ExoPlanet Exploration Program

Pre-proposal Briefing:

Technology Development for Exoplanet Missions (TDEM) Element of the 2012 Strategic Astrophysics Technology (SAT) Solicitation

Introduction and Overview

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The Strategic Astrophysics Technology (SAT) Program

- Composed of three elements:
  - *Technology Development for Exoplanet Missions (TDEM)*
  - *Technology Development for the Cosmic Origins Program (TCOP)*
  - *Technology Development for the Physics of the Cosmos Program (TPCOS)*
- Three elements are coordinated, but operate independently. Each element has its own Program Officer and funding line (the SR&T line in the associated program—Exoplanet Exploration, Cosmic Origins, Physics of the Cosmos)
  - *TDEM Program Officer: Douglas Hudgins, Douglas.M.Hudgins@nasa.gov*
  - *TCOP Program Officer: Michael Garcia, Michael.R.Garcia@nasa.gov*
  - *TPCOS Program Officer: Wilt Sanders, Wilton.T.Sanders@nasa.gov*
- This briefing is specifically for people interested in proposing under the TDEM element of the SAT solicitation. People with questions about the other elements of the program should contact the appropriate program officer.

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The Role of the SAT/TDEM element

- The overarching goal of NASA's Exoplanet Exploration Program (ExEP) is to advance NASA's efforts to detect and characterize planets and planetary systems around other stars.
- The long-term goal of the program is to develop and execute a ***New Worlds*** mission such as that described in the 2010 Decadal Survey of Astronomy and Astrophysics (Astro2010)—a space flight mission capable of imaging and spectroscopy of habitable, terrestrial planets in the Solar neighborhood.
- The Technology Development for Exoplanet Missions (TDEM) element of the SAT program was established to facilitate overcoming the numerous significant technological hurdles associated with implementing a future New Worlds mission.
- SAT/TDEM represents the implementation of the ***New Worlds Technology Development*** program recommended by Astro2010.

Scope of Program

- The goal of the SAT/TDEM program is the focused development of key technologies for future flight hardware that support exoplanet direct detection measurements.
- The scope of the program is best be described in terms of the 9-level "Technology Readiness Level" (TRL) classification system NASA uses to rate the readiness of a particular technology for use in a space flight mission.
  - TRL definitions are described in detail in the SAT 2012 solicitation and in Appendix J of NASA Procedural Requirement (NPR) 7120.8 (http://nodis3.gsfc.nasa.gov; search "7120.8").
- **In general, the SAT Program designed to address maturation of mid-range TRL technologies (3 < TRL ≤ 6).**
- The SAT Program is not intended to support:
  - basic research into new technologies and initial demonstration of their feasibility (i.e. TRL 1-3). Such work is supported under the Astrophysics Research and Analysis (APRA) Program (ROSES 2012, Appendix D.3).
  - development of flight hardware (TRL 7-9) for strategic missions.

Scope of Program

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- Areas of technology development solicited under the 2012 SAT/TDEM program include:
  - Starlight suppression
    technologies for rejecting scattered starlight to the degree required to image an Earth-like planet around a sun-like star in the Solar neighborhood.
  - Wavefront sensing and control
    control algorithms, sensing technology, and deformable mirror technology required to control light paths within both coronagraphic and interferometric systems to subnanometer precision.
  - System performance assessment
    development of high-fidelity, very high density models to infer expected picometer-level on-orbit performance based on nanometer-level ground measurements.
- Relevant technology development activities involving ground-based astronomical facilities are allowed, but proposals for suborbital programs are not solicited at this time due to budgetary constraints.
- Excluded Technologies:

Detector Technology	*Telescope Assembly Technology*	*Mirror Technology (except AO as req. for WFSC)*
S/C Pointing Control	*Formation Flying Technologies*	*S/C Sunshields/Thermal Control*
Propulsion Systems	*Vibration Isolation Systems*	

Programmatic Information

- Proposals must:
  - Provide a convincing case that the maturity of the subject technology falls in the range 3 ≤ TRL < 6.
  - Make a compelling case that that subject technology is important and relevant to one or more of the SAT/TDEM development focus areas.
  - Articulate the expected technology advancement
    - *Identify state of technological readiness at beginning*
    - *Identify one or more quantitative milestones that will be achieved over course of proposed development project.*
    - *Identify success criteria for evaluating performance at end of project.*
    - *Provide a detailed schedule for achieving milestones*

Note: The goal of SAT/TDEM program is advancement of key for exoplanet direct detection and characterization technologies to TRL 6-7; however, it is neither required nor expected that this process will be completed within the time frame of a single investigation; the long-term goal(s) of the proposed work may extend beyond proposed period of performance.

Reporting Requirements

- Annual Progress Report
  - A written report, submitted to the SAT/TDEM program officer, detailing the status of the project, progress over the preceding year, and plans for the coming year is required annually.
- Final Report
  - Written report submitted at end of second year detailing project performance against proposed success criteria.
- Formal Documentation of Milestones
  - When work begins, success criteria of a technology demonstration is documented in a whitepaper
    - *Reviewed by independent board appointed by NASA Headquarters, and revised as necessary according to review.*
  - Successful achievement of milestone is documented in a second report that shows success criteria have been met
    - *Also subject to review and verification by independent board.*

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4. Summary of Key Information

- Total funding available for new awards: ~$2.6M in FY14
- Expected number new awards: ~ 3–10
- Expected Period of Performance: 2 or 3 years
- Notices of Intent due: January 25, 2013
- Proposal due date: March 22, 2013
- Planning Date for start of new awards: January 1, 2014
- Website for proposal submission (NSPIRES):
  - http://nspires.nasaprs.com/
  - NSPIRES Helpdesk nspires-help@nasaprs.com or (202) 479-9376
- Detailed instructions for proposal preparation
  - NASA 2011 Guidebook for Proposers, http://www.hq.nasa.gov/office/procurement/nraguidebook/
- SAT/TDEM Program Officer: Douglas Hudgins, NASA Headquarters Douglas.M.Hudgins@nasa.gov, (202) 358-0988

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