Spitzer Space Telescope

Cycle-3 Call for Proposals

Version 1.0

General Observer Program
Legacy General Observer Program
Archival Research Program
Theoretical Research Program
Guaranteed Time Observer Program

Key Dates:
Call for Proposals Issued: November 01, 2005
Proposals Due: February 16, 2006, 1:00 pm (PST), Thursday
Cycle-3 Observations Start: June 2006

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

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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-3 General Observer (GO), Legacy General Observer (Legacy), 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). Legacy General Observer proposals seek observing time of > 50 hours, request no proprietary data rights for their program and promise to return enhanced science data products to the astronomical community. The hallmark of these Legacy projects is the applicability of the data to research beyond the objectives of the proposed investigation. It is anticipated that 6000 hours of observing time will be available to GO and Legacy investigators in Cycle-3. Spitzer GO/Legacy 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 $24 million of NASA data analysis support is available to eligible researchers in Cycle-3.

Archival and Theoretical Research proposals should be submitted only if investigators are seeking NASA data analysis support. It is anticipated 5-10% of the Cycle-3 data analysis support will be made available for Archival and Theoretical investigations. If no funds are required to support the archive or theory investigation, no Cycle-3 proposal should be submitted.

Guaranteed Time Observer (GTO) proposals will also be submitted for 1125 hours of observing time allocated in Cycle-3.

All proposals must be submitted electronically to the Spitzer Science Center (SSC). The proposal deadline for all proposals is February 16, 2006, 1:00 pm (Pacific Standard Time).

In order to have an adequate pool of targets for observing at the end of Cycle-3 we are calling for 13 months of observations in this CP.

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-3 proposals must be submitted with *Spot***, a free software package available within the online Proposal Kit. *Spot* must be downloaded to your computer.

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.

Questions about proposal planning should be sent to 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 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-3 research programs.

Upon selection by the SSC Director, a GO program is entered into the Spitzer observations database for execution as part of Cycle-3, commencing in June 2006. Funding for approved AR and TR investigations will be issued after the cycle begins, most likely in the first quarter of fiscal year 2007 (October-December 2006).

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*.

A Legacy proposal includes the elements listed above for GO programs and adds the following:

- A statement that no proprietary period is requested for the data, i.e. the nominal one-year proprietary period is waived.
- A plan for returning enhanced science data products to the community.
- A program design that ensures the observational data will have wide utility to the broader scientific community.

No cost plans are required for GO or Legacy proposals. The science data analysis funding for approved and eligible investigators will be determined through formulaic means (§6.1.10). Successful Legacy proposers will also be allocated additional funds, via contracts, specifically for creating and delivering the enhanced data products.

In general, 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. The *Observing Rules* are also reproduced in their entirety in Appendix A of the current document. Proposers should use *Leopard*, the SSC archive interface tool, to search all observations that have been executed or approved for execution for potential duplications. The *Reserved Observations Catalog* is also available online in list form.

An AR proposal is submitted only if the proposer seeks 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 the proposer seeks 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 (models, algorithms, etc.) will be made available 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 S13). Proposals must conform to all requirements and constraints described in this CP, in particular the format and page limits listed in §8.2. The proposal submission deadline is 1:00 pm (Pacific Standard Time) on Thursday, February 16, 2006.

Archival and Theoretical proposals must include a cost plan and budget narrative in the proposal PDF file submitted by the February 16th deadline. Three paper copies of the institutionally endorsed cost plan and budget narrative for Archival and Theoretical proposals must be received at the SSC by Friday, February 24, 2006, 5:00pm (Pacific Standard Time). *Only the cost plan submitted as part of the PDF proposal file will be provided to the reviewers.*

2 Introduction to Cycle-3

This *Call for Proposals (CP)* solicits participation to conduct Cycle-3 Spitzer Space Telescope research. Investigations may be proposed in one of five categories:

General Observer (GO) Program
This program allows investigators to propose new observations with the Spitzer Space Telescope. Proposals are categorized as *small* (less than 50 hours), *medium* (50 to 200 hours) or *large* (> 200 hours).

Legacy General Observer (Legacy) Program
This program allows investigators to propose new observations with the Spitzer Space Telescope. Legacy programs must be greater than 50 hours, have no proprietary period, and must create and return to the astronomical community enhanced data products (e.g. reduced images, spectra, catalogs and appropriate documentation). The program must be designed so that the observational data will have wide utility to the broader scientific community.

Guaranteed Time Observer (GTO) Program
1125 hours are available to the Guaranteed Time Observers who built the Spitzer focal plane instruments.

Archival Research (AR) Program
The AR Program provides funding support for the analysis of Spitzer data publicly available in the archive by December 31, 2006. The entire original Legacy Science Program 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.

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) proposals and all GTO proposals, a complete set of proposed observations (Astronomical Observation Requests), generated by *Spot* must be submitted as part of the proposal. GO medium (50-200 hours), large (> 200 hours) and Legacy proposals must include representative AORs 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 GO 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-3 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-3 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-2

Features of the Spitzer Cycle-3 *Call for Proposals* that differ substantially from Cycle-2 are summarized here.

1. Scope of Proposals:
    a. Legacy programs will be accepted in Cycle-3. These programs require greater than 50 hours of Spitzer time and have no proprietary data rights. In addition to having strong science goals they also promise to return enhanced data products to the astronomical community. The program must be designed so that the observational data will have wide utility to the broader scientific community.
    b. Approximately 6000 hours will be available for General Observers (including Legacy programs) in Cycle-3, equal to the time awarded to GO observations in Cycle-2.
    c. In order to allow for adequate observations at the end of Cycle-3, the duration will be 13 months (June 1, 2006 through June 30, 2007).
    d. In addition to the 6000 hours available for General Observers, 1125 hours is available for Guaranteed Time Observers. We are currently scheduling 575-580 science hours per month, we therefore expect to schedule ~7500 hours for the 13 months of Cycle-3. This is 6000 hours of GO/Legacy, 1125 hours of GTO and 375 hours of Director's Discretionary Time (DDT) observations.
    e. Archival proposals will be accepted for studies using Spitzer data that will be publicly available by December 31, 2006.
    f. Joint observing proposals will again be accepted that require time with NRAO (200 hours each – VLA/GBT), NOAO (5% of total time available; including Gemini, excluding Magellan and Keck), HST (90 orbits total), and/or Chandra (400 ksecs total) to support the main Spitzer observations. The award of joint observatory time is recommended solely by the Spitzer TAC.
    g. Collaborative Spitzer-HST General Observer proposals that were solicited in Cycle-2 are not offered in Cycle-3. This proposal category was for programs that required large commitments of time from both HST (> 100 orbits) and Spitzer (> 50 hours) to reach their science goals. Joint Spitzer-HST proposals are accepted in Cycle-3, i.e., those proposing for a modest number of HST orbits in addition to their Spitzer request. If there is sufficient interest in the community the Collaborative program will be offered again in Cycle-4.
    h. Programs with substantial numbers of bright targets will be identified as difficult to schedule by the SSC, and their evaluation will be affected accordingly.
2. Observing Modes:
    a. MIPS 160 micron observations: In order to maximize Spitzer's cryogenic lifetime, MIPS campaigns will be organized into "warm" (telescope cooled to 8.5K) or "cold" (5.7K) campaigns. *Please read §4.4.1 for more details.* The cold campaigns, in which 160-micron observations can be executed, are likely to be scheduled during a continuous 6-month period to enable observations of the full sky. During the rest of Cycle-3, only warm MIPS campaigns will be executed. Programs requiring MIPS 160 micron observations must justify this specifically

in the proposal. Programs requiring 160-micron data will be more difficult to schedule given that every MIPS campaign will not be 'cold'.

b. IRS Long-High Observations: As a result of the continual increase in the number of degraded pixels in the IRS Long High module due to the effects of Cosmic Rays, the IRS Instrument Support Team strongly urges that all Long High (LH) observations of sources with equivalent point source flux densities of 2.0 Jy or less at 25 microns be accompanied by off-source background measurements. *Please read §4.4.2 for more details.*
c. IRAC Stellar Mode: The IRAC AOT now includes a stellar mode that allows different frame times to be used for the shorter and longer wavelength arrays.

3. Details of Proposals:
   a. You MUST use the templates provided at the proposal kit website for preparing your PDF proposal attachment. This was required in Cycle-2 but a number of people ignored it and submitted proposals without all the required sections. Reviewers have a harder time evaluating proposals with missing sections.
   b. Proposals that violate the page limits may be edited prior to being sent to the reviewers. Pages in excess of those allowed will be deleted from the PDF file.
   c. Archival/Theoretical: Cost plans for archival and theoretical proposals *must* be included in the proposal PDF file submitted by the February 16th deadline. Institutionally endorsed hard copies of the cost plans must also be sent to the SSC by February 24, 2006 but these paper copies will NOT be distributed to the review panels. If the cost plan and budget narrative are not included in the original PDF proposal file then *the panels and TAC will have no way to evaluate the cost effectiveness of the proposed effort*. The panels and TAC cannot fully evaluate your proposal without these components.
   d. Proprietary Period: Any modification to the standard proprietary period should be specified in *Spot*. There is now a field in the proposal tool for entering the number of days in the proprietary period, nominally 365 days for GO programs.
   e. In the "Status of Existing Observatory Programs" section of the proposal, provide this information for the PI and CoIs primarily involved in the proposal, not just the PI.
   f. Figures and tables should be segregated into a separate section and not embedded into the text of the Science Justification or Technical Plan. Two pages are allowed for figures and tables.
   g. Joint observing proposals are now allowed 1-additional page in the technical plan for each additional observatory. For example, if you request HST and NRAO time in your Spitzer proposal you can include one page in the technical plan for the HST observations and one page for the NRAO observations.
   h. One page of references is allowed in all proposals. References no longer count toward the two pages allowed for figures and tables.
   i. Version S13 of *Spot*, the SSC proposal and observation planning software, is scheduled to be available from the Proposal Kit website in mid-November 2005. You must submit your proposal with this version of *Spot*.

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 is in 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 (Channel 1), 4.5 microns (Channel 2), 5.8 microns (Channel 3) and 8.0 microns (Channel 4). The 256 x 256 focal-plane arrays use Indium Antimonide (InSb) detectors for the two short-wavelength channels, 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 Channels 1 and 3 comprising one FOV, and Channels 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 ($\lambda / \Delta\lambda = 64\text{-}128$): the short-wavelength module covering 5.2 to 14.5 microns, with a pixel scale 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 a pixel scale 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 a pixel scale 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 a pixel scale 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, MIPS is capable of measuring low-resolution ($\lambda / \Delta\lambda = 15\text{-}25$) 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. 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. The scan mirror also enables 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-3, 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 software for Spitzer observation planning. The AOTs in *Spot* provide observers with control of all the relevant parameters for their observation. An AOT with target information and observer-selected 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-3 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

Complete sets of AORs covering the entire observing program must be submitted with proposals requesting less than 50 hours of observing time and all GTO proposals. A representative set of AORs that fully describes the observing program must be submitted with GO/Legacy proposals requesting 50 hours or more of observing time (though the entire set may also be submitted).

4.4.1 MIPS Warm Campaigns: 160 micron Observations

In order to maximize Spitzer's cryogenic lifetime, MIPS campaigns will be organized into "warm" (telescope cooled to 8.5K) or "cold" (5.7K) campaigns. The cold campaigns, in which 160-micron observations can be executed, are likely to be scheduled during a continuous 6-month period to enable observations of the full sky. During the rest of the cycle, only warm MIPS campaigns will be executed. Programs requiring MIPS 160 micron observations must justify this specifically in the proposal. If MIPS Scan AORs are requested and the 160 micron observations are required to accomplish the science objectives of the program, the '160 micron required' checkbox must be selected in the AORs. AORs requiring 160 micron will be segregated and scheduled only in cold (5.7K) MIPS campaigns. MIPS observations not requiring 160-micron data will be scheduled in warm (8.5K) or cold (5.7K) campaigns. Programs requiring 160-micron data will be more difficult to schedule given that every MIPS

campaign will not be ‘cold’. Proposers should carefully consider the science objectives of their program before requesting 160-micron data.

A proposal can contain both ‘warm’ and ‘cold’ MIPS AORs. The AORs are scheduled individually, not as a program.

4.4.2 IRS Long-High Observations

As a result of the continual increase in the number of degraded pixels in the IRS Long High module due to the effects of Cosmic Rays, the IRS Instrument Support Team strongly urges that all Long High (LH) observations of sources with equivalent point source flux densities of 2.0 Jy or less at 25 microns be accompanied by off-source background measurements. Examination of the properties of Long High warm, or "rogue" pixels (pixels with abnormally high dark current that vary unpredictably with time), shows that the rogue dark current can be reduced substantially by subtracting a nearby background spectrum taken within a few hours of the science spectrum. Improvements in the signal-to-noise in the extracted spectrum can be substantial, up to 80% when averaged over an entire order of Long High and when the integration time is split evenly between target and background, since for faint sources the dark current in the rogue pixels is the dominant source of noise. This recommendation applies chiefly to those observers using IRS Staring mode. Observers who are mapping their sources may only need one additional background observation, or none, depending on the extent of their map.

To reduce the (increasing) number of rogue pixels, the bias voltage on the Long High array was reduced in October 2005. This should reduce the current number of rogue pixels (approximately 1200) by a factor of about 2.5. This reduction in bias should improve the overall signal to noise ratio of LH spectra even if no additional background observations are obtained, however, background subtraction will further improve the signal-to-noise in faint source spectra by about 30%, averaged over an order of Long High.

4.4.3 IRAC Stellar Mode

The IRAC AOT now includes a stellar mode that allows different frame times to be used for the shorter and longer wavelength arrays. See the Spitzer Observer’s Manual (SOM) for more information.

4.5 Science Operations

An integrated team of personnel from the Jet Propulsion Laboratory (JPL), Lockheed Martin (Denver) and the Spitzer Science Center (SSC) conducts flight operations for Spitzer. 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-3 *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 data from proposals selected by the SSC.

5.1 Who May Submit a Proposal

This solicitation for General Observer (GO), Legacy General Observer (Legacy), 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/Legacy 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.

GO and Legacy Program proposals requesting Spitzer observing time may be submitted by 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 §6.1.10.*

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.

Guaranteed Time Observer (GTO) proposals may only be submitted by the three Spitzer instrument team PIs: James R. Houck, Giovanni G. Fazio, and George H. Rieke.

Graduate students can apply for Spitzer time as principal investigators. Before applying they should check with their advisors regarding any specific requirements of their home institution regarding proposal submission.

5.2 Funding Support

The SSC will provide financial support for Cycle-3 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 that propose investigations with Spitzer should seek support through their own appropriate funding agencies.

For the General Observer programs (GO and Legacy), 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 §6.1.10.

Legacy programs will be eligible for additional funding to support the creation and delivery of enhanced data products to the astronomical community. This funding is determined using a separate formula from that used to calculate the data analysis funding for eligible programs. Successful Legacy observers will be notified of the amount of formulaically determined science data analysis funding and enhanced data products creation funding after selection. The funding for creating enhanced data products will be provided in a separate contract from the science funding provided to all eligible GO observers.

Data analysis support for the GTO programs is provided separately.

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 proposals 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 funding instrument used by JPL (not always a contract) will depend on whether the program is a GO/Legacy/AR/TR investigation and on the nature of the Principal Investigator's home institution. Additional details about the Spitzer research funding contracts are provided in §5.2.1.

5.2.1 Overview of Research Funding Instruments

5.2.1.1 RSA -- Research Support Agreement

The Research Support Agreement (RSA) is a simple Fixed Price, Advance Paid, subcontract provided through JPL that is used for GO science funding and can be awarded to educational and non-profit institutions. RSAs can only be issued for the formulaically determined science funding. No budget submission to the SSC or JPL is required, though your institution may require you to create a budget for internally handling the funds. Your institution is sent the RSA paperwork, returns the completed forms, and JPL then mails your institution a check for the entire award amount. The administrative overhead for executing RSAs is about half that of standard contracts so using these instruments allows us to send out more money for research and

pay less for the administrative costs. No-cost extensions are NOT available for RSAs. You have three years from the start of the Cycle to spend the funds, regardless of exactly when your RSA is issued. For example, for Cycle-1 all the RSAs expire on June 30, 2007. For Cycle-2 the RSAs expire on May 31, 2008.

At present, short quarterly reports are required for RSAs. These are generally a paragraph in length and are emailed to a repository that JPL will designate in the RSA. The RSAs are the fastest contracts to execute and are therefore funded first in the cycle. The SSC does not have all the funding for the Cycle available when it starts, therefore the issuance of the funding awards are spread out over about a 6-month period.

Institutions that are eligible to receive RSAs but elect not to accept them will generally be issued cost-reimbursable contracts**. The additional cost in issuing these contracts, rather than RSAs, will be deducted from the science funding for those investigators eligible for RSA funding but whose institutions request a different funding instrument.** The majority of RSAs are issued in the first quarter of the Cycle.

5.2.1.2 CREI -- Cost Reimbursement with an Educational Institution

CREIs are a standard JPL contract that we use to fund Archival and Theoretical research programs for investigators at educational institutions. These contracts require institutionally endorsed budgets, which are provided and evaluated with all AR/TR proposals. Investigators receiving CREIs are generally funded in the second quarter of the Cycle.

5.2.1.3 Other JPL Contracts

If you are at an institution that cannot accept RSAs or CREIs (e.g. a for-profit institutions) then you will be funded by JPL with the appropriate contract. These programs are typically funded in the second quarter of the Cycle.

5.2.1.4 Direct NASA Funding

Investigators affiliated with NASA Centers will receive their award of formulaically determined funds directly from NASA, following guidance provided by the SSC. The SSC and JPL provide NASA Headquarters with the investigators, institutions, and formulaically determined funding amounts, and Headquarters sends these funds directly to the appropriate NASA centers. This applies for GO, Legacy, AR and TR programs. These programs are typically funded in the second quarter of the Cycle.

6 Proposal Categories

This *Call for Proposals (CP)* solicits proposals to conduct research in the General Observer (GO), Legacy General Observer (Legacy), Guaranteed Time Observer (GTO), Archival Research (AR), and Theoretical Research (TR) Programs.

6.1 General Observer and Legacy General Observer Programs

The Spitzer General Observer (GO) and Legacy General Observer (Legacy) Programs allow 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/Legacy investigations. The GO and Legacy Programs are open to all investigators worldwide on a competitive basis. Apart from Targets of Opportunity (§6.1.5), GO and Legacy programs that are not executed to completion by the nominal end of Cycle-3 will typically be carried over into Cycle-4.

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 research proposals. Cycle-3 is 13 months in duration (June 2006 through June 2007). We are currently scheduling 575-580 science hours per month**. We therefore expect to schedule ~7500 hours for the 13 months of Cycle-3, including 6000 hours of GO/Legacy, 1125 hours of GTO and 375 hours of DDT observations.** [See Appendix B for nominal science schedule.]

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

Proposals requesting 50 or more hours may be submitted as regular GO or Legacy programs. Assuming sufficiently high scientific merit, it is anticipated that between 2000 and 3000 hours of the available observing time will be allocated in support of medium and large GO/Legacy investigations. There is no expectation of a specific allocation between medium/large GO and Legacy programs.

6.1.2.1 Legacy General Observer Proposals

Legacy proposals have the following characteristics:

1. Spitzer observing time requested is 50 or more hours.
2. There is no proprietary period requested for the data.
3. The program is designed so that the observational data will have wide utility to the broader scientific community, well beyond the objectives of the proposed investigation.
4. The proposal has a plan for delivering enhanced data products to the astronomical community, providing lasting value for the program beyond the completion of the original science goals.

The latter three criteria differentiate Legacy proposals from medium and large GO proposals. Additional funding will be provided to eligible Legacy programs for the creation and delivery of the proposed enhanced data products. The funding amount is determined formulaically and awarded with a contract separate from the science funding. The SSC will provide additional details and instructions to successful Legacy proposers when the funding awards are determined.

Legacy proposals can include Second-Look observations, following the rules specified in (§6.1.6), but may not include Targets of Opportunity (§6.1.5).

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-3 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 60 hours). Ten hours of multicycle observations were approved in Cycle-2.

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 §6.1.9).

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 classify each of their ToO requests, 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. Even if the specific date of an observation can be specified well in advance, if a modification to the scheduled AOR is required on a time scale of less than 5 weeks (other than moving targets requiring a late ephemeris update [Appendix E-§19]), the observations should be submitted as a medium- or high-impact ToO, as appropriate.

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/medium-impact ToO observations have on efficient telescope scheduling, the combined total of high/medium-impact ToO activations approved in Cycle-3 will not exceed ten. 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-3. 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-4 proposal submission deadline (nominally February 2007) be prepared to resubmit their proposal for Cycle-4 at that time. Any expired ToO time will be returned to the General Observer pool. Cycle-3 runs from June 2006 through June 2007 (13 months). Additional information on Targets of Opportunity, including the procedures for activation of an approved AOR, can be found in Appendix A §(15.5).

Observers awarded ToO observations in Cycle-2 that have not been executed by the Cycle-3 proposal submission deadline (February 16, 2006) should resubmit their proposals for Cycle-3.

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 or Legacy investigation. These *second-look observations* (SLOs) must be clearly justified as an integral part of a coherent 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 an observing 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 observation.

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-4. 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 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 have more refined and predictive spatial and temporal information than a ToO. 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 or clearly available to the Spitzer Principal Investigator) are scheduled or will be scheduled with high likelihood, but not yet executed or analyzed prior to the Spitzer proposal deadline.

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-3 this deadline is April 1, 2007.

6.1.8 Joint Observing Proposals

GO and Legacy observing programs where the primary science is obtained from the Spitzer Space Telescope and where observing time utilizing the Hubble Space Telescope, the Chandra X-Ray Observatory, NOAO facilities and/or NRAO facilities is required are supported in Cycle-3. Joint observing proposals should only be submitted to the Spitzer Science Center if Spitzer provides the primary science.

Spitzer Cycle-3 proposers requesting joint time with other observatories must enter the appropriate observatory acronym(s) into the Joint Proposal field in the *Spot* proposal tool, e.g. **HST, CXO, NOAO,** and/or **NRAO.** For example, in addition to your Spitzer hours if you require 5 orbits with HST and 100 ksec with Chandra then enter **HST, CXO** into the Joint Proposal field and justify the observations for HST and Chandra in your proposal.

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.

6.1.8.1 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-3 or the HST Cycle-15 review. By agreement with the Space Telescope Science Institute (STScI), the SSC will be able to award up to 90 orbits of HST observing time. Similarly STSCI will be able to award up to 125 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/Legacy observations and should not be proposed in conjunction with a Spitzer GTO, Archival or Theoretical proposal. Proposals for combined Spitzer and HST observations should be submitted to the observatory that represents the prime science (not to both observatories).

The HST Cycle-15 deadline is January 27, 2006. 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 of proposed HST observations is the responsibility of the observer, who should review the HST documentation or consult with STScI. For proposals that are approved, STSCI will perform detailed feasibility checks in HST Cycle-15 and a Phase II proposal submission to STScI will have to be completed. 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. STSCI may also reject duplicate HST observations. 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-3 proposers requesting HST time must enter '**HST**' into the Joint Proposal field in the *Spot* proposal tool.

6.1.8.2 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 review. 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 125 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/Legacy observations and should not be proposed in conjunction with a Spitzer GTO, Archival or Theoretical Proposal.

Of the 400 kiloseconds of Chandra observing time that can be awarded in the Spitzer review only ~15% of the observations, where an observation is an individual pointing at a target, 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-3 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-8 deadline is March 15, 2006. 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 of proposed Chandra observations 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-8. 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 X-ray Center using their normal funding process.

Spitzer Cycle-3 proposers requesting Chandra time must enter '**CXO**' into the Joint Proposal field in the *Spot* proposal tool.

6.1.8.3 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 §6.1.8.1 and §6.1.8.2.

6.1.8.4 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 all the observing time available for this opportunity. NOAO observing time will be divided roughly equally between the spring (2007A) and fall (2007B) 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. Specify the requested proprietary period (18 months nominal) for the NOAO observations.

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. NOAO time will only be awarded in conjunction with Spitzer GO/Legacy observations and should not be proposed in conjunction with a Spitzer GTO, Archival or Theoretical Proposal.

Spitzer Cycle-3 proposers requesting NOAO time must enter '**NOAO**' into the Joint Proposal field in the *Spot* proposal tool.

6.1.8.5 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 time will only be awarded in conjunction with Spitzer GO/Legacy observations and should not be proposed in conjunction with a Spitzer GTO, Archival or Theoretical proposal.

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 2006 to January 2007.

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-3 proposers requesting NRAO time must enter '**NRAO**' into the Joint Proposal field in the *Spot* proposal tool.

6.1.9 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 (http://ssc.spitzer.caltech.edu/geninfo/ddt/). Abstracts of approved DDT proposals are also available at the website.

6.1.10 Data Analysis Support

For approved GO and Legacy 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 and Legacy investigators do not need to submit cost plans as part of their science proposal.* The same formula is used to calculate the data analysis funding, regardless of the funding instrument used to provide it.

In addition to the formulaically determined research funds, eligible Legacy programs will be awarded funds specifically for the creation and delivery of the enhanced data products described in their original proposal. This funding is determined using a separate formula from that used to calculate the data analysis funding. Successful Legacy observers will be notified of the amount of formulaically determined science data analysis funding and enhanced data products creation funding after selection. The funding for creating enhanced data products will be provided in a separate contract from the science funding.

For Cycle-3, approximately $24 million in NASA funding will be available to approved GO, Legacy, Archival and Theoretical investigations.

If a GO/Legacy 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, scientific interpretation and publication of Spitzer data. The funding to each investigator will then be the indicated fraction of the total algorithmically determined level, 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 if it is successful they are ready to handle the funding process.

6.1.11 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 and Guaranteed Time 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. Legacy General Observers have no proprietary data period. The data will enter the public domain at the same time that scientifically usable data from fully commissioned pipelines are made available to the Principal Investigator via 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. Funding to a given institution of less than $5,000 must be done with a sub-award from the PI's home institution.

Investigators may be affiliated with universities, industry, NASA Centers, federally funded research and development centers, national laboratories, other non-profit institutes, or military facilities. **Of the Cycle-3 data analysis funds, 5-10% will be available for direct support of Archival and Theoretical Research.** A total of $1,800,000 was awarded to twenty archival and eight theoretical programs in Cycle-2.

The SSC cannot award NASA supporting funds to investigators affiliated with non-U.S. institutions.

All AR/TR proposals must be accompanied by an institutionally endorsed copy of the cost plan included in the proposal that is submitted separately to the SSC (§8.4.8). Guidelines for allowable costs are provided in Appendix F. The evaluation of AR/TR proposals will take into account the cost effectiveness and reasonableness of the proposed investigation and the available funds.

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-3, financial support for archival research is available for all of the Spitzer data that will be publicly available by December 31, 2006. Proposers should anticipate that all of the Spitzer data from the original Legacy Science Programs will be available, including enhanced data products returned to the SSC by the Legacy teams for distribution to the community. The data from the Legacy-like programs approved in Cycle-2 should also be available. (See Appendix C for brief descriptions of the Legacy programs.) 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 was first offered in Cycle-2 and is available again for Cycle-3. 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. For example, models or algorithms produced should be made available to the community in addition to publishing the scientific results obtained from the models. 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.

6.3 Guaranteed Time Observer Programs

The Spitzer Science Utilization Policies specify that following the first 2.5 years of nominal operations the fraction of science observing time allocated to Guaranteed Time Observers will be 15%. Each of the three instrument teams is assigned 5%. The GTO programs are allocated a total of 1125 hours in Cycle-3. GTOs are required to submit their proposals for the use of their time, and they no longer have automatic priority in the selection of targets. The GTO proposals will be submitted, reviewed and ranked according to the same guidelines used for the GO/Legacy observing proposals. The relative ranking of GTO and GO/Legacy proposals is necessary to resolve the competition for targets in GTO and GO proposals. Duplicate targets will be awarded to the higher-ranking proposal or can be assigned to multiple teams by the TAC.

Individual GTO teams will oversubscribe their 5% allocation so that time lost through target duplication can be made up. The TAC will identify any GTO proposals that do not meet minimum technical standards (observatory health & safety; instrument health & safety; within documented capabilities; feasibility). These will be rejected. All GTO proposals that meet the minimum standards (established before the review by the SSC and communicated to the TAC) are approved for observation up to the maximum allocated time. After completion of the review the SSC will fill in the 5% allocated GTO time (per team) in rank order from approved GTO proposals. No post-review science modification to GTO proposals is allowed. In exceptional circumstances, SSC may allow GTO teams to select desired proposals during the post-review stage rather than follow strict rank order.

GTO proposals may not include joint observations with other observatories. The TAC will rank the proposals 'as is' and the only recommended change in a GTO proposal by the TAC should be the deletion of observations awarded to a higher-ranking proposal.

GTO programs must be submitted with complete sets of final AORs. Generic targets and second-look observations are allowed following the guidelines specified in §§15.6 and 15.7

GTOs may also submit GO, Legacy, AR and/or TR proposals, which will be governed by the rules of competition provided for those proposal categories.

7 Proposal Planning

Before submitting a Spitzer Space Telescope Cycle-3 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-3 Call for Proposals (CP)

Version 1.0 (November 1, 2005) Required Reading: All proposers

The *Call for Proposals* is the present document.

Spitzer Space Telescope Observer's Manual (SOM)

Version 6.0 (November 1, 2005) 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 5.0 (November 1, 2005) Recommended Reading: GO/Legacy/GTO

The Observation Planning Cookbook provides detailed examples of how to construct Spitzer observations.

Spot User's Guide

Spot version 13.0 (November, 2005) Required Reading: GO/Legacy/GTO (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 6.0 (November 1, 2005) Required Reading: GO/Legacy/GTO
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 7.0 (November 1, 2005) Required Reading: GO/Legacy/GTO/AR

The *Reserved Observations Catalog* includes an itemized list of all executed and approved observations. Proposers should use *Leopard* or *Spot*, the SSC software packages, to query for executed or approved observations. The ROC is also available online in ASCII text format.

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. 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 is the website that 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 *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/Legacy investigators are strongly encouraged to download *Spot* and to start planning their observing programs well before the proposal submission deadline. The final version of Spot, required to submit your proposal, will be available in mid-November 2005.

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. The proposal can be resubmitted or updated at any time before the deadline.

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 System 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 were allocated 20 percent of the available observing time for the first 2.5 years of the cryogenic 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.

The Guaranteed Time Observers who built the Spitzer focal plane instruments will be submitting proposals to utilize their 15 percent of guaranteed time in Cycle-3 (see §6.3).

7.4 Legacy Science Program

The original 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.

Though Legacy proposals weren't solicited in Cycle-2, five programs that meet the Legacy program criteria were selected. In addition to strong science goals, these programs requested more than 50 hours of observing time, waived the proprietary data period, the data were of broad

utility to the community and the teams promised to return enhanced data products to the astronomical community. A summary of these programs is provided in Appendix C.

7.5 Additional Guidelines for Observers

This section contains additional guidelines and policies that investigators must know as they plan their GO, Legacy or GTO proposal.

7.5.1 Duplicate Observations

In general, duplicate observations with the Spitzer Space Telescope are not permitted. *It is the responsibility of the investigator to avoid duplication of previously approved observations.* A list of all such observations is available in the *Reserved Observations Catalog* (ROC). The ROC lists all observations approved or executed to date. The Proposal Kit contains the ROC in text format. Observers should use *Leopard*, the SSC Science Archive interface software to search all planned and executed observations. The S13 version of *Spot* will also include a feature that allows you to search for existing observations by target position.

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). Generally, when such an observation is approved, the data will be embargoed until the proprietary period of the prior observations expires.

Proposed AORs deemed to duplicate previously approved observations specified in the *Reserved Observations Catalog (ROC)* will be identified by the SSC (hereafter called GO3-ROC duplications). This information will be forwarded to the peer reviewers. These reviewers will be instructed to omit GO3-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 GO3-ROC duplicate observation. In such a case, the observation deemed to be a GO3-ROC duplicate will be executed, but the resultant data withheld from the GO3 observer until the proprietary period of the previously approved observer ends.

The SSC will also attempt to identify observations in proposals that do not duplicate anything in the ROC but do overlap with other proposals received in response to the Cycle-3 CP (hereafter called GO3-GO3 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 GO3-GO3 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 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).***

The SSC does encourage observers to use loose constraints when this substantially enhances the science. For example, a loose sequence or group-within constraint can be used to ensure that mapping AORs are done at a similar orientation. These are not difficult to support and will result in better science than mapping AORs that are completely unconstrained. Using chain constraints, multiple follow-ons, and short timing constraints can make your observations very difficult or even impossible to schedule. Use the minimum number of constraints that you need for your science and provide a clear justification in the proposal. As a rule of thumb any constraint that involves a time range should be twice as long as the AORs you want scheduled within the time range. For example, if you have 10 hours of mapping AORs any timing or grouping constraints should allow a ***minimum*** of 20 hours for their execution.

Observing constraints must be specified in *Spot* and justified in the proposal text.

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 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 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 (§6.1.11).

7.5.4 Bright Object Observations

Given the unprecedented sensitivity of Spitzer, it is perhaps not surprising that bright objects affect the detector arrays. 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, 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.

Scheduling of observations of bright sources so as not to impact other programs has become a scheduling issue. *Programs with substantial numbers of bright targets will be identified as difficult to schedule by the SSC, and their evaluation will be affected accordingly.* 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. *Spot* also has a bright object search feature to check for bright objects near your target(s). 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 Ephemerides

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 System 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), Monday, February 6, 2006**, that includes the NAIF identifier and requests that the SSC obtain and install the ephemeris file. If your list includes more than 25 objects we must have your request by **5:00 pm (PST), Monday, January 30, 2006**. **Please ask for new ephemerides 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 ephemerides 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 Baseline Instrument Campaign

The normal operating schedule for the instruments on Spitzer is contained in the Baseline 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 spacing of campaigns for each instrument in Cycle-3 will be approximately 35 days (the same as in Cycle-2) with each instrument on for 7-14 days. As discussed in §4.4.1, MIPS observations will be segregated into 'warm' and 'cold' campaigns.

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-3 submission process is one 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. *These AORs should be the final set you expect to have executed if the proposal is successful.* GO investigators proposing a medium or large Spitzer program or a Legacy 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. All GTO proposals must be submitted with a complete set of AORs. *Accepted proposals that are submitted with a complete set of AORs will begin scheduling in Cycle-3 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 text files on your local computer. The cover sheet information, the proposal PDF file and the AORs are all submitted electronically via *Spot*. ***Cycle-3 proposals must be submitted with the S13 version of Spot. This will be available to download from the Proposal Kit website in mid-November 2005.***

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. The Principal Investigator may withdraw a proposal from consideration at any time prior to the completion of the selection process.

Proposal PDF files must be prepared with the SSC provided templates. The templates are available in Latex and Microsoft Word formats in the online Proposal Kit.

8.1 Proposal Submission Deadline

The proposal submission deadline is Thursday, February 16, 2006 (1:00 pm PST).

Proposals must be submitted prior to the deadline. Proposals received after the deadline will not be considered. **The proposal submission deadline is 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.**

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. No proposals will be accepted on paper. For AR/TR proposals the cost plan and budget narrative *must* be included in the proposal PDF file. 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.

Archival/Theoretical Proposals Only:

Three copies of your institutionally endorsed cost plan must be received at the SSC by **Friday, February 24, 2006 (5:00pm PST)**. The SSC mailing address is provided in §10.

The paper cost plans will NOT be distributed to the review panels. The cost plan and budget narrative information MUST be included in the proposal PDF file submitted electronically by the February 16th deadline.

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.

8.2.1.1 Science Category

An important piece of information that is provided in the Cover Sheet is the **Science Category.** All proposals must include one, and only one, science category. This information is used to distribute the proposals to the panels for the review. Please select the science category that best describes your proposal. The categories are divided into three broad groups: extragalactic, galactic and solar system. The solar system category is for OUR solar system. If your proposal is related to other solar systems, please select one of the galactic categories, e.g. extra-solar planets. A category has also been added to the galactic group for proposals that are doing detailed stellar studies outside of our galaxy. These proposals have historically ended up in extragalactic panels while the best expertise to review them is in the galactic panels.

8.2.2 Astronomical Observation Requests (AORs)

The submission of Astronomical Observation Requests (AORs) is required for observing proposals. GO investigators proposing *small* Spitzer programs are required to submit all of their completed AORs with their proposal. GO investigators proposing a *medium, large or Legacy* program must submit representative AORs that clearly define all of their observations, but are not required to submit the entire program of AORs with the proposal. GTO investigators must submit a complete set of AORs. 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 or all at once 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. The page limits for each section in 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 edited by the SSC, and the excess pages deleted or flagged for the peer reviewers as not meeting the section page limits. Reviewers will be instructed to disregard any pages in excess of the limits listed for each section. In Cycle-2, some proposals with flagrant violations of the page limits, font size, etc. were deemed 'not responsive to the Call for Proposals' by the panels and were rejected without review.

The page limits for proposals are:

	Science Just.	Technical Plan	Data Prod. Plan	Figures/ Tables	Refs.	Res./ Bibl.
Legacy	**4**	**3**	**1**	**2**	**1**	**1**
Medium/Large	**4**	**3**	**0**	**2**	**1**	**1**
Small	**3**	**2**	**0**	**2**	**1**	**1**
AR/TR	**3**	**2**	**0**	**2**	**1**	**1**

Observers proposing Joint observations are allowed one additional page in the Technical plan for each joint observatory requested. For example, if HST and Chandra observations are requested then the technical plan can include one additional page for the HST observations and one for the Chandra observations. The necessity of the joint observations should be included in the scientific justification.

Additional pages allowed for each joint-observatory requested						
Joint	**+0**	**+1**	**+0**	**+0**	**+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	**Medium/Large & Legacy only**
Modification of Proprietary Period	**all GO/GTO**
Justification of Duplications	**all observing proposals**
Justification of Scheduling Constraints	**all observing proposals**
Cost Plan & Budget Narrative	**Archival and Theoretical only**

Additional details pertaining to proposal contents are listed in §§8.3-8.4. All proposals 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 all sides 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.* No preprints or reprints should accompany the proposal as they won't be forwarded to the review panels.

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.

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.* For Cycle-3 we plan to have 11 panels -- 5 galactic, 5 extragalactic and 1 for our solar system. The extragalactic panels are subdivided into nearby and distant universe categories. The galactic panels are subdivided into stars & the ISM and star and planet formation categories. The science category you select in *Spot* to be characterize the science in your proposal will determine which panel reviews it. Proposals will be evaluated according to the criteria listed in §9.2.

Additional guidelines for all observing proposals are provided in the following sub-sections.

8.3 Observing Proposal Contents

Observing proposals must include the following sections, each subject to the individual page limits listed in §8.2. The required proposal templates are available from the Proposal Kit website. The required sections (except the AORs) 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 Joint proposals (see §6.1.8) must provide a full and comprehensive scientific justification for the requested observing time. Figures and tables should be segregated onto separate pages and not embedded in the text.

Any pages labeled Science Justification that exceed the page limits described in §8.2.3 may be deleted before the proposal is sent to the reviewers.

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*, in the instrument-specific *Data Handbooks* and also the *Pipeline Description Documents*. Figures and tables should be segregated onto separate pages and not embedded in the text.

Any pages labeled Technical Plan that exceed the page limits described in §8.2.3 will be deleted before the proposal is sent to the reviewers.

Joint telescope proposals (§6.1.8) must include technical information for all proposed observations. Up to one additional page for each observatory is allowed in the technical plan for Joint proposals requesting observations from HST, CXO, NOAO and/or NRAO.

8.3.2.1 Joint Spitzer-HST Observations

Proposers requesting 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.

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-15 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 in several pitch angle ranges. Long observations at these pitch angles will be split into segments of no more than 50 ksecs. Please refer to the notice on Pitch Angle restrictions n the CXC website. Also refer to 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-8 in mid-December, 2005.

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 at *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 2006 to January 2007. 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/proposers_guide/GBTPROPOSERSGUIDE.pdf (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 Data Products Plan – Legacy General Observer Proposals

Legacy proposals should include a one-page plan that outlines the enhanced data products that they will create for their program, e.g. image mosaics, catalogs, spectra and documentation. The

plan should include a high level schedule for when the products will be delivered. These data deliveries are generally tied to when the data are available in the archive. This section is ONLY allowed for Legacy proposals.

8.3.4 Other Contents

8.3.4.1 Figures and Tables

Up to two pages of figures and tables may be included in the proposal. These should be consolidated into two separate pages and appear after the Science Justification and Technical Plan. The Observation Summary table required for proposals requesting 50 hours or more of observing time is not included in this page limit. 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.* Figure captions and tables may be listed in 10-point font (rather than 12-point).

8.3.4.2 References

Up to one page of references may be included in the proposal. References may be listed in 10-point font (rather than 12-point).

8.3.4.3 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.

8.3.4.4 Observation Summary Table

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

Medium and Large (including Legacy) 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.

8.3.4.5 Existing Observatory Programs

Proposers must explicitly summarize their current involvement as a Principal Investigator or Technical Contact on existing Spitzer Space Telescope research programs. This applies to the PI and principal CoIs on the proposal. The proposer should indicate the status of each GTO, GO, Legacy, DDT, Archival or Theoretical program and any publications resulting from the program(s). For observing programs, include the status of the data analysis effort.

Proposers that are the PI/Technical contact for five or more current Spitzer programs (e.g., the GTOs) are not required to provide a detailed status for every program. They should provide a summary that includes the number of programs, overall status (e.g. 75% observed, 50% data analysis complete, 20 papers published, 20 papers submitted, etc.) that will allow the reviewers to understand the state of the programs.

Proposers requesting joint observations must specify whether they were awarded time in a previous cycle for similar or related observations at the relevant observatory.

8.3.4.6 Data Analysis Funding Distribution

If a GO/Legacy 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.

8.3.4.7 Financial Contact Information

This information is required for any investigators (PI and CoIs) expecting funding support. Please provide contact information (e.g., name, address, phone number, email address) for an authorized financial representative at the investigator's 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.

8.3.4.8 Modification of Proprietary Period

If any reduction of the standard proprietary period is proposed, please specify that in this section. For Cycle-3 there is a field specifying the proprietary period in the *Spot* Proposal Tool. Any modifications should also be entered there. The standard period for GO/GTO programs is 365 days and for Legacy programs it is 0 days.

8.3.4.9 Justification of Duplicate Observations

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

8.3.4.10 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.

8.3.5 Astronomical Observation Requests (AORs)

Each *small* GO proposal must be accompanied by a complete list of Astronomical Observation Requests (AORs). The submitted AORs should be the final ones you expect to have executed if the proposal is successful. *Medium* and *large* GO and Legacy proposals must submit representative AORs that fully encompass the proposed observations. GTO proposals must submit a complete set of AORs.

All AORs are created in *Spot* and submitted electronically to the SSC. The AORs that you have loaded in Spot at the time you are submitting your proposal are AORs that will be transmitted to the SSC and stored in our database. Do not include the AORs as text in the proposal PDF file.

You can create or edit your AORs in Spot at any time prior to submitting or updating your proposal. They can be saved as an ASCII text file on your local computer and then reloaded for editing or submission at a later time. 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. ***Observers approved for Cycle-3 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 proposal.***

8.4 Archival & Theoretical Research Proposal Contents

Archival Research (AR) and Theoretical Research (TR) proposals must be submitted to the SSC electronically using *Spot*, the SSC proposal planning and submission software. AR proposals

may propose analysis of any data publicly available in the Spitzer Science Archive. AR and TR proposals must include the sections described below, each subject to individual page limits listed in §8.2. The required proposal templates are available from the Proposal Kit website. These sections must be combined into a single PDF file for submission with *Spot*. **The cost plan and budget narrative must be included in the proposal PDF file.** Three paper copies of the institutionally endorsed cost plan and budget narrative for Archival and Theoretical proposals must be received at the SSC by Friday, February 24, 2006, 5:00pm (Pacific Standard Time). The budget requested in the institutionally endorsed cost plan must match the one submitted in the PDF file (to within 2%) or the proposal will not be funded. ***Only the cost plan submitted as part of the PDF proposal file will be provided to the reviewers.***

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.

Any pages that exceed the page limits described in §8.2.3 will be deleted before the proposal is sent to the reviewers.

8.4.1 Science Justification

8.4.1.1 Archival Research

The Scientific Justification for 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.

8.4.1.2 Theoretical Research

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 Theoretical 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. For example, models or results from modeling should be made available to the community. 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.

8.4.2 Technical Plan

8.4.2.1 Archival Research

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*.

8.4.2.2 Theoretical Research

The Technical Plan section of the proposal should discuss the types of Spitzer observations 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.

8.4.2.3 Statement of Work and Schedule

The technical plan for Archival and Theoretical proposals should include a high level statement of the planned work and a schedule for any promised deliverables. These are important for the evaluation and for issuing the contracts for successful proposals.

8.4.3 Figures and Tables

Up to two pages of figures and tables may be included in the proposal. These should be consolidated into two separate pages and appear after the Science Justification and Technical Plan. The Observation Summary table required for proposals requesting 50 hours or more of observing time is not included in this page limit. 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.* Figure captions and tables may be listed in 10-point font (rather than 12-point).

8.4.4 References

Up to one page of references may be included in the proposal. References may be listed in 10-point font (rather than 12-point).

8.4.5 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.

8.4.6 Existing Observatory Programs

Proposers must explicitly summarize their current involvement as a Principal Investigator or Technical Contact on existing Spitzer Space Telescope research programs. This applies to PIs and CoIs. The proposer should indicate the status of each GTO, GO, Legacy, Archival or

Theoretical program and any publications resulting from the program(s). For observing programs, include the status of the data analysis effort.

Proposers that are the PI/Technical contact for five or more current Spitzer programs (e.g., the GTOs) are not required to provide a detailed status for every program. They should provide a summary that includes the number of programs, overall status (e.g. 75% observed, 50% data analysis complete, 20 papers published, 20 papers submitted, etc.) that will allow the reviewers to understand the state of the programs.

8.4.7 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.

8.4.8 Cost Plan

Cost effectiveness and reasonableness are a substantial factor in the evaluation of Archival and Theoretical research proposals. A cost plan must include a budget and a descriptive 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. The narrative must describe how the funds will be allocated.

Proposers must include budgets for each institution requesting funding. Direct funding of less than $5,000 must be done with a sub-award from the PI's home institution. The budgets should include the direct and indirect costs that will be covered. Cost plans are limited to one year in duration, with a period of performance starting in October 2006. Investigators can use the budget form provided in the Proposal Kit section of the SSC website or a form utilized by their home institution.

The cost plan information MUST be included in the proposal PDF file submitted by the February 16, 2006 deadline. Three paper copies of the institutionally endorsed cost plan for AR/TR proposals must be received at the SSC by Friday, February 24, 2006, 5:00 pm (Pacific Standard Time). The institutionally endorsed cost plan must match the one submitted in the PDF file (to within 2%) or the proposal will not be funded. *Only the cost plan submitted as part of the PDF proposal file will be provided to the reviewers.*

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 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. The PDF file must be created using one of the templates available at the Proposal Kit website. 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 S13 version of *Spot*, which will be available in mid-November 2005.
2. Download a proposal template from the Proposal Kit website and use it to create the proposal PDF file.
3. Start up *Spot* and open the Proposal Tool.
4. Load any previously generated cover sheet information, the proposal PDF file, and the accompanying AORs (except for AR/TR proposals) that comprise your program.
5. For observing proposals make sure you have updated the resource estimates and entered the correct total observing time required in the proposal cover sheet.
6. For observing proposals make sure you have updated the proprietary period, if necessary. For Legacy programs it should be 0 days.
7. For AR and TR proposals make sure you have entered the total funding requested in the proposal cover sheet.
8. Click on the SUBMIT Menu in the Proposal Tool and select 'Submit proposal to SSC.'
9. Prior to the proposal submission deadline, proposals can be modified by using 'Update Proposal at SSC' option.
10. 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.
11. For Archival and Theoretical Research proposals the entire proposal, including a cost plan and budget narrative in the PDF file, must be submitted electronically by the submission deadline. Three paper copies of the institutionally endorsed cost plan and budget narrative for AR/TR proposals must be received at the SSC by Friday, February 24, 2006, 5:00pm (Pacific Standard Time). *Only the cost plan submitted as part of the PDF proposal file will be provided to the reviewers.*

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

8.6 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 observing 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* and *Leopard*.

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-3 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. *The proposals are assigned to panels based primarily on the science category selected by the Principal Investigator on the proposal coversheet*. 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, except for the Solar System panel. In Cycle-2 the panels focused primarily in the following areas:

Extragalactic – distant universe and cosmology
Extragalactic – nearby-universe and normal galaxies
Galactic – circumstellar disks, brown dwarfs, extrasolar planets
Galactic – evolved stars, ISM, star-formation, galactic structure
Solar System – all proposals

The specific distribution of proposals reviewed by each panel in Cycle-3 will depend on the number received in each category. A given set of parallel Panels will review and rank all relevant GO, Legacy, GTO, AR and TR 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-3 research program.

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 observing proposals 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 Legacy General Observer proposals, the utility of the immediately public data and proposed enhanced data products to the broader scientific community. The program should create a legacy for future Spitzer or other NASA investigations.

(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 proposals).
(5) For Joint 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.

(6) 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 models, software or tools, to the astronomical community.

9.3 Proposal Selection

The Spitzer Science Review Panels and Time Allocation Committee are currently scheduled to conduct their peer reviews on April 24-28, 2006. The SSC Director, the NASA-designated selection official, plans to announce the final selections before the end of May 2006 with Cycle-3 observations beginning in June 2006.

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 appropriate program. 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 Cycle Education and Public Outreach Program

In Cycle-1 approximately 1% of the available data analysis funds were made available to fund Education and Public Outreach (EPO) programs proposed by Spitzer investigators. Due to recent cuts in the Spitzer project budget, no additional funding will be available for Cycle-related EPO programs for successful Cycle-3 proposers. Though no additional funding is available, investigators interested in pursuing EPO should contact the EPO professionals at the Spitzer Science Center via the Helpdesk.

13 Guide for Observing Proposals

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-3.
3. Download and install the S13 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 in mid-November, 2005.
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 Observation Planning 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 proposal (§6.1.2). If requesting 50 or more hours of observing time, decide whether to submit a regular GO or Legacy proposal. (§6.1.2.1).
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 or Spot.
9. Contact the electronic Spitzer Helpdesk (*help@spitzer.caltech.edu*) for assistance, if needed.
10. Prepare your observing 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 (§6.1.10) 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 (§6.1.10).
14. Follow the steps described in §8.5 to electronically submit your proposal, cover sheet, (and accompanying AORs) to the SSC prior to the deadline of Thursday, February 16, 2006 (1:00 pm PST).

14 Guide for Archival/Theoretical Researchers

1. If no funding support is required, no Archival Research (AR) or Theoretical Research (TR) proposal is necessary. AR proposals may be submitted for analysis of all Spitzer data that will be publicly available by December 31, 2006
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 S13 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 in mid-November 2005. *Spot* includes the proposal submission tool for AR/TR investigators.
4. Download the *Spot User's Guide* and read the relevant proposal submission chapter to understand how to create and submit an AR/TR proposal.
5. Contact the electronic Spitzer Helpdesk (help@spitzer.caltech.edu) for assistance, if needed.
6. Prepare your AR/TR 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 §8.5 to electronically submit your proposal and cover sheet to the SSC prior to the proposal deadline of February 16, 2006 (1:00 pm Pacific Standard Time). The proposal MUST include the cost plan and budget narrative in the proposal PDF file. ***Only the cost plan submitted as part of the PDF proposal file will be provided to the reviewers.***
9. Three paper copies of the institutionally endorsed cost plan and budget narrative for AR/TR proposals must be received at the SSC by Friday, February 24, 2006, 5:00pm (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-3 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 (24 micron 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). All previously approved and executed observations can also be queried using *Leopard*, the SSC Archive software. 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). The SSC should be alerted if any duplications are found.

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 observations that duplicate approved observations from a previous Cycle. Observations that are recommended by the TAC but found to be duplicates of a previously approved program after detailed inspection of the program by the SSC will be disallowed. The final program for a Cycle recommended by the TAC and approved by the SSC Director may include programs with intra-Cycle duplications. These observations will in general be executed by the SSC as approved.

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 for the first 2.5 years of the cryogenic mission 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. Starting with Cycle-3, the additional approved GTO programs are defined in the same way as the GO programs described below.

For the original Legacy Science projects, the approved programs consist of the full list of AORs and corresponding abstracts submitted in 2001. Starting with Cycle-2, the additional approved Legacy programs are defined in the same way as the GO programs described below.

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. 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 an 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 Period

There is a blackout period 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 while a solicitation for proposals for a new observing Cycle is active. This time period runs from the date the Call for Proposals is issued until the proposal submission date passes.

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 for the next Cycle. 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**

Even if the date of the required observation can be determined well in advance, if ANY update to the observing sequence is required less than 5 weeks before execution then the observation must be submitted as a medium or high impact ToO.

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- and medium-impact ToO observations will have on the 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 or clearly available to the Spitzer Principal Investigator) are scheduled or will be scheduled with high likelihood, but not yet executed or analyzed prior to the Spitzer 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.

Any generic target observation that will require an update to the observing sequence less than 5 weeks prior to execution must be submitted as a medium or high impact ToO.

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 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 program are the same as for any other element of that program.

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-3 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

Observations 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. 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 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 existing programs. 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.

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 original Legacy Science Program or the Legacy General Observer program . These data will enter the public domain immediately after pipeline processing and quality analysis are 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 the start of Cycle-4 are included:

Oct-Nov 2005	Enhanced Legacy Data Products Delivery
November 2005	Cycle-3 Call for Proposals Issued
	Spitzer Science Conference: Infrared Diagnostics of Galaxy Evolution
February 2006	Cycle-3 proposals due
April 2006	Cycle-3 proposal review
	Enhanced Legacy Data Products Delivery
May 2006	Cycle-3 proposal results announced
June 2006	Cycle-3 observations begin scheduling
October 2006	Enhanced Legacy Data Products Delivery
November 2006	Cycle-4 Call for Proposals Issued
	Spitzer Science Conference: Cool Stars 14
February 2007	Cycle-4 proposals due
April 2007	Cycle-4 proposal review
May 2007	Cycle-4 proposal results announced
July 2007	Cycle-4 observations being scheduling

17 Appendix C: Legacy Science Program

The original 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 original 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 has developed post-pipeline data products and/or analysis tools that have been delivered to the SSC for wider dissemination to the community. These products, including catalogs and image mosaics, are invaluable to researchers planning future GO proposals. Enhanced Legacy science data product deliveries to the SSC started in October 2004. The data are available from the SSC Popular Products website (http://data.spitzer.caltech.edu/popular), via the SSC archive interface software, *Leopard*, and from the Infrared Science Archive (IRSA -- http://irsa.ipac.caltech.edu).
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.

Though Legacy programs were not specifically solicited in Cycle-2, five programs were selected that meet the Legacy selection criteria. The abstracts for these programs are provided below.

- **SAGE: Spitzer Survey of the Large Magellanic Cloud: Surveying the Agents of a Galaxy's Evolution**
  Margaret Meixner (Space Telescope Science Institute), Principal Investigator
  511 hours of Spitzer observing time Program ID 20203

The recycling of matter between the interstellar medium (ISM) and stars drives the evolution of a galaxy's visible matter. To understand this recycling, we propose to study the physical processes of the ISM, the formation of new stars and the injection of mass by evolved stars and their relationships on the galaxy-wide scale of the Large Magellanic Cloud (LMC). Due to its proximity, favorable viewing angle, multi-wavelength information, and measured tidal interactions with the Milky Way (MW) and Small Magellanic Cloud (SMC), the LMC is uniquely suited for surveying the agents of a galaxy's evolution (SAGE), the ISM and stars. Our uniform and unbiased survey of the LMC (7x7 degrees) in all IRAC and MIPS bands will have much better wavelength coverage, up to ~1000 times better point source sensitivity and ~11 times better angular resolution than previous IR surveys.

- **MIPSGAL: A 24 and 70 Micron Survey of the Inner Galactic Disk with MIPS**
  Sean Carey (Spitzer Science Center), Principal Investigator
  417 hours of Spitzer observing time Program ID 20203

The program will survey 220 square degrees of the inner Galactic plane, $65 < l < 10$ and $-10 < l < -65$ for $|b| < 1$, at 24 and 70 microns with MIPS. Our survey complements existing (GLIMPSE) and proposed (Hi-Gal) surveys of the Galactic plane and has significantly better resolution and sensitivity than previous infrared surveys covering the plane. Over 75% of the survey area should have useful data at 70 microns, while >99% of the plane is expected to be unsaturated at 24 microns. The survey data will be used to examine the early phases of high mass star formation, complete the census of star formation in the inner Galactic disk and provide a snapshot of the current Galactic star formation rate, measure the distribution and heating of very small grains in the ISM and most importantly enable research by the astronomical community. We will make available enhanced data products including a high quality point source catalog, image mosaics and, to facilitate the study of extended emission, large format and source subtracted mosaics.

- **SCOSMOS: The Spitzer Deep Survey of the HST COSMOS 2-Degreee ACS Field**
  David Sanders (University of Hawaii), Principal Investigator
  220 hours of Spitzer observing time Program ID 20070

SCOSMOS is a deep imaging survey with Spitzer using both the IRAC and MIPS detectors to observe the HST-COSMOS 2-square degree field. COSMOS is an HST Treasury program (Cy12-13) that is specifically designed to probe the coupled formation and evolution of galaxies and large-scale structure on scales up to $2x10^{14}$ solar masses during the formative era of galaxy, AGN, and clusters (z~0.5-3). The COSMOS survey also includes extensive multi-wavelength imaging from X-ray to radio (XMM, GALEX, Subaru, NOAO, VLA and CSO) and spectroscopic surveys (VLT and Magellan). The Spitzer observations will complete this survey with vital infrared coverage at 3-160 microns. IRAC imaging is critical for deriving stellar masses; MIPS imaging will be used to determine star formation rates, and AGN activity for enormous samples of galaxies. COSMOS specifically probes the dependence of morphological

properties, star formation, and galactic masses on the clustering environment over the last 75% of cosmic history.

- **GLIMPSE II: Imaging the Central +/-10 Degrees of the Galactic Plane with IRAC**
  Ed Churchwell (University of Wisconsin), Principal Investigator
  148.8 hours of Spitzer observing time Program ID 20201

The main scientific goals of this program are to use a large sample of stars located in the inner Galaxy to: determine the content and distribution of stars in the inner Galaxy; the extent, stellar population, and interaction of the strong nuclear wind with the ambient interstellar medium above and below the nucleus of our Galaxy; and determine the rate and location of current star formation in the inner Galaxy. This survey will complete the coverage of the inner Galaxy from 0 deg to 65 deg on both sides of the Galactic center in all four IRAC bands when combined with the initial GLIMPSE survey. The program is a fully sampled, unbiased, confusion-limited survey toward longitudes +/- 10 deg of the central region of the Galaxy in all 4 IRAC bands. The latitude coverage will be +/- 1 deg from |l|=10 deg to 5 deg, +/-1.5 deg from |l|=5 deg to 2 deg, and +/- 2 deg from |l|=2 deg to 0 deg. This survey will also enable many other scientific investigations by the wider community such as studies of supernovae, planetary nebulae, stellar populations, and correlations with objects detected at other wavelengths or energy regimes in the inner Galaxy.

- **A Public Deep IRAC Survey in the Extended Chandra Deep Field South**
  Pieter van Dokkum (Yale University), Principal Investigator
  122.9 hours of Spitzer observing time Program ID 20708

The 0.5 x 0.5 degree area surrounding the Chandra Deep Field South (CDFS) is the only cosmological survey field that has multi-wavelength coverage from X-rays to the thermal infrared and whose size exceeds the correlation length of massive galaxies at $1<z<4$. More than 10,000 redshifts are known, ~800 AGN have been detected and two-band HST ACS imaging exists over the whole field. While the GALEX, Chandra, HST, and MIPS data in this field are all very deep, the existing IRAC data are not. Deep IRAC data have been shown to be pivotal in a) identifying massive high redshift objects, b) estimating galaxy masses, and c) completing the census of AGN and their host galaxies. We will obtain deep IRAC imaging across the whole Extended CDF-South to enable such analyses over a large enough area where the evolution of cosmic average properties can be well measured. The full set of Great Observatories data in this 900 square arcmin low-background field offers unparalleled archival value for future studies with ALMA and 20m-30m telescopes.

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 that 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 that 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 Update: 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 strongly justify it in his or her proposal.

These 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.

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 (i.e. the investigator's institution). 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	Baseline Instrument Campaign schedule
Co-I	Co-Investigator
CP	Call for Proposals
CREI	Cost Reimbursement with an Educational Institution
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 Observatory
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
RSA	Research Support Agreement
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