

National Aeronautics and
Space Administration



EXPLORE SCIENCE

Potential funding structures and options for SOFIA instrumentation

SOFIA Instrumentation Workshop
July 29, 2020

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Outline

- SOFIA Instrumentation Roadmap – the NASA perspective
- Programs for technology and instrument development
- Options for foreign science and instrumentation teams
- Summary

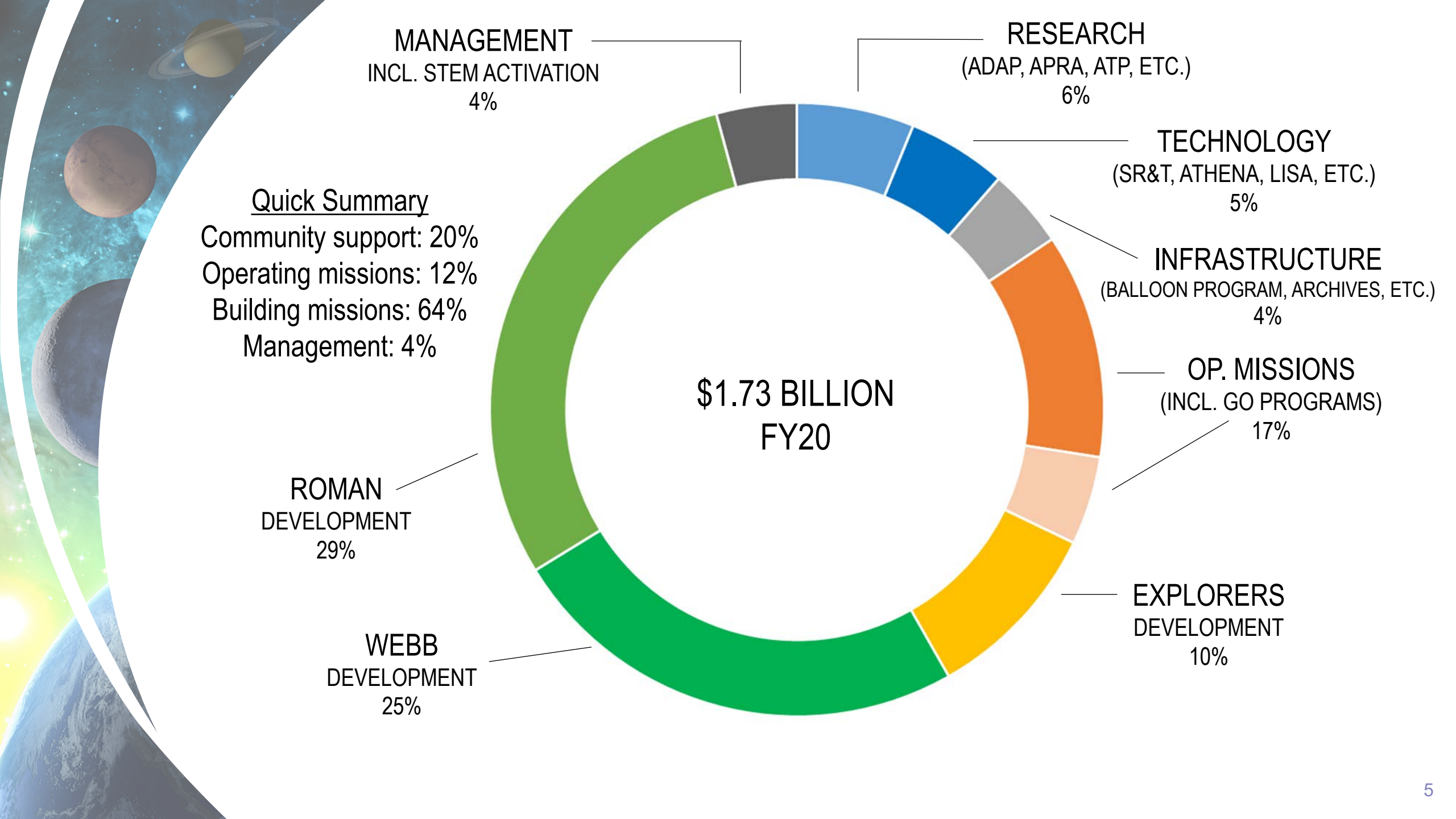
A decorative graphic on the left side of the slide features a curved white border. Inside the curve, there are illustrations of various celestial bodies: Saturn with its rings at the top, followed by Mars, a crescent moon, and the Earth at the bottom. The background is a vibrant space scene with blue and green nebulae and numerous white stars.

SOFIA Instrumentation Roadmap – the NASA perspective

- NASA has asked the SOFIA Project evaluate the options to provide enhanced instrument capabilities for SOFIA and to deliver an instrumentation roadmap by September 30, 2020
- Options include, but are not limited to:
 - Restart of HIRMES at the appropriate time
 - Call for new instrument proposals and/or
 - Upgrading existing instruments with state-of-the-art detectors
- **Bottom line:** NASA Astrophysics wants to see a roadmap that is scientifically driven and compelling and that addresses the scientific interests of its research community; we'll figure out how to make it happen



The Astrophysics Portfolio



MANAGEMENT
INCL. STEM ACTIVATION
4%

RESEARCH
(ADAP, APRA, ATP, ETC.)
6%

TECHNOLOGY
(SR&T, ATHENA, LISA, ETC.)
5%

INFRASTRUCTURE
(BALLOON PROGRAM, ARCHIVES, ETC.)
4%

OP. MISSIONS
(INCL. GO PROGRAMS)
17%

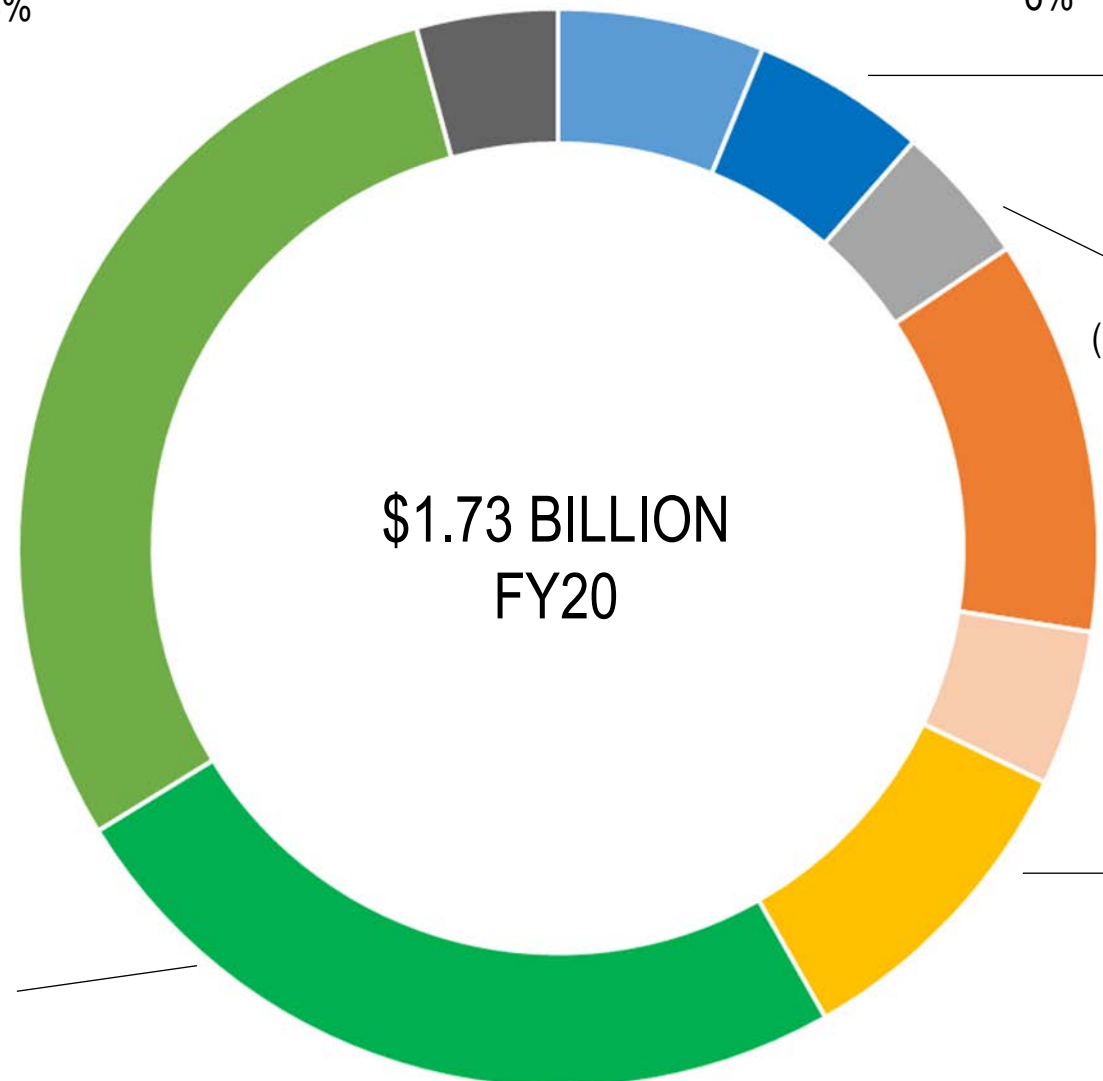
EXPLORERS
DEVELOPMENT
10%

WEBB
DEVELOPMENT
25%

ROMAN
DEVELOPMENT
29%

\$1.73 BILLION
FY20

Quick Summary
Community support: 20%
Operating missions: 12%
Building missions: 64%
Management: 4%



Astrophysics Research & Analysis Elements

Supporting Research and Technology

- **Astrophysics Research & Analysis (APRA)**
- **Strategic Astrophysics Technology (SAT)**
- Roman Technology Fellowships (RTF)
- Astrophysics Theory Program (ATP) (biennial, not this year)
- Theoretical and Computational Astrophysics Networks (TCAN) (triennial, this year)
- Exoplanet Research Program (XRP) (cross-div)
- Topical Workshops, Symposia, and Conferences (TWSC)

Data Analysis

- Astrophysics Data Analysis (ADAP)
- GO/GI programs for:
 - Fermi
 - Swift
 - NuSTAR
 - TESS
 - NICER

Mission Science and Instrumentation

- Sounding rocket, balloon, cubesat, and ISS payloads solicited through APRA
- Astrophysics Explorers U.S. Participating Investigators (triennial, this year)
- Astrophysics Pioneers

Separately Solicited

- GO/GI/Archive/Theory programs for:
 - Chandra
 - Hubble
 - SOFIA
 - Webb
- NASA Hubble Fellowship Program
- NASA Postdoctoral Program
- FINESST Graduate Student Research Awards



Programs for technology and instrument development

- **Astrophysics Research & Analysis (APRA)** supports suborbital and suborbital-class investigations, development of detectors and supporting technology, and laboratory astrophysics.
- **Strategic Astrophysics Technology (SAT)** supports focused development efforts for key technologies to the point at which they are ready to feed into major missions in the three science themes of the Astrophysics Division: Exoplanet Exploration, Cosmic Origins, and the Physics of the Cosmos
- **SOFIA Instrumentation Solicitation** similar to the 2018 SOFIA Next Generation Science Instrumentation Call



APRA

- **Astrophysics Research & Analysis (APRA)** supports suborbital and suborbital-class investigations, development of detector technology and supporting technology, and laboratory astrophysics.
- Basic research proposals in these areas are solicited for investigations that are relevant to NASA's programs in astronomy and astrophysics, including the entire range of photons, gravitational waves, and particle astrophysics. The emphasis of this solicitation is on technology development and suborbital investigations that advance NASA astrophysics missions and goals.



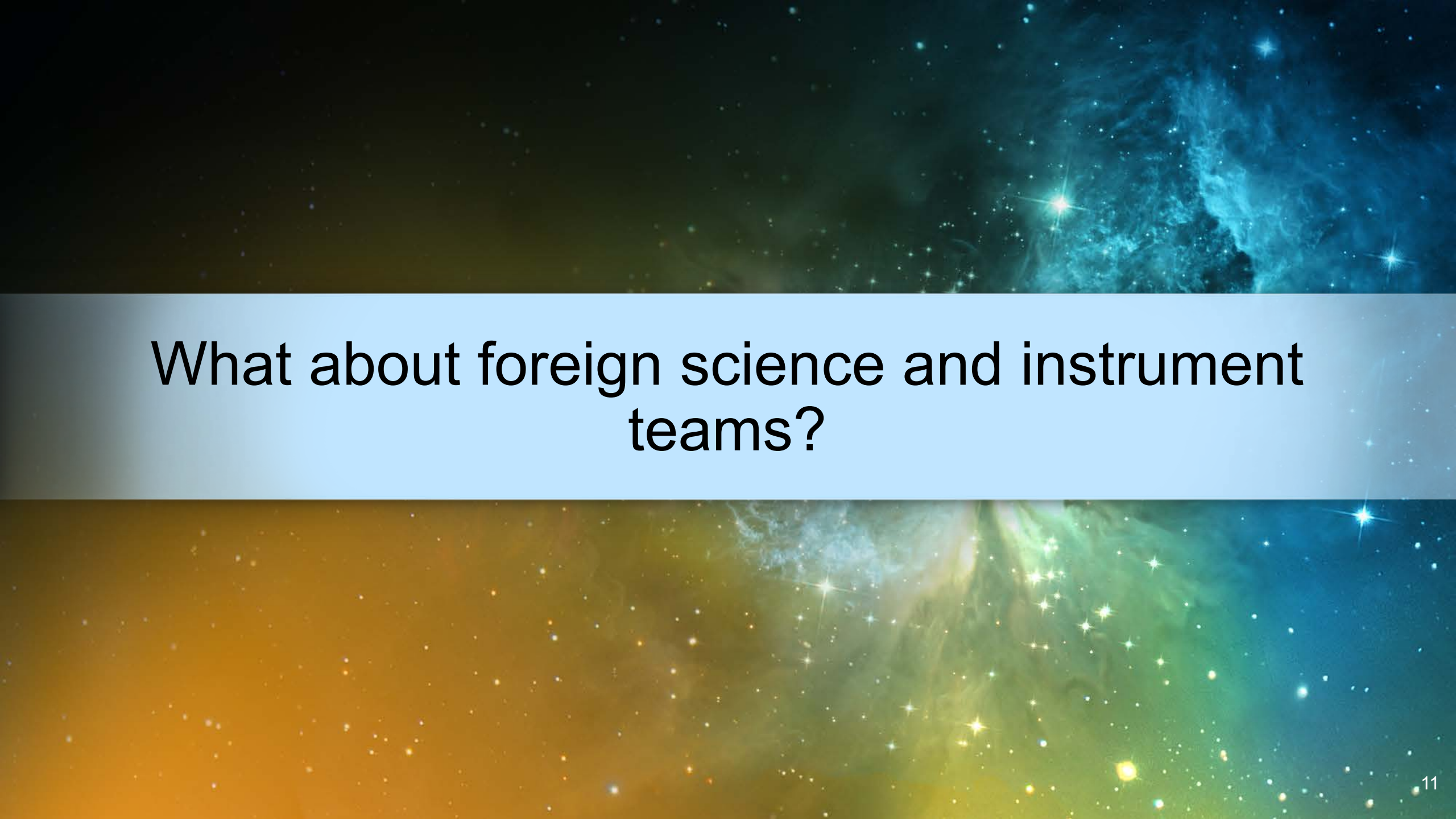
SAT

- **Strategic Astrophysics Technology (SAT)** supports focused development efforts for key technologies to the point at which they are ready to feed into major strategic missions, nominally from the Decadal Survey, in the three science themes of the Astrophysics Division: Exoplanet Exploration, Cosmic Origins, and the Physics of the Cosmos
- This program is specifically designed to address middle technology readiness level (TRL) "gaps" between levels 3 and 6: the maturation of technologies that are required for strategic missions, that have been established as feasible, but which are not yet sufficiently mature to incorporate into flight missions without introducing an unacceptable level of risk



SOFIA Instrumentation Solicitation

- **SOFIA instrumentation call** program element requests proposals for scientific investigations that require the development and use of scientific instrumentation flown on the SOFIA observatory
- The intent is to select and execute development of one or more new SOFIA science instruments and/or upgrades to existing instruments; such an instrument call might
 - Prioritize instruments that enable broad community usage and/or data of high archival value
 - Allow for agile, “niche” instruments to solve important / outstanding science questions
 - Allow for new instruments or upgrades/modifications to existing instruments
 - Allow for flexibility for future enhancements and modifications to a next generation SOFIA instrument



What about foreign science and instrument teams?



What if non-U.S. scientists are interested?

Can foreign team members be supported via a NASA grant?

Short plain English answer: **NASA funds research at US institutions and foreign agencies pay for research at foreign institutions.**

- If a U.S. institution hires this foreign investigator, then you can pay him/her while they are in your employ. If not, then NASA funds cannot be used to support them, not even for travel.

The longer answer more official version of this may be found in the NASA Guidebook for Proposers, Section 3.2 "Submission Requirements and Restrictions" which reads in part: **"NASA's policy welcomes the opportunity to conduct research with non-U.S. organizations on a cooperative, no-exchange-of-funds basis. Although Co-Is or collaborators employed by non-U.S. organizations may be identified as part of a proposal submitted by a U.S. organization, NASA funding may not support research efforts by non-U.S. organizations, collaborators or subcontracts at any level, including travel by foreign investigators. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted."** This derives from 1835.016-70 "Foreign participation under broad agency announcements", which may be found at <https://www.hq.nasa.gov/office/procurement/regs/NFS.pdf#page=273>.

A decorative graphic on the left side of the slide features a curved white border. Inside this border, there is a vibrant space scene with a bright yellow sun at the bottom left, a blue and white Earth at the bottom, and various celestial bodies including a brown planet, a grey planet, and a ringed planet (Saturn) against a starry blue and green background.

So What is Possible?

- A foreign science and instrumentation team could offer an instrument they develop and build to SOFIA as a PI-instrument; no funds are exchanged, PI team gets flights, Guest Observer community gets access to instrument
- A foreign science and instrumentation team could partner with a U.S. institution to design and build an instrument for SOFIA, with the U.S. institution proposing to fund its part of the work to a NASA solicitation and the foreign team obtaining funding for their work from a foreign institution
- A U.S. science and instrumentation team could propose to a NASA solicitation to design and build an instrument for SOFIA and use part of the funding to procure parts or services from a foreign company or institution if they are unavailable in the U.S., again, as long as it doesn't constitute research

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 gradient from orange to green, with a large, bright green nebula on the right and many smaller stars scattered throughout. A horizontal white band with a light blue gradient runs across the middle, containing the word 'Summary' in a black, sans-serif font.

Summary



SOFIA Instrumentation Roadmap - Summary

Bottom line: NASA Astrophysics wants to see a roadmap that is scientifically driven and compelling and that addresses the scientific interests of its research community; we'll figure out how to make it happen

NASA wants to hear from the community, and we look forward to the delivery of the instrumentation roadmap

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 transitions into a warmer color palette, with a golden-yellow and orange glow on the left, fading into a greenish-blue on the right, also filled with stars and nebulae. A horizontal white band with a light blue gradient runs across the middle of the slide, containing the word "BACKUP" in a bold, black, sans-serif font.

BACKUP



R&A News Highlights

Dual Anonymous Peer Review: SMD is strongly committed to ensuring that review of proposals is performed in an equitable and fair manner that reduces the impacts of any unconscious biases

- <https://science.nasa.gov/researchers/dual-anonymous-peer-review>

High-Risk/ High-Impact (HR/HI): To reinforce SMD's interest in High-Risk/High-Impact research, a special review process will be implemented in ROSES 2020 to review and select HR/HI proposals

Strategic Data Management: SMD will be implementing changes to enable open data, open source code, and open model. This will be a step wise process with the first changes coming in ROSES 2020

- <https://science.nasa.gov/researchers/science-data>

Request for Information soliciting research that falls in gaps between current SMD solicitations

- Released Dec. 2, 2019; response date January 31, 2020

Astrophysics Pioneers is a new class of small missions filling gap between ROSES investigations and Explorers – ROSES appendix with anticipated proposal due date in September 2020

APD Peer Reviews

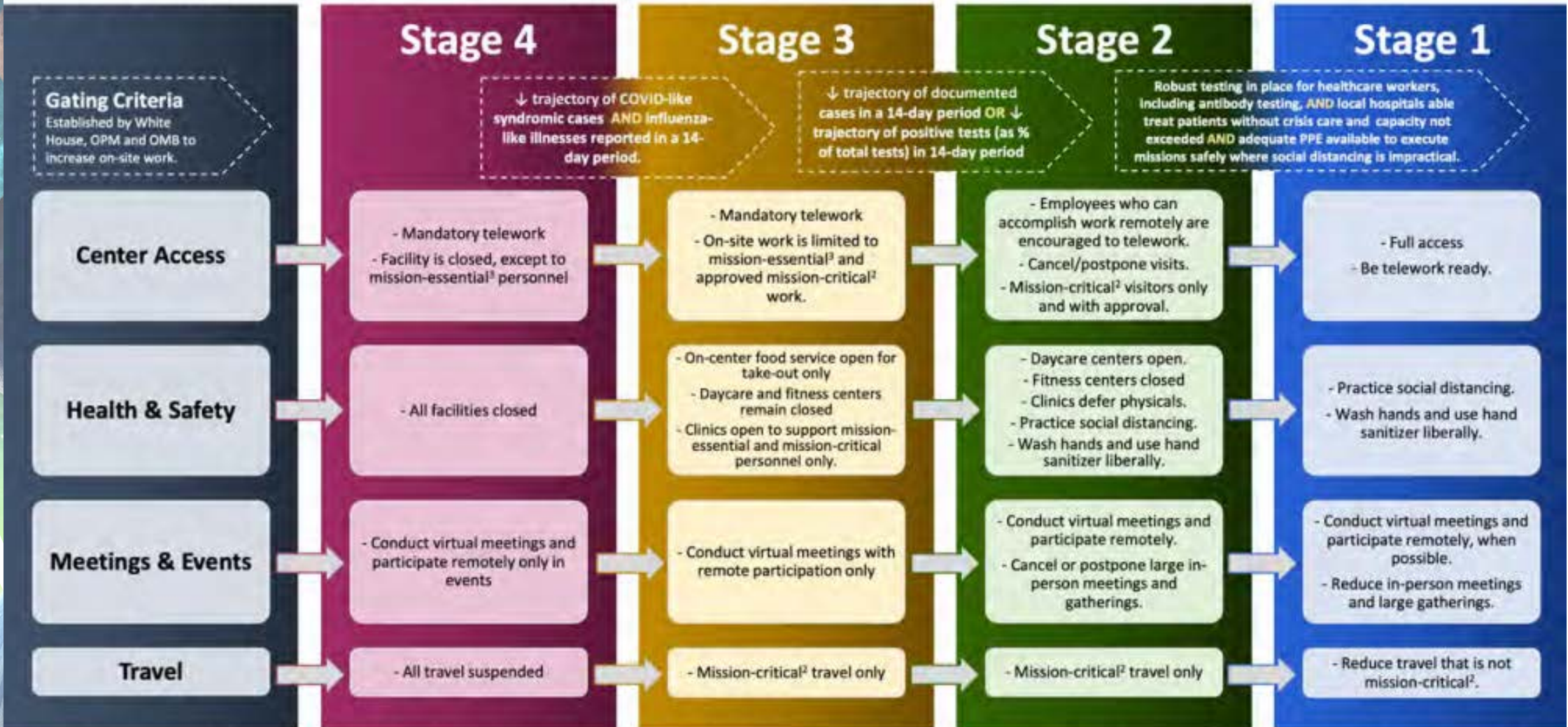
Last update: July 28, 2020

ROSES Program Element	NOIs due	Proposals due	Dual Anonymous	Review Format	Comment
Astrophysics Archives Programmatic Review 2020	N/A	02/03/20	traditional	virtual	
FINESST-20	N/A	02/03/20	traditional	virtual	
TESS GI – Cycle 3	N/A	01/16/20	traditional	virtual	
NuSTAR GO – Cycle 6	N/A	01/24/20	dual anonymous	virtual	
Astrophysics SmallSat Studies	N/A	12/19/19	traditional	virtual	
Fermi GI – Cycle 13	N/A	02/19/20	traditional	virtual	
Hubble GO – Cycle 28	N/A	03/12/20	dual anonymous	virtual	
Chandra GO – Cycle 22	N/A	04/02/20	traditional	virtual	
XRP (Exoplanets Research)	3/27/20	05/29/20	traditional	virtual	
TCAN (Theory)	N/A	06/23/20	traditional	TBD	
ADAP (Data Analysis)	5/5/20	07/16/20	dual anonymous	TBD	
SOFIA GO – Cycle 9 TAC	N/A	09/04/20	traditional	TBD	
Swift GO – Cycle 17	N/A	09/25/20	dual anonymous	TBD	
Astrophysics Explorers US PIs	8/3/20	09/15/20	traditional	TBD	
Pioneers (Suborbital Programs)	8/13/20	10/01/20	traditional	TBD	
NICER GO – Cycle 3	N/A	11/12/20	dual anonymous	TBD	
LISA Preparatory Science	09/15/20	12/15/20	dual anonymous	TBD	
APRA (Basic research)	10/23/20	12/17/20	traditional	TBD	
Nancy Grace Roman Fellowshp	10/23/20	12/17/20	traditional	TBD	Solicited through APRA
SAT (Technology)	–	–	–	–	Not solicited in ROSES-20
Webb GO – Cycle 1	N/A	11/04/20	dual anonymous	TBD	
XRISM Guest Scientists	–	–	–	–	Not solicited in ROSES-20. Moved to ROSES-21
TESS GI – Cycle 4	N/A	01/15/21			
NuSTAR GO – Cycle 7	N/A	1/22/21	dual anonymous	TBD	

NASA Return to Work Plan

NASA Framework for Return to On-Site Work (as of 3 May 2020)

* This guidance applies to NASA civil servants. Contractor employees should reach out to their management.



1. All travel to or from centers at Stage 3 or higher, or to countries at Level 3 or higher, requires an approved Request for Travel Exception form. The [Request for Travel Exception](#) form is available on the NASA People website. For the latest CDC international travel information, go to <https://www.cdc.gov/coronavirus/2019-ncov/travelers/index.html>.

2. **Mission critical:** work that must be performed to minimize the impact on mission/project operations and/or schedules and cannot be performed remotely or virtually.

3. **Mission essential functions:** As described in the COOP, during an emergency, NASA's Primary and Mission Essential Functions (P/MEFs) must be continued with minimum interruption and are focused on protecting life and property as well as insuring agency leadership and control of the agency.

Pioneers

- **Astrophysics Pioneers** supports astrophysics space and sub-orbital science investigations that are greater in cost, scope and capability than what is possible within the Astrophysics Research and Analysis (APRA) program (D.3 of ROSES-2020) but are smaller in cost than what is possible within the Astrophysics Explorers Mission of Opportunity (MO) program (e.g., PEA O of SALMON-3 for the 2019 opportunity).
- Investigations are solicited using platforms that include CubeSats (including constellations), SmallSats, Major Balloon Missions, and International Space Station (ISS)-attached payloads. Technology development and maturation within the proposed project is allowed, but the primary review criterion for selection is the merit of the proposed science investigation.
- *Pioneers is part of the Explorers Program. Pioneers is not a technology program or an instrument program, it is a mission program. A SOFIA instrument proposal would be non-compliant.*