

**Charter for Wide Field Infrared Survey Telescope (WFIRST)  
Science Definition Team (SDT)  
November 1, 2010**

**Purpose**

The Science Definition Team (SDT) for the Wide Field Infrared Survey Telescope (WFIRST) is chartered by NASA Headquarters (HQ) by the Astrophysics Division Director. The SDT will provide scientific assistance to NASA HQ during the pre-Phase A study of WFIRST.

**WFIRST Mission**

As envisaged by the Astro2010 Decadal Study, WFIRST will be a wide-field-of-view near-infrared-imaging and low-resolution-spectroscopy telescope with performance comparable to a 1.5m obscured telescope. WFIRST will address two of the most fundamental questions in astronomy and astrophysics: Are there other solar systems like ours, with worlds like Earth? Why is the expansion rate of the universe accelerating? In addition, WFIRST will allow astronomers to tackle issues of central importance to understand how galaxies, stars, and black holes form and evolve.

The WFIRST mission will be designed to address three, equally important, science goals. These are: the nature of dark energy, the search for exoplanets, and Galactic and extragalactic NIR surveys through a Guest Observer program. To settle fundamental questions about the nature of dark energy, the postulated cause of the accelerating expansion of the universe, WFIRST will employ three distinct techniques – measurements of baryon acoustic oscillations, supernova distances, and weak gravitational lensing. To search for exoplanets, WFIRST will monitor a large sample of stars in the central bulge of the Milky Way for small deviations in brightness due to microlensing by intervening stars and their associated planetary systems. Finally, WFIRST will offer a robust guest investigator program supporting opportunistic and archival studies of broad astrophysical topics.

**Study Request**

The SDT is to provide science requirements, investigation approaches, key mission parameters, and any other scientific studies needed to support the definition of an optimized space mission concept satisfying the goals of the WFIRST mission as outlined by the Astro2010 Decadal Survey. Justification for conducting the WFIRST investigations from space and an assessment of how such investigations will complement existing and planned domestic and international ground and space facilities will be included in the SDT's report. Among the products to be produced by the SDT, working with the WFIRST Project Office (PO), will be a Design Reference Mission (DRM) that describes a preliminary investigation approach for the WFIRST prime science mission, including the expected scientific impact of the proposed strawman investigations.

In particular, the SDT report should present assessments about how best to proceed with the WFIRST mission, covering the cases that the Euclid mission, in its current or modified form, proceeds to flight development, or that ESA does not choose Euclid in the near future.

**Concept Development**

The WFIRST PO is located at the Goddard Space Flight Center (GSFC), and is part of the ExoPlanet Exploration Program located at the Jet Propulsion Laboratory (JPL). The PO will be responsible for mission concept development, based on input and/or comment from the SDT, and cost and schedule estimation, working with the Astrophysics Division to ensure alignment with programmatic constraints. Cost control will be a central tenet of concept development.

## **Organization**

The SDT and the PO 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 PO to study particular mission concept(s), technical and/or programmatic trades, or other studies, including variations of concepts already studied or new concepts.

The SDT may seek inputs from scientists and technologists external to the SDT. Though permission is not required, the SDT will inform the WFIRST PO of these interactions. The PO may ask the SDT for scientific or technical assessments, perspectives and/or studies. Any external scientific inputs and discussions needed by the PO should flow through the SDT only. The PO 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 PO and will be shared with the SDT.

## **Public Release of Information**

Any public release or discussion of the SDT or PO status or results of findings, studies or concepts shall be coordinated with NASA beforehand. All reports and other output of the WFIRST SDT will be made publically available.

## **Membership**

SDT members will be selected by NASA HQ from the pool of applicants that responded to the call for applications. Members will be selected for balance among the three science goals of WFIRST, relevant hardware and technology knowledge, and expertise in both ground and space-based approaches to the implementation of WFIRST science. The selected members will have demonstrated expertise and knowledge in areas highly relevant for WFIRST primary scientific goals and related technology, including: relevant space-based and ground-based existing and planned observatories; stellar microlensing surveys and their use for detection of extrasolar planetary systems, methods for dark energy research, weak gravitational lensing of galaxies, baryon acoustic oscillations (galaxy redshift surveys), redshift space distortions and supernovae distances; the origin and evolution of extrasolar planetary systems; figure of merit forecasting for dark energy research and extrasolar planet searches; sky surveys in the near infrared; ancillary extragalactic and Galactic science relevant to WFIRST; and space-based telescope and infrared focal plane instrumentation design and development.

## **Structure**

The SDT Chair will be appointed from the SDT membership by the NASA Astrophysics Division Director.

The NASA HQ WFIRST Program Scientist, WFIRST Project Scientist (GSFC), Exoplanet Exploration Program Office Chief Scientist (JPL), and possibly other agency representatives will be *ex officio* members of the SDT.

## **Termination**

The WFIRST SDT will be disbanded prior to any future Announcement of Opportunity (AO) for participation in the WFIRST mission, including provision of instrumentation.

## **Meetings**

The initial meeting of the WFIRST SDT will be targeted for early 2011. The SDT can be expected to meet in person 3 to 5 times per year for (typically) two to three days. The WFIRST

SDT might also have phone-in meetings. Meetings will be called by the SDT Chair, and the agendas will be set by the Chair in coordination with NASA HQ and WFIRST project and science management to ensure that planned activities are aligned with programmatic needs and expectations. All meetings of the SDT are open to nonmembers.

**Reports**

The SDT preliminary report is to be completed by summer 2011, and final report by the end of 2012. The SDT may be retained for further work beyond that date.

**Logistics**

The WFIRST PO will provide logistical support for the SDT, including arranging meetings, compiling agendas, and issuing minutes. Travel to WFIRST meetings will be funded by the WFIRST PO, subject to NASA policies and availability of funds from NASA. If appropriate, ESA and other agencies will support SDT members from their respective countries.

**Point of Contact**

The NASA point-of-contact and Program Scientist for WFIRST is Dr. Rita Sambruna (rita.m.sambruna@nasa.gov).



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