Spitzer Space Telescope

Cycle-2 Call for Proposals

Version 1.0
November 1, 2004

General Observer Program
Archival Research Program
Theoretical Research Program
Collaborative Spitzer-HST General Observer Program

Key Dates:
Call for Proposals Issued: November 01, 2004
Collaborative Spitzer-HST General Observer Proposals Due:
January 21, 2005, 5:00 pm (PST), Friday
General Observer, Archival, & Theoretical Proposals Due:
February 12, 2005, 1:00pm (PST), Saturday
Cycle-2 Observations Start: June, 2005

http://ssc.spitzer.caltech.edu/

Issued by the
Spitzer Science Center, California Institute of Technology
Pasadena, California USA

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The Spitzer Science Center (SSC) is operated by the California Institute of Technology for the Jet Propulsion Laboratory (JPL) and the National Aeronautics and Space Administration (NASA).

1 Overview

1.1 Executive Summary

This Call for Proposals (CP) invites investigators worldwide to submit Spitzer Space Telescope Cycle-2 General Observer (GO), Archival Research (AR), and Theoretical Research (TR) proposals. General Observer proposals seek observing time in one of three categories: small (up to 50 hours); medium (50-200 hours); and large (> 200 hours). It is anticipated that 5400 hours of observing time will be available to GO investigators in Cycle-2. Spitzer GO programs that require time on NOAO facilities (including Gemini, excluding Keck and Magellan), NRAO facilities, the Hubble Space Telescope or the Chandra X-Ray Observatory may also be proposed. Approximately $20 million of NASA data analysis support is available to eligible researchers in Cycle-2.

A special type of GO proposal is also available in Cycle-2: Collaborative Spitzer-HST GO proposals. These programs require > 50 hours of Spitzer observing time and > 100 orbits of Hubble Space Telescope observing time to reach their science goals and must be submitted to the Space Telescope Science Institute and the Spitzer Science Center at the time of the Hubble Space Telescope proposal call deadline.

Archival and Theoretical Research proposals are to be submitted only if investigators are seeking NASA data analysis support. It is anticipated that up to 10% of the Cycle-2 data analysis support will be made available for Archival and Theoretical investigations. If no supporting funds are required to support the investigation, no Cycle-2 proposal should be submitted.

All proposals must be submitted electronically to the Spitzer Science Center (SSC). The proposal deadline for GO, AR, and TR proposals is February 12, 2005, 1:00pm (Pacific Standard Time). The proposal deadline for Collaborative Spitzer-HST General Observer proposals is January 21, 2005, 5:00pm (Pacific Standard Time). Spitzer-HST General Observer proposals must be submitted to both the Spitzer Science Center and the Space Telescope Science Institute by this deadline.

1.2 Proposal Planning

This call for proposals (CP) provides an overview of the telescope's technical capabilities (§4), eligibility criteria (§5), the current research opportunities (§6), and information on planning (§7) and submitting (§8) a proposal. The CP is accompanied by other technical documents (see §7.1). Interested scientists may retrieve digital copies of these documents from the Proposal Kit section of the Spitzer Science Center (SSC) website (http://ssc.spitzer.caltech.edu/propkit). An important component of the proposal tools is *Spot*, the Spitzer software required for observation planning and proposal submission. **All Cycle-2 proposals must be submitted with *Spot*** which is a free software package available within the online Proposal Kit, and is downloaded to a researcher's host machine.

In addition to handling proposal submission, *Spot* allows General Observers (GOs) to construct detailed Astronomical Observation Requests (AORs) by specifying observation parameters for

the required observing modes. *Spot* also includes useful visualization tools to permit the GO investigator to see how proposed Spitzer observations will be laid out on the sky.

Additional proposal planning assistance is available through the Spitzer Helpdesk (help@spitzer.caltech.edu).

1.3 Proposal Review

Topical Science Review Panels and a Time Allocation Committee (TAC) organized by the Spitzer Science Center (SSC) will review and evaluate the GO, AR, and TR proposals according to the criteria listed in §9.2. The TAC will recommend a list of programs to the SSC Director, who is the ultimate selection official for all Cycle-2 research programs. Collaborative Spitzer-HST Programs will be reviewed independently by both the HST and Spitzer TACs. The final selection of proposals in this category will be made by a merging committee, combining the results from the deliberations of both TACs. The merging committee will be comprised of the chairs of the HST and Spitzer TACs and two other members from each TAC. This committee will make the appropriate recommendations to the Directors of the STScI and the SSC, who will select the successful Collaborative Spitzer-HST Observing Programs.

Upon selection by the SSC Director, a GO program is entered into the Spitzer observations database for execution as part of Cycle-2, commencing in June 2005. Funding for approved AR and TR investigations will be issued once the cycle begins.

1.4 Proposal Submission

A GO proposal requests Spitzer Space Telescope observing time and consists of these elements:

- A scientific justification for the program.
- A technical plan describing how the scientific investigation will be implemented, including an explanation of target selection and observing modes, and how the data will be analyzed.
- Detailed specification of Spitzer observations, through Astronomical Observation Requests (AORs) generated by *Spot*.

No cost plans are required for GO proposals, since data analysis funding for approved and eligible investigators will be determined through formulaic means (§6.1.11).

In general, GO investigators should not propose observations that are deemed to duplicate those previously executed or approved for execution on the observatory. Proposers should consult the *Spitzer Space Telescope Observing Rules* to determine what constitutes a duplicate observation, and the *Reserved Observations Catalog* for a list of approved observations. Both documents are available in the online Proposal Kit. The *Observing Rules* are also reproduced in their entirety in Appendix A of the current document. Proposers may also use *Leopard*, the SSC archive interface tool, to search all observations that have been executed or approved for execution for potential duplications.

An AR proposal is submitted only if proposers are seeking funding support. An AR proposal consists of these elements:

- A scientific justification for the proposed archival research.

- A technical implementation and data analysis plan.
- A cost plan and budget narrative.

A TR proposal is submitted only if proposers are seeking funding support. A TR proposal consists of these elements:

- A scientific justification for the proposed theoretical research.
- A technical plan that describes how the results will be disseminated to the community.
- A cost plan and budget narrative.

All proposals should be submitted to the SSC electronically, using the proposal submission tool integrated into *Spot* (Version S11). Proposals must conform to all requirements and constraints described in this CP, in particular the format and page limits listed in §8.2. The main electronic proposal submission deadline is 1:00pm (Pacific Standard Time) on Saturday, February 12, 2005. Collaborative Spitzer-HST General Observer proposals must be submitted to the SSC and STScI by Friday, January 21, 2005, 5:00pm (Pacific Standard Time). Collaborative Spitzer-HST General Observer proposals (§6.1.8) must be submitted to both the Spitzer Cycle-2 and Hubble Space Telescope Cycle 14 Reviews. Hard copies of cost plans and budget narratives for Archival and Theoretical programs, submitted separately from the science proposal, must be received at the SSC by Friday, February 18, 2005, 5:00pm (Pacific Standard Time).

2 Introduction to Cycle-2

This *Call for Proposals (CP)* solicits participation to conduct Cycle-2 Spitzer Space Telescope research. Investigations may be proposed in one of three categories:

General Observer (GO) Program

This program allows investigators to propose new observations with the Spitzer Space Telescope. Small (less than 50 hours), medium (50 to 200 hours) and large (> 200 hours) GO investigations are solicited.

Archival Research (AR) Program

The AR Program provides funding support for the analysis of Spitzer data publicly available in the archive by December 31, 2005. The entire Legacy Science Program should be available, including enhanced data products returned to the SSC by the Legacy teams for distribution to the community. Laboratory astrophysics relevant to Spitzer observations is an acceptable component of an archival proposal.

Theoretical Research (TR) Program

The TR Program provides funding support for theoretical research of direct relevance to Spitzer science. The program should provide lasting benefit for current or future observational programs with Spitzer.

Spitzer uses a mainly single-phase proposal submission process. Proposers must utilize *Spot*, the SSC proposal planning and submission software, to specify their observations and calculate the observing time necessary to successfully complete the proposed program. For small (< 50 hours) GO proposals, a detailed list of proposed observations (Astronomical Observation Requests), generated by *Spot* must be submitted as part of the proposal. Medium (50-200 hours), large (> 200 hours) and Collaborative Spitzer-HST GO proposals (see §6.1.8) must submit representative AORs with the proposal that cover all requested observing modes as well as a complete target list and description of the proposed observations. The complete set of AORs required for Spitzer programs of > 50 hours will be required after the proposal is approved. Accepted medium and large proposals that are originally submitted with a complete set of AORs will begin scheduling earlier in Cycle-2 than those submitted after the program is approved. Supporting technical and programmatic documentation for this CP is listed in §7.1. These documents are all available online in the Proposal Kit section of the SSC website (http://ssc.spitzer.caltech.edu/propkit).

Questions pertaining to the Cycle-2 CP should be sent electronically to the Spitzer Helpdesk at *help@spitzer.caltech.edu.* Questions (and answers) that are deemed by the SSC to be of broad interest to Spitzer investigators are listed in the Frequently Asked Questions section of the SSC website.

3 Summary of Major Changes from Cycle-1

Features of the Spitzer Cycle-2 *Call for Proposals* that differ substantially from Cycle-1 are summarized here.

1. Duration: Cycle-2 will cover 12 months instead of the 11-month Cycle-1.
2. Observations and Observing Modes:
    a. Two new observing modes are available in Cycle-2:
        i. MIPS Total Power
        ii. IRS Peak-up Imaging
    b. A maximum of ten high- and/or medium-impact targets of opportunity will be selected.
    c. We anticipate that the Basic Instrument Campaign (BIC) schedule will be approximately 35 days long, e.g. 1 week of IRAC followed by 2 weeks of MIPS followed by 2 weeks of IRS.
    d. The slew overhead charged to each AOR has increased from 180 seconds to 215 seconds for Cycle-2. The new value was determined based on our experience in scheduling the first 11 months of the mission.
3. Scope of Proposals:
    a. Large observing programs (> 200 hours) will be accepted.
    b. Approximately 45% more hours are available for GO observers in Cycle-2 than were available in Cycle-1. From 1500 to 2500 hours should be available for programs requesting > 50 hours.
    c. Complete Astronomical Observation Requests (AORs) must be submitted with small proposals (< 50 hours). Representative AORs that encompass the observing program must be submitted with medium (50 – 200 hours) and large (> 200 hours) proposals, as well as complete target lists and descriptions of the proposed observations.
    d. Archival proposals will be accepted for studies using Spitzer data that will be publicly available by December 31, 2005. The entire Legacy Science Program should be available, including enhanced data products returned to the SSC by the Legacy teams for distribution to the community. Laboratory astrophysics relevant to Spitzer observations is an acceptable component of an archival proposal.
    e. Proposals for theoretical investigations that are directly relevant to Spitzer observations will be accepted.
    f. Joint observing proposals will be accepted that require time with NRAO (200 hours each – VLA/GBT), NOAO (5% total; including Gemini, excluding Magellan and Keck), HST (130 orbits total), and/or Chandra (400 ksecs total) to support the main Spitzer observations. The awarding of the joint observatory time is recommended solely by the Spitzer TAC. Joint observing proposals are due at the regular Spitzer proposal deadline on February 12, 2005 (1:00pm PST).
    g. Collaborative Spitzer-HST General Observer proposals will be accepted. This special proposal category is for programs that require large commitments of time from both HST (> 100 orbits) and Spitzer (> 50 hours) to reach their science goals. These proposals will be evaluated by both the HST and Spitzer TACs and selected by the STScI and SSC Directors. Proposals must be submitted to both

observatories. Collaborative Spitzer-HST General Observer proposals are due January 21, 2005 (5:00pm PST).

4. Details of Proposals:
    a. Proposal templates in Latex and Microsoft Word formats are provided in the SSC Proposal Kit for preparing the proposal PDF attachment.
    b. The maximum size of the PDF attachment file for all proposals is now 10 megabytes. Proposers may include color figures. The proposals will be distributed to the reviewers as PDF files on CD-ROMs. Proposers should ensure that any color figures are legible when printed in black and white.
    c. Version S11 of *Spot*, the SSC proposal and observation planning software, is scheduled to be available from the Proposal Kit website on November 17, 2004. You must submit your proposal with this version of *Spot*.
    d. A count-down clock will be provided at the SSC website so that proposers can accurately gauge the deadline for proposal submission.
5. Documentation: The Spitzer Observer's Manual (SOM) and other documentation have been updated to fully reflect the on-orbit performance of the observatory.

4 Mission Overview

This section briefly summarizes the scientific capabilities of the Spitzer Space Telescope. The reader is urged to consult the companion document, the *Spitzer Space Telescope Observer's Manual (SOM)*, for complete technical details of the telescope, including the three science instruments. The SOM is available in the Proposal Kit section of the Spitzer Science Center (SSC) website (http://ssc.spitzer.caltech.edu/propkit).

The Spitzer Space Telescope is the fourth and final element in NASA's family of Great Observatories and represents an important scientific and technical component of NASA's Astronomical Search for Origins Program. Spitzer consists of a cryogenically-cooled 0.85-meter diameter telescope and three science instruments capable of performing imaging and spectroscopy in the 3 to 180 micron range. The telescope was launched from Cape Canaveral, Florida into an Earth-trailing heliocentric orbit on August 25, 2003. The cryogenic lifetime of the Spitzer Space Telescope is expected to be 5.5 years.

4.1 Telescope

The Spitzer telescope is of Cassegrain design, with beryllium optics, and can be cooled to < 5.5 K. The telescope offers pointing accuracy of better than 1.0 arcsec (1-sigma radial rms), and pointing stability of 0.1 arcsec (1-sigma radial rms, 200 sec) with the star-tracker. An angular resolution of ~1.5 arcsec is achieved at the diffraction limit of 5.5 microns. The typical field-of-view is ~5 arcmin square for imaging. Spitzer is capable of achieving tracking rates of ~1 arcsec/sec for fast-moving (e.g., Solar System) targets.

4.2 Orbit/Sky Visibility

The Spitzer Space Telescope was launched on August 25, 2003 atop a Delta 7920-H rocket. The telescope was launched into an Earth-trailing heliocentric orbit with radius 1 AU, and is drifting away from Earth at a rate of about 0.1 AU per year. In this orbit, the telescope is in a benign thermal environment. Moreover, this choice of orbit substantially reduces the projection of the Sun-Earth-Moon avoidance zones on the sky, yielding high astronomical observing efficiencies.

The telescope's instantaneous visibility region is a 37.5-degree wide annulus, extending from 82.5° to 120° in solar elongation, and encompassing all ecliptic latitudes. The size of this region is constrained in two ways. First, the telescope cannot point within 82.5 degrees of the Sun, for reasons of thermal control. Second, the telescope cannot point more than 120 degrees from the Sun, in order to maintain sufficient illumination of the power-generating solar panels. About one-third of the entire sky is accessible to Spitzer at any given time.

The amount of time that any particular target is visible to Spitzer is a function of ecliptic latitude. Objects with |ecliptic-latitude| > 82.5° are located within the Continuous Viewing Zone, and those with 60° < |ecliptic-latitude| < 82.5° are annually visible to Spitzer in one continuous ~7-month time interval. Targets with |ecliptic-latitude| < 60° are observable twice per year in ~40-day windows. For any given target position, sky visibility is available using *Spot*, the Spitzer observation planning software (§7.2).

4.3 Science Payload

The Spitzer Space Telescope science payload consists of three instruments, cryogenically cooled with liquid helium to ~1.5 K. ***Only one of the instruments can be operated at a time,*** and instrument campaigns of 7-14 days duration are the norm.

The **InfraRed Array Camera (IRAC)** provides simultaneous ~5 arcmin square images in four channels ($\lambda / \Delta\lambda \sim 4$) centered at 3.6 microns (Band 1), 4.5 microns (Band 2), 5.8 microns (Band 3) and 8.0 microns (Band 4). The 256 x 256 focal-plane arrays use Indium Antimonide (InSb) detectors for the two short-wavelength bands, and Arsenic-doped Silicon (Si:As) impurity-band conductors (IBC) for the two longer wavelengths. The pixel size for each detector array is ~1.2 arcsec. Two adjacent fields of view (FOV) are simultaneously imaged in pairs using dichroic beam splitters, with Bands 1 and 3 comprising one FOV, and Bands 2 and 4 the other. The Principal Investigator for IRAC is Giovanni G. Fazio, Smithsonian Astrophysical Observatory, Harvard-Smithsonian Center for Astrophysics.

The **InfraRed Spectrograph (IRS)** provides spectroscopic capabilities with low- and high-spectral resolutions from wavelengths of 5.2 to 38.0 microns. The IRS is composed of four separate modules, incorporating two types of 128 x 128 IBC arrays: Arsenic-doped Silicon (Si:As) at the shorter wavelengths, and Antimony-doped Silicon (Si:Sb) at the longer wavelengths. Two of the modules provide low spectral resolution ($\lambda / \Delta\lambda$ = 64-128): the short-wavelength module covering 5.2 to 14.5 microns, with pixel size of ~1.8 arcsec and FOV of 3.6 x 54.6 arcsec, and the long-wavelength module providing coverage from 14.0 to 38.0 microns, with pixel size of 4.8 arcsec and a 9.7 x 151.3 arcsec FOV. The low-resolution modules employ long-slit designs that allow both spectral and one-dimensional spatial data to be acquired simultaneously on the same detector array. The other two modules provide high spectral resolution ($\lambda / \Delta\lambda$ = 600): the short-wavelength module covering 9.9 to 19.6 microns, with pixel size of 2.4 arcsec and FOV of 5.3 x 11.8 arcsec, and the long-wavelength module providing coverage from 18.7 to 37.2 microns, with pixel size of 4.8 arcsec and an 11.4 x 22.4 arcsec FOV. The high-resolution modules use a cross-dispersed echelle design to provide both spectral and limited spatial measurements on the same detector array. Each module has its own entrance slit in the focal plane. The IRS has no moving parts.

An internal "peak-up" array can be used to locate and position sources on the spectrograph slits to better than the blind pointing accuracy of the telescope. The peak-up array has 1.8 arcsec square pixels, and offers two filters covering 13.5-18.5 microns and 18.5-26 microns, each with a 1 x 1.2 arcmin FOV. The peak-up arrays can also be used for direct imaging. The Principal Investigator for IRS is James R. Houck, Cornell University.

The **Multiband Imaging Photometer for Spitzer (MIPS**) provides imaging and photometric capabilities in three broad bands centered at 24, 70, and 160 microns. In addition, the MIPS is capable of measuring low-resolution ($\lambda / \Delta\lambda$ = 15-25) spectral energy distributions (SED) between 55 and 95 microns. The instrument uses three types of detector arrays: an Arsenic-doped Silicon (Si:As) 128 x 128 IBC array at 24 microns, an unstressed Gallium-doped Germanium (Ge:Ga) 32 x 32 array at 70 microns for imaging/photometry and for measurements of SED, and a stressed Ge:Ga 2 x 20 array at 160 microns. The functionally useful area of the 70 micron array is 32 x 16 pixels. The MIPS samples the telescope's Airy disk with pixels smaller

than the Nyquist limit. The FOVs are approximately 5 arcmin square at 24 microns, 2.5 x 5 arcmin at 70 microns, and 0.5 x 5 arcmin at 160 microns. The 70 micron array features a high-magnification (super-resolution) mode, with a 2x improvement in effective resolution. MIPS utilizes an internal scan mirror to facilitate efficient mapping of large areas and which enables total power measurements for absolute sky brightness measurements. The MIPS Principal Investigator is George Rieke, Steward Observatory, University of Arizona.

Additional technical details about each of the science instruments are provided in Chapters 6 through 8 of the *Spitzer Observer's Manual (SOM).*

4.4 Observing Modes/AOTs

In Cycle-2, Spitzer Space Telescope observations will be executed with one of eight distinct observing modes. Observers completely specify their observations through the use of Astronomical Observation Templates (AOTs), one for each observing mode. The complete specification of targets and observing parameters is done using *Spot*, the Spitzer observation planning software. The AOTs in *Spot* provide observers with control of all the relevant parameters for their observation. An AOT with target information and observer-specified parameters specified becomes an Astronomical Observation Request (AOR), the fundamental unit of Spitzer observing.

The Spitzer observing modes/AOTs are listed below. Details about these observing modes and the available choice of AOT parameters are provided in the *Spitzer Observer's Manual*. The eight observing modes available for Cycle-2 Observers are:

- IRAC Mapping/Photometry
- IRS Staring-Mode Spectroscopy
- IRS Spectral Mapping
- IRS Peak-up Imaging (*)
- MIPS Photometry/Super-Resolution Imaging
- MIPS Scan Mapping
- MIPS Spectral Energy Distribution
- MIPS Total Power (*)

Observing modes denoted with an asterisk are new for Cycle-2. Complete sets of AORs covering the entire observing program must be submitted with proposals requesting less than 50 hours of observing time. A representative set of AORs that fully describes the observing program must be submitted with proposals requesting 50 hours or more of observing time.

4.5 Science Operations

Flight operations for Spitzer are conducted by an integrated team of personnel from the Jet Propulsion Laboratory (JPL), Lockheed Martin (Denver) and the Spitzer Science Center (SSC). Science operations activities are based at the SSC, on the campus of the California Institute of Technology, Pasadena. The SSC solicits observational, archival, and theoretical research investigations through Calls for Proposals; organizes the peer review of the proposals by science experts; and administers supporting NASA research funds for investigations selected by the SSC Director. In addition, the SSC schedules all science observations (including calibrations), conducts pipeline processing of all Spitzer Space Telescope data, and places the data in the electronically-accessible science data archive.

5 Eligibility

Investigators worldwide are eligible to submit a proposal in response to the Spitzer Space Telescope Cycle-2 *Call for Proposals*. The Spitzer Science Center will offer NASA funding to investigators affiliated with U.S.-based institutions, subject to availability and the limitations cited below, to support the analysis of investigators selected by the SSC.

5.1 Who May Submit a Proposal

This solicitation for General Observer (GO), Archival Research (AR), and Theoretical Research (TR) is open to investigators of any nationality. Each proposal must identify a single individual who will serve as Principal Investigator (PI) and will be responsible for the scientific and administrative conduct of the project. *The PI for GO proposals may have any institutional affiliation. The PI for AR/TR proposals must have a U.S. institutional affiliation.* There is no limit to the number of Co-Investigators (Co-Is) that may appear on a proposal. The PI may designate a Technical Contact for purposes of communications with the SSC Observer Support Team.

For the GO Program, proposals requesting Spitzer observing time may be submitted from non-U.S. based PIs. *If such a proposal includes U.S.-based Co-Is who intend to request data analysis support from NASA, see the special instructions in §6.1.11.*

Any investigator may conduct archival research with Spitzer data in the public domain. AR and TR proposals should be submitted only if the U.S.-based Principal Investigator is seeking NASA funding support.

5.2 Funding Support

The SSC will provide financial support for Cycle-2 investigators, subject to the availability of NASA funds and the eligibility guidelines described below. Investigators affiliated with U.S.-based institutions, regardless of nationality, are eligible for funding support. Investigators may be affiliated with educational institutions, nonprofit nonacademic organizations, industry, NASA centers and other government agencies.

The SSC cannot award NASA research funds to investigators affiliated with non-U.S. institutions. While non-US based Co-Is are permitted on all proposals, no NASA funds may flow to them through the PIs. Therefore, researchers affiliated with non-U.S. institutions who propose investigations with Spitzer should seek support through their own appropriate funding agencies.

For the General Observer (GO) Program, U.S.-based Principal Investigators and Co-Investigators are eligible for funding to support data analysis. Funding awards will be determined through formulaic means. For purposes of determining funding levels, the sum of the efforts by U.S.-based Co-Investigators on a proposal led by a foreign Principal Investigator cannot exceed 50%. For additional details about the funding methodology and limitations, see §6.1.11.

Data analysis funding for HST or Chandra observations approved as part of a joint proposal will be provided directly through the Space Telescope Science Institute or the Chandra X-Ray Center using their normal funding processes. The formula for determining the Spitzer data analysis funds will only be applied to the awarded Spitzer observing time.

For the Archival Research (AR) and Theoretical Research (TR) Programs, Principal Investigators must be affiliated with a U.S.-based institution. U.S.-based Co-Investigators on approved AR/TR may be funded via a sub-award issued by the PI's home institution or directly by the SSC/JPL. The justification for and amount of funding to be provided to each investigator must be specified in the proposal and cost plan. Direct funding of less than $5,000 must be done with a sub-award from the PI's home institution.

The SSC will manage Spitzer research funds and will contract with the Jet Propulsion Laboratory (JPL) to administer the disbursement of most of the funds. The type of contract issued by JPL will depend on whether the program is a GO, AR/TR investigation and on the nature of the Principal Investigator's home institution. Additional details about the Spitzer research contracts are available in the 'Data Analysis Funding' section of the SSC website.

Investigators affiliated with NASA Centers will receive their funds directly from NASA, following guidance provided by the SSC.

5.3 Education and Public Outreach

The NASA Office of Space Science (OSS) has developed a comprehensive approach for making education at all levels (with a particular emphasis on pre-college education), and the enhancement of public understanding of space science, integral parts of all of its missions and programs. Principal Investigators responding to solicitations sponsored by NASA/OSS are encouraged to engage in Education and Public Outreach (EPO) activities.

The SSC will offer an opportunity for Principal Investigators of approved programs, following their selection, to submit a companion EPO proposal. The SSC will offer approximately 1% of the available data analysis funds for EPO activities that accompany approved Cycle-2 proposals. Additional details pertaining to EPO proposals will be sent to the Cycle-2 PIs following the completion of the observing proposal selection process.

6 Proposal Categories

This *Call for Proposals (CP)* solicits proposals to conduct research in the: (i) General Observer (GO) Program, (ii) Archival Research (AR) Program, and/or (iii) Theoretical Research (TR) Program.

6.1 General Observer Programs

The Spitzer General Observer (GO) Program allows investigators to conduct independent research programs utilizing new Spitzer Space Telescope observations. Most of the observing time available during the science mission will be devoted to peer-reviewed GO investigations. The GO Program is open to all investigators worldwide on a competitive basis. Apart from Targets of Opportunity (§6.1.5), GO programs that are not executed to completion by the nominal end of Cycle-2 will typically be carried over into Cycle-3.

The following sub-sections contain references to the *Spitzer Space Telescope Observing Rules*, which are reproduced in their entirety as Appendix A of this CP.

6.1.1 Observing Time Available

The SSC plans to release annual solicitations for GO research, typically offering ~5000 hours of Spitzer observing time per cycle. [See Appendix B for nominal science schedule.] **Cycle-2 offers an estimated 5400 hours of Spitzer observing time for GO investigators.**

6.1.2 Types of GO Investigations

Proposals will be classified into three categories, based on the amount of observing time requested:

1. Small < 50 hours
2. Medium 50-200 hours
3. Large > 200 hours

Assuming sufficiently high scientific merit, it is anticipated that between 1500 and 2500 hours of the available observing time will be allocated in support of medium and large investigations.

6.1.3 Parallel Observations

It is *not* possible to conduct parallel observations with more than one science instrument on Spitzer.

All of the science data obtained via a single Astronomical Observation Request are deemed to be associated with that particular observation, whether or not the observer explicitly requested them as part of their proposed investigation. See Appendix A (§15.11) for examples and additional information pertaining to *single-instrument* parallel observations.

6.1.4 Multi-Cycle Observations

Investigations requiring long temporal baselines to study changes in one or more targets and small amounts of total observing time can be a component of a proposed GO investigation. These requests must be limited to cases where it is clearly required to optimize the scientific return of the project. The observations are presumed to be repeated visits to the same target(s) with the same observing mode over multiple observing cycles. Examples include long-term monitoring of variable stars or active galactic nuclei, and could also include astrometric observations. Proposals with multi-cycle observations should describe the entire requested program and provide a yearly breakdown of the Spitzer observing time requested. The scientific justification for allocating time beyond Cycle-2 should be presented in detail. Investigators with approved multi-cycle observations need not submit continuation proposals in subsequent cycles. The upper limit for the observing time available for multi-cycle observations in each subsequent observing cycle is one percent (approximately 50 hours). Less than 5 hours of multicycle observations were approved in Cycle-1.

6.1.5 Targets of Opportunity

Observations of phenomena whose exact timing and/or location on the sky are uncertain at the time of the proposal submission deadline (*e.g.,* a newly discovered comet or bright supernova) *must* be submitted as a General Observer Target of Opportunity (ToO) proposal in response to this *Call for Proposals (CP)*. Observations of completely unanticipated phenomena can be requested through Director's Discretionary Time (DDT) procedures (see §6.1.10).

Targets of Opportunity are categorized by the extent to which the execution of such an observation affects normal scheduling and observing procedures. As part of the proposal submission, GO investigators will self-classify each ToO request, based upon the maximum delay – in their judgment – that is scientifically acceptable between the activation of an approved AOR and the execution of the observation. A *high-impact* ToO is one with a delay of less than one week (minimum 48-hours). A *medium-impact* ToO is one with user-specified delays of one to five weeks. A *low-impact* ToO is one where the acceptable delay is longer than five weeks.

Additional overheads are assessed against high- and medium-impact ToO observations (see Appendix E). No additional overheads will be assessed against low-impact ToO observations. Because of the significant effect that high-impact ToO observations will have on efficient telescope scheduling, no more than ten high- or medium-impact ToO observations will be approved in Cycle-2. The additional overheads must be specified using *Spot* when the AORs for the proposal are created. From within the relevant AOR dialog click the **Special …** button and select the appropriate overheads from the list. *Spot* will calculate the required time and add it to the Total Duration returned on the main *Spot* AOR page.

In addition, any ToO proposals seeking multiple-instrument observations on timescales shorter than the normal instrument campaign (7-14 days) will be assessed special overheads in observing time, as listed in Appendix E. These overheads must be specified in *Spot*. They can be designated from the AOR dialog using the **Special …** button as described in the previous paragraph.

An approved ToO observation will be executed only in the event that the specified phenomenon actually occurs within Cycle-2. If the triggering event for an approved ToO observation does not occur during the observing cycle, the AOR will be deactivated at the end of the cycle. Therefore, it is recommended that GO investigators with approved ToO observations that have not yet been executed by the time of the Cycle-3 proposal submission deadline (nominally February 2006) be prepared to resubmit their Cycle-2 proposal at that time. Any expired ToO time will be returned to the General Observer pool. Additional information on Targets of Opportunity, including the procedures for activation of an approved AOR, can be found in Appendix A §(15.5).

Programs awarded ToO observations in Cycle-1 that have not been executed by the Cycle-2 proposal submission deadline (February 12, 2005) should resubmit their observations for Cycle-2.

6.1.6 Second-Look Observations

Predictable and pre-planned re-visits to objects and/or fields may be appropriate as part of a General Observer investigation. These *second-look observations* (SLOs) must be clearly justified as an integral part of a coherent GO investigation. Plans for such SLOs must be fully described in the proposals. The description must include the rationale and procedure for selecting sources to be re-observed, as well as the specific AORs to be used and their key parameters. The relevant AORs must be designated as second-look using *Spot*. From within the relevant AOR dialog click the **Special …** button and select **second-look** from the list. Second-look observations cannot be used to follow up, at will, interesting results uncovered in the initial observations. Such "follow-up" observations should be proposed as part of a GO program in a subsequent cycle.

Unlike multi-cycle monitoring observations (§6.1.4), SLOs are presumed to be a subsequent observation(s) of a target with a different observing mode, with the intention of conducting a diagnostic observation related to an earlier discovery.

The SSC cannot guarantee that an approved SLO will be scheduled and observed before the end of the observing cycle. In such cases, the SLO will be executed during Cycle-3. The targets and AORs for approved second-look observations must be completely specified within two months of the time that the data from Spitzer necessary for their specification is made available in the archive. *No more than ten percent of the total observing time being requested in a GO proposal may be allocated towards SLOs.* Additional details and limitations pertaining to SLOs can be found in Appendix A (§15.7).

6.1.7 Generic Targets

Generic targets denote observations that fail to qualify as Targets of Opportunity (see §6.1.5); that is, they have more refined and predictive spatial and temporal information than ToOs. Generic targets can be described scientifically, but lack *precise* celestial coordinates or brightness estimates *at the time of the proposal submission deadline*. A generic target can be selected from a complementary observing program with Spitzer, or with any other telescope, but one where the conditional observations (assumed to be under the control of the Spitzer Principal Investigator) are scheduled, but not yet executed or analyzed prior to the Spitzer proposal

deadline. Alternatively the generic target can be selected from Spitzer Legacy data sets that are not publicly accessible at the time of the Cycle-2 proposal due date.

An investigator may propose observations of generic targets, describing them in as much detail as possible in the proposal. An AOR accompanying a generic target must contain a celestial position accurate to within 2 degrees (radial) for fixed targets. For a moving generic target (*e.g.,* Solar System object) proposers must submit an AOR with a target position 'to be determined' from Navigation and Ancillary Information Facility (NAIF) identification, or from orbital elements. In either case, the execution time must be specified to within a factor of 1.5.

The observations must be completed within the observing time allocation awarded when the proposal was approved. Examples of generic targets and additional details and limitations pertaining to their use can be found in Appendix A (§15.6). The targets and AORs must be completely specified three months prior to the end of the cycle in which they are selected. For programs selected in Cycle-2 this deadline is March 1, 2006.

6.1.8 Collaborative Spitzer-HST GO Proposals

This new proposal category aims to maximize the scientific potential of the concurrent, but finite duration, availability of HST and the Spitzer Space Telescope. In collaboration with the Space Telescope Science Institute (STScI), we encourage the submission of Spitzer medium and large proposals that also require more than 100 orbits of HST time. The only criterion above and beyond the usual criteria is that the project is fundamentally multi-wavelength in nature and both datasets are *required* to meet the science goals. If your science project requires observations from both Spitzer and the Hubble Space Telescope, but the Spitzer Science is primary and less than 100 orbits of Hubble Space Telescope time are required then you should submit a Joint Spitzer-HST program to the Spitzer Science Center (see §6.1.9.1).

As with other Spitzer medium and large proposals, Collaborative Spitzer-HST Observing Programs will be reviewed by the Spitzer TAC. All of the proposals in this category will *also* be reviewed independently by the HST TAC (which meets in March 2005). Proposals in this category must therefore be submitted to *both* HST and Spitzer. Representative AORs must be included with the Spitzer proposal submission. These AORs should cover all observing modes planned for the Spitzer observing program. Accepted proposals must receive a high ranking from both TACs.

The selection of successful Spitzer-HST Programs will take place immediately after the completion of the Spitzer review process (April 18-22, 2005), allowing timely notification of proposers. The final selection of proposals in this category will be made by a merging committee, which will combine the results from the deliberations of both TACs. The merging committee will be comprised of the chairs of the HST and Spitzer TACs and two other members from each TAC. This committee will make the appropriate recommendations to the Directors of the STScI and the SSC, who will select the successful Collaborative Spitzer-HST Observing Programs.

Data taken under Collaborative Spitzer-HST Programs will usually have no proprietary period, although brief proprietary periods may be requested if that will enhance the public data value.

Please see the HST website (http://www.stsci.edu/hst/proposing) for details on how to submit the Cycle-14 Call HST proposal.

Spitzer Cycle-2 proposers submitting Collaborative Spitzer-HST proposals must enter '**HST**' into the Joint Proposal field in the *Spot* proposal tool.

6.1.9 Joint Observing Proposals

Observing programs where the primary science is obtained from the Spitzer Space Telescope and observing time utilizing the Hubble Space Telescope, the Chandra X-Ray Observatory, NOAO facilities, and/or NRAO facilities is required are supported in Cycle-2. Joint observing proposals should only be submitted to the Spitzer Science Center if Spitzer provides the primary science. Proposals that *require* > 50 hours of Spitzer time and > 100 orbits of HST time should be submitted under the Collaborative Spitzer-HST GO program described in §6.1.8.

Spitzer Cycle-2 proposers requesting joint time with other observatories must enter the appropriate observatory acronym into the Joint Proposal field in the *Spot* proposal tool, e.g. **HST, CXO, NOAO,** and/or **NRAO.**

Data analysis funding for HST or Chandra observations approved as part of a joint proposal will be provided directly through the Space Telescope Science Institute or the Chandra X-Ray Center using their normal funding processes.

6.1.9.1 Joint Spitzer/HST Observations

If your science project requires observations from both Spitzer and the Hubble Space Telescope, then you can submit a single proposal to request time on both observatories to either the Spitzer Cycle-2 or the HST Cycle-14 review. This avoids the "double jeopardy" of having to submit proposals to two separate reviews. By agreement with the Space Telescope Science Institute (STScI), the SSC will be able to award up to 130 orbits of HST observing time. Similarly the STScI will be able to award up to 225 hours of Spitzer time to highly rated proposals. The only criterion above and beyond the usual review criteria is that the project is fundamentally of a multi-wavelength nature, and that both sets of data are required to meet the science goals. It is not essential that the project requires simultaneous HST and Spitzer observations. HST time will only be awarded in conjunction with Spitzer GO observations and should not be proposed in conjunction with a Spitzer Archival or Theoretical Proposal.

A maximum of 100 orbits of HST observing time will be awarded to an individual proposal except under the Collaborative Spitzer-HST GO program described in §6.1.8. Proposals for combined Spitzer and HST observations should be submitted to the observatory that represents the prime science (not to both observatories) unless the proposal falls in the Collaborative Spitzer-HST category (§6.1.8).

The HST Cycle-14 deadline is January 21, 2005. While there is multi-wavelength expertise in the review panels for both observatories, typically the Spitzer panels will be stronger in infrared science and the HST panels in the optical/UV science. Evaluation of the technical feasibility is the responsibility of the observer, who should review the HST documentation or consult with the STScI). For proposals that are approved, the STScI will perform detailed feasibility checks in

HST Cycle-14 and a Phase II proposal submission to STScI will have to be completed. The STScI reserves the right to reject any previously approved observation that proves to be non-feasible, impossible to schedule, and/or dangerous to the HST instruments. Any HST observations that prove infeasible or impossible could jeopardize the overall science program and may cause revocation of the corresponding Spitzer observations. Duplicate HST observations may also be rejected by the STScI. Data analysis funding for HST observations approved as part of a joint proposal will be provided directly through the Space Telescope Science Institute using their normal funding process.

Spitzer Cycle-2 proposers requesting HST time must enter '**HST**' into the Joint Proposal field in the *Spot* proposal tool.

6.1.9.2 Joint Spitzer/Chandra Observations

If your science project requires observations from both Spitzer and the Chandra X-ray Observatory, then you can submit a single proposal to request time on both observatories to either the Spitzer or the Chandra reviews. This avoids the "double jeopardy" of having to submit proposals to two separate reviews. By agreement with the Chandra X-ray Center (CXC), the SSC will be able to award up to 400 kiloseconds of Chandra observing time. Similarly the CXC will be able to award up to 110 hours of Spitzer time to highly rated proposals. The only criterion above and beyond the usual review criteria is that the project is fundamentally of a multi-wavelength nature, and that both sets of data are required to meet the science goals. It is not essential that the project requires simultaneous Chandra and Spitzer observations. Chandra time will only be awarded in conjunction with Spitzer GO observations and should not be proposed in conjunction with a Spitzer Archival or Theoretical Proposal.

Of the 400 kiloseconds of Chandra observing time that can be awarded in the Spitzer review, only approximately 20% of the targets may be time-constrained. In addition, only one rapid ToO can be awarded (less than 30 days turn-around time). A Chandra ToO is defined as an interruption of a command load, which may include several predictable observations within that one-week load. Spitzer Cycle-2 proposers should keep their Chandra requests within these limits. Proposals for combined Spitzer and Chandra observations should be submitted to the observatory that represents the prime science (not to both observatories).

The Chandra Cycle-7 deadline is in mid-March 2005. While there is multi-wavelength expertise in the review panels for both observatories, typically the Spitzer panels will be stronger in Infrared science and the Chandra panels in X-ray science. Evaluation of the technical feasibility is the responsibility of the observer, who should review the Chandra documentation or consult with the CXC. For proposals that are approved, the CXC will perform detailed feasibility checks in Chandra Cycle-7. The CXC reserves the right to reject any previously approved observation that proves to be non-feasible, impossible to schedule, and/or dangerous to the Chandra instruments. Any Chandra observations that prove infeasible or impossible could jeopardize the overall science program and may cause revocation of the corresponding Spitzer observations. Duplicate Chandra observations may also be rejected by the CXC. Data analysis funding for Chandra observations approved as part of a joint proposal will be provided directly through the Chandra Science Center using their normal funding process.

Spitzer Cycle-2 proposers requesting Chandra time must enter '**CXO**' into the Joint Proposal field in the *Spot* proposal tool.

6.1.9.3 Joint Spitzer/HST/Chandra Observations

Proposals that require observations from all three great observatories should be submitted to the observatory that represents the prime science. If submitting to the SSC, follow the guidelines previously spelled out in §6.1.9.1 and §6.1.9.2.

6.1.9.4 Joint Spitzer/NOAO Observations

By agreement with NOAO, proposers interested in making use of observing facilities available through NOAO (including Gemini, excluding Magellan and Keck) as part of their Spitzer science may submit a single proposal in response to this CP. The award of NOAO time will be made to highly ranked Spitzer proposals and will be subject to approval by the NOAO Director. The primary criterion for the award of NOAO time is that both Spitzer and NOAO data are required to meet the scientific objectives of the proposal. The highest priority for the award of NOAO time will be given to programs that plan to publicly release the NOAO data in a timely manner (shorter than the usual 18-month NOAO proprietary period) and that create databases likely to have broad application. NOAO plans to make up to 5% of the time available for this opportunity. NOAO observing time will be divided roughly equally between the spring (2006A) and fall (2006B) semesters.

Proposers wishing to make use of this opportunity must provide the following additional NOAO-related information as part of their Spitzer proposal:

1. Indicate the choice of NOAO telescope(s) and instrument(s). Dates of availability for the various telescopes and instruments can be found on the web at http://www.noao.edu/gateway/nasa/.

2. Enter the total estimated observing time for each telescope/instrument combination.

3. Specify the number of nights for each semester during which time will be required and include any observing constraints (dates, moon phase, synchronous or synoptic observations, etc.);

4. Include a full and comprehensive scientific and technical justification for the requested NOAO observing time.

5. Provide a plan for the public release of the NOAO data within 18 months of the observation date.

Demonstration of the technical feasibility of the proposed NOAO observations is the responsibility of the proposer. Detailed technical information concerning NOAO facilities may be found at http://www.noao.edu/.

If approved for NOAO time, successful PIs will be required to submit the standard NOAO forms providing detailed observing information appropriate to the telescope and instrument

combination(s) awarded. NOAO will perform feasibility checks on the proposed observations and reserves the right to reject any observation determined to be unfeasible for any reason. Such a rejection could jeopardize the entire proposed science program and impact the award of the Spitzer observing time as well.

Spitzer Cycle-2 proposers requesting NOAO time must enter '**NOAO**' into the Joint Proposal field in the *Spot* proposal tool.

6.1.9.5 Joint Spitzer/NRAO Observations

By agreement with NRAO, proposers interested in making use of the NRAO Very Large Array (VLA) and/or the Green Bank Telescope (GBT) facilities as part of their Spitzer science may submit a single proposal in response to this CP. The award of NRAO time will be made to highly ranked Spitzer proposals and will be subject to approval by the NRAO Director.

The primary criterion for the award of NRAO time is that both Spitzer and NRAO datasets are essential to meet the scientific objectives of the proposal. If the need for both instruments to satisfy the science goals is not clearly demonstrated in the proposal, the proposal will be rejected. No NRAO time will be allocated without Spitzer time.

NRAO plans to make up to 200 hours of the observing time on each of the VLA and the GBT available for this opportunity with a maximum of 75 hours in any configuration/scheduling trimester and including an 18 month period close to the Spitzer Cycle such that all VLA configurations are available. The first trimester in which observations could be executed is October, 2005 to January, 2006.

Proposers wishing to make use of this opportunity must provide a full and comprehensive scientific and technical justification for the requested NRAO observing time. If approved for NRAO time, successful PIs will be required to submit the standard NRAO forms providing detailed observing information appropriate to the telescope and instrument combination(s) awarded. NRAO will perform final feasibility checks on the proposed observations based on the information provided on these forms and reserves the right to reject any observation determined to be infeasible for any reason. Such a rejection could jeopardize the entire proposed science program and impact the award of the Spitzer observing time as well. Proposals whose observing requests for NRAO facilities are inconsistent between the cover sheet and the scientific justification may be rejected, due to the short time period available to notice and then reconcile these inconsistencies.

Papers reporting original observations made with any NRAO instrument(s) should include the NRAO footnote in the text, as described at: http://www.nrao.edu/library/page_charges.shtml.

Spitzer Cycle-2 proposers requesting NRAO time must enter '**NRAO**' into the Joint Proposal field in the *Spot* proposal tool.

6.1.10 Director's Discretionary Time

Five percent of the total Spitzer observing time is allocated by the SSC Director as Director's Discretionary Time (DDT). This time is intended to facilitate proposals that address emerging

scientific topics. Observations of completely unanticipated phenomena that cannot be proposed as a Target of Opportunity (§6.1.5) can be requested through the DDT allocation.

Scientists wishing to request DDT can do so at any time during the year through the online Helpdesk (*help@spitzer.caltech.edu*) following procedures described on the SSC website. Requests for DDT cannot be used to submit a proposal that can be accommodated within a regular GO *Call for Proposals*. Proposed observations that could wait until the next proposal cycle with no significant reduction in the expected scientific return should not be submitted as a DDT request. Moreover, an investigator should not utilize DDT to resubmit all or part of a proposal that was rejected by the normal peer review process.

Additional details pertaining to DDT can be found in Appendix D and on the SSC website.

6.1.11 Data Analysis Support

For approved GO programs (but not for AR or TR investigations; see §6.2), the award of supporting research funds will be determined by the SSC through formulaic means. The funding formula will include terms related to the total amount of observing time awarded and the complexity of the data analysis tasks associated with the observing mode(s) utilized. Since a formulaic approach will be used to determine funding levels, *GO investigators do not need to submit cost plans as part of their science proposal.*

For Cycle-2, approximately $20 million in NASA funding will be available to approved GO, Archival, and Theoretical investigations.

If a GO proposal includes U.S.-based Co-Investigators (Co-Is) who are based at institutions different from that of the Principal Investigator (PI) and who intend to request data analysis support from NASA, the PI (whether U.S.-based or not) must explicitly identify the fractional extent to which each U.S.-based investigator (including the PI) will be involved in the investigation's total data analysis efforts. In this context, the term "data analysis" is taken to include activities that directly support the processing, analysis and scientific interpretation of Spitzer data. The funding to each investigator will then be an appropriate fraction of the total level determined algorithmically, as described above. **Failure to include this information may preclude U.S.-based investigators from receiving NASA funding support.** For purposes of determining funding levels, the sum of the efforts by U.S.-based Co-Investigators on a proposal led by a foreign Principal Investigator cannot exceed 50%.

Data analysis funding for joint observations approved for HST or Chandra will be provided directly through the Space Telescope Science Institute or the Chandra X-Ray Center using their normal funding processes. The formula for determining the Spitzer data analysis funds will only be applied to the awarded Spitzer observing time.

Please make sure that your Sponsored Research Office has a copy of your proposal so that it if is successful they are ready to handle the funding process.

6.1.12 Data Rights

Most observers have exclusive access to their science data during a proprietary period, intended to facilitate the processing and scientific analysis of the data by the relevant investigator. General Observers shall have a proprietary data period of twelve months, commencing from the time that scientifically usable data from fully commissioned pipelines are made available to the Principal Investigator via the Spitzer Science Archive. Once the proprietary period expires, the raw and pipeline-processed data will enter the public domain and be available to anyone through the Spitzer Science Archive. The SSC Director reserves the right to designate any Target of Opportunity or DDT data for early release when such a release is deemed to be in the interest of the community.

The Spitzer Time Allocation Committee may recommend a shorter proprietary period for individual proposals, particularly from the Large and Medium categories, due to the high value of the data to the general astronomical community. As part of their proposal, observers may request that the SSC Director waive all or part of their proprietary period if the proposal is approved.

6.2 Archival and Theoretical Research Programs

The SSC will provide financial support for Investigators selected to conduct Archival (AR) and/or Theoretical (TR) Research programs, subject to the availability of NASA funds. Only PIs affiliated with U.S.-based institutions, regardless of nationality, are eligible to submit AR/TR proposals. U.S.-based Co-Investigators on approved AR/TR programs may be funded via a sub-award issued by the PI's home institution or directly by the SSC/JPL. The justification for and amount of funding to be provided to each investigator must be specified in the proposal and cost plan. Direct funding of less than $5,000 must be done with a sub-award from the PI's home institution.

The SSC cannot award NASA supporting funds to investigators affiliated with non-U.S. institutions. Investigators may be affiliated with universities, industry, NASA Centers, federally funded research and development centers, national laboratories, other non-profit institutes, or military facilities. **Up to 10% of the Cycle-2 data analysis funds will be available for direct support of Archival and Theoretical Research.** A total of $700,000 was awarded to nine archival programs in Cycle-1.

All AR/TR proposals must be accompanied by an institutionally endorsed cost plan that is submitted separately to the SSC (§8.4.7). Guidelines for allowable costs are provided in Appendix F. The evaluation of AR/TR proposals will take into account the cost effectiveness of the proposed investigation and the available funds.

The SSC cannot award NASA research funds to investigators affiliated with non-U.S. institutions. While non-US based Co-Is are permitted on all proposals, no NASA funds may flow to them through the PIs. Therefore, researchers affiliated with non-U.S. institutions who propose investigations with Spitzer should seek support through their own appropriate funding agencies.

6.2.1 Archival Research Program

The Archival Research (AR) Program is an integral part of Spitzer and is expected to provide substantial scientific returns beyond the end of the prime cryogenic mission. An AR proposal is submitted only if investigators are seeking funding support. For Cycle-2, financial support for archival research is available for all of the Spitzer data that will be publicly available by December 31, 2005. Proposers should anticipate that all of the Spitzer data from the Legacy Science Programs will be available, including enhanced data products returned to the SSC by the Legacy teams for distribution to the community. Laboratory astrophysics relevant to Spitzer observations is an acceptable component of an archival proposal.

6.2.2 Theoretical Research Program

A Theoretical Research (TR) Program is available for Cycle-2. SSC will accept proposals to obtain support for Spitzer-related theoretical research. The proposed program should provide a lasting benefit for current or future observational programs with Spitzer.

A Theory Proposal should address a topic that is *of direct relevance* to Spitzer observational programs, and this relevance should be explained in the proposal. The results of the theoretical investigation should be made available to the community in a timely fashion. GO or AR proposals which include a minor component of theoretical research will be funded under the appropriate GO or AR Program. Theoretical research should be the primary or sole emphasis of a Theory Proposal. Analysis of archival data may be included, but should not be the main aim of the project.

7 Proposal Planning

Before submitting a Spitzer Space Telescope Cycle-2 proposal it is important that investigators consult relevant technical documentation about the capabilities of the telescope, the sensitivities of the science instrument(s), and the nature of the pipeline-processed data delivered to investigators by the SSC. General Observer proposals must include credible and justifiable estimates of requested observing time. *Spot*, the Spitzer observation planning and proposal submission software, and other online resources are provided for this purpose. All of these resources may be found within the Proposal Kit section of the SSC website (http://ssc.spitzer.caltech.edu/propkit).

The documentation listed in §7.1 provides details on how GO researchers can learn about the capabilities of Spitzer, plan and define their detailed observational program, check for possible duplicate observations, and modify their planned observations. Specific questions should be submitted electronically to the Helpdesk at help@spitzer.caltech.edu.

Prospective GO investigators should read this entire chapter. Researchers proposing to conduct AR or TR investigations should read §7.1 -§7.4, then §7.8.

7.1 Technical Documentation

The documents needed to plan, prepare and submit a proposal are listed below. General Observer (GO) investigators are urged to read all of these documents. Archival Research (AR) and Theory proposers should follow the reading recommendations provided.

Spitzer Space Telescope Cycle-2 Call for Proposals (CP)

Version 1.0 (November 1, 2004) Required Reading: All proposers

The *Call for Proposals* is the present document.

Spitzer Space Telescope Observer's Manual (SOM)

Version 5.0 (November 1, 2004) Required Reading: All proposers

The *Spitzer Observer's Manual (SOM)* provides technical information about the telescope, including the three science instruments. It also includes information on planning, editing, and submitting Astronomical Observation Requests (AORs), the user-provided specification of individual observation parameters. The SOM is an essential document for GO investigators. It will also be useful in helping Archival and Theoretical Research investigators understand how Spitzer data are collected and processed.

Spitzer Space Telescope Observation Planning Cookbook

Version 4.0 (November 1, 2004) Recommended Reading: GO

The Observer's Cookbook provides detailed examples of how to construct Spitzer observations.

Spot User's Guide

Spot version 11.0 (November 17, 2004) Required Reading: GO (all)
AR/TR (Proposal Submission)

The *Spot* User's Guide is a comprehensive guide to the Spitzer observation planning software package (see §7.2). All proposals must be submitted using *Spot*.

Spitzer Space Telescope Observing Rules

Version 5.1 (November 1, 2004) Required Reading: GO
Recommended Reading: AR/TR

The Observing Rules describe the rules and processes governing duplicate observations, the declaration and modification of AORs, and other policies governing Spitzer observations. This document is reproduced in its entirety as Appendix A in the *Call for Proposals*.

Spitzer Space Telescope Reserved Observations Catalog (ROC)

Version 6.0 (November 1, 2004) Required Reading: GO, AR

The *Reserved Observations Catalog* includes an itemized list of all executed and approved observations. The ROC is available online in a searchable ASCII text format. Proposers may also use Leopard, the SSC archive interface software, or the online ROC Search Tool to query for executed or approved observations.

The documents described above are available within the Proposal Kit section of the SSC website.

The reader is urged to regularly consult the SSC Website for the latest news, technical information and telescope performance updates. This is particularly important for GO investigators, who must plan their observational program based on the on-orbit performance of the telescope. The *Frequently Asked Questions (FAQ)* sections of the site, organized by topic, will be updated regularly with new questions and answers.

7.2 The Proposal Kit

The online Proposal Kit provides all of the information necessary for the prospective General Observer (GO). It includes each of the documents listed in §7.1 and can be found on the SSC website at http://ssc.spitzer.caltech.edu/propkit/.

The Kit also includes instructions for installing the *Spot*, the Spitzer observation planning tools, on the user's host machine. *Spot* is used to plan and prepare observations, and to submit all proposals electronically to the SSC. It allows GO investigators to construct and edit detailed Astronomical Observation Requests (AORs) by selecting from a variety of preset instrument-specific functions. *Spot* also includes useful visualization tools to permit the GO investigator to see how proposed observations will be laid out on the celestial sky. These capabilities allow GOs to retrieve relevant images from other astronomical surveys and archives. It also describes how an investigator can obtain estimates of observing time for a proposed program.

Prospective GO investigators are strongly encouraged to download *Spot* and to start planning their observing programs well before the proposal submission deadline.

Spot allows prospective investigators to plan, develop and modify their proposal in an iterative manner. That is, a proposer can write a portion of their proposal and define their accompanying

AORs, save the results locally, and then re-load those results at a later time for subsequent modification. The saved cover sheet, proposal text, and AORs can be modified repeatedly until the proposal is submitted to the SSC.

Special overhead burdens (Appendix E) are applied to Targets of Opportunity, targets requiring rapid instrument changes, and targets with late ephemeris changes. **These must be specified in *Spot*.**

A separate section of the online Kit contains information specifically designed for Solar System researchers. It includes asteroid count estimates, ephemeris files currently integrated into *Spot*, NAIF name identifications, and tips for utilizing the Horizons database supported by the Solar Systems Dynamics Group at the Jet Propulsion Laboratory.

The Proposal Kit includes an Infrared Compendium, an online resource for professional scientists new to infrared astronomy. The Proposal Kit also contains a multitude of links to useful general-purpose astronomical tools (such as coordinate conversion), observation planning tools (e.g. IRSKY, Skyview), astronomical databases (e.g. IRSA, NED, SIMBAD), and archived datasets (e.g. 2MASS, ISO, DSS).

7.3 GTO Observations

The Spitzer Guaranteed Time Observation (GTO) program results from a 1983 *NASA Announcement of Opportunity* and competitive selection of instrument teams and the Science Working Group. The GTOs are allocated 20 percent of the available observing time for the first 2.5 years of the science mission, and 15 percent thereafter. The GTO project abstracts and itemized observations for the first 2.5 years are included in the *Reserved Observations Catalog (ROC)*, which accompanies this CP and is available online at the SSC website.

7.4 Legacy Science Program

The Spitzer Legacy Science Program consists of six projects competitively selected in November 2000 following a solicitation of proposals and competitive peer review. The Program was motivated by a desire to enable major science observing projects early in the mission, with the goal of creating a substantial and coherent database of archived observations that can be utilized by subsequent Spitzer researchers, including General Observers.

Additional details pertaining to the six approved Legacy Science projects are available in Appendix C. The individual observations that comprise each project are listed in the *Reserved Observations Catalog*. More information about the Legacy Science Program is available on the SSC website (http://ssc.spitzer.caltech.edu/legacy) including extended abstracts of the programs, links to PASP articles describing the science goals, and links to the Legacy Team websites. Also see the SSC publication archive (http://ssc.spitzer.caltech.edu/pubs/) for more information.

7.5 Additional Guidelines for Observers

This section contains additional guidelines and policies that General Observer investigators must know as they plan their GO proposal.

7.5.1 Duplicate Observations

In general, duplicate observations with the Spitzer Space Telescope are not permitted. *It is the responsibility of the GO investigator to avoid duplication of previously approved observations.* A list of all such observations is available in the *Reserved Observations Catalog* (ROC). This ROC lists all observations approved or executed to date. The Proposal Kit contains a search utility tool that allows researchers to check newly planned observations against the ROC. Observers can also use *Leopard*, the SSC Science Archive interface software to search all planned and executed observations.

Quantitative descriptions of what constitutes a duplicate observation can be found in the Spitzer Observing Rules (Appendix A, §15.2). The duplication criteria are a function of celestial coordinates, areal coverage on the sky, and Spitzer sensitivity. Under special circumstances properly justified by the proposer, new AORs judged to duplicate previously approved observations may be approved by the SSC Director. For examples of scientifically justified observations that are formally duplicate observations, the reader should consult Appendix A (§15.2.1).

Proposed AORs deemed to duplicate previously approved observations specified in the *Reserved Observations Catalog (ROC)* will be identified by the SSC (hereafter called GO2-ROC duplications). This information will be forwarded to the peer reviewers. These reviewers will be instructed to omit GO2-ROC duplicate observations and to assess the proposal's merits excluding them. However, in rare cases, the SSC Director may approve the execution of a GO2-ROC duplicate observation. In such a case, the observation deemed to be a GO2-ROC duplicate will be executed, but the resultant data withheld from the GO2 observer until the proprietary period of the previously approved observer ends.

The SSC will also identify observations in proposals that do not duplicate anything in the ROC but do overlap with other proposals received in response to the Cycle-2 CP (hereafter called GO2-GO2 duplications). This information will be provided to the peer reviewers to use in their assessment of the proposals. The final program recommended by the TAC and approved by the SSC Director may include programs with GO2-GO2 duplications. These observations will in general be executed by the SSC as approved.

7.5.2 Constrained Observations

Constraints placed on proposed observations must be explicitly stated and accompanied by a compelling justification. Apart from the obvious constraint of sky visibility (§4.2), there are various means by which an observer may place scheduling and relational constraints on proposed observations (see §5.5.3 of the *Spitzer Observer's Manual* for details). Constraints limit the flexibility of telescope scheduling and reduce the overall observing efficiency. Therefore, proposers should carefully consider the impact of constrained observations. The SSC discourages GO investigators from placing undue constraints on proposed AORs. Programs with heavily constrained AORs will be identified as difficult to schedule by the SSC, and their evaluation will be affected accordingly (see §9.2). For Cycle-2 as a whole, the SSC will allow no more than 20 percent of all approved observations to have user-imposed constraints (*i.e.,* timing, follow-on, group-within, chain and sequence constraints available to the proposer within *Spot*).

7.5.3 Calibration Observations

The SSC establishes and maintains the calibration of each science instrument to levels specified in the *Spitzer Observer's Manual*. Data resulting from these routine calibrations will generally enter the Science Archive upon processing and validation by the SSC.

The initial on-orbit calibration of the telescope was performed as part of the commissioning of each observing mode (or AOT, see §4.4). After an AOT is commissioned for general use, the SSC conducts the periodic observations necessary to maintain such calibrations. Calibration observations make up from 5-15% of the observing time per instrument campaign. Celestial and internal calibrations are a component of each 7-14 day instrument campaign. Observations of celestial targets necessary to maintain the calibration of each AOT are not subject to rules regarding duplicate observations.

For GO investigations that require a higher level of calibration, it is the responsibility of the Principal Investigator to include those *special calibrations* as part of their proposal. The SSC will process such observations through its normal data processing pipeline(s), and the data will be subject to the normal proprietary data periods (§6.1.12).

7.5.4 Bright Object Observations

Given the unprecedented sensitivity of Spitzer, it is perhaps not surprising that the detector arrays are affected by bright objects. Much of the Galactic Plane, for example, will saturate the MIPS 160-micron arrays. While saturation will not permanently damage the detector arrays, latency effects will compromise subsequent observations.

Proposals that involve observations of bright sources will not be precluded. However, GO investigators should be aware of infrared sources that may saturate the Spitzer detectors, whether they are the intended target, or whether their celestial position is near the proposed target. The SOM provides current estimates of the saturation limits for each wavelength. A list of bright celestial sources likely to exceed the saturation limits is provided in the online Proposal Kit. Note that the SSC reserves the right to exclude some targets as a result of impacts that these bright objects might have on subsequent observations. Observers proposing observations of bright objects should discuss their impact in the technical plan.

7.6 Moving Target Ephemeredes

The online Proposal Kit (http://ssc.spitzer.caltech.edu/propkit) contains a section specifically designed to support Solar System researchers. It includes asteroid count estimates, ephemeris files currently integrated into *Spot*, NAIF name identifications, and tips for utilizing the Horizons database supported by the Solar Systems Dynamics Group at the Jet Propulsion Laboratory.

To obtain an accurate estimate of the observing time required for your moving target observation, an ephemeris file for your target must be installed at the SSC. If you wish to include a moving target in your proposal for which the ephemeris file is not already installed at the SSC, you must send a request to the Helpdesk (*help@spitzer.caltech.edu*) by 5:00 pm (PST), Friday, February 5, 2005, that includes the NAIF identifier and requests that the SSC obtain and install the ephemeris file. Our normal turn-around time for ephemeris requests is 3 working

days. Please ask for new ephemeredes early in your proposal planning process. Requests received at the SSC during the last week of the proposal call will be supported on a best efforts basis.

We note also that ephemeredes can have large intrinsic errors, and the ensuing positional errors can be sufficiently large that the object has a very low probability of being acquired by Spitzer. We therefore *strongly* recommend that the observer check the available positional accuracy for a Solar System target before proposing to observe it with Spitzer. Instructions on how to do this can be found in the Horizons documentation in the Solar System section of the online Proposal Kit (http://ssc.spitzer.caltech.edu/propkit).

7.7 Basic Instrument Campaign

The normal operating schedule for the instruments on Spitzer is contained in the Basic Instrument Campaign (BIC). Spitzer operates the instruments in the order IRAC-MIPS-IRS and then starts again with IRAC. Only ToO observations interrupt this ordering. We anticipate that the time between each individual instrument campaigns in Cycle-2 will be approximately 35 days: typically 1 week IRAC – 2 weeks MIPS – 2 weeks IRS – 1 week IRAC – etc.

7.8 SSC Assistance

All questions of a scientific, technical, programmatic, or financial nature should be submitted electronically to the Spitzer Helpdesk (*help@spitzer.caltech.edu*). The SSC is committed to answering all questions as rapidly as feasible, and normally within two business days from the receipt of a query. Note that as the proposal deadline approaches, the turnaround times for an SSC response (particularly for definitive answers to complex technical questions) will likely increase. It is the responsibility of proposers to take this reality into consideration when submitting queries shortly before the proposal submission deadline.

Questions and answers deemed by the SSC to be of interest to the broader community will be archived as an anonymous Frequently Asked Question (FAQ) on the SSC website. Therefore, all questions and comments submitted to the Helpdesk become the property of the SSC and California Institute of Technology.

8 Proposal Submission

The Spitzer Cycle-2 submission process is a single phase for small proposals. GO investigators proposing a small Spitzer program are required to submit all of their completed Astronomical Observation Requests (AORs) with their science proposal. GO investigators proposing a medium or large Spitzer program or a Collaborative Spitzer-HST GO program must submit representative AORs that clearly define their observations, but are not required to submit the entire program of AORs with their proposals. These proposals must include complete target lists and descriptions of the observations. If successful, the final AORs for the program must be submitted to the SSC within four to six weeks of notification of the awarded time. *Accepted medium and large proposals that are submitted with a complete set of AORs will begin scheduling in Cycle-2 earlier than programs that submit the final AORs after acceptance.*

All categories of proposals must be submitted through *Spot*, a downloadable software package developed by the SSC. The AORs and cover sheet information are entered directly into *Spot* for transmittal. ***The science justification and all other required elements must be submitted as a single PDF file attachment.*** The AORs and cover sheet information created in *Spot* can be saved as a text files on your local computer. The cover sheet information, the proposal PDF file, and the AORs are all submitted electronically via *Spot*. ***Cycle-2 proposals must be submitted with the S11 version of Spot. This will be available to download from the Proposal Kit website on November 17, 2004.***

There is no limit to the number of proposals that may be submitted by a Principal Investigator or by Co-Investigators. Proposals should not contain classified information or depend on access or use of classified information or facilities for any portion of the proposed activities. A proposal may be withdrawn from consideration by the Principal Investigator at any time prior to the completion of the selection process.

Templates for preparing the PDF proposal attachment in Latex and Microsoft Word formats are available in the online Proposal Kit. Sample proposals are also provided.

8.1 Proposal Submission Deadlines

Proposals must be submitted prior to the appropriate deadlines. Proposals received after the deadlines will not be considered. **The proposal submission deadlines are firm**. If you need information from a source outside of the SSC that you do not directly control, particularly a service available via the internet, then obtain this information well in advance of the deadline. There are periodic slow-downs in internet service due to internet worms, viruses, etc. Disks crash and computers are hacked. **Please plan your submission with these factors in mind because the submission deadlines will not be moved.**

The deadlines for proposal submission are:

Collaborative Spitzer-HST GO Proposals: January 21, 2005 (5:00 pm PST), Friday
GO, Archival, and Theoretical Proposals: February 12, 2005 (1:00pm PST), Saturday
Archival/Theoretical Cost Plans (paper): February 18, 2005 (5:00pm PST), Friday

You may resubmit your proposal as many times as you want prior to the deadline. You must use the *Spot* software to submit your proposal electronically. Only AR and TR cost plans will be accepted on paper. If the SSC servers have started (or completed) processing of your proposal when the deadline is reached, the proposal will be accepted. There will be a clock on the SSC website that tells you what time it is at the SSC and you can therefore accurately gauge when the deadline is.

8.2 Proposal Formats

8.2.1 Cover Sheet

For all proposals the Cover Sheet information is entered into *Spot* and then submitted electronically to the SSC. This information can be saved to your local computer as a text, PDF, or html file. We recommend that all proposers start early. You can update the cover sheet information from *Spot* as many times as necessary prior to the proposal deadline.

8.2.2 Astronomical Observation Requests (AORs)

The submission of Astronomical Observation Requests (AORs) is required for GO proposals. GO investigators proposing *small* Spitzer programs are required to submit all of their completed AORs with their proposal. GO investigators proposing a *medium* or *large* Spitzer program or a Collaborative Spitzer-HST GO program must submit representative AORs that clearly define their observations, but are not required to submit the entire program of AORs with the proposal. No AORs are submitted for AR/TR proposals.

AORs are created in *Spot* and then submitted electronically to the SSC. You create your AORs and save them to a text file on your local computer. When you are ready to submit the proposal, load the AORs into *Spot* and they will be automatically transmitted with the cover sheet and PDF attachment to the SSC. The cover sheet information, PDF attachment, and AORs can all be updated separately after your initial submission.

8.2.3 PDF Attachment – Page Limits

Templates in Latex and Microsoft Word formats are provided on the SSC proposal kit web page (http://ssc.spitzer.caltech.edu/propkit) and must be used to prepare your PDF attachment. (For Collaborative Spitzer-HST proposals the PDF attachment can be prepared using either the HST or Spitzer proposal templates.) The page limit for the PDF attachment depends on the proposal category as described in §6.1 and §6.2. Relevant page limits for each proposal category are summarized in the table below.

Proposals that exceed the page limits will be flagged by the SSC and peer reviewers will be instructed to disregard any pages in excess of the limits. Observers proposing Joint observations are allowed one additional page in the Technical plan to describe all joint observations. Their necessity should be included in the scientific justification. Collaborative Spitzer-HST proposals are allowed two additional pages for the science justification and one additional page for the technical plan.

	Science Justification	Technical Plan	Figs./Refs. Tables	Res./ Bibl.	Total
Medium/Large	**4**	**3**	**2**	**1**	**10**
Small	**3**	**2**	**2**	**1**	**8**
AR/TR	**3**	**2**	**2**	**1**	**8**

Additional pages allowed for Joint/Collaborative proposals					
Joint	**+0**	**+1**	**+0**	**+0**	
Coll Spitzer-HST	**+2**	**+1**	**+0**	**+0**	

The following table summarizes additional information that is *required but not subject to the page limits* specified above.

Content	**Required Proposal Categories**
Summary of Existing Spitzer Programs	**all proposals**
Financial Contact Information	**all proposals expecting funding**
Observations Summary Table	**GO Medium and Large only**
Modification of Proprietary Period	**all GO**
Justification of Duplications	**all GO**
Justification of Scheduling Constraints	**all GO**
Cost Plan & Budget Narrative	**Archival and Theoretical only**

Additional details pertaining to proposal contents are listed in §§8.3-8.5. Regardless of the proposal category, the proposal must be written in English and a printable version must utilize fonts that are *no smaller than 12 point, and must adopt one-inch margins on 8.5 × 11-inch paper*. Color figures or tables can be included but the SSC will only reproduce proposals in black-and-white. *The PDF file size limit for submission is 10 megabytes so extremely large or complex color figures may not be acceptable. Proposals will be provided to reviewers as PDF files on a CD-ROM.* No preprints or reprints should accompany the proposal.

All investigators should recognize that the peer review process (§9) utilizes external scientists organized into topical Review Panels. While reviewers will be selected such that their expertise reflects the proportional mix of submitted proposals, a given Review Panel will necessarily span a wide variety of research disciplines. *Therefore, proposals should be written for a knowledgeable, but broad-based, audience.* Proposals will be evaluated according to the criteria listed in §9.2.

Proposals will be provided to each panel and TAC reviewer as PDF files on a CD-ROM. It is the responsibility of the proposer to ensure that their PDF file is legible when opened with Acrobat Reader. Please see http://ssc.spitzer.caltech.edu/documents/makepdf.html for instructions on making legible PDF files.

Additional proposal guidelines for General Observers (§8.3), Archival Research investigators (§8.4), and Theoretical research investigators (§8.5) are provided in the following sub-sections.

8.3 General Observer Proposal Contents

General Observer (GO) proposals must include the following sections, each subject to the individual page limits listed in §8.2. All of these must be combined into a single PDF file for submission with *Spot*.

8.3.1 Science Justification

Proposals must include a clear statement of observing goals and describe the general importance of the proposed project to the astronomical sciences. It should address why the Spitzer capabilities are uniquely important in advancing knowledge in the proposed area of research. The science plan and its underlying rationale should be readily comprehensible to broad-based scientists. It must include a justifiable and reasonably accurate request for observing time for each observing mode. The observing time requests must be based on the resource estimates calculated with Spot, the SSC proposal planning and submission software. All proposed targets must have corresponding AORs, although some information may be omitted for Targets of Opportunity (§6.1.5), second-look observations (§6.1.6), generic targets (§6.1.7). Large Collaborative Spitzer-HST GO proposals must include representative AORs that encompass the Spitzer observations. Collaborative Spitzer-HST GO proposals (§6.1.8) and all Joint proposals (see §6.1.9) must provide a full and comprehensive scientific justification for the requested observing time.

8.3.2 Technical Plan

The technical plan must include a description of the proposed observing strategy, with information about target selection and the choice of observing modes. For all observations the technical plan must include quantitative descriptions of the required sky/target position(s), expected target flux densities or surface brightness, required sensitivity/depth (1-sigma noise or S/N ratio), wavelength(s), and coverage strategy (including redundancies). For spectroscopic observations, the proposal must also include the positional accuracy needed and the strategies by which targets will be acquired. The technical plan should also show that the proposers have checked the sky background brightness and saturation issues for their observations and provide the maximum expected flux densities or surface brightness in the fields of view or spectral slits/apertures. For projects conducting photometric measurements, the proposal must define the photometric accuracy needed and any special calibration requirements. For other types of observations, similar levels of technical detail should be specified.

All flux densities and surface brightness must be provided in correct flux units:

Point Sources	**IRAC, MIPS, IRS**	**micro-Jy, milli-Jy, or Jy**
	or IRS	**$W \times m^{-2}$**
Extended Sources	**IRAC, MIPS, IRS**	**$MJy \times sr^{-1}$**
	or IRS	**$W \times m^{-2} \times sr^{-1}$**

In all cases, the target list for Spitzer observations must be adequately justified and explained. Investigators should describe why the proposed targets were selected, and any assumptions made about their targets and/or sample. Telescope and scheduling constraints placed by investigators on proposed observations must include compelling scientific justification (§7.5.2). Observers

proposing observations of bright objects (§7.5.4) should discuss their impact in the technical plan.

The technical plan should also include a data analysis plan. Descriptions of the instrument-specific pipelines can be found within Chapters 6-8 of the *Spitzer Observer's Manual* and in the instrument-specific *Data Handbooks*.

Collaborative Spitzer-HST GO proposals (§6.1.8) and any Joint telescope proposals (§6.1.9) must include technical information for all proposed observations. One additional page is allowed in the technical plan for Joint or Collaborative proposals requesting observations from HST, CXO, NOAO and/or NRAO.

8.3.2.1 Collaborative/Joint Spitzer-HST Observations

Proposers requesting collaborative or joint Spitzer-HST observations must provide a full and comprehensive technical justification for the HST portion of their program. This justification must include:

1. The choice of instrument, filters, and configuration required.
2. The requested exposure time, justification for the exposure time, and assumptions made in its determination.
3. Information on whether the observations are time-critical. Indicate whether the observations must be coordinated in a way that affects the scheduling of either HST or Spitzer.
4. A description of how HST 2-gyro operations would affect these observations.

Proposers should read the HST Cycle-14 Call for Proposals for detailed information, particularly about the impact of potential 2-gyro operations.

Technical documentation about HST is available from the STScI website (http://www.stsci.edu/hst). Full specification of approved observations will be requested during phase II of the HST Cycle-14 period when detailed feasibility checks will be made (http://www.stsci.edu/hst/proposing).

8.3.2.2 Joint Spitzer-Chandra Observations

Proposers requesting joint Spitzer-Chandra observations must provide a full and comprehensive technical justification for the Chandra portion of their program. This justification must include:

1. The choice of instrument (and grating, if used).
2. The requested exposure time, justification for the exposure time, target count rate(s) and assumptions made in its determination.
3. Information on whether the observations are time-critical; indicate whether the observations must be coordinated in a way that affects the scheduling (of either Chandra or Spitzer observations).
4. The exposure mode and chip selection (ACIS) or instrument configuration (HRC).
5. Information about nearby bright sources that may lie in the field of view.
6. A demonstration that telemetry limits will not be violated.
7. A description of how pile-up effects will be minimized (ACIS only).

Proposers should note the current restrictions on uninterrupted observations of more than 50 ksecs with pitch angle between 80 and 110 degrees. Long observations at these pitch angles will be split into segments of no more than 50 ksecs. Please see the Chandra Proposers' Observatory Guide (POG) for more information (http://asc.harvard.edu/proposer). The Chandra Proposal Documentation and observations planning software will be updated for Cycle-7 in mid-December, 2004.

Technical documentation about Chandra is available from the Chandra X-ray Center (CXC) website, which also provides access to the Chandra Helpdesk. Full specification of approved observations will be requested during the Chandra Cycle 7 period when detailed feasibility checks will be made.

8.3.2.3 Joint Spitzer-NOAO Observations

Proposers requesting joint Spitzer-NOAO observations must provide a full and comprehensive technical justification for the NOAO portion of their program. This justification must include:

- the telescope(s) and instrument(s) on which time is requested,
- the requested observing time per telescope/instrument, a specification of the number of nights for each semester during which time will be required, a breakdown into dark, grey and bright time, and an explanation of how the required exposure time was estimated,
- information on whether the observations are time-critical; indicate whether the observations must be coordinated in a way that affects the scheduling (of either the NOAO or the Spitzer observations),
- a description of any special scheduling or implementation requirements (e.g., optimum and acceptable dates).

Successful proposers will be asked to supply additional details about the observations, i.e., the same details required for NOAO proposals for the particular telescope/instrument. Submission instructions will be forthcoming following notification of the results of the Spitzer review.

Technical documentation about the NOAO facilities is available from the NOAO Website. Questions may be directed to the NOAO Proposal Helpdesk by email to *noaoprop-help@noao.edu*. NOAO will perform feasibility checks on any approved proposals. Proposers requesting joint Spitzer-NOAO observations must specify whether they were recently (in the last two years) awarded NOAO time for similar or related observations.

8.3.2.4 Joint Spitzer-NRAO Observations

Proposers wishing to make use of this opportunity must provide the following additional NRAO-related information as part of their Spitzer proposal:

1. Indicate the choice of NRAO telescope(s) (VLA and/or GBT).
2. For the VLA, indicate the requested configuration(s) (dates of availability for the configurations are at http://www.vla.nrao.edu/genpub/configs).
3. Enter the total estimated observing time and the observing frequency(ies) for each telescope/configuration.

The first trimester in which observations could be executed is October, 2005 to January, 2006.

Demonstration of the technical feasibility of the proposed NRAO observations is the responsibility of the proposer. The basic technical feasibility will be reviewed by NRAO before the proposal is evaluated. Detailed technical information concerning the VLA and the GBT can be found at http://www.vla.nrao.edu/astro (VLA) and at http://www.nrao.edu/GBT/proposals/short_guide.shtml (GBT). In particular, note the comprehensive "Observational Status Summary" for the VLA and the description of instrumentation and observing modes for the GBT.

If approved for NRAO time, successful PIs will be required to submit the standard NRAO forms providing detailed observing information appropriate to the telescope and instrument combination(s) awarded. NRAO will perform final feasibility checks on the proposed observations based on the information provided on these forms and reserves the right to reject any observation determined to be infeasible for any reason. Proposals whose observing requests for NRAO facilities are inconsistent between the cover sheet and the scientific justification may be rejected, due to the short time period available to notice and then reconcile these inconsistencies.

8.3.3 Other Contents

8.3.3.1 Figures, Table and References

Up to two pages of figures, tables and references may be included in the proposal. These may be consolidated into two separate pages and appear after the Science Justification or be integrated into the text. Color figures or tables can be included but the SSC will only reproduce proposals in black-and-white. They should be of adequate size to comprehend. *The PDF file size limit for submission is 10 megabytes so extremely large or complex color figures may not be acceptable.* The references and figure captions may be listed in 10-point font (rather than 12-point).

8.3.3.2 Brief Resume and Bibliography

One additional page should be devoted to brief qualifications of the Principal Investigator and summary bibliographies of key investigators. This page should list the major publications related to the proposed research.

8.3.3.3 Observation Summary Table

An Observation Summary Table is NOT required for small GO proposals (< 50 hours). These will be generated by the SSC from the AORs submitted with the proposal.

Medium and Large GO proposals require an Observation Summary Table unless a complete set of AORs for the entire program is submitted. The Observation Summary Table is not subject to the proposal page limits. For each proposed observation the table must include all target position(s), AOT (e.g. IRAC Mapping, MIPS Scan), imaging arrays (e.g. 24 microns) or IRS modules, integration time, and estimated AOR duration. The target fluxes (or flux ranges), background flux, sensitivities, and depth reached should be included in the technical plan. Targets of Opportunity and their impact classification should also be specified in the table (§6.1.5). All flux densities and surface brightness must be provided in correct flux units:

Point Sources	IRAC, MIPS, IRS	micro-Jy, milli-Jy, or Jy

	or IRS	$W \times m^{-2}$
Extended Sources	IRAC, MIPS, IRS	$MJy \times sr^{-1}$
	or IRS	$W \times m^{-2} \times sr^{-1}$

An example is provided in the sample proposals.

8.3.3.4 Existing Observatory Programs

Proposers must explicitly summarize their current involvement as a Principal Investigator or Technical Contact on existing Spitzer Space Telescope research programs. The proposer should indicate the status of each GTO, GO, Legacy, and/or Archival program and of its data analysis efforts and any publications resulting from the program(s).

Proposers requesting joint Spitzer-Chandra or joint/collaborative Spitzer-HST observations must specify whether they were awarded Chandra or HST time in a previous cycle for similar or related observations.

8.3.3.5 Data Analysis Funding Distribution

If a GO proposal includes U.S.-based Co-Is who require data analysis support from NASA, the PI (whether U.S.-based or not) must explicitly identify them and the fractional extent to which each U.S.-based investigator (including the PI) will be involved in the investigation's total data analysis efforts. In this context, the term "data analysis" is taken to include activities that directly support the processing, analysis and scientific interpretation and publication of Spitzer data. **Failure to include this information may preclude U.S.-based investigators from receiving NASA funding support.** For purposes of determining funding levels, the sum of the efforts by U.S.-based Co-Investigators on a proposal led by a foreign Principal Investigator cannot exceed 50%.

Data analysis funding for joint observations approved for HST or Chandra will be provided directly through the Space Telescope Science Institute or the Chandra X-Ray Center using their normal funding processes.

8.3.3.6 Financial Contact Information

The Principal Investigator must include contact information (e.g., name, address, phone number, email address) for an authorized financial representative of their home institution. This individual should be from your Sponsored Research Office or equivalent department for your institution. This will facilitate the efficient processing of the supporting data analysis contract.

This information should also be provided for any Co-Investigators requiring funding support.

8.3.3.7 Modification of Proprietary Period

If any reduction of the standard proprietary period is proposed, please specify that in this section.

8.3.3.8 Justification of Duplicate Observations

Briefly summarize the justification for any proposed duplicate observations. The details should have been provided in the science justification.

8.3.3.9 Justification of Scheduling Constraints

Briefly summarize the justification for any proposed scheduling constraints. The details should have been provided in the science justification and technical plan.

8.3.4 Astronomical Observation Requests (AORs)

Each *small* GO proposal must be accompanied by a complete list of Astronomical Observation Requests (AORs). *Medium* and *large* GO proposals and Collaborative Spitzer-HST GO proposals may submit representative AORs that fully encompass the proposed observations. The AORs are created in *Spot* and submitted electronically to the SSC. Do not include them in the proposal PDF file. They can be saved as an ASCII text file on your local computer. The AORs include the total time required to execute a given observation with the telescope. **Each AOR includes an assessed overhead of 215 seconds to account for the average time required to acquire the target, regardless of the actual time utilized.** The average acquisition time is based on our experience to date.

Additional overheads are assessed for high- and medium-impact Targets of Opportunity and for observations requiring rapid instrument turnarounds or late ephemeris changes (see Appendix E and the *Spot User's Guide*). **Failure to include these overheads in the preparation of AORs may result in disqualification of the program during its SSC technical review**. It is the responsibility of the proposer to ascertain the completeness and correctness of their AORs. The special overhead must be specified using *Spot* when the AORs for the proposal are created. From within the relevant AOR dialog click the **Special …** button and select the appropriate overheads from the list. *Spot* will calculate the required time and add it to the Total Duration returned on the main *Spot* AOR page.

Providing robust, ready-to-execute AORs with your proposal is the fastest way to ensure that your observations get quickly into the scheduling pool. ***GO investigators approved for Cycle-2 will not, in general, have any opportunity to make major modifications (see §15.4.1) to their AORs after selection. Hence, proposers are urged to carefully plan and construct the AORs that accompany their GO proposal.***

8.4 Archival Research Proposal Contents

Archival Research (AR) proposals must be submitted to the SSC electronically using *Spot*, the SSC proposal planning and submission software. Archival research proposals may proposal analysis of any data publicly available in the Spitzer Science Archive. AR proposals must include the following sections, each subject to individual page limits listed in §8.2. These sections, except the cost plan, must be combined into a single PDF file for submission with *Spot*.

Proposals will be provided to each panel and TAC reviewer as PDF files on a CD-ROM. It is the responsibility of the proposer to ensure that their PDF file is legible when opened with Acrobat Reader. Please see http://ssc.spitzer.caltech.edu/documents/makepdf.html for instructions on making legible PDF files.

Copies of the cost plans will be provided to the reviewers on paper.

8.4.1 Science Justification

AR proposals must include a clear and complete statement of the investigation's science goals. The science plan and its underlying rationale should be readily comprehensible to broad-based scientists. The proposer should describe how the results of the investigation will be made available to the community in a timely manner.

8.4.2 Technical Plan

The technical plan should describe the data analysis plans of the AR investigator. It should describe the extent to which the SSC pipeline processed data contribute towards achieving the stated scientific goals of the investigation, and the extent to which post-pipeline data analysis must be performed by the investigator. Descriptions of the instrument-specific pipelines can be found within Chapters 6-8 of the *Spitzer Observer's Manual* and instrument-specific *Data Handbooks*.

8.4.3 Figures, Table and References

Up to two pages of figures, tables and references may be included in the proposal. These may be consolidated into two separate pages and appear after the Science Justification or be integrated into the text. Color figures or tables can be included but the SSC will only reproduce proposals in black-and-white. They should be of adequate size to comprehend. *The PDF file size limit for submission is 10 megabytes so extremely large or complex color figures may not be acceptable.* The references may be listed in 10-point font (rather than 12-point).

8.4.4 Brief Resume and Bibliography

One additional page should be devoted to the brief resume of the Principal Investigator and summary bibliographies of key investigators. This page should list the major publications related to the proposed research.

8.4.5 Existing Observatory Programs

Proposers must explicitly summarize their current involvement as a Principal Investigator or Technical Contact on existing Spitzer Space Telescope research programs. The proposer should indicate the status of each GTO, GO, Legacy, and/or Archival program and of its data analysis efforts and any publications resulting from the program(s).

8.4.6 Financial Contact Information

The Principal Investigator must include contact information (e.g., name, address, phone number, email address) for an authorized financial representative of their home institution. This individual should be from your Sponsored Research Office or equivalent department for your institution. This will facilitate the efficient processing of the supporting data analysis contract.

This information should also be provided for any Co-Investigators requiring funding support.

8.4.7 Cost Plan

Cost effectiveness and reasonableness are evaluation criteria for Archival and Theoretical research proposals. One copy of the printed proposal and three copies of the cost plan(s), including budget narratives, must be mailed to 'Cycle-2 Proposal Submission' at the address

listed in §10. The cost plans should be received at the SSC by the Friday following the proposal submission deadline.

A single cost plan can be provided if all requested funding will be issued to the PI, otherwise a cost plan should be provided for each Investigator for which funding is requested. A cost plan must include budget spreadsheet and a budget narrative. These are not subject to the overall proposal page limit. The plan(s) must include a request for total project funds itemized by major categories, with supporting justifications provided in a supplementary budget narrative.

Cost plans are limited to one year in duration, with a period of performance starting in July 2005. Investigators can use the budget form provided in the Proposal Kit section of the SSC website or a form utilized by their home institution. *Each cost plan must be endorsed by an authorized financial representative of their home institution.*

The reimbursable costs are governed by applicable Federal Acquisition Regulations (available online at http://www.arnet.gov/far/) and proposers are urged to consult the Sponsored Research Office (or equivalent) of their home institution for guidance. Guidelines as to what constitutes allowable costs appear in Appendix F.

8.5 Theoretical Research Proposal Contents

Theoretical Research (TR) proposals must be submitted to the SSC electronically using *Spot*, the SSC proposal planning and submission software. TR proposals must include the following sections, each subject to individual page limits listed in §8.2. These sections, except the cost plan, must be combined into a single PDF file for submission with *Spot*.

Proposals will be provided to each panel and TAC reviewer as PDF files on a CD-ROM. It is the responsibility of the proposer to ensure that their PDF file is legible when opened with Acrobat Reader. Please see http://ssc.spitzer.caltech.edu/documents/makepdf.html for instructions on making legible PDF files.

8.5.1 Science Justification

The Scientific Justification section of the proposal should describe the proposed theoretical investigation and also its impact on observational investigations with Spitzer. The proposal must include a clear and complete statement of the investigation's science goals. Review panels will consist of observational and theoretical astronomers with a broad range of scientific expertise. They will not necessarily have specialists in all areas of astrophysics, particularly theory, so the proposals must be written for general audiences of scientists.

A Theory Proposal should address a topic that is of *direct relevance* to Spitzer investigations, and this relevance should be explained in the proposal. The results of the theoretical investigation should be made available to the community in a timely fashion. GO or AR proposals which include a minor component of theoretical research will be funded under the appropriate GO or AR Program. Theoretical research should be the primary or sole emphasis of a TR Proposal. Analysis of archival data may be included, but should not be the main aim of the project. The program should provide a lasting benefit for current or future observational programs with Spitzer.

8.5.2 Technical Plan

The Technical Plan section of the proposal should discuss the types of Spitzer data that will benefit from the proposed investigation, and references to specific data sets in the Spitzer Data Archive should be given where possible. This section should also describe how the results of the theoretical investigation will be made available to the astronomical community, and on what time scale the results are expected.

8.5.3 Other Contents and Cost Plan

The other contents and cost plan requirement are identical to those described for AR proposals in §8.4.3 through §8.4.7.

8.6 Submission of Proposals

Proposals must be submitted to the SSC electronically through *Spot*, the Spitzer observation planning software (*Spot*; see §7.2), and must be consistent with the page and format guidelines listed throughout §8. Detailed instructions on using the software are available in the *Spot User's Guide*, and are summarized below.

1. Download *Spot* from the Proposal Kit section of the SSC website (http://ssc.spitzer.caltech.edu/propkit) and install it on your host machine. Use the S11 version of *Spot* which will be available November 17, 2004.
2. Start up *Spot* and open the Proposal Tool.
3. Load any previously generated cover sheet information, the proposal PDF file, and (for General Observer investigations) the accompanying AORs that comprise your program.
4. For GO proposals make sure you have updated the resource estimates and entered the correct total observing time required in the proposal cover sheet.
5. For AR and TR proposals make sure you have entered the total funding requested in the proposal cover sheet.
6. Click on the SUBMIT Menu in the Proposal Tool and select 'Submit proposal to SSC.'
7. Prior to the proposal submission deadline, proposals can be modified by using 'Update Proposal at SSC' option.
8. The proposal PDF file, cover sheet, and any accompanying AORs that reside at the SSC at the time of the proposal submission deadline shall be defined to be the final version of the proposal.
9. For Archival and Theoretical Research proposals the main proposal must be submitted electronically by the submission deadline. You must submit one printed copy of the proposal and three paper copies of institutionally-endorsed cost plan(s) to "Cycle-2 Proposal Submission" at the address listed in §10. These must be received by the SSC by the Friday following the electronic submission deadline, e.g. Friday, February 18, 2005, 5:00pm (PST).

Note that neither NASA nor JPL/Caltech will be responsible for any cost incurred in submitting a proposal.

8.7 Proposal Confidentiality

Proposals submitted in response to this Call for Proposals will be kept confidential to the extent allowed by the review process (§9). For approved investigations only, the SSC will make the titles, investigator names, and abstracts publicly available after the selections are announced. The remainder of the approved proposal, and the entirety of proposals not selected, shall remain confidential. In addition, AORs from the approved General Observer investigations will be incorporated into future versions of the Reserved Observations Catalog and will also be available to download from the Spitzer science operations database using *Spot*.

If a proposal contains proprietary information that should not be used and /or disclosed for any purpose other than the proposal evaluation, it should be clearly marked by placing the following legend on a separate page that does not count against the proposal page limit:

"NOTICE: The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government and the Jet Propulsion Laboratory/California Institute of Technology ("Institute") in confidence with the understanding that it will not, without permission of the proposer, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal, the Government or the Institute shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's or Institute's right to use or disclose this information (data) if obtained from another source without restriction."

9 Proposal Evaluation and Selection

Spitzer Space Telescope Cycle-2 research programs will be selected through a competitive peer review process, using the evaluation criteria listed in §9.2.

9.1 Peer Review

Proposals received by the submission deadline will be organized into broad science topics by the SSC Director's Office, based primarily on the proposal category identified by the Principal Investigator. The Director's Office will then assign the proposals to Science Review Panels, with members selected from the astronomical community-at-large. In order to minimize institutional, professional and personal conflicts of interest there will be parallel Panels for each broad-based topic. A given set of parallel Panels will review and rank all relevant GO and AR proposals, based on the evaluation criteria listed in §9.2. The evaluations of the Science Review Panels will be forwarded to a Time Allocation Committee (TAC), which will be comprised of a Chair and the Panel Chairs. The TAC will take the results of the Science Review Panels and provide a consolidated list of recommendations to the SSC Director, who will then make the final selection of the Cycle-2 research program.

Collaborative Spitzer-HST Programs will be reviewed independently by both the HST and Spitzer TACs. The final selection of proposals in this category will be made by a merging committee, which will combine the results from the deliberations of both TACs. The selection of successful Spitzer-HST Programs will take place immediately after the completion of the Spitzer review process. The merging committee will be comprised of the chairs of the HST and SSC TACs and two other members from each TAC. This committee will make the appropriate recommendations to the Directors of the STScI and the SSC, who will select the successful Collaborative Spitzer-HST Observing Programs.

Proposals will be provided to each panel and TAC reviewer as PDF files on a CD-ROM. It is the responsibility of the proposer to ensure that their PDF file is legible when opened with Acrobat Reader. Please see http://ssc.spitzer.caltech.edu/documents/makepdf.html for instructions on making legible PDF files.

9.2 Evaluation Criteria

The Science Review Panels and Time Allocation Committee will base their evaluations of proposals on the criteria listed in this section. The numbered criteria are listed in descending order of importance.

All proposals submitted to the General Observer Program will be evaluated according to these criteria:

(1) The overall scientific merit of the proposed investigation; its potential contribution to the advancement of scientific knowledge; and its potential for enabling new and important types of scientific investigations.

(2) The extent to which the proposed investigation requires the unique capabilities of the Spitzer Space Telescope.

(3) For Joint or collaborative proposals requesting an award of time on other telescopes, the extent to which the project is fundamentally multi-wavelength in nature and both datasets are required to meet the science goals.

(4) The technical feasibility and robustness of the proposed observations and the extent to which the observations can be accommodated within routine Spitzer operations (and the other relevant observatories for joint or collaborative proposals).

(5) The demonstrated competence and relevant experience of the Principal Investigator and any Co-Investigators as an indication of their ability to carry out the proposed research to a successful conclusion.

Proposals submitted to the Archival Research Program will be evaluated according to these criteria:

(1) The overall scientific merit of the proposed investigation; its potential contribution to the advancement of scientific knowledge; and its potential for enabling new and important types of scientific investigations.

(2) The cost effectiveness and reasonableness of the proposed investigation, including the direct funds being requested and the potential impact on SSC resources for any special needs being requested.

(3) The demonstrated competence and relevant experience of the Principal Investigator and any Co-Investigators as an indication of their ability to carry out the proposed research to a successful conclusion.

Proposals submitted to the Theoretical Research Program will be evaluated according to these criteria:

(1) The overall scientific merit of the proposed investigation; its potential contribution to the advancement of scientific knowledge; and its potential for enabling scientific investigations utilizing Spitzer, enhancing their interpretation (in the context of new models or theories), and/or by refining the knowledge needed to interpret specific Spitzer results.

(2) The cost effectiveness and reasonableness of the proposed investigation, including the direct funds being requested and the potential impact on SSC resources for any special needs being requested.

(3) The demonstrated competence and relevant experience of the Principal Investigator and any Co-Investigators as an indication of their ability to carry out the proposed research to a successful conclusion.

(4) Plans for timely dissemination of the theoretical results, and possibly software or tools, to the astronomical community.

9.3 Proposal Selection

The Spitzer Science Review Panels and Time Allocation Committee will conduct their peer reviews on April 18-22, 2005. The SSC Director, the NASA-designated selection official, will announce the final selections on about May 15, 2005. The GO observations will start in June, 2005.

Collaborative Spitzer-HST Programs will be reviewed independently by both the HST and Spitzer TACs. The final selection of proposals in this category will be made by a merging committee, which will combine the results from the deliberations of both TACs. The selection of successful Spitzer-HST Programs will take place immediately after the completion of the Spitzer review process. The merging committee will be comprised of the chairs of the HST and SSC TACs and two other members drawn from each TAC. This committee will make the appropriate recommendations to the Directors of the STScI and the SSC, who will select the successful Collaborative Spitzer-HST Observing Programs.

10 SSC Contact Information

The SSC postal mailing address is:

Spitzer Science Center
California Institute of Technology
Mail Code 314-6
1200 East California Boulevard
Pasadena, CA 91125 USA

The SSC central telephone lines are:

Phone: +1-626-395-8000 Fax: +1-626-432-7484

The science community should consult the Spitzer Science Center Website at:

http://ssc.spitzer.caltech.edu/

The public Spitzer Space Telescope website is located at:

http://www.spitzer.caltech.edu/

Questions about any aspect of the Spitzer Space Telescope, including the Call for Proposals, may be submitted electronically to the Helpdesk at:

help@spitzer.caltech.edu

11 Publication and Dissemination of Science Results

The publication and dissemination of science results is critical in assessing the success of the Spitzer Space Telescope mission, and in assessing how effectively it meets the goals of NASA's strategic plans in space science. The Spitzer research community is reminded of the important responsibility inherent in utilizing this national resource, and in sharing the scientific results with the general public. In particular, investigators with potentially important and newsworthy results should contact the SSC as early as possible to help NASA plan appropriate news releases.

11.1 Science Publications

It is expected that useful scientific results obtained through Spitzer observations, archival research, and theory investigations will be published in the scientific literature. All publications based on Spitzer data or theory investigations must carry an appropriate acknowledgement. Investigators should consult the SSC website for the appropriate acknowledgement template(s) [http://ssc.spitzer.caltech.edu/approvdprog/ackn.html].

In papers describing Spitzer results, investigators should provide reference(s) to seminal papers describing the telescope, including the relevant science instruments. These references are posted on the SSC website [http://ssc.spitzer.caltech.edu/pubs/seminalobs.html]. Moreover, the SSC advises investigators to accurately trace the original heritage of any Spitzer archival data. In particular, scientific results based on data from the Legacy Science Program should cite appropriate references to the original Legacy Science project. The most relevant of these references are listed on the SSC website [http://ssc.spitzer.caltech.edu/pubs/seminallegacy.html].

One electronic preprint of each publication based on Spitzer research should be sent to the SSC (via the Helpdesk) as early as possible. The advance information provided by a preprint is important for planning and evaluation of the scientific operation of the mission, and may be used for the selection and preparation of press releases (§11.2).

11.2 Press Releases

Researchers who receive Spitzer Space Telescope observing time and/or NASA funding support are strongly encouraged to release Spitzer-related and newsworthy information through NASA channels. This does not preclude news releases by other institutions, although such parallel releases must be coordinated with NASA. The SSC utilizes the public affairs resources of NASA and the Jet Propulsion Laboratory to maximize the impact of discoveries and newsworthy items resulting from Spitzer research investigations. NASA has "first right of refusal" for such items and has a policy to distribute all information and news fairly and equitably. This policy also means that exclusive news releases are not supportable.

Scientists with potentially newsworthy observations should contact the SSC Director's Office via the Helpdesk (*help@spitzer.caltech.edu*). *Spitzer investigators should initiate such contact well before the expected publication of those results,* in order to allow the SSC, JPL, and NASA to prepare press releases and supporting materials. The contact may either be initiated by the Principal Investigator of the Spitzer investigation, or through the public affairs office of their home institution. For a potential press release, the SSC and NASA will coordinate with the PI

and/or institutional public affairs office in the preparation of a draft news release and other supporting materials. In general, the press release date will be timed to coincide with acceptance of the research for publication in a science journal, or presentation at a major astronomical meeting.

For additional information on Spitzer public affairs, including guidelines on what may constitute a newsworthy result, consult the 'Got News' link on the SSC website (http://ssc.spitzer.caltech.edu/approvdprog/newsworthy.html).

12 Instructions for General Observers

1. Read a summary of the capabilities of the Spitzer Space Telescope (§4).
2. Download the *Spitzer Space Telescope Observer's Manual* from the Proposal Kit section of the SSC website (http://ssc.spitzer.caltech.edu/propkit) to obtain additional details about the telescope, science instruments, and the eight observing modes available for Cycle-2.
3. Download and install the S11 version of *Spot*, the Spitzer proposal planning and submission software package, available in the online Proposal Kit, to your host machine. It will be available November 17, 2004.
4. Download and read the *Spot User's Guide* and learn how to create and edit an Astronomical Observation Request (AOR), the fundamental unit of Spitzer observing.
5. Download and read the *Spitzer Space Telescope Observer's Cookbook*, also in the Proposal Kit, to see examples of typical observations.
6. Use *Spot* to create, edit and store sequences of AORs to construct a Spitzer observing program.
7. Determine whether to submit a small, medium or large GO proposal (§6.1.2).
8. Be sure that your proposed observations do not duplicate (§7.5.1) existing Spitzer Space Telescope observations by consulting the *Reserved Observations Catalog* or searching the Spitzer Science Archive with Leopard.
9. Contact the electronic Spitzer Helpdesk (*help@spitzer.caltech.edu*) for assistance, if needed.
10. Prepare your GO proposal according to the guidelines listed in §§8.1-8.3. Templates for preparing the PDF proposal attachment in Latex and Microsoft Word formats are available in the online Proposal Kit. Sample proposals are also provided.
11. Note the evaluation criteria listed in §9.2.
12. Note that NASA data analysis support for eligible investigators (§5.2) will be determined through formulaic means (§6.1.11), and that no cost proposal is necessary. If you are expecting funding you must include the financial contact information for your institution.
13. Specify explicitly the fractional extent to which each U.S.-based investigator (including the PI) will be involved in the investigation's total data analysis efforts (§6.1.11).
14. Follow the steps described in §8.6 to electronically submit your proposal, cover sheet, (and accompanying AORs) to the SSC prior to the appropriate proposal deadline.

12.1.1 Special Instructions-Collaborative Spitzer-HST Proposals

The GO instructions above apply with the following exceptions:

1. The proposal must be submitted to both the Space Telescope Science Institute and the Spitzer Science Center by the appropriate deadline.
2. The Spitzer proposal submission must include representative AORs that fully encompass the proposed Spitzer observations.

12.1.2 Submission Deadlines

Collaborative Spitzer-HST GO Proposals: January 21, 2005 (5:00 pm PST), Friday
Joint and Spitzer-only GO Proposals: February 12, 2005 (1:00pm PST), Saturday

13 Instructions for Archival Researchers

1. If no funding support is required, no Archival Research (AR) proposal is necessary. Archival research proposals may be submitted for analysis of all Spitzer data that will be publicly available by December 31, 2005. The entire Legacy Science Program should be available, including enhanced data products returned to the SSC by the Legacy teams for distribution to the community. Laboratory astrophysics relevant to Spitzer observations is an acceptable component of an archival proposal.
2. Download the *Spitzer Space Telescope Observer's Manual* from the Proposal Kit section of the SSC website (http://ssc.spitzer.caltech.edu/) to obtain additional details about the telescope and science instruments.
3. Download and install the S11 version of *Spot*, the Spitzer proposal planning and submission software package, available in the online Proposal Kit, to your host machine. It will be available November 17, 2004. *Spot* includes the proposal submission tool for AR investigators.
4. Download the *Spot User's Guide* and read the relevant proposal submission chapter to understand how to create and submit an AR proposal.
5. Contact the electronic Spitzer Helpdesk (help@spitzer.caltech.edu) for assistance, if needed.
6. Prepare your AR proposal according to the guidelines listed in §§8.1, 8.2, and 8.4. Templates for preparing the PDF proposal attachment in Latex and Microsoft Word formats are available in the online Proposal Kit. Sample proposals are also provided.
7. Note the evaluation criteria listed in §9.2.
8. Follow the steps described in §8.6 to electronically submit your proposal and cover sheet to the SSC prior to the proposal deadline of February 12, 2005 (1:00 pm Pacific Standard Time).
9. Submit one paper copy of the electronically submitted proposal and three paper copies of an institutionally-endorsed cost plan to "Cycle-2 Proposal Submission" at the address listed in §10. These must be received at the SSC by the Friday following the proposal deadline, i.e. February 18, 2005 (5:00 pm Pacific Standard Time).

14 Instructions for Theoretical Researchers

1. If no funding support is required, no Theoretical Research (TR) proposal is necessary.
2. Download the *Spitzer Space Telescope Observer's Manual* from the Proposal Kit section of the SSC website (http://ssc.spitzer.caltech.edu/) to obtain additional details about the telescope and science instruments.
3. Download and install the S11 version of *Spot*, the Spitzer proposal planning and submission software package, available in the online Proposal Kit, to your host machine. It will be available November 17, 2004. *Spot* includes the proposal submission tool for TR investigators.
4. Download the *Spot User's Guide* and read the relevant proposal submission chapter to understand how to create and submit a TR proposal.
5. Contact the electronic Spitzer Helpdesk (help@spitzer.caltech.edu) for assistance, if needed.
6. Prepare your AR proposal according to the guidelines listed in §§8.1, 8.2, and 8.5. Templates for preparing the PDF proposal attachment in Latex and Microsoft Word formats are available in the online Proposal Kit. Sample proposals are also provided.
7. Note the evaluation criteria listed in §9.2.
8. Follow the steps described in §8.6 to electronically submit your proposal and cover sheet to the SSC prior to the proposal deadline of February 12, 2005 (1:00 pm Pacific Standard Time).
9. Submit one paper copy of the electronically submitted proposal and three paper copies of an institutionally-endorsed cost plan to "Cycle-2 Proposal Submission" at the address listed in §10. These must be received at the SSC by the Friday following the proposal deadline, i.e. February 18, 2005 (5:00 pm Pacific Standard Time).

15 Appendix A: Spitzer Space Telescope Observing Rules

These observing rules pertain to all categories of science observations made with the Spitzer Space Telescope, unless explicitly stated otherwise.

15.1 Definition of Science Observing Time

All of the wall-clock time required for the execution of a specific observation, by means of an Astronomical Observation Request (AOR), will be charged to that particular AOR. This assessment of observing time starts with the beginning of the sequence of events associated with the AOR and continues until the completion of the events in that AOR. Assessed time shall include all science integration time, readout time, internal calibrations, and routine instrument/spacecraft motions embedded within the AOR.

In addition, there will be overheads assessed to every AOR in order to distribute necessary Observatory activities among all science observations. For the Cycle-2 Call for Proposals (CP), each AOR will be assessed 215 seconds to account for telescope slew time, regardless of the actual time utilized. The algorithm used to calculate observing time, including standard overheads, is integrated into the software time estimators that scientists use in planning observations. Overhead burdens will be reevaluated, and perhaps redefined, from one observing cycle to another.

Target of Opportunity (ToO) observations and Solar System observations that require late ephemeris updates (*i.e.,* within five weeks of the observations) will be assessed additional overhead burdens based on the degree of disruption to the onboard observing schedule (§15.5.1). These overheads will reflect the lost observing time that was allocated to other programs if the observations are executed, and will be factored into the proposal review conducted by the Time Allocation Committee. They are subject to change in future CPs. Proposals *must* include these overheads in the total requested observation time.

Any proposals seeking multiple-instrument observations on timescales shorter than the normal instrument campaign (7-14 days) will be assessed special overheads in observing time by the SSC. They are subject to change in future CPs. Proposals *must* include these overheads in the total requested observation time.

The total observing time assessed to a program shall consist of the sum of observing times for each of its constituent AORs, including applicable overhead burdens.

Note that Observatory engineering, calibration, and telemetry activities are functions of the SSC, and the wall-clock time required to perform these functions is accounted for separately from the science observing time. Any estimates of General Observer time published as part of a *Call for Proposals* will refer to the science observing time, and will be derived after adequate time for facility activities is reserved.

15.2 Duplicate Observations

In order to ensure the most efficient use of the Spitzer Space Telescope, proposed observations that duplicate those already executed or approved for execution (and therefore in the Science Operations Database) will not be permitted without the explicit approval of the SSC Director, or designee. Archival data should be used whenever possible to accomplish the science goals of any proposed investigation.

15.2.1 Definitions

Given the large number of Spitzer observations annually (> 20,000), it is important to define quantitative thresholds which permit automated checking of AORs to identify candidates for duplication. These flagged AORs will be checked manually by SSC staff to ascertain the degree of duplication between the candidate observations. Two or more observations are considered to be potential duplicates when one of the conditions described in criterion #1 is met and both criterion #2 and criterion #3 apply:

1. One of conditions a-d exist:
    a. Both of the observations are executed with the same Astronomical Observation Template (AOT).
    b. One of the observations is executed with the IRS Staring-Mode Spectroscopy mode and the other is executed with the IRS Spectral Mapping mode and the observations are conducted with the same IRS module.
    c. One of the observations is executed with the MIPS Photometry/Super-Resolution Imaging mode and the other is executed with the MIPS Scan Mapping mode.
    d. One of the observations is executed with the MIPS Photometry/Super-Resolution Imaging (24um array selected) or Scan Mapping Mode and the other is executed with the IRS Peak-up Imaging mode (red array selected).

2. The integration time per pixel for each observation agrees to within a factor of nine (corresponding to a factor of ~three in sensitivity).

3. The areas on the sky covered by two proposed imaging observations overlap by more than 25% of either of the fields/areas being compared. For spectroscopic observations with IRS, the area overlap shall mean that the targets are considered to be potential duplicates if the target positions are closer together than one-half of the slit length of the appropriate IRS module. Note that for very large programs, an area overlap of less than 25% could still translate into a significant amount of Spitzer observing time. Observations with area overlaps less than 25%, but greater than 10 hours of observing time, will receive additional scrutiny by the SSC and may be disallowed by the SSC Director.

Note that a lengthy observation within the same observing proposal may be segmented because of operational constraints, and that the series of component observations will not be deemed to be duplicates.

Newly proposed observations that are identified to be potential duplicates must be approved by the SSC Director. Approval will be contingent on a legitimate scientific justification for carrying

out the new observations. Examples of observations that may be approved include: synoptic observations of time-variable phenomena and second-epoch (or later) observations searching for transient phenomena. Another example includes a large-area survey, where excising ("cutting out") a small area to avoid overlap with a previously cataloged observation is so inefficient that it increases the observing time for the affected observation. Finally, a proposed observation resulting from an evolution of the Spitzer AOTs and which leads to a demonstrably better observation strategy for a particular science goal will be considered for approval.

If a new candidate observation is less sensitive than a previously accepted observation and if it meets the area overlap criterion above, it will always be considered a duplicate since the science objective of the new program can be achieved using the deeper observation.

In general, the data from an approved duplicate observation will be embargoed by the SSC (i.e., not released to the second investigator) until the proprietary rights (§15.14) of the original observer end.

15.2.2 Procedures

It is the responsibility of any investigator to avoid proposing duplicate observations, apart from the exclusions listed in this sub-section. Each Call for Proposals is accompanied by a comprehensive list of targets and AORs previously approved (§15.3.2). To assist users in checking for duplications, the SSC will develop suitable software for checking newly proposed observations against a comprehensive catalog of approved AORs. Any newly proposed AOR meeting the criteria listed in §15.2.1 will be deemed a potential duplicate observation. If the new observation is obviously a different target, it will be permitted. If manual inspection reveals the new observation to be a duplicate, the proposed observation will (in general) be forbidden.

Though the SSC will endeavor to identify all duplicate observations, it is the responsibility of Principal Investigators of existing approved programs to check the Reserved Observations Catalog released after each completed proposal cycle to determine if any newly approved observations are duplications of any part of their program(s).

One exception to the duplicate observation policy described in §15.2.1 is the case where a series of observations of the same target are intended to search for time-variable phenomena. In this case, a single observation of the same area of the sky will not disallow the time-series observations. On the other hand, if the time-series observations occur *before* the single observation, it will disallow the single observation (since the objectives of the single observation could be achieved by using data from the time-series observations).

Previously accepted observations (i.e., AORs already entered into the Science Operations Database, or SODB) will always take priority over newly proposed observations. A new or modified AOR that is found to be a duplicate of an existing AOR cannot be entered into the SODB without special permission granted by the SSC Director. To be granted this dispensation, the investigator who stands to lose a proposed duplicate observation must file a request to the Director, describing why the AOR already entered in the SODB cannot be utilized in the proposed investigation. Basing a request solely on the time lag associated with gaining access to data from an existing AOR (whose observation may not yet have been executed and whose data

may not enter the public domain until proprietary rights expire) will be insufficient, unless such a delay will significantly compromise the timing and integrity of the proposed investigation. [Affected investigators can always contact the Principal Investigator of the original AOR to seek access to the required data.]

Investigators must describe their observations unambiguously by completing AORs. When proposals are submitted, observations that are potentially duplicates of observations already listed in the SODB will be noted by the SSC, and this information will be provided to the Time Allocation Committee (TAC). In general, the TAC shall not recommend duplicate observations. If the TAC elects to recommend a duplicate observation, it must specify in writing (to the SSC Director) why the duplicate observation(s) should be permitted. Observations that are recommended by the TAC but found to be duplicates after detailed inspection of the program by the SSC will be disallowed.

During the period when Guaranteed Time Observers (GTOs) are submitting and revising their AORs, the newly submitted AORs will be verified for non-duplication of previously accepted AORs. To facilitate this process, modifications to approved AORs will be scheduled in a sequential manner, with various categories of observers (GTOs, Legacy Science, and General Observers) permitted to modify their AORs according to a schedule developed by the SSC and disseminated on the SSC website.

The SSC Director shall have final authority to either allow or disallow duplicate observations.

15.3 Declaration of AORs

As a general rule, the earliest description of an approved observation -- via completion of a valid Astronomical Observation Request (AOR) -- shall reserve priority rights in the case of duplication(s).

15.3.1 Definition of Approved Programs

For every category of Spitzer Space Telescope observing time, an approved program is established in a different manner.

For Guaranteed Time Observations (GTOs), the approved programs consist of the complete list of AORs and corresponding program abstracts submitted in response to a Request for GTO Program Submission issued by the SSC. The Project Scientist has the responsibility to verify that the submitted programs are conflict-free.

For Legacy Science projects, the approved programs consist of the full list of AORs and corresponding abstracts submitted in 2001.

For General Observer (GO) investigations, the approved programs will consist of abstracts and either of the following: (i) all of the original AORs submitted as part of a GO proposal that has been accepted without any modifications recommended by the TAC, or (ii) a revised list of AORs that has been modified in response to specific TAC recommendations.

For Director's Discretionary Time (DDT) observations, the approved programs consist of the AORs based on approved DDT proposals and the corresponding abstracts.

15.3.2 Reserved Observations Catalog

Each Call for Proposals (CP) is accompanied by a *Reserved Observations Catalog (ROC)*, a tabular list of targets and observing modes excerpted from the Science Operations Database. The ROC includes all AORs previously approved through the GTO program, the Legacy Science Program, and DDT (including the First-Look Survey). It also includes AORs resulting from any previous GO cycles and from time awarded through the Spitzer Fellowship Program.

During the time when a CP is active (i.e., between the release of the CP and the selection of observations for the pertinent observing cycle), no major changes are permitted in the ROC. *An exception to the ROC freeze during active CPs will be granted to successful Spitzer Fellow applicants that are awarded observing time as part of their fellowship.*

15.4 Modification of AORs

To accommodate the inevitable need of investigators to modify and refine their approved observations, procedures are established to allow for this process. The intent of these procedures is to allow adequate flexibility in modifying a Spitzer observing program to maximize the scientific value of an approved observation. The guiding principles underlying these procedures are:

- All programs executed by the Spitzer Space Telescope are properly reviewed and approved. The approval process described below is intended to ensure that the modified program, as executed, is approved and avoids duplicate observations.

- All modifications shall be such that the program stays within its originally allocated observing time.

The procedures described here exclude the procedures that will be followed in the catastrophic loss of a major instrumental or telescope function.

15.4.1 Types of Modifications

An Astronomical Observation Request (AOR) in the Science Operations Database (SODB) can be modified electronically by the Principal Investigator, according to the precepts and schedule outlined below. Once an AOR has been scheduled for observation, typically five weeks before execution, it cannot be modified without approval (which will be rare) of the SSC Director.

All requests for modification of approved AORs must be approved by the SSC Observer Support Team, which will characterize the request as one of two types. Minor modifications consist of small changes of target parameters, typically a few arcseconds in celestial coordinates, or small changes in AOR execution time (< 20%), subject to the total observing time in an investigation remaining constant. Minor modifications could also include small changes of other parameters

in the AOR (e.g., change to high-dynamic mode in the IRAC AOR), as long as the changes do not alter the scientific content or intent of the original AOR.

Major modifications to an individual AOR consist of those changes that would substantially alter the scientific content or intent of the AOR. Apart from the exception noted below, major modification of AORs can be granted only to GTO and Legacy Science investigators. Examples of major modifications include:

- Changing the observing mode for an observation (e.g., from MIPS scan map to IRAC imaging).
- Changing the execution time of an AOR by 20 percent or more, thereby increasing the probability that duplicate observations might arise.
- Changing the sensitivity by a factor of 1.5 or more.
- Changing the target coordinates, or boundary area, by an astronomically significant amount.
- Changing the target to a different target judged by the investigator to be scientifically equivalent to the original target.

The execution of an approved observation may become infeasible (§15.12) or prove to be scientifically useless because of unanticipated circumstances. If these events occur, and if a General Observer can a priori demonstrate that the approved AOR will yield useless data, the Principal Investigator can submit a request to make major modifications to the AOR. The proposed modifications must be consistent with the original scientific intent of the approved observation and the observing time granted. In addition, it cannot duplicate any other approved observation, and must be approved by the SSC Director.

Requests for major modifications to any approved observing program or AOR must be made to the SSC Observer Support Team through the Helpdesk (help@spitzer.caltech.edu), and must be accompanied by adequate justification. Modifications are contingent upon approval by the SSC Director, or designee. Once the request for a modification is approved, the requestor may modify the AOR/program, with assistance provided by SSC Observer Support Team. The latter is responsible for insuring that the modifications are implemented as approved.

15.4.2 Blackout Periods

There are blackout periods, during which no *major* modifications to approved AORs or programs can be performed. The contents of the *Reserved Observations Catalog (ROC)* are frozen, and major modifications are not permitted, during blackout periods timed to coincide with the solicitation of General Observer investigations. The Reserved Observations Catalog/AOR blackout schedule is available on the SSC website.

An exception to the ROC freeze during active CPs will be granted to successful Spitzer Fellow applicants that are awarded observing time as part of their fellowship. These observations will take precedence over duplicate observations proposed in Cycle-2. A maximum of fifty hours of observing time can be awarded annually with the Spitzer Space Telescope Fellowships.

15.5 Targets of Opportunity

Targets of Opportunity (ToO) are transient phenomena whose timing and/or location on the sky are unpredictable. They include objects that can be generically identified before the onset of such phenomena (e.g., recurrent novae, variable stars) and predictable phenomena that can be expected, although whose precise timing cannot be specified *a priori* (e.g., newly discovered comets, novae, supernovae, gamma-ray bursts).

Predictable phenomena whose exact timing may remain uncertain at the time of proposal submission should be submitted in response to a General Observer Call for Proposals (CP). Observations of completely unanticipated phenomena can be requested through Director's Discretionary Time (DDT) procedures.

By its very nature, a ToO warrants urgent consideration and attention, and unique procedures to handle such observations are therefore accommodated within all categories of Spitzer observing programs. At the time of proposal submission, investigators will classify each ToO request, based on the degree to which the execution of such an observation affects normal scheduling and observing procedures.

A General Observer proposal must include a valid Astronomical Observation Request (AOR) for each predictable ToO observation. The AOR must be completed in as much detail as possible, lacking perhaps the precise target position (i.e., a "null target") and refined integration times. The proposal must present a detailed plan of observations that will be implemented if the specific event occurs. Moreover, it must also provide an estimate of the probability of occurrence of the specified event during the relevant Spitzer observing cycle(s).

The SSC Director reserves the right to designate any ToO data for early release when such a release is deemed (by the Director) to be in the interest of the community.

15.5.1 Classification of Impact

At the time of proposal/AOR submission, investigators must classify each ToO observation into one of three categories based upon the impact that the observation will have on the normal scheduling and observing procedures (if approved). The classification scheme is based solely on the time elapsed between the activation of a Target of Opportunity AOR (§15.5.2) and the execution of the corresponding observation:

High-Impact	**< 1 week (normally a minimum 48-hour turnaround)**
Medium-Impact	**1-5 weeks**
Low-Impact	**> 5 weeks**

Apart from the overhead burdens applied to all Spitzer observations (§15.1), the SSC will impose no additional overheads on low-impact ToO observations. The SSC has developed separate calculations of Observatory overheads to be assessed against the high- and medium-impact categories of ToO observations. Current estimates of these special overhead burdens are described online within the 'Proposal Kit' section of the SSC website and are subject to change in future CPs. Proposals must include these overheads in the total requested observation time.

An investigator will self-determine the appropriate category, based upon the maximum delay (in their judgment) that is scientifically acceptable between the activation of an approved AOR and the execution of the observation. This information will be useful in permitting the SSC and the Time Allocation Committee (TAC) to scientifically assess the value of the ToO observation vis-à-vis other approved observations.

The Principal Investigator of a 'high-impact' ToO observation must include, as part of the observing proposal, strong justifications for a rapid turnaround of ToO data by the SSC and (if relevant) compelling evidence to support the need for rapid instrument changes. In general, the more disruptive the ToO observation is to normal scheduling and operations, the stronger the justification must be to approve the proposed observation.

Any ToO proposals seeking multiple-instrument observations on timescales shorter than the normal instrument campaign (7-14 days) will be assessed special overheads in observing time by the SSC. These overheads will reflect the observing time estimated to be lost to other programs if the approved ToO observations are activated, and will be factored into the proposal review conducted by the TAC. Proposals *must* include these overheads in the total requested observation time.

15.5.2 Activation of AORs

For an approved ToO, a request for AOR activation must be electronically submitted to the SSC Director by the Principal Investigator (PI) via the Spitzer Helpdesk (*help@spitzer.caltech.edu*). Following the request for activation, the SSC will ascertain the feasibility of conducting the ToO observations, taking into account sky visibility and the schedule of instrument campaigns. The observer will also submit a revised AOR, with precise coordinates and integration time. If the observations cannot be conducted on a schedule requested by the investigator, the SSC Director will consult with the Principal Investigator on the scientific utility of later observations. The SSC Director must issue final approval for any high-impact ToO observations requiring an interruption of the onboard observing schedule.

An approved ToO observation will be executed only in the event that the specified phenomenon actually occurs within the relevant observing cycle. If the triggering event for an approved ToO observation does not occur during the observing cycle, the AOR will be deactivated at the end of the cycle. In the event that a ToO observation expires without execution, the allotted observing time will be returned to the General Observer pool and the SSC will explicitly publicize this information as part of the next Call for Proposals.

15.5.3 Regulation of Observations

The SSC Director will rely on the recommendations of the Time Allocation Committee to assess the benefits of a proposed ToO observation against any disruptions to the efficient planning and scheduling of science observations with the Spitzer Space Telescope. Because of the heavy impact that high-impact ToO observations will have on the short- and medium-term schedule, no more than ten of these rapid-execution ToO observations will be approved and executed in any given observing cycle.

15.6 Generic Targets

Generic targets denote observations that fail to qualify as Targets of Opportunity (i.e., they have more refined and predictive spatial and temporal information than ToOs), and can be scientifically described, but lack precise celestial coordinates or brightness estimates *at the time of Spitzer proposal submission*. A generic target can be selected from a complementary observing program with Spitzer, or with any other telescope, but one where the conditional observations (assumed *to be under the control of the Spitzer Principal Investigator*) are scheduled, but not yet executed or analyzed prior to the proposal deadline.

An investigator may propose observations of generic targets, describing them in as much detail as possible in a Spitzer observing proposal. The investigator must submit AORs with celestial positions accurate to within 2 degrees (radius), and with integration times specified to within a factor of 1.5. After the complementary observations are obtained and analyzed, the Principal Investigator must modify the generic target AOR and include the precise celestial coordinates and integration time before the observations can be scheduled. The observations must be completed within the observing time allocation awarded when the proposal was approved.

An example of a generic target involves Spitzer follow-up observations of targets culled from a ground-based supernova search program. In this case, the investigator would demonstrate that scheduled ground-based observing time is likely to yield enough supernovae to create a credible Spitzer proposal. However, the initial observations have not yet been made at the time of Spitzer proposal submission. Once the ground-based data have been taken, the proposing investigator must specify the celestial coordinates of the new supernovae, an integration time, and submit a completed AOR at least eight weeks prior to observing. [If a more rapid response is required, the observations must be treated as a Target of Opportunity; see §15.5.]

Generic targets could be a primary component of second-look observations (§15.7). For example, generic targets describe the situation where Spitzer imaging data yields discoveries of new objects for which Spitzer spectroscopic second-look observations are desired, based upon selection criteria specified in the original science proposal. The targets and AORs must be completely specified three months prior to the end of the cycle in which they are selected.

15.6.1 Necessary Conditions

Proposals seeking to observe generic targets will be accepted for consideration through the normal processes if the following (relevant) conditions are satisfied:

- Rules pertaining to duplicate observations and priority of target selection (as specified in §15.2) apply. The basic principle is that the first observer who specifies the AOR with sufficient completeness to permit execution of the AOR has priority for the observation.

- The generic target observations are specified in celestial coordinates to < 2 deg (radius) in the initial AOR/proposal (see §15.6.2 for an exception pertaining to moving targets). The reason for submitting approximate coordinates is to enable the SSC to properly assess the over-subscription of various areas of the celestial sphere in making the observing time allocations.

- The generic targets are selected from datasets to which the proposing investigator has clear access.

- Observations of generic targets that require timely execution of Spitzer Space Telescope observations and rapid turnaround of validated data to the investigator (in order to specify second-look observations) are accepted at the risk to the observer. In other words, the SSC cannot guarantee that the sequence of Spitzer observations and follow-up observations will be executed completely. Generic target observations that are not completed during the given observing cycle are not carried over to the following observing cycle, and must be requested via the next proposal cycle.

15.6.2 Moving Targets

Generic moving targets meet all of the criteria above, except that the target positions for observations cannot be specified within 2 degrees because these objects move significantly in position on the sky between their discovery and subsequent Spitzer observation. Proposers must submit an AOR for a generic moving target with a target position 'to be determined' (from Navigation and Ancillary Information Facility identification, or from orbital elements).

Generic moving targets, like the analogous celestially fixed targets, must be selected from observations under the control of the investigator. The proposer must estimate the number of such targets to be observed with Spitzer, based on well-defined criteria. Examples of generic moving targets include near-Earth asteroids, main-belt asteroids, Centaurs and Kuiper Belt Objects. Because of the time urgency of observations, comets near perihelion should be treated as Targets of Opportunity (§15.5).

15.7 Second-Look Observations

A scientifically important factor in planning and implementing any category of observational investigation with the Spitzer Space Telescope is the ability to discover new phenomena or peculiar objects and then to characterize a sub-sample of them in a timely manner -- for the benefit of the entire user community. *Second-look observations (SLOs)* are deemed to be a predictable element of an integrated Spitzer observing program, even if they cannot be completely described at the time of proposal submission. Requests for SLOs must be included in the original proposal and must be described in as much detail as possible. The SLO concept applies to GTO, GO and Legacy Science investigations.

For example, an investigator can propose to conduct IRAC or MIPS imaging observations to identify objects with extreme color ratios, and then conduct IRS spectroscopy to characterize these objects. The spectroscopic observations comprise the second-look observations, and comprise a legitimate portion of the proposed scientific investigation. No more than ten percent of the total observing time being requested in a GO proposal may be allocated towards SLOs. Moreover, SLOs can include generic targets (see §15.6). In all cases, the SLOs must be justified as an integral part of the proposed science program at the time of proposal submission. The targets and AORs for approved second-look observations must be completely specified within two months of the time that the data from Spitzer necessary for their specification is made available in the archive.

Proprietary data periods for SLOs that are part of an approved GTO or GO program are the same as for any other element of that GTO or GO program. Data from SLOs conducted as part of a Legacy Science project enter the public domain as soon as the basic calibrated data are pipeline-processed and validated by the SSC.

15.8 Commissioning of AOTs

An Astronomical Observation Template (AOT) must be tested, validated and commissioned by the SSC before routine science observations can be executed with the corresponding observing mode. The commissioning of an AOT entails a wide variety of activities, and includes the verification of spacecraft command sequences, proper operability of the science instrument, and the proper input of spacecraft data and output of calibrated data by the relevant automated processing pipeline at the SSC.

Present plans call for eight Spitzer Space Telescope AOTs to be available to Cycle-2 General Observers:

- IRAC Mapping/Photometry
- IRS Staring-Mode Spectroscopy
- MIPS Photometry/Super-Resolution Imaging
- MIPS Scan Mapping
- IRS Spectral Mapping
- MIPS Spectral Energy Distribution
- MIPS Total Power
- IRS Peak-up Imaging

Guaranteed Time Observers may utilize non-commissioned AOTs at their own risk (if the commanding sequences are available). Calibration must be performed by the GTO investigator(s). Any observing time used to conduct the calibration observations will be assessed against the GTO investigator's allotment of time.

Observations selected through the Legacy Science and General Observer Programs will be scheduled for execution only after the corresponding AOT has been fully commissioned by the SSC.

15.9 Routine Calibrations

The SSC establishes and maintains the calibration of each Spitzer science instrument to levels specified in the individual instrument handbooks contained within the *Spitzer Observer's Manual*. The routine calibrations to be executed by the SSC on behalf of the community are described on the SSC website at the time of each *Call for Proposals*. Data resulting from routine facility calibrations generally enters the public domain immediately upon processing and validation by the SSC.

The initial on-orbit calibration of the Observatory, including the three science instruments, was performed during the In-Orbit Checkout period and Science Verification phase as part of the

commissioning of each observing mode (or Astronomical Observation Template, AOT). Observations of celestial targets necessary to establish the calibration of each AOT is part of the commissioning process for the AOT, and will not be subject to rules regarding duplicate observations (§15.2).

If the SSC must use a previously approved AOR for routine calibration purposes, the resultant data will be embargoed from scientific utilization until the proprietary period of the original observer ends.

The initial on-orbit calibration of the telescope was performed as part of the commissioning of each observing mode (or AOT, see §15.8). After an AOT is commissioned for general use, the SSC conducts the periodic observations necessary to maintain such calibrations. Calibration observations make up from 5-15% of the observing time per instrument campaign. Celestial and internal calibrations are a component of each 7-14 day instrument campaign. Observations of celestial targets necessary to maintain the calibration of each AOT are not subject to rules regarding duplicate observations.

Expected and achieved calibration accuracy for AORs processed with the normal calibration pipelines is published as part of the *Spitzer Observer's Manual*. For observations that require a higher level of calibration, and therefore special calibration observations (see §15.10), it is the responsibility of the requesting investigator to include those special calibration observations as part of their proposed observational program.

15.10 Special Calibrations

Any additional calibration(s) that are not included as part of routine calibrations (§15.9) conducted by the SSC will be regarded as special calibrations, and are the responsibility of the approved investigator. The observing time required to conduct such special calibrations will be charged against the observer's allocation and, for General Observers, must be included in the original science proposal. The SSC will process such observations through the normal data processing pipeline(s). The investigator is responsible for using these data for the special calibration requirements of their program. The normal proprietary data period applies to special calibration data that are part of an approved science program.

All Spitzer Space Telescope data, including routine and special calibrations, can be accessed and analyzed by appropriate SSC instrument specialists to assess instrument performance and to develop improved or necessary instrument calibrations. For such use of special calibration data, strict confidentiality will be maintained throughout the normal proprietary period.

15.11 Use of Parallel Observations

Only one Spitzer Space Telescope science instrument can be operated at any given time.

All of the science data obtained via a single Astronomical Observation Request (AOR) will be considered to belong to the requestor of the observation, and will be subject to the same proprietary data rights as the explicitly requested data. That is, the proprietary rules and periods apply to all of the data collected via a specific AOR, whether or not the observer explicitly requested it as part of their proposed science program. The four-channel IRAC camera aboard

Spitzer provides an example of such parallel observations. When imaging the sky at 3.6 and/or 5.8 microns, an offset field of view simultaneously collects images at 4.5 and 8.0 microns. All of the IRAC data are collected and processed via a single AOR, and hence are under the control of the Principal Investigator.

15.12 Infeasible or Non-Schedulable Observations

All approved observations are accepted with the understanding that there can be no guarantee that the observations will actually be obtained. The SSC will make all reasonable efforts to execute all approved observations.

In specifying observations through the completion of Astronomical Observation Requests (AORs), the front-end graphical user interface to the Astronomical Observation Template (AOT) will not process invalid parameters. Therefore, a completed AOR represents a 'doable' observation, in principle. In practice, however, it could turn out that the actual execution of some observations could prove to be highly difficult or impossible. For example, on-orbit events may conspire to restrict the range of acceptable or safe AOT parameters, and thereby make previously approved observations infeasible. If the AOR can be modified to make the observation feasible, the Principal Investigator will be given the opportunity to make these modifications. Otherwise, the AOR will be abandoned without execution, and the SSC will explicitly publicize this information as part of the next Call for Proposals. Guaranteed Time Observers will be permitted to re-allocate the relevant time from abandoned observations to another observation in their program. The usage of abandoned time from the Legacy Science Program and from General Observer investigations will be determined by the SSC Director.

15.13 Failed Observations

A failed observation is one that cannot be calibrated, or where a significant fraction of the data is lost or severely corrupted, or where the data processing system (the "pipeline") is incapable of processing the observation. Some failures may result from instrument anomalies, while other failures may be due to the loss of data in transmission. The SSC will attempt to repeat observations that fail for reasons beyond the Principal Investigator's control.

If an investigator believes that an observation has failed or has been seriously corrupted or degraded (and has not been identified as such by the SSC), he/she can submit a written request to the SSC Observer Support Team for a repeated observation. Any request for a repeated observation must be filed within two months of the investigator's data being made available to the investigator. If the SSC concurs with the request, attempts will be made to repeat the observation. The SSC Director reserves the right, in cases where the request for a repeated observation is approved, to place the failed/degraded observations into the public archive immediately. The request for a repeated observation will not be granted when the PI has committed an error in specifying the AOR.

If an investigator has obtained more than 90% of the data in a planned and approved observing program, and the missing data are not uniquely important for scientific goals of the program, then the request for a repeated observation will not normally be granted. Any failed AORs comprising the incomplete portion of an observing program will be explicitly publicized by the SSC as part of the next General Observer Call for Proposals.

15.14 Data Rights

Most observers have exclusive access to their science data during a proprietary period, intended to facilitate the processing and scientific analysis of the data by the relevant investigator. For General Observer and Guaranteed Time Observers, Spitzer Space Telescope observations shall have a proprietary data period of twelve months, commencing from the time that scientifically usable data from fully commissioned pipelines are made available to the Principal Investigator via the Spitzer Science Archive. Once the proprietary period expires, the raw and pipeline-processed data will enter the public domain and be available to anyone through the Spitzer Science Archive. The SSC Director reserves the right to designate any Target of Opportunity data for early release when such a release is deemed to be in the interest of the community.
There are no proprietary data rights for observations obtained through the Legacy Science Program. These data will enter the public domain immediately after pipeline-processing and quality assurance is performed by the SSC.

Because observations obtained through Director's Discretionary Time (DDT) are assumed to be of such urgency that they cannot be deferred until the next General Observer cycle, and are presumed to be of interest in the broad scientific community, proprietary periods for DDT observations will not exceed three months. The SSC Director reserves the right to make all raw and calibrated data publicly available immediately as a condition for approving a DDT request, particularly where the data involves an unexpected Target of Opportunity.

The Spitzer Time Allocation Committee may recommend a shorter proprietary period for individual proposals, particularly from the Large and Medium categories, due to the high value of the data to the general astronomical community. As part of their proposal, observers may request that the SSC Directory waive all or part of their proprietary period if the proposal is approved.

15.15 Publication and Dissemination of Science Results

It is expected that scientific results obtained through Spitzer Space Telescope observations, archival research, and theory investigations will be published in the scientific literature. All publications based on Spitzer data must carry an appropriate acknowledgement. Investigators should consult the SSC website for the appropriate acknowledgement template(s) [http://ssc.spitzer.caltech.edu/approvdprog/ackn.html].

In papers describing Spitzer results, investigators should provide reference(s) to seminal papers describing the Observatory, including the relevant science instruments. These references are posted on the SSC website at [http://ssc.spitzer.caltech.edu/pubs/seminalobs.html]. Moreover, the SSC encourages investigators to provide reference(s) to seminal Legacy Science project results, where appropriate. The most relevant Legacy Science Program references are listed on the SSC website at [http://ssc.spitzer.caltech.edu/pubs/seminallegacy.html].

The publication and dissemination of Spitzer science results is critical in assessing the success of the mission, and its contributions to NASA's strategic plans in space science. The Spitzer community is reminded of the important responsibility inherent in utilizing this national

resource, and in sharing the scientific results with the general public. The SSC Director encourages investigators with newsworthy results to utilize the resources and services of the SSC, JPL and NASA to help disseminate important results to the mass media and to the general public.

16 Appendix B: Spitzer Space Telescope Science Schedule

The monthly calendar of Spitzer events pertaining to the science user community is available at the SSC website (http://ssc.spitzer.caltech.edu/geninfo/sched/). Major events through 2005 include:

October, 2004	Initial Enhanced Legacy Data Products Delivery
November, 2004	Cycle-2 Call for Proposals Issued
	Spitzer New View of the Cosmos Conference
February, 2005	Cycle-2 proposals due
April, 2005	Cycle-2 proposal review
	2nd Enhanced Legacy Data Products Delivery
May, 2005	Cycle-2 proposal results announced
June, 2005	Cycle-2 observations being scheduling
October, 2005	3rd Enhanced Legacy Data Products Delivery
November, 2005	Cycle-2 Call for Proposals Issued
	Spitzer-sponsored Science Conference

17 Appendix C: Legacy Science Program

The Spitzer Space Telescope Legacy Science Program is comprised of six projects selected in November 2000 following a solicitation of proposals and competitive peer review. The Program was motivated by a desire to enable major science observing projects early in the mission, with the goal of creating a substantial and coherent database of archived observations that can be utilized by subsequent Spitzer researchers, including General Observers (GOs). Legacy Science projects are distinguished from GO investigations by the following fundamental principles:

- They are *large and coherent science projects*, not reproducible by any reasonable number or combination of smaller GO investigations;

- They are projects of *general and lasting importance* to the broad astronomical community, with the Spitzer observational data yielding a *substantial and coherent database*; and

- They are projects whose raw and pipeline-processed *data enter the public domain immediately upon SSC processing and validation*, thereby enabling timely and effective opportunities for follow-on observations and for archival research, with both Spitzer and other observatories.

The six approved projects utilize a total of 3160 hours of Spitzer observing time, primarily in the first year of the mission, and integrate substantial ancillary data from ground-based observatories and other space-borne telescopes. Each Legacy Science project is also developing post-pipeline data products and/or analysis tools that will be delivered to the SSC for wider dissemination to the community. These products, including catalogs and image mosaics, will be invaluable to researchers planning future GO proposals. The first delivery of enhanced Legacy science data products from the teams to the community was made in October, 2004.

The six Legacy Science projects are summarized below.

- **GLIMPSE: Galactic Legacy Infrared Mid-Plane Survey Extraordinaire**
  Ed Churchwell (University of Wisconsin), Principal Investigator
  400 hours of Spitzer observing time

A 220 square degree IRAC survey of the inner Galactic plane, extending from 10 to 65 degrees in longitude on either side of the Galactic Center, and from -1 to +1 degree in latitude. The primary science goals include studying the structure of the inner Galaxy and investigating the statistics and physics of star formation.

- **GOODS: The Great Observatories Origins Deep Survey**
  Mark Dickinson (National Optical Astronomy Observatory), Principal Investigator
  647 hours of Spitzer observing time

A deep 300 square arcmin IRAC and MIPS (24-micron) survey that overlaps deep fields obtained by the Hubble Space Telescope and the Chandra X-ray Observatory. The primary science goals include the study of galaxy formation and evolution over a wide range of redshift and cosmic look back time.

- **c2d: From Molecular Cores to Planet-Forming Disks**
  Neal Evans II (University of Texas), Principal Investigator
  400 hours of Spitzer observing time

Imaging surveys of nearby molecular clouds, with follow-up spectroscopy of young and embedded stellar sources. The primary science goals include the study of the evolution of molecular cores into protostars and disks, the incidence and early evolution of sub-stellar objects, and the spatial structure of groups and clusters.

- **SINGS: The Spitzer Nearby Galaxies Survey -- Physics of the Star-Forming ISM and Galaxy Evolution**
  Robert Kennicutt Jr. (University of Arizona), Principal Investigator
  512 hours of Spitzer observing time

A comprehensive imaging and spectroscopic survey of 75 nearby galaxies in order to characterize their large-scale infrared properties. The primary science goals are to understand the physical processes connecting star formation to the ISM and to provide diagnostic templates for interpreting observations of objects in the distant universe.

- **SWIRE: The Spitzer Wide-area InfraRed Extragalactic Survey**
  Carol Lonsdale (IPAC/California Institute of Technology), Principal Investigator
  851 hours of Spitzer observing time

Wide-area, high-latitude imaging surveys of ~50 square degrees, reaching to cosmological redshifts of ~2.5. The primary science goals include the evolution of dusty, star-forming galaxies, evolved stellar populations and AGN as a function of environment. The resultant catalogs will include ~2 million infrared-selected galaxies.

- **FEPS: The Formation and Evolution of Planetary Systems -- Placing Our Solar System in Context**
  Michael Meyer (University of Arizona), Principal Investigator
  350 hours of Spitzer observing time

An imaging and spectroscopic survey of hundreds of young stars with accretion disks, ranging in age from a few million years to a few billion years. The primary science goal is to trace the evolution of planetary systems from stellar accretion through the coalescence of solids and accretion of remnant molecular gas, and on through the planetary debris disk phase.

More information about the Legacy Science Program is available on the SSC website (http://ssc.spitzer.caltech.edu/legacy) including extended abstracts of the programs, links to PASP articles describing the science goals, and links to the Legacy Team websites. Also see the SSC publication archive (http://ssc.spitzer.caltech.edu/pubs/) for more information.

18 Appendix D: Director's Discretionary Time

Five percent of the available Spitzer Space Telescope observing time is allocated by the SSC Director as Director's Discretionary Time (DDT). It is intended to facilitate observations that address emerging scientific topics or areas missed in the proposal review process. *This Call for Proposals (CP) does not solicit DDT proposals.* Investigators wishing to request DDT can do so at any time during the year, by using the DDT submission template and procedures described on the SSC website (http://ssc.spitzer.caltech.edu/geninfo/ddt).

The primary utilization of DDT will be in support of community-proposed requests that are based on exceptional, time-critical observing opportunities that cannot be accommodated with the regular cycle of CPs. Other DDT usages may include innovative observations that extend the scientific capabilities of Spitzer, and extraordinary events and opportunities that necessitate -- in the view of the SSC Director -- observations to be obtained with Spitzer for the benefit of the astronomical community. Requests for DDT must be submitted electronically to the SSC Director via the SSC website (http://ssc.spitzer.caltech.edu/geninfo/ddt). All questions should be sent to the Helpdesk (help@spitzer.caltech.edu).

The DDT requests must include a strong scientific justification, completed Astronomical Observation Requests (if possible) and must specify why the request could not be submitted via a proposal to the regular GO program. A proposal for DDT might be appropriate in cases where a truly unexpected transient phenomenon occurs or when developments since the previous Spitzer proposal deadline make a time-critical observation necessary. *Requests for DDT cannot be used to resubmit all or part of a proposal that was rejected by the normal peer review process.*

Recognizing the limited lifetimes for major space astronomy facilities such as the Hubble Space Telescope, the Chandra X-ray Observatory and the Spitzer Space Telescope, DDT proposals for rapid follow-up of new discoveries will also be considered. In such cases, the proposing investigator must demonstrate that the observations will provide a critical link in the understanding of the phenomena and that carrying them out quickly is particularly important for planning future observations with major facilities. They should then also indicate their plans for quickly making the scientific community aware of their discoveries, to enable subsequent wider community follow-up.

A request for DDT observations is predicated on the assumption that the proposed observations are deemed to be of such urgency that it cannot be deferred until the next GO cycle, and that the observations will be of interest to the broad scientific community. Therefore, proprietary data periods for DDT observations will be no more than three months, at which point the data will enter the public domain. The SSC Director reserves the right to make all raw and calibrated data publicly available immediately as a condition for approving a DDT request, particularly where the data involves an unexpected Target of Opportunity.

Any unutilized DDT will be returned to the General Observer allocation for the next proposal cycle.

19 Appendix E: Special Telescope Overheads

Special overhead burdens are applied to:

1. observations of high- and medium-impact Targets of Opportunity (ToO),
2. rapid non-sequential instrument observations of a target, and
3. solar system targets with a late ephemeris change.

These special overheads are added to the normal overheads applied to each Astronomical Observation Request (AOR) computed by the Spitzer Planning Observations Tool. They represent current estimates of the time required to prepare for the observation and to return the Telescope to its nominal configuration and schedule. As described in §15.1 of the *Spitzer Space Telescope Observing Rules* (Appendix A), the special overheads are intended to reflect the observing time lost to other programs as a result of executing the relevant observation(s).

For observations in categories (1) and (2) above, it is deemed that access to the source in a timely manner is more important than the calibration accuracy. The advantages of stable operations within a normal instrument campaign of 7-14 days are compromised in these quick-turnaround scenarios, and the Principal Investigator needs to ensure that the data collection is sufficiently robust to meet reliability and calibration accuracy requirements.

In evaluating General Observer proposals, peer reviewers will assess the value of observations with special overhead burdens against other proposed observations. Proposals *must* include these overheads in the total requested observation time. The special telescope overheads are listed below.

High-Impact Target of Opportunity, Single Instrument: 6.5 hours
This overhead will be applied to the first AOR in a *group*, *chain* or *sequence* of AORs to be executed consecutively during a single observing session on a single ToO with one science instrument. For observations that are constrained with a *follow-on* constraint, the overhead must be applied to every AOR individually. The *group*, *chain* or *sequence* constraints mean observations can be scheduled contiguously and therefore have less impact on the schedule than those constrained with a *follow-on* constraint.

High-Impact Target of Opportunity, Multiple Instruments: 8.8 hours
This overhead will be applied to the first AOR in a *group* of AORs to be executed consecutively during a single observing session on a single ToO. Either two or three instruments may be used if the observation is constrained in a manner (i.e., the 'GROUP' constraint) which allows the instruments to be used in any order. For observations that are constrained with a *follow-on* constraint, the overhead must be applied to every AOR individually.

Medium-Impact Target of Opportunity, Single Instrument: 2.6 hours
This overhead will be applied to the first AOR in a *group, chain or sequence* of AORs to be executed consecutively during a single observing session on a single ToO with one science

instrument. For observations that are constrained with a *follow-on* constraint, the overhead must be applied to every AOR individually.

Medium-Impact Target of Opportunity, Multiple Instruments: 5.2 hours
This overhead will be applied to the first AOR in a *group* of AORs to be executed consecutively during a single observing session on a single ToO. Either two or three instruments may be used if the observation is constrained in a manner (i.e., the 'GROUP' constraint) which allows the instruments to be used in any order. For observations that are constrained with a *follow-on* constraint, the overhead must be applied to every AOR individually.

Non-Standard Sequential Observations: 2.6 hours per instrument change
The normal cycle of scheduled instrument campaigns (of 7-14 days duration) will be IRAC-MIPS- IRS-IRAC, etc. Requests for observations, to be executed in rapid succession, that violate this sequence will be assessed additional overheads per instrument change. For example, a request for IRAC observations, followed shortly thereafter by an IRS observations, will be assessed an additional 2.6 hours of overheads. A request for near-contemporaneous observations of a target with all three instruments will be assessed 5.2 hours of special overheads.

Late Ephemeris Change: 0.5 hour
This overhead will be applied to the first AOR in a *group, chain or sequence* of AORs to be executed consecutively on the same moving target during a single observing session, using a single science instrument. Use of multiple instruments will incur yet additional special overheads, as described above. Late ephemeris updates are required if an ephemeris update is required less than 5 weeks prior to the start of the week in which the observation will execute. The ephemeris will be updated two weeks prior to the start of the week in which the observation is scheduled. Anyone requesting an ephemeris update later than this time should request it and strongly justify it in their proposal.

These overhead must be specified using *Spot* when the AORs for the proposal are created. From within the relevant AOR dialog click the **Special …** button and select the appropriate overheads from the list. *Spot* will calculate the required time and add it to the Total Duration returned on the main *Spot* AOR page.

20 Appendix F: Allowable Costs

Archival Research (AR) and Theoretical Research (TR) proposals will be evaluated, in part, on the reasonableness of the proposed costs and the overall cost effectiveness of the investigation. The allowable costs which should be included in the cost plan are listed below. A budget narrative (not subject to the overall proposal page limit) should be included describing the funding program.

20.1 Salaries and Wages

Direct labor costs for eligible project investigators should be included and itemized. Spitzer Space Telescope funds may not be used to pay more than a person's full-time salary or to pay more than an individual's hourly wage rate. An investigator may not normally be reimbursed for consulting or other work in addition to a regular full-time institutional salary covering the same period of employment. For faculty members in academic institutions, Spitzer funding will normally be limited to no more than two months of summer salary support. Exceptions for released time during the academic year (e.g., "buying back" teaching time) may be permitted, but such costs must be fully justified in the proposal and the compensation requested must be reasonable and consistent with each employee's regular full-time salary or rate of compensation. Released time for project investigators working in non-academic institutions may be proposed, provided the compensation requested is reasonable and consistent with each employee's regular full-time salary or rate of compensation.

It is assumed that most scientists will be affiliated with institutions that will make substantial support available for project activities (e.g., computer facilities, collaboration with other scientists, students, or research assistants).

20.2 Research Assistance

Direct labor costs for graduate students, post-doctoral associates, data aides, and secretarial and technical support should be included and itemized. For post-doctoral associates and other professionals, each position should be listed with the number of months, percentage of time that will be spent on the project, and rate of pay (hourly, monthly, or annual). For graduate students and secretarial, clerical, and technical staff, only the total number of persons and the total amount of salaries per year in each category are required. All such salaries must be in accordance with the standard policies of the institution assuming responsibility for the project.

20.3 Fringe Benefits

If an institution's usual accounting practices provide that its contributions to employee "benefits" (Social Security, retirement, etc.) be treated as direct costs, funds may be requested for all applicable fringe benefits. In this case, proposers must break out the associated costs and list them as a separate cost component within the direct labor element.

20.4 Publication Costs

Reasonable costs for publication of research results obtained from a Spitzer research investigation should be included as a component of "Other Direct Costs."

20.5 Travel

Itemized transportation and subsistence costs for project personnel to plan, obtain, analyze, and disseminate direct results of a Spitzer research investigation should be included. Proposers must include origin/destination, number of travelers, number of trips, and costs associated with each, and include this information as a component of "Other Direct Costs."

20.6 Computer Services

The itemized costs of computer time and software for the analysis of Spitzer data should be included. Details of the services and software that will be used must be fully described and justified in the proposal, and included as a component of "Other Direct Costs."

20.7 Equipment

Itemized equipment costs, including computers or related hardware, should be included and accompanied by a detailed justification in the budget narrative. In general, the title to approved equipment purchased for $5,000 or less will be vested with the Contractor. The title to equipment costing in excess of $5,000 will be vested with the U.S. Government, unless JPL and/or NASA indicate otherwise in writing. In either case, if the proposer seeks title to the equipment, it must be noted in their cost narrative.

20.8 Materials and Supplies

The itemized costs of materials and supplies directly related to the Spitzer research investigation may be included, provided such costs are not already reimbursed through indirect costs or some other means. These costs should be included as a component of "Other Direct Costs."

20.9 Indirect Costs (IDCs)

Indirect costs may be proposed, provided that the IDC rate used in the budget is based on a Negotiation Agreement with the Federal Government, or its designated agent.

21 Appendix G: Acronyms and Abbreviations

2MASS	Two-Micron All-Sky Survey
AAS	American Astronomical Society
AOR	Astronomical Observation Request(s)
AOT	Astronomical Observation Template(s)
AR	Archival Research
BIC	Basic Instrument Campaign schedule
Co-I	Co-Investigator
CP	Call for Proposals
CXC	Chandra X-Ray Center
CXO	Chandra X-Ray Observatory
DDT	Director's Discretionary Time
DSS	Digital Sky Survey
EPO	Education and Public Outreach
FAQ	Frequently Asked Questions(s)
FOV	Field of View
GO	General Observer(s)
GTO	Guaranteed Time Observer(s)
HST	Hubble Space Telescope
IBC	Impurity-Band Conductor(s)
IDC	Indirect Cost(s)
IOC	In-Orbit Checkout
IPAC	Infrared Processing & Analysis Center
IRAC	InfraRed Array Camera
IRS	InfraRed Spectrograph
IRSA	InfraRed Science Archive
ISO	Infrared Space Telescope
JPL	Jet Propulsion Laboratory
MIPS	Multiband Imaging Photometer for Spitzer
NAIF	Navigation and Ancillary Information Facility
NASA	National Aeronautics and Space Administration
NED	NASA/IPAC Extragalactic Database
NOAO	National Optical Astronomy Observatory
NRAO	National Radio Astronomy Observatory
OSS	Office of Space Science
PDF	Portable Document Format
PI	Principal Investigator
ROC	Reserved Observations Catalog
SA	Science Archive
SED	Spectral Energy Distribution(s)
SIMBAD	Set of Identifications, Measurements, and Bibliography for Astronomical Data
SLO	Second-Look Observation(s)
SODB	Science Operations Database
STScI	Space Telescope Science Institute

SOM	Spitzer Observer's Manual
SSC	Spitzer Science Center
TAC	Time Allocation Committee
ToO	Target(s) of Opportunity
TR	Theoretical Research