SOFIA Instrument Roadmap Strategy/Phasing

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SOFIA
Stratospheric Observatory for Infrared Astronomy

NASA DLR USRA DSI

NASA's expectation for this Roadmap

- SOFIA is in the extended mission phase – enhancing scientific productivity and producing impactful science are primary goals

- Keep SOFIA scientifically relevant by investing in upgrades and new capabilities that will allow us to
  - Address the most pressing needs of the astrophysics community
  - Pursue strong synergies with other NASA missions and observatories
  - Expand SOFIA's discovery space
  - Grow SOFIA's community
  - Broaden SOFIA's influence and impact

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Developing the Instrument Roadmap

SOIFA is charged with developing an Instrument Roadmap that is

- **SCIENTIFICALLY COMPELLING**
- **COMMUNITY-DRIVEN**
- **TIMELY**

Science Themes

Science Case	Capability
Disk Masses	HD line at 112 μm
ISM/disk diagnostics	High-res MIR/FIR spectroscopy (hydrides, Si II, H_2O)
Disk/Solar System Ices + solids	Med-res MIR spectroscopy (ice features)
Star Formation/ISM	High-res FIR spectral imaging (C II, O I, O III…)
Galaxies/Star Formation B-field	MIR and FIR polarimetry
Stars/Novae/Supernovae	Monitoring/Photometry/Imaging
Galaxies ISM	Med-res spectroscopy (C II, O I, O III…)
Galactic Center	Imaging, spectroscopy, polarimetry
Solar System/Comets gas	Med-res and High-res spectroscopy, imaging

Identified Gaps

- Medium- to high-resolution 30 to 120 μm spectroscopy/imaging
- Mapping speed
- Wavelength coverage for existing instruments
- Sensitivity at some key wavelengths
- Line Polarimetry

Science- and Community-Driven Instrument Devleopment

- SOFIA envisions a Science- and Community- Driven instrument development process
  - Recommend NASA funding for promising and obviously necessary technology development for SOFIA science priorities
  - Establish scientific priorities with community feedback and external review and select the most compelling science case
  - Establish the instrumental capabilities necessary to achieve this science.
  - Issue a competitive call for proposals to build an instrument with these capabilities.

A Strawman Plan: Option #1

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Technology Development A												
Technology Development B												
Technology Development C												
Upgrade to Existing Instrument												
Specify Science Case/Capability							COMMUNITY OBSERVING					
Call for **Instrument A**												
Develop **Instrument A**												
Commission **Instrument A**												
Specify Science Case/Capability										COMMUNITY OBSERVING		
Call for **Instrument B**												
Develop **Instrument B**												
Commision **Instrument B**												
Specify Science Case/Capability												
Call for **Instrument C**												
Develop **Insturment C**												
Commision **Instrument C**												

A Strawman Plan: Option #2

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Technology Development A											
Technology Development B											
Technology Development C											
Upgrade to Existing Instrument											
Specify Science Case/Capability							COMMUNITY OBSERVING				
Call for **Instrument A**											
Develop **Instrument A**											
Commission **Instrument A**											
Specify Science Case/Capability								COMMUNITY OBSERVING			
Call for **Instrument B**											
Develop **Instrument B**											
Commision **Instrument B**											
Specify Science Case/Capability									COMMUNITY OBSERVING		
Call for **Instrument C**											
Develop **Insturment C**											
Commision **Instrument C**											

Where do we go from here?

SMO will evaluate the contributions and from the workshops to assess the best science SOFIA can do, to identify gaps in instrumental capabilities, and to gather feedback from the community on SOFIA's future role in astrophysics.

Based on this community input and external Red Team review, SMO will develop an instrument roadmap document and submit to NASA.

We want your help…please provide us advice and give us your feedback! Googledoc, SOFIA website, jjackson@sofia.usra.edu