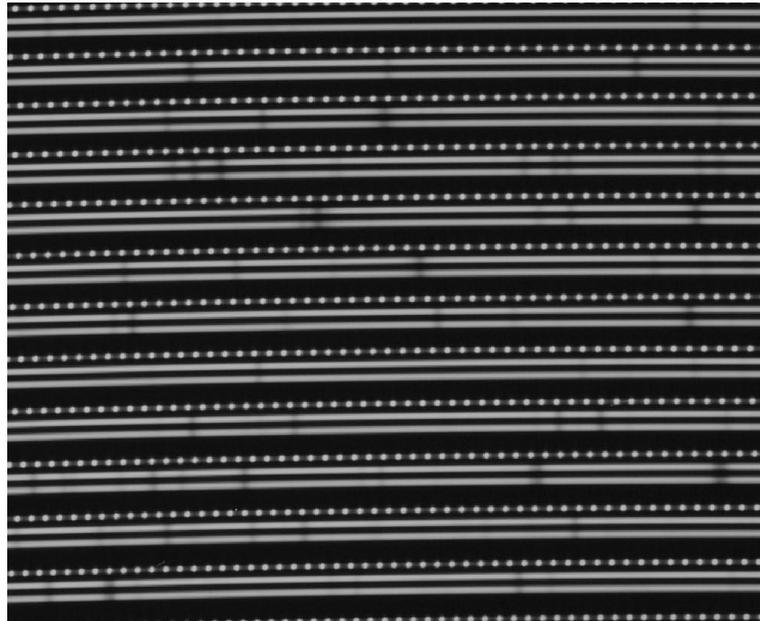


Image from the NEID spectrometer installed at the WIYN telescope with LFC. Daytime sky illuminating both star and sky fibers.

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- Early Dec. Solar telescope and feed to NEID installed at WIYN Facility.





NEID Accomplishments and Status

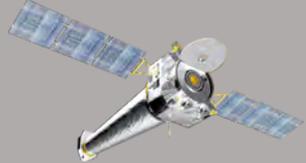
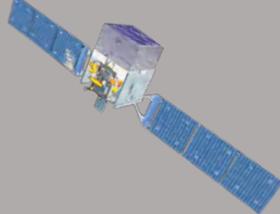
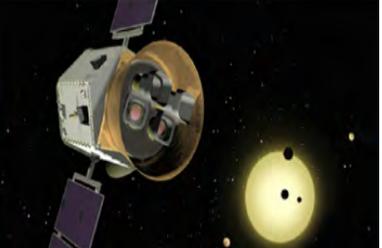
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- Early Dec. Solar telescope and feed to NEID installed at WIYN Facility.
- First light observations will be presented and discussed by Jason Wright at AAS Press Conference on Wednesday (8 Jan) at 10:15 AM HST.
 - First shared-risk GO observations were executed 29 December. A limited number of shared-risk GO observations will be conducted during the 2020A observing semester (most of observing time allocated to commissioning).
 - Next GO Solicitation (2020B): Expected release February 2020; Proposal due date 31 March 2020.



NASA Astrophysics Mission Update

Operating Missions

Spitzer's Scientific Legacy, Session 238
Mon Jan 6 @ 10:00 AM in Room 320

<p>Hubble 4/90 NASA Strategic Mission</p>  <p>Hubble Space Telescope</p>	<p>Chandra 7/99 NASA Strategic Mission</p>  <p>Chandra X-ray Observatory</p>	<p>XMM-Newton 12/99 ESA-led Mission</p>  <p>X-ray Multi Mirror - Newton</p>	<p>Spitzer 8/03 NASA Strategic Mission</p>  <p>Mission ending Jan 30, 2020</p> <p>Spitzer Space Telescope</p>	<p>Gehrels Swift 11/04 NASA MIDEX Mission</p>  <p>Neil Gehrels Swift Gamma-ray Burst Explorer</p>	<p>Fermi 6/08 NASA Strategic Mission</p>  <p>Fermi Gamma-ray Space Telescope</p>
<p>Kepler 3/09 NASA Discovery Mission</p>  <p>Mission Complete!</p>	<p>NuSTAR 6/12 NASA SMEX Mission</p>  <p>Nuclear Spectroscopic Telescope Array</p>	<p>SOFIA 5/14 NASA Strategic Mission</p>  <p>Stratospheric Observatory for Infrared Astronomy</p>	<p>ISS-NICER 6/17 NASA Explorers Miss. of Oppty</p>  <p>Neutron Star Interior Composition Explorer</p>	<p>TESS 4/18 NASA MIDEX Mission</p>  <p>Transiting Exoplanet Survey Satellite</p>	

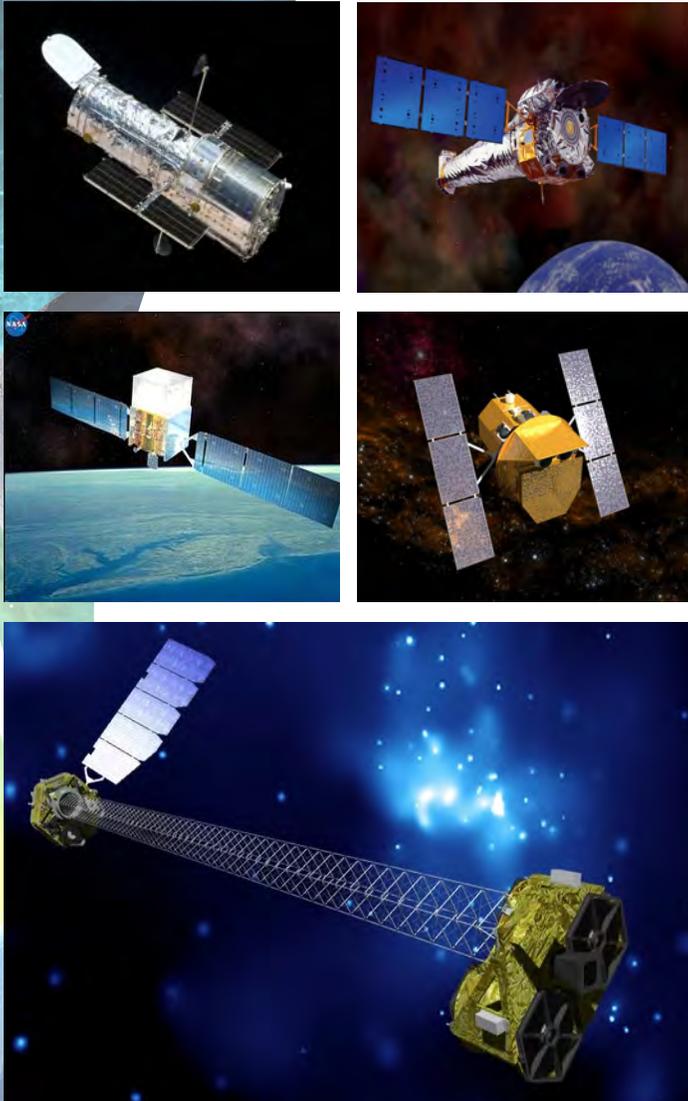
SOFIA Town Hall – Tues Jan 7 @ 7:00 PM; Room 313B

Senior Review 2019

All missions were extended for three years. The next Senior Review for Astrophysics Operating Missions will be in 2022.

- Hubble No change to budget guideline
- Chandra Selected overguides: Audit fees, labor & GO (inflation)
- **TESS** **Extended mission w/full funding & continued GO program**
- Swift Selected overguides: New tools for Targets of Opportunity and Ultraviolet-Optical Telescope
- Fermi Operations w/out Department of Energy
- NICER Extended mission w/ reduced ops & new GO program
- NuSTAR Phase out legacy science and replace with GO science
- XMM-Newton No change

Not in 2019 Senior Review: Kepler, SOFIA, Spitzer



TESS Completes First Year of Prime Mission, Begins Year 2

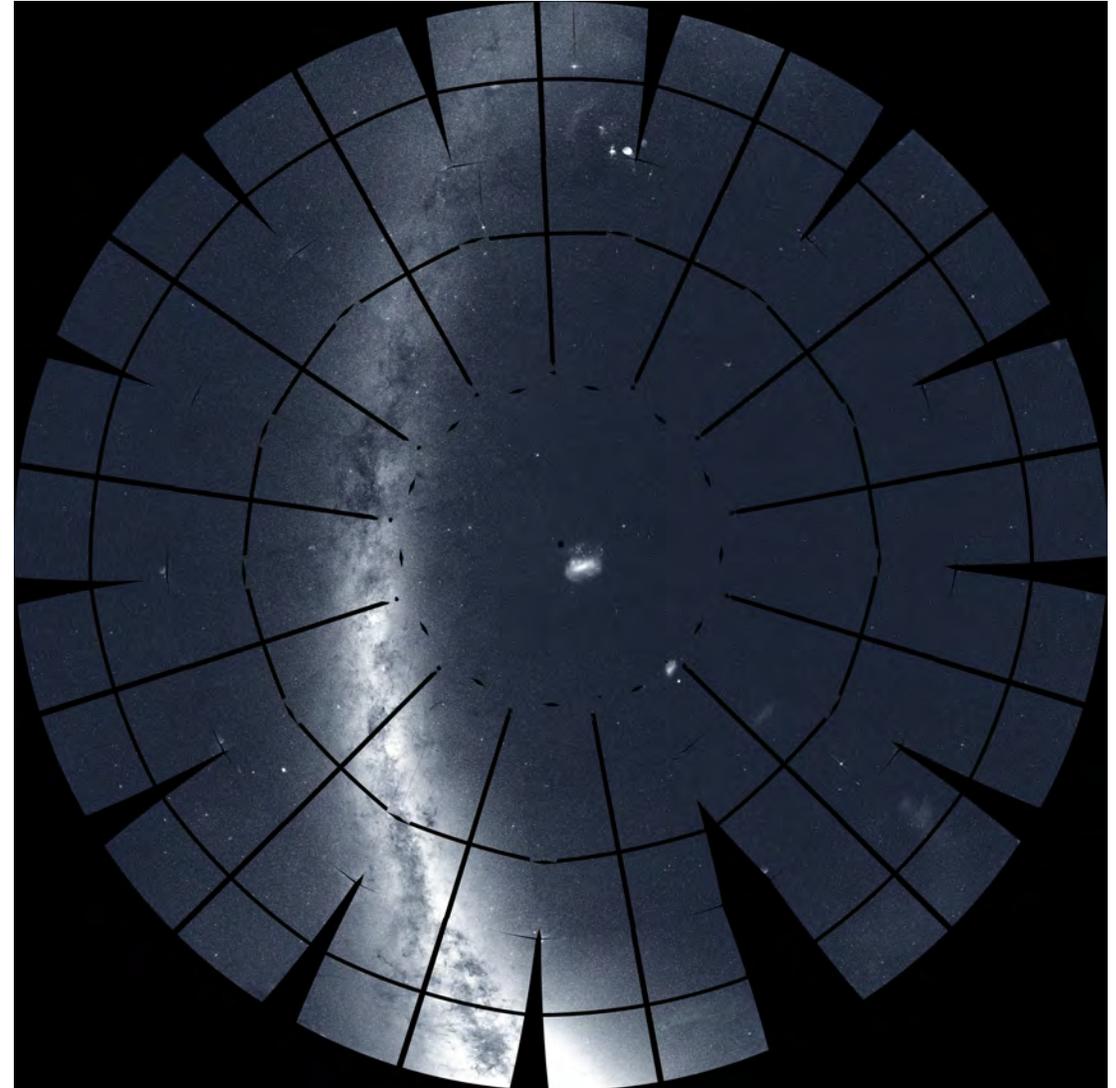
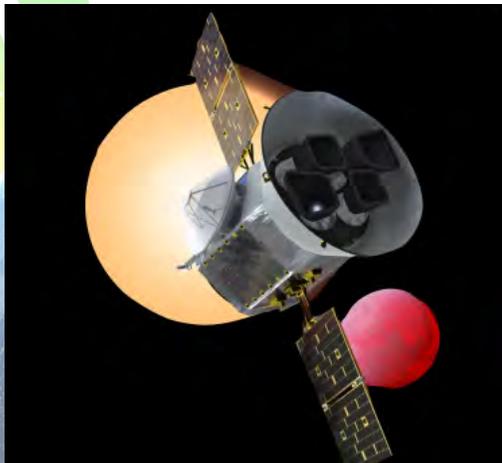
1414 planet candidates
34 confirmed planets
+ many discoveries in astrophysics
36 peer-reviewed publications
+51 more submitted

Successful Guest Investigators Program
Cycles 1 and 2 for Prime Mission

Extended mission approved!

Cycle 3 proposal deadline 1/16/2020

- TESS observed the southern hemisphere sky during Year 1
- Currently observing the northern hemisphere sky for Year 2
- Current Observing Sector: 18 of 26 in Prime Mission
- Data from Sectors 1-16 all publicly available at MAST

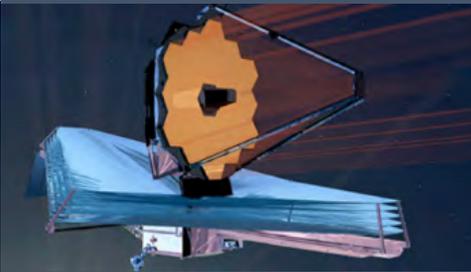


Mosaic image of the southern hemisphere sky generated by combining TESS observing sectors 1-13. Credit E. Kruse.

TESS Town Hall – Mon Jan 6 @ 5:30 PM in Room 306AB

Astrophysics Missions in Development

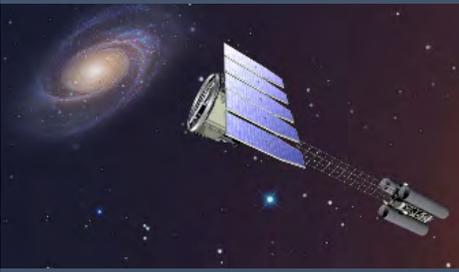
Webb 2021
NASA Mission



James Webb
Space Telescope

The image shows the James Webb Space Telescope (JWST) in space, with its large, gold-colored segmented primary mirror and blue sunshield fully deployed. The telescope is set against a dark background with a bright star.

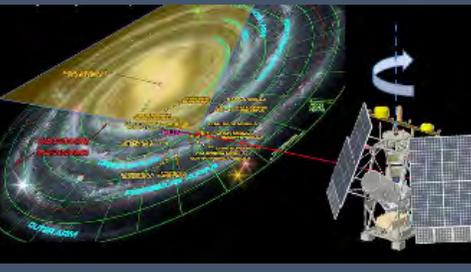
IXPE 2021
NASA Mission



Imaging X-ray
Polarimetry Explorer

The image shows the Imaging X-ray Polarimetry Explorer (IXPE) satellite in space, with its solar panels and instruments visible. The background features a spiral galaxy.

GUSTO 2021
NASA Mission



Galactic/ Extragalactic ULDB
Spectroscopic Terahertz Observatory

The image shows the GUSTO satellite in space, with its solar panels and instruments visible. The background features a colorful, multi-layered structure representing the Galactic/ Extragalactic ULDB Spectroscopic Terahertz Observatory.

XRISM 2022
JAXA-led Mission



NASA is supplying the SXS
Detectors, ADRs, and SXTs

The image shows the XRISM satellite in space, with its solar panels and instruments visible. The background features a starry field.

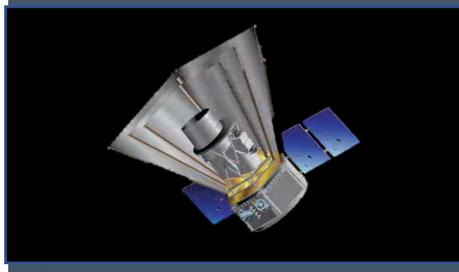
Euclid 2022
ESA-led Mission



NASA is supplying the NISP
Sensor Chip System (SCS)

The image shows the Euclid satellite in space, with its solar panels and instruments visible. The background features a starry field.

SPHEREx 2023
NASA Mission



Spectro-Photometer for the History of
the Universe, Epoch of Reionization,
and Ices Explorer

The image shows the SPHEREx satellite in space, with its solar panels and instruments visible. The background features a starry field.

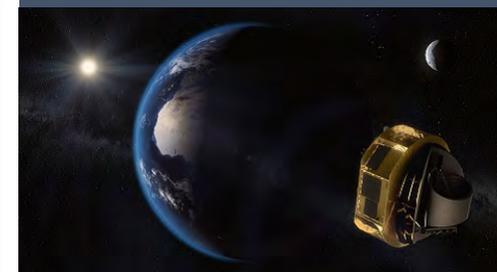
WFIRST Mid 2020s
NASA Mission



Wide-Field Infrared
Survey Telescope

The image shows the WFIRST satellite in space, with its solar panels and instruments visible. The background features a starry field.

ARIEL 2028
ESA-led Mission



NASA is supplying the CASE
fine guidance instrument

The image shows the ARIEL satellite in space, with its solar panels and instruments visible. The background features the Earth and the Moon.

James Webb Space Telescope



2019 Accomplishments

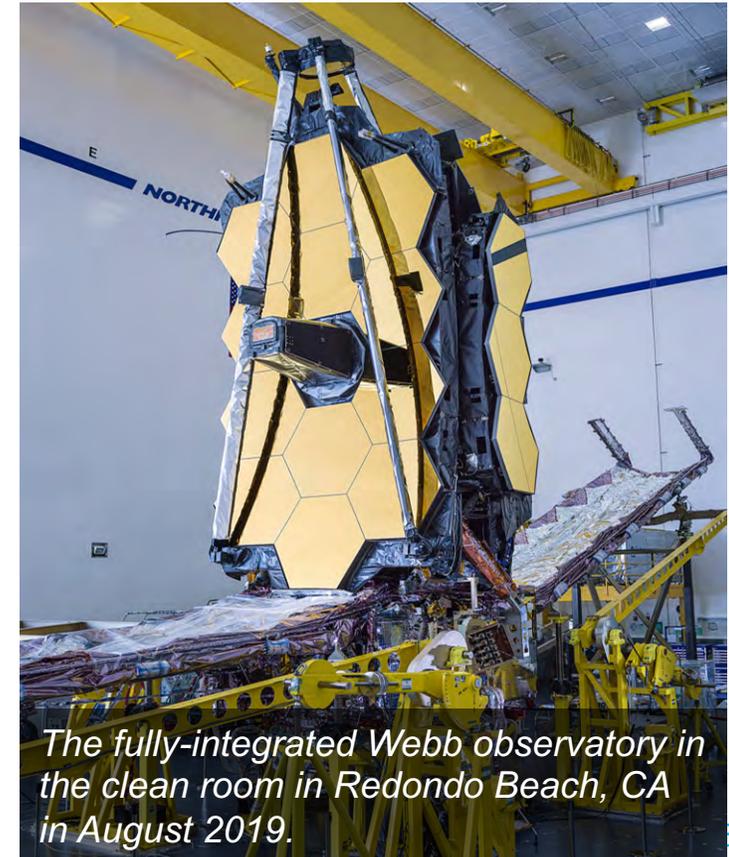
- ✓ Spacecraft element including sunshield completed environmental testing (acoustics, vibration and thermal vacuum) in May 2019
- ✓ Integration of the fully-tested science payload with spacecraft element completed August 2019
- ✓ Test deployment of telescope and sunshield completed November 2019

2020 Highlights

- Full observatory-level testing scheduled for 2020. Includes launch environment testing (acoustics and sine vibration), as well as deployment, system-level electrical, and ground system testing
- 4 launch readiness rehearsals and 16 other mission phase rehearsals are planned for 2020 at STScI
- Cycle 1 Guest Observer call will be released on Jan. 23 with a due date of May 1, 2020. Est. ~6000 hours of observations will be available to the community for Cycle 1.

Numerous sessions about proposing to Webb held throughout AAS 235. Check the schedule!

Webb Town Hall – Sun Jan 5 @ 6:30 PM in Room 313A



WFIRST

Wide-Field Infrared Survey Telescope

- **NASA continuing work on WFIRST as planned**

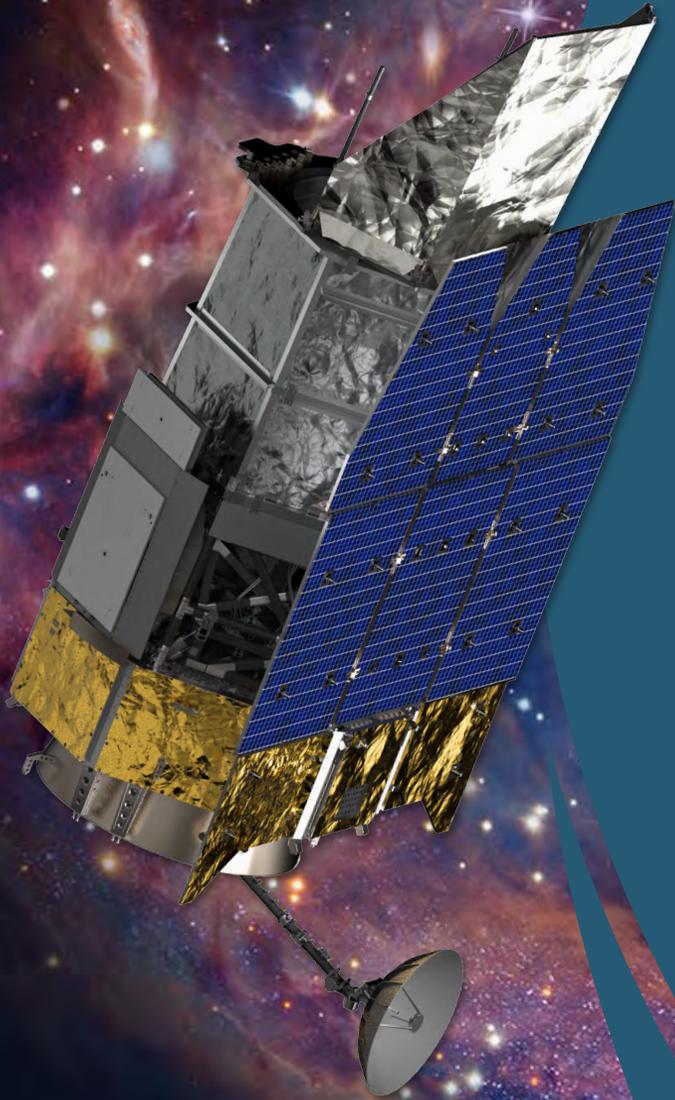
- WFIRST is fully funded under recent FY20 appropriation
- WFIRST remains on the plan approved at the beginning of Phase B: Lifecycle cost range remains \$3.2B - \$3.9B, launch range remains late 2025 - 2026
- Formal cost and schedule commitments, including Headquarters held reserves to increase confidence level to 70%, will be made at Confirmation in early 2020

- **Major milestones completed in 2019:**

- Completed Preliminary Design Reviews for all primary mission elements (Wide Field Instrument, Coronagraph, Optical Telescope, Instrument Carrier, Spacecraft)
- WFIRST mission passed Preliminary Design Review (gate for entering Phase C)
- Additional major contracts awarded: Instrument Carrier (NGIS), Science Operations Center (STScI), numerous spacecraft components
- Long-lead hardware making excellent progress; telescope refiguring proceeding as expected; several flight candidate detectors already in hand

- **Work Plan for 2020**

- NASA confirmation of mission; enter implementation phase (Phase C)
- Significant engineering test unit fabrication and testing



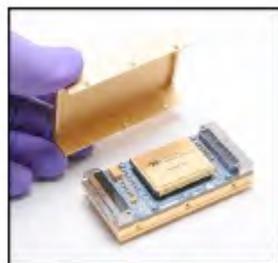
WFIRST Exoplanets: Direct Imaging

- **Coronagraph features:**
 - Demonstrates technologies & system → significantly lowers technical risk for future missions
 - Visible light (550-880nm) imager, polarimeter, $R \sim 50$ slit spectrograph (no longer integral field)
 - Prediction still 100-1,000 times better performance than current facilities
- **Capabilities of baseline instrument and mission in tech demo phase:**
 - Young planets: imaging + spectroscopy of 1-2 self-luminous planetary systems
 - Mature planets: imaging of several reflected light planets, spectrum of 1.
 - Disks: imaging and polarimetry of several debris disks
- **Anticipated schedule in operations:**
 - Participating Scientist Program (PSP) to be solicited to execute tech demo observations & analysis
 - if warranted, PSP and/or GO science beyond tech demo phase

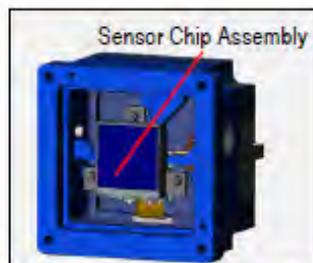


New Partner Mission of Opportunity: ARIEL

Contribution to ARIEL Spectroscopy of Exoplanets (CASE) PI Mark Swain (JPL)

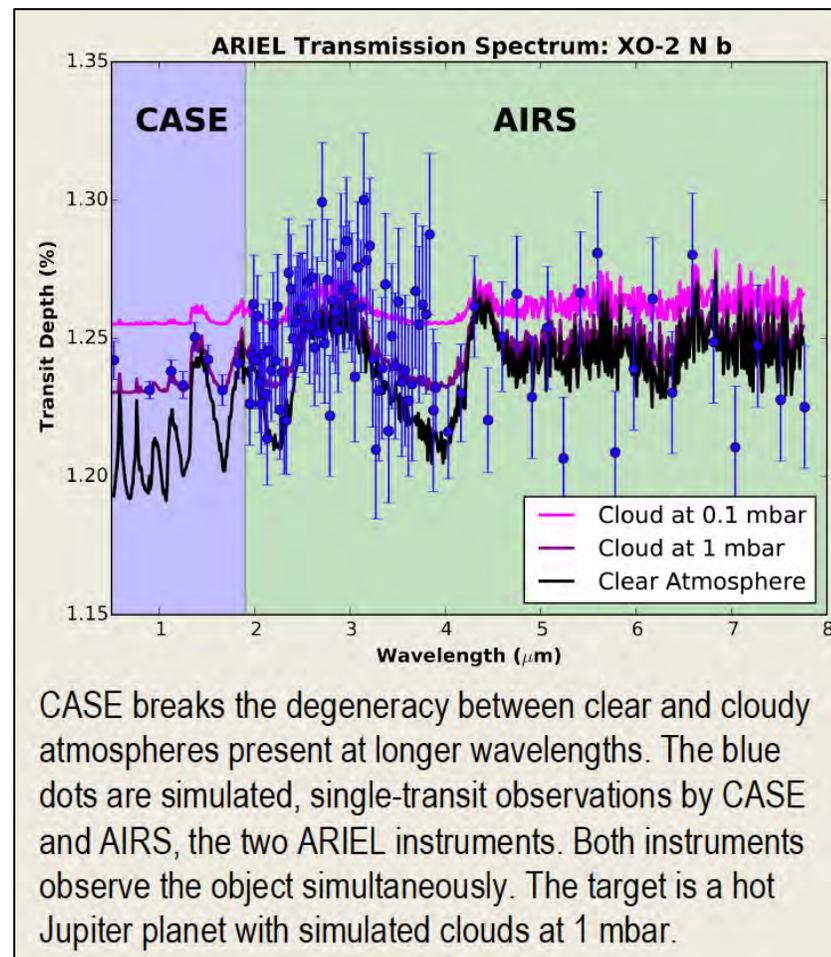


Cold Front End Electronics



Focal Plane Module

CASE detectors and electronics would provide fine guidance for ARIEL; blueward data ($0.5\mu\text{m}$ - $2\mu\text{m}$) enables studies of aerosols (clouds and hazes) which are important for the energy budget of the atmosphere.



ARIEL: ESA M4 mission for Infrared Spectroscopy of Exoplanet Atmospheres PI Giovanna Tinetti (UK)

Launch in 2028 to L2 for 4-yr mission; primary mirror 1.1m x 0.7m; CASE photometry complements AIRS spectroscopy $2\mu\text{m}$ - $8\mu\text{m}$.

ARIEL is next step beyond Kepler and TESS; will obtain spectra of hundreds of warm transiting exoplanets to study atmospheric chemistry and energy budget



Looking to the Future: Astro2020

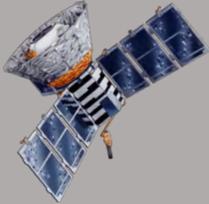
A vibrant space-themed background featuring a large blue and white curved shape on the left. Inside this shape, there's a depiction of the Earth's horizon at the bottom, a bright sun or star in the lower left, and several other celestial bodies including a ringed planet (like Saturn), a reddish planet (like Mars), and a greyish planet (like the Moon). The background is filled with a starry field and nebulae in shades of blue and green.

Decadal Survey Planning

- NASA's highest aspiration for the 2020 Decadal Survey is that it be ambitious
 - The important science questions require new and ambitious capabilities
 - Ambitious missions prioritized by previous Decadal Surveys have always led to paradigm shifting discoveries about the universe
- To provide the Decadal Survey committee with scientifically and technically sound information upon which to base their evaluation of potential future space astrophysics missions, NASA sponsored mission concept studies of a set of medium-class (probe class) missions and a smaller set of large (flagship class) missions.

Medium Mission Concepts (Probes)

Probes are strategic missions that have had a strong impact on astrophysics, either through a focused investigation or as a broadly-capable observatory

COBE 11/89 NASA Strategic Explorer	EUVE 06/92 NASA Strategic Explorer	Rossi XTE 12/95 NASA Strategic Explorer	GP-B 04/04 NASA Strategic Mission	Fermi 6/08 NASA Strategic Mission	Kepler 3/09 NASA Discovery Mission
					
Cosmic Background Explorer	Extreme Ultraviolet Explorer	Rossi X-ray Timing Explorer	Gravity Probe B The Relativity Mission	Fermi Gamma-ray Space Telescope	Kepler Space Telescope

NASA funded probe studies are available at <https://science.nasa.gov/astrophysics/2020-decadal-survey-planning>

NASA's independent assessment of probe studies by the Probes Cost Assessment Team (PCAT) is available at <https://science.nasa.gov/astrophysics/2020-decadal-survey-planning>

Options for 2020 Decadal Survey

- Do not recommend a medium mission in Astro2020
- Recommend specific probe(s) as medium-size strategic missions
- Recommend several specific science concepts for an AO (similar to New Frontiers)
- Recommend an unconstrained AO (i.e., Super-Explorer)

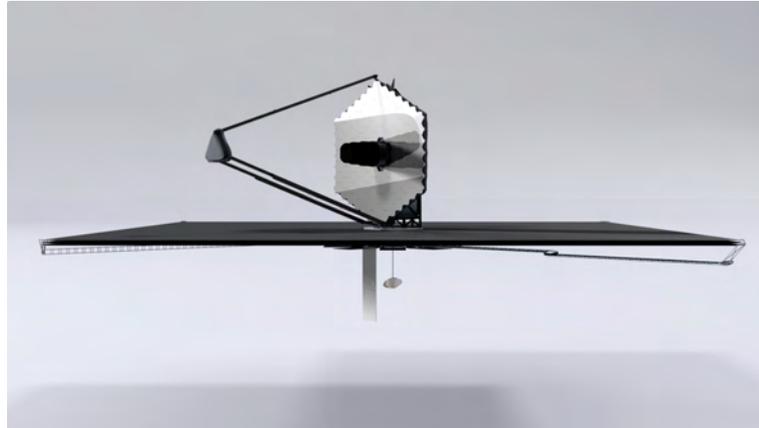
Large Mission Concepts

“NASA should ensure that robust mission studies that allow for trade-offs (including science, risk, cost, performance, and schedule) on potential large strategic missions are conducted prior to the start of a decadal survey. These trade-offs should inform, but not limit, what the decadal surveys can address.” – Powering Science: NASA's Large Strategic Science Missions (NASEM, 2017)



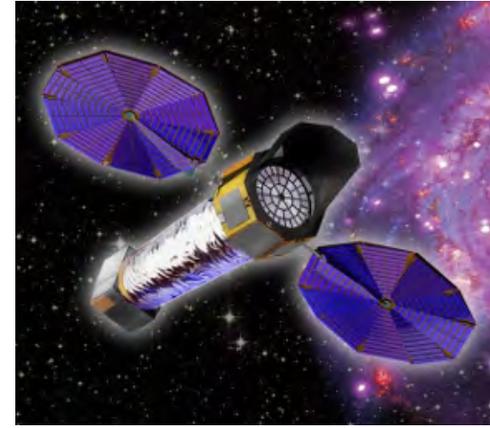
HabEx

Special Session:
Tues Jan 7 @ 1:30 pm
Room 306AB



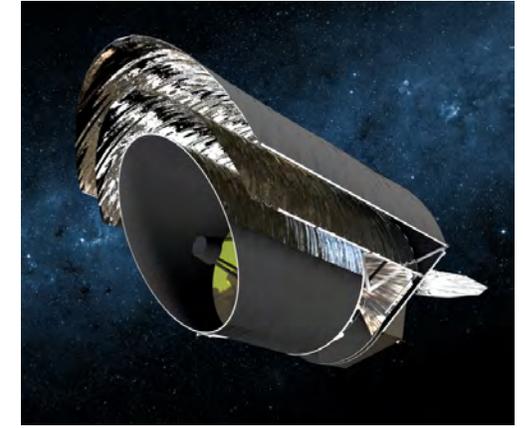
LUVOIR

Special Session:
Mon Jan 6 @ 2:00 pm
Room 301A



Lynx

Special Session:
Sun Jan 5 @ 1:00 pm
Room 303A

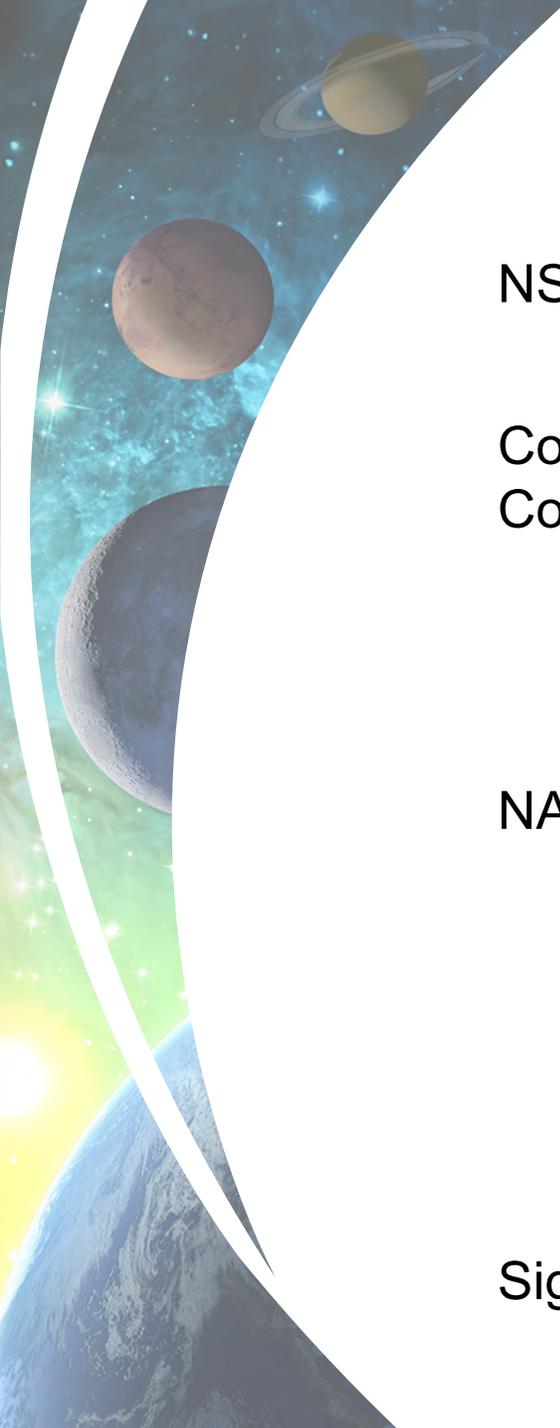


Origins

Special Session:
Mon Jan 6 @ 9:00 am
Room 307B

Special Session: The NASA Decadal Studies - Wed Jan 8 @ 2:00 PM, Room 318A

Links to the concept study reports and the independent assessment of the studies by the Large Mission Concept Independent Assessment Team (LCIT) are posted at: <https://science.nasa.gov/astrophysics/2020-decadal-survey-planning>



Keep Informed about NASA

NSPIRES mailing list – information about NASA solicitations

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

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

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

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

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

NASA Astrophysics Federal Advisory Committees

Astrophysics Advisory Committee (APAC)

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

NAS Committee on Astronomy and Astrophysics (CAA)

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

Astronomy and Astrophysics Advisory Committee (AAAC)

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

Sign up to be a panel reviewer:

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