

**Charter for the Astrophysics Focused Telescope Assets (AFTA) Follow-on Study  
Science Definition Team (SDT)  
July 2101**

**Purpose**

The Science Definition Team (SDT) for the Astrophysics Focused Telescope Assets (AFTA) study is chartered by the NASA Headquarters (HQs) Astrophysics Division Director. The SDT will continue the development of the AFTA Design Reference Mission, using the existing 2.4m optical telescope assets, to address the science priorities described in the Astrophysics 2010 Decadal Survey *New Worlds New Horizons* (NWNH) for a wide field infrared survey telescope (first priority for large-scale space activity) and the maturing of exoplanet direct imaging technology and exoplanet precursor science (first priority for medium-scale space activity). The telescope assets consist of two 2.4 meter optics, outer barrel assemblies, and related space-qualified hardware.

**Study Content**

1. Based on the results of the AFTA study completed on April 30, 2013, NASA has decided to continue pre-formulation activities for AFTA using the 2.4m telescope for a widefield infrared survey and to baseline a coronagraph instrument to address the first medium-scale space recommendation of the NWNH Decadal Survey which was to prepare for a planet-imaging mission beyond 2020 by developing technology and conducting precursor science activities.
2. The SDT is to continue the development of science requirements, investigation approaches, key mission parameters, and any other scientific studies needed to support the refinement and optimization of a space mission concept (Design Reference Mission) to further the science priorities described in NWNH for a wide field infrared survey telescope and maturation of technology and science for an exoplanet direct imaging mission. Justification for conducting the proposed science investigations from space and an assessment of how such investigations will complement existing and planned domestic and international ground and space facilities should continue to be addressed in the SDT's report.
3. The SDT and Astrophysics Focused Telescope Assets (AFTA) Study Office will update the April 2013 Design Reference Mission (DRM) and document the effort in a study report. The AFTA Study Office will develop cost and schedule scenarios that address both optimal build scenarios as well as other funding profiles that might be provided during the course of the study. Overall mission cost is to be kept as low as possible while still achieving all or part of the science priorities for a wide field infrared survey telescope and exoplanet technology and science maturation. A descopable internal coronagraph instrument for the detection and study of exoplanets will be included in the design reference mission, consistent with the design reference and requirements for the existing telescope asset and the IR survey. Modularity to facilitate emerging robotic servicing capabilities shall also continue to be studied.
4. Areas of focus in the study shall include:
  - a. Optimization of observatory to reduce risk and minimize cost
  - b. Requirements development, refinement and flowdown, including calibration
  - c. Operations concept refinement, survey yield predictions and survey efficiency drivers, including calibration
  - d. Continuation the study of spectroscopy capability options
  - e. Maturation of the AFTA coronagraph instrument design, including a science

- assessment vs. performance, and a study of required observatory stability
- f. Payload structural, thermal, and optical performance assessments
  - g. Science case versus difficulty and risk of extending the long wavelength cutoff as far as 2.4 micron
  - h. Reexamination of filter selection in light of long wavelength cutoff conclusion above
  - i. Investigation of a possible all-sky one-filter survey that could be done in 1 year
  - j. Continuation of maturing estimates of expected microlensing rates, including dynamic range requirements for microlensing.
  - k. Modifications to the telescope assets to maximize the science return with minimal costs

### **Organization**

- a. The SDT will work with the AFTA Study Office, which is located at GSFC. The SDT and the Study Office are independent of each other, but need to work in close coordination. They will iterate on science requirements and the mission concepts that flow from these and will share results with each other in a two-way exchange. The SDT may ask the Study Office for additional data or to study particular mission concept(s), technical and/or programmatic trades, or other studies, including variations of concepts already studied or new concepts.
- b. The SDT may seek inputs from scientists and technologists external to the SDT. Though permission is not required, the SDT will inform the AFTA Study Office and NASA HQs of these interactions. The Study Office may ask the SDT for scientific or technical assessments, perspectives, and/or studies. External scientific inputs and discussions needed by the Study Office should flow through the SDT only. The Study Office may seek internal scientific or technical perspectives from NASA scientists for help in developing mission concepts based on the findings of the SDT. Such scientists will be named by the Study Office, and their perspectives will be shared with the SDT.
- c. The SDT Co-chairs will act as the official point of contact between the SDT members and NASA representatives for any issue of programmatic, technical, or budgetary nature.

### **Public Release of Information**

- a. Any public release or discussion of the SDT or Study Office status or results of findings, studies or concepts shall be coordinated directly with NASA HQ beforehand. All reports and other output of the SDT studies will be made publicly available to the extent that is consistent with Federal export regulations (e.g., ITAR).
- b. Within these guidelines, the SDT will inform the community about the AFTA mission through a combination of town hall meetings, sessions at conferences, specialized workshops, newsletter articles, web features/updates, and other venues as appropriate.

### **Membership**

- a. SDT members were selected by NASA HQ in 2012 from the pool of applicants that responded to the call for applications in 2012. Additional members will be added at the request of the SDT Co-chairs and the approval of the Astrophysics Division Director. Members were selected for balance among expertise in relevant science

areas, relevant hardware and technology, optics, and both ground and space-based approaches to the implementation of the science priorities.

### **Structure**

- a. The SDT Co-chairs will be appointed from the SDT membership by the NASA Astrophysics Division Director.
- b. The NASA AFTA Study Program Scientist (HQ), AFTA Study Scientist (GSFC), Exoplanet Exploration Program Office Chief Scientist (JPL), and possibly other agency representatives (domestic and international) will be *ex officio* members of the SDT.

### **Termination**

- a. The SDT will be disbanded after the release of the report to NASA and prior to any future Announcement of Opportunity (AO) for participation in the possible mission(s).

### **Meetings**

- a. The initial meeting of the SDT will occur via telecon during the summer of 2013, followed by the first in-person meeting on September 9-10, 2013, at Goddard Space Flight Center. Additional meetings are anticipated throughout the study. The SDT will also have telecons throughout the study to augment the face-to-face meetings. Meetings will be called by the SDT Co-chairs, and the agendas will be set by the Co-chairs in coordination with NASA HQ and the Study Office to ensure that planned activities are aligned with programmatic needs and expectations. All meetings of the SDT are open to nonmembers.

### **Time Commitment**

- a. Members will be expected to attend the approximately 5 in-person meetings and participate in the telecons. In addition, there will be support tasks and writing assignments for members that will take additional time, for example, simulations in support of requirements development and flowdown.

### **Reports**

- a. A report to NASA HQs and the AFTA Study Office presenting a baseline and threshold science drivers for an internal coronagraph due by September 30, 2013.
- b. An interim report addressing the effort with an updated DRM shall be delivered to NASA HQs on April 30, 2014
- c. A final study report with the final DRM shall be delivered to NASA HQs on January 30, 2015.

### **Logistics**

- a. The AFTA Study Office will provide logistical support for the SDT, including arranging meetings, in person and by phone, and providing online resources. Travel to the SDT meetings will be funded by the AFTA Study Office, subject to NASA policies and availability of funds from NASA. The Study Office will provide support and direction in conjunction with NASA HQ for all ITAR sensitive activities and products.
- b. No support other than travel will be provided by NASA to the SDT members.

**Point of Contact**

- a. The NASA HQ point-of-contact is Dr. Joan Centrella ([joan.m.centrella@nasa.gov](mailto:joan.m.centrella@nasa.gov)) through September 10, 2013, and Dr. Dominic Benford ([dominic.j.benford@nasa.gov](mailto:dominic.j.benford@nasa.gov)) thereafter.



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Paul Hertz  
Director  
Astrophysics Division  
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date