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
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
$1.73 BILLION
FY20

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

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%
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.
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
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*
BACKUP
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](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](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
<table>
<thead>
<tr>
<th>ROSES Program Element</th>
<th>NOIs due</th>
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<td>Astropysics Archives Programmatic Review 2020</td>
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NASA Framework for Return to On-Site Work (as of 3 May 2020)

**Stage 4**
- Mandatory telework
- On-site work is limited to mission-essential and approved mission-critical work
- On-center food service open for take-out only
- Daycare and fitness centers remain closed
- Clinics open to support mission-essential and mission-critical personnel only

**Stage 3**
- Mandatory telework
- Trajectory of COVID-like syndromic cases and influenza-like illnesses reported in a 14-day period
- Trajectory of documented cases in a 14-day period
- Trajectory of positive tests (as % of total tests) in 14-day period
- Conduct virtual meetings with remote participation only
- Mission-critical travel only

**Stage 2**
- Employees who can accomplish work remotely are encouraged to telework.
- Cancel/postpone visits.
- Mission-critical visitors only and with approval.
- Conduct virtual meetings and participate remotely.
- Mission-critical travel only

**Stage 1**
- Full access
- Be telework ready.
- Practice social distancing.
- Wash hands and use hand sanitizer liberally.
- Conduct travel that is not mission-critical.
- Daycare centers open.
- Fitness centers closed.
- Clinics defer physicals.
- Practice social distancing.
- Wash hands and use hand sanitizer liberally.

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.

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