Spitzer Space Telescope

(Space InfraRed Telescope Facility)

Cycle-1 Call for Proposals

(Version 2.0)

General Observer Program

Archival Research Program

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

Key Dates:

Call for Proposals (V2.0) Issued: December 19, 2003

Proposals Due: Saturday, February 14, 2004 (12:00 noon PST)

Cycle-1 Observations Start: July 2004

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

Table of Contents

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).

Executive Summary

This *Call for Proposals* (CP) invites investigators worldwide to submit Spitzer Space Telescope Cycle-1 General Observer (GO) and Archival Research (AR) proposals. General Observer proposals seek observing time in one of two categories: small (up to 50 hours) and medium (50-200 hours). It is anticipated that 3700 hours of observing time will be available to GO investigators in Cycle-1. In addition, approximately $15 million of NASA data analysis support is available to eligible GO researchers.

Archival Research proposals are to be submitted only if AR investigators are seeking NASA data analysis support, and are limited to analysis of data from the Spitzer First Look Survey (FLS). It is anticipated that up to $750,000 of NASA support will be made available to support analysis of FLS data in Cycle-1. *If no supporting funds are required, no Cycle-1 proposal should be submitted.* Once the Spitzer Science Archive opens in May 2004, any person may access and utilize mission data in the public domain.

• Proposal Planning

The Spitzer Space Telescope Cycle-1 CP was originally issued (using the previous Space InfraRed Telescope Facility moniker) on November 8, 2002 in anticipation of a January 2003 launch. At that time, it was announced that a second -- and final -- version of the CP would be issued after the on-orbit performance of the telescope had been characterized. The present document is the post-launch update to the earlier CP and represents the top-level programmatic document governing the solicitation and selection of Spitzer Cycle-1 research proposals.

The CP provides an overview of the telescope's technical capabilities (§2), eligibility criteria (§3), the current research opportunities (§4), and information on planning (§5) and submitting (§6) a proposal. The CP is accompanied by other technical documents (see §5.1). Interested scientists may retrieve digital copies of these documents from the Proposal Kit section of the Spitzer Science Center (SSC) public Web site (http://ssc.spitzer.caltech.edu/). An important component of the proposal tools is the Spitzer Planning Observations Tool (SPOT). SPOT is a free software package available within the online Proposal Kit, and is downloaded to a researcher's host machine. SPOT allows General Observers (GOs) to construct 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 Spitzer observations will be laid out on the sky.

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

• Proposal Submission

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

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

No cost plans are required for GO proposals, since data analysis funding for approved and eligible investigators will be determined through formulaic means (§4.1.11).

GO investigators may not propose observations that are deemed to duplicate those previously approved as part of the Spitzer First-Look Survey, the Legacy Science Program, or from Guaranteed Time Observation programs. Proposers should consult the *Spitzer Space Telescope Observing Rules* to determine what constitutes a duplicate observation, and the *Reserved Observations Catalog* for a list of approved observations. Both documents are available in the online Proposal Kit. [The *Observing Rules* are also reproduced in their entirety in Appendix A of the current document.]

An AR proposal is submitted only if proposers are seeking funding support and is limited to analysis of data from the First-Look Survey (§4.2.1). An AR proposal consists of these elements:

- A scientific justification for the proposed archival research.
- A data analysis plan.
- A cost plan.

All GO and AR proposals should be submitted to the SSC electronically, using the proposal submission tool integrated into SPOT. Proposals must conform to all requirements and constraints described in this CP, in particular the format and page limits listed in §6.1. The proposal deadline is 12:00 noon (Pacific Standard Time) on Saturday, February 14, 2004.

• Proposal Review

Topical Science Review Panels and a Time Allocation Committee (TAC) organized by the Spitzer Science Center (SSC) will review and evaluate the GO and AR proposals according to the criteria listed in §7.2. The TAC will recommend a list of programs to the SSC Director, who is the ultimate selection official for all Cycle-1 research programs. Upon selection by the Director, a GO program is entered into the Spitzer Observations Database for execution as part of Cycle-1, commencing in July 2004. Funding for approved AR investigations will be issued once the cycle begins.

Call for Proposals Editor:
Dr. Michael D. Bicay, SSC Assistant Director for Community & Public Affairs

Instructions for General Observers

- Read a summary of the capabilities of the Spitzer Space Telescope (§2).
- Download the *Spitzer Space Telescope Observer's Manual* from the Proposal Kit section of the SSC public Web site (http://ssc.spitzer.caltech.edu/) to obtain additional details about the telescope, science instruments, and the six observing modes available for Cycle-1.
- Download the Spitzer Planning Observations Tool (SPOT) software package, available in the online Proposal Kit, to your host machine.
- 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.
- Check the SSC public Web site for any late updates to the observatory technical specifications on January 15, 2004.
- Download and read the *Spitzer Space Telescope Observer's Cookbook*, also in the Proposal Kit, to see examples of typical observations.
- Use SPOT to create, edit and store sequences of AORs to construct a Spitzer observing program.
- Determine whether to submit a small or medium GO proposal (§4.1.2).
- Be sure that your proposed observations do not duplicate (§5.5.1) existing Spitzer Space Telescope observations by consulting the online *Reserved Observations Catalog*.
- Contact the electronic Spitzer Helpdesk (help@spitzer.caltech.edu) for assistance, if needed.
- Prepare your GO proposal according to the guidelines listed in §§6.1-6.2, making sure that you incorporate the Spitzer Space Telescope's on-orbit performance characteristics.
- Note the evaluation criteria listed in §7.2.
- Note that NASA data analysis support for eligible investigators (§3.2) will be determined through formulaic means (§4.1.11), and that no cost proposal is necessary.
- Follow the steps described in §6.4 to electronically submit your proposal (and accompanying AORs) to the SSC prior to the proposal deadline of February 14, 2004 (12:00 noon Pacific Standard Time).

Instructions for Archival Researchers

- If no funding support is required, no archival research proposal is necessary. Once the Spitzer Science Archive opens in May 2004, any person may access and utilize mission data in the public domain.
- Learn about the Spitzer First-Look Survey (§4.2.1), the only dataset for which archival research funding is available in Cycle-1.
- Download the *Spitzer Space Telescope Observer's Manual* from the Proposal Kit section of the SSC public Web site (http://ssc.spitzer.caltech.edu/) to obtain additional details about the telescope, science instruments, and how First-Look Survey data were obtained.
- Download the Spitzer Planning Observations Tool (SPOT) software package, available in the online Proposal Kit, to your host machine. SPOT includes the proposal submission tool for AR investigators.
- Download the *SPOT User's Guide* and read Chapter 15 to understand how to create and submit an AR proposal.
- Contact the electronic Spitzer Helpdesk (help@spitzer.caltech.edu) for assistance, if needed.
- Prepare your AR proposal according to the guidelines listed in §6.1 and §6.3, making sure that you incorporate the Spitzer Space Telescope's on-orbit performance characteristics.
- Note the evaluation criteria listed in §7.2.
- Follow the steps described in §6.4 to electronically submit your proposal to the SSC prior to the proposal deadline of February 14, 2004 (12:00 noon Pacific Standard Time).
- Submit three paper copies of an institutionally-endorsed cost plan to "Cycle-1 Proposal Submission" at the address listed in §8. These must be received by the SSC within one week of the proposal deadline.

Changes from Version 1.0

This is a summary of the significant changes between the present document and Version 1.0 of the Call for Proposals, released on November 8, 2002.

- **Observatory Name Change**
  NASA renamed the Space InfraRed Telescope Facility (SIRTF) as the Spitzer Space Telescope on December 18, 2003, in honor of Lyman Spitzer, Jr. The science operations center at the California Institute of Technology has been renamed the Spitzer Science Center (SSC). Concomitant changes have also been made in addresses for the Spitzer public Web site, the SSC public Web site, and in the online Helpdesk.

- **Schedule Change**
  Various dates have been adjusted to be commensurate with the launch of the Spitzer Space Telescope on August 25, 2003. In particular, the proposal submission deadline is now February 14, 2004 (12:00 noon Pacific Standard Time).

- **Science Data Archive Access**
  Once the Spitzer Science Archive opens in May 2004, any person may access and utilize mission data in the public domain via the SSC Web site. It will not be necessary for users to contact the Spitzer Helpdesk to request an access account and password.

- **NASA Funding for U.S.-Based Investigators**
  For the purpose of determining NASA funding support for U.S.-based Co-Investigators on General Observer proposals led by foreign Principal Investigators (§3.2 *et seq.*), the sum of the efforts by U.S.-based investigators cannot exceed 50%.

- **Listing and Status of Existing Research Programs**
  Principal Investigators must explicitly summarize their Spitzer Space Telescope research programs (§6.2.3). For GO and GTO programs, the investigator should indicate the status of each observational program and of its data analysis efforts.

- **Modification of GO Evaluation Criteria**
  The technical feasibility evaluation criterion (#3) for General Observers (§7.2) has been slightly modified to emphasize the importance of observational robustness against the actual on-orbit performance of the observatory.

1 Introduction

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. The 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 exceed its 2.5-year requirement, perhaps by a factor of two.

This *Call for Proposals (CP)* solicits participation to conduct Cycle-1 Spitzer Space Telescope research. Investigations may be proposed in one of two categories:

- **General Observer (GO) Program**
  This program allows investigators to propose new observations with the Spitzer Space Telescope. Proposals must incorporate the actual on-orbit performance of the telescope. These on-orbit data are available in the technical documents listed in §5.1 and in the online Proposal Kit. Small (less than 50 hours) and medium (50 to 200 hours) GO investigations are solicited.
- **Archival Research (AR) Program**
  Funding support for archival research in Cycle-1 is limited to the analysis of data from the Spitzer First-Look Survey (FLS). This ~110-hour program was executed at the start of the science mission in December 2003. The FLS will be conducted by the SSC and is intended to characterize the mid-infrared sky at Spitzer sensitivities. If no funding support is required, it is *not* necessary to submit a Cycle-1 AR proposal.

Note that Spitzer Cycle-1 adopts a single-phase proposal submission process. For GO proposals, a detailed list of proposed observations, generated by the Spitzer Planning Observations Tool (SPOT), must accompany the research proposal. This CP is accompanied by supporting technical and programmatic documentation (listed in §5.1). All of these documents are available online in the Proposal Kit section of the SSC public Web site. ***All proposals must be submitted electronically to the SSC by the February 14, 2004 deadline.***

Questions pertaining to the Cycle-1 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 will be listed in the Frequently Asked Questions section of the SSC public Web site. Suggestions for improving the organization of the CP should be sent to the CP Editor via the Helpdesk.

2 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) public Web site (http://ssc.spitzer.caltech.edu/).

***Note**: The content of the SOM represents the known on-orbit characterization of the observatory performance through December 19, 2003. It is anticipated that improved and/or additional technical performance specifications will be available over the next few weeks. The SSC is committed to providing updated numbers to the community no later than January 15, 2004.*

2.1 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 (1σ radial rms), and pointing stability of 0.1 arcsec (1σ 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.

2.2 Orbit / Sky Visibility

The Spitzer Space Telescope was launched on August 25, 2003 atop a Delta 7920-H rocket. The telescope was launched into an Earth-trailing heliocentric orbit with radius 1 AU, and it drifts 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 40-degree wide annulus, extending from 80° 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 80 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 (b). Objects with $|b| > 80°$ are located within the Continuous Viewing Zone, and those with $60° < |b| < 80°$ are annually visible to Spitzer in one continuous ~7-month time interval. Targets with $|b| < 60°$ are observable twice per year in ~40-day windows. For any given target position, sky visibility maps are available through the Spitzer Planning Observations Tool (§5.2).

2.3 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 5-10 days duration will be 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 μm (Band 1), 4.5 μm (Band 2), 5.8 μm (Band 3) and 8.0 μm (Band 4). The 256 x 256 focal-plane arrays use Indium Antimonide (InSb) detectors for the two short-wavelength bands, and Arsenic-doped Silicon (Si:As) impurity-band conductors (IBC) for the two longer wavelengths. The pixel size for each detector array is 1.2 arcsec. Two adjacent fields of view (FOV) are simultaneously imaged in pairs using dichroic beamsplitters, with Bands 1 and 3 comprising one FOV, and Bands 2 and 4 the other. The Principal Investigator for IRAC is Giovanni G. Fazio, Smithsonian Astrophysical Observatory, Harvard-Smithsonian Center for Astrophysics.

The **InfraRed Spectrograph (IRS)** provides spectroscopic capabilities with low- and high-spectral resolutions from wavelengths of 5.3 to 40 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 ($\lambda/\Delta\lambda$ = 62-124): the short-wavelength module covering 5.3 to 14.2 microns, with pixel size of 1.8 arcsec and FOV of 3.6 x 54.6 arcsec, and the long-wavelength module providing coverage from 14.2 to 40.0 microns, with pixel size of 4.8 arcsec and a 9.7 x 151.3 arcsec FOV. The low-resolution modules employ long-slit designs that allow both spectral and one-dimensional spatial data to be acquired simultaneously on the same detector array. The other two modules provide high spectral resolution ($\lambda/\Delta\lambda$ = 600): the short-wavelength module covering 10.0 to 19.5 microns, with pixel size of 2.4 arcsec and FOV of 5.3 x 11.8 arcsec, and the long-wavelength module providing coverage from 19.3 to 37.0 microns, with pixel size of 4.8 arcsec and a 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 μm and 18.5-26 μm, each with a 1 arcmin x 1.2 arcmin FOV. The Principal Investigator for IRS is James R. Houck, Cornell University.

The **Multiband Imaging Photometer for Spitzer (MIPS**) provides imaging and photometric capabilities in three broad bands centered at 24, 70, and 160 microns. In addition, the MIPS is capable of measuring low-resolution ($\lambda/\Delta\lambda$ = 15-25) spectral energy distributions (SED) between 55 μm and 96 μm. The instrument uses three types of detector arrays: an Arsenic-doped Silicon (Si:As) 128 x 128 IBC array at 24 μm, an unstressed Gallium-doped Germanium (Ge:Ga) 32 x 32 array at 70 μm for imaging/photometry and for measurements of SED, and a stressed Ge:Ga 2 x 20 array at 160 μm. The MIPS will sample the telescope's Airy disk with pixels smaller than the Nyquist limit. The FOVs are about 5 arcmin square at 24 μm and 70 μm respectively, and 0.5 arcmin x 5 arcmin at 160 μm. The 70 μm array features a high-magnification (super-resolution) mode, with a 2x improvement in effective resolution. MIPS utilizes an internal scan mirror to facilitate efficient mapping of large areas and which enables total power measurements for absolute sky brightness measurements. The MIPS Principal Investigator is George Rieke, Steward Observatory, University of Arizona.

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

2.4 Observing Modes / AOTs

In Cycle-1, Spitzer Space Telescope observations will be executed with one of six distinct observing modes. Users will completely specify their observations through the use of Astronomical Observation Templates (AOTs), one for each observing mode. The selection of observational parameters will be through an electronic form that is accessed and prepared through a menu-driven, graphical user interface known as the Spitzer Planning Observations Tool (SPOT). These forms offer the user a limited set of control parameters. An AOT with target information and user-specified parameters "filled in" becomes an Astronomical Observation Request (AOR).

The Spitzer observing modes/AOTs are listed below. Details about these observing modes and the available choice of AOT parameters are provided in the SOM. The six observing modes available for Cycle-1 General Observers (GOs) are:

- IRAC Mapping/Photometry
- IRS Staring-Mode Spectroscopy
- IRS Spectral Mapping (*)
- MIPS Photometry/Super-Resolution Imaging
- MIPS Freeze-Frame Scan Mapping
- MIPS Spectral Energy Distribution (*)

Observing modes denoted with an asterisk may not be fully commissioned until mid-2004. Observations utilizing these modes can be proposed, although they may not be scheduled immediately at the start of Cycle-1.

A seventh observing mode, MIPS Total Power Measurement, will be not be commissioned until about one year after launch. *Its corresponding AOT is not available to the community for Cycle-1 observations.* It is anticipated that MIPS Total Power Measurement observations may be proposed by GO investigators starting with Cycle-2.

2.5 Science Operations

Flight operations for Spitzer will be conducted by an integrated team of personnel from the Jet Propulsion Laboratory (JPL) and from the Spitzer Science Center (SSC). Science operations activities will be based at the SSC, on the campus of the California Institute of Technology, Pasadena. The SSC will solicit observational and archival research investigations through *Calls for Proposals*, will organize a peer review of the proposals by science experts and administer supporting NASA research funds for investigations selected by the SSC Director. In addition, the SSC will schedule all science observations (including calibrations), conduct pipeline processing of all Spitzer Space Telescope data, and create an electronically-accessible science data archive.

3 Eligibility

Investigators worldwide are eligible to submit a proposal in response to the Spitzer Space Telescope Cycle-1 *Call for Proposals*. The Spitzer Science Center will offer NASA funding, subject to availability and the limitations cited below, to support the analysis of investigators selected by the SSC and affiliated with U.S.-based institutions.

3.1 Who May Submit a Proposal?

This solicitation for General Observer (GO) and Archival Research (AR) research is open to investigators of any nationality or institutional affiliation. 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. There is no limit to the number of Co-Investigators (Co-Is) that may be appear on a proposal. The PI may designate a Technical Contact for purposes of communications with the SSC Observer Support Team.

For the GO Program, proposals requesting Spitzer observing time may be submitted from non-U.S. based PIs. [If such a proposal includes U.S.-based Co-Is who intend to request data analysis support from NASA, see the special instructions in §4.1.11.]

Once the Science Archive opens in May 2004, any investigator may conduct archival research with Spitzer data in the public domain. An AR proposal is submitted only if the U.S.-based Principal Investigator is seeking NASA funding support, and is limited to research with First-Look Survey data (§4.2.1).

3.2 Funding Support

The SSC will provide financial support for Cycle-1 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 GO and AR proposals, no NASA funds may flow to them through the PIs. Therefore, researchers affiliated with non-U.S. institutions who propose investigations with Spitzer should seek support through their own appropriate funding agencies.

For the General Observer (GO) Program, U.S.-based Principal Investigators and Co-Investigators are eligible for funding to support data analysis. Funding awards will be determined through formulaic means (see §4.1.11). 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 §4.1.11.

For the Archival Research (AR) Program, only Principal Investigators affiliated with U.S.-based institutions are eligible for funding support. No U.S.-based Co-Investigators on approved AR proposals will be funded directly by the SSC. Such Co-Is may be funded via a sub-award issued by the PI's home institution, but the total cost of such sub-awards must be included in the cost plan submitted by the PI.

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

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

3.3 Education and Public Outreach

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

The SSC will offer an opportunity for Principal Investigators of approved programs, following their selection, to submit a companion EPO proposal. The SSC will offer approximately $150,000 for EPO activities that accompany approved Cycle-1 proposals. Additional details pertaining to EPO proposals will be sent to the Cycle-1 PIs following the completion of the selection process in May 2004.

4 Proposal Categories

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

4.1 General Observer Program

The Spitzer General Observer (GO) Program allows investigators to conduct independent research programs utilizing new Spitzer Space Telescope observations. Most of the observing time available during the science mission will be devoted to peer-reviewed GO investigations. The GO Program is open to all investigators worldwide on a competitive basis. Apart from Targets of Opportunity (§4.1.6), GO programs that are not executed to completion by the nominal end of Cycle-1 will typically be carried over into Cycle-2.

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

4.1.1 Observing Time Available

The SSC expects to release annual solicitations for GO research, typically offering ~5000 hours of Spitzer observing time per cycle. [See Appendix B for nominal science schedule.] However, Legacy Science observations (see Appendix C) will be interleaved with GO observations during Cycle-1. Therefore, **Cycle-1 offers an estimated 3700 hours of Spitzer observing time for GO investigators.**

Proposals may request up to 200 hours of observing time. The upper limit is imposed because of the reduced availability of observing time during Cycle-1 and because the average size of previously approved Legacy Science projects is on the order of 500 hours.

4.1.2 Types of GO Investigations

Proposals will be classified into two categories, based on the amount of observing time requested. Proposals seeking 50 to 200 hours of time will be classified as 'medium' GO programs. [The Legacy Science projects comprise the 'large' programs for Cycle-1.] Assuming sufficiently high scientific merit, it is anticipated that between 700 hours and 1400 hours of the available observing time will be allocated in support of medium-sized investigations. Proposals requesting fewer than 50 hours of observing time will be classified as 'small' GO programs.

4.1.3 SnapShots

SnapShot exposures, consisting of relatively short observations and used to optimize observational efficiencies, *cannot* be proposed in Cycle-1. The SSC is studying the feasibility of accommodating SnapShots in the future, although the expected high observing efficiency of the Spitzer Space Telescope may obviate their need.

4.1.4 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.11 for examples and additional information pertaining to *single-instrument* parallel observations.

4.1.5 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-1 should be presented in detail. Investigators with approved multi-cycle observations need not submit continuation proposals in subsequent cycles. The SSC will establish an upper limit of one percent of available observing time (*i.e.*, about 50 hours) in each subsequent observing cycle for the execution of all multi-cycle observations approved in previous cycles.

4.1.6 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 §4.1.10).

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

Additional overheads, beyond the baseline of three minutes per AOR, are assessed against high- and medium-impact ToO observations (see Appendix E). No additional overheads will be assessed against low-impact ToO observations. Because of the significant effect that high-impact ToO observations will have on efficient telescope scheduling, no more than six high-impact ToO observations will be approved in Cycle-1. Moreover, it is unlikely that *any* high-impact ToO observation will be executed during the first three months of Cycle-1.

In addition, any ToO proposals seeking multiple-instrument observations on timescales shorter than the normal instrument campaign (5-10 days) will be assessed special overheads in observing time, as listed in Appendix E.

An approved ToO observation will be executed only in the event that the specified phenomenon actually occurs within Cycle-1. 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-2 proposal submission deadline (nominally February 2005) be prepared to resubmit their Cycle-1 proposal at that time. Any expired ToO time will be returned to the General Observer pool and the SSC will publicize this information as part of the Cycle-2 *Call for Proposals*.

Additional information on Targets of Opportunity, including the procedures for activation of an approved AOR, can be found in Appendix A.5.

4.1.7 Second-Look Observations

Predictable and pre-planned re-visits to objects and/or fields may be appropriate as part of a General Observer investigation. These *second-look observations* (SLOs) must be clearly justified as an integral part of a coherent GO investigation. Plans for such SLOs must be fully described in the proposal. The description should 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. Such re-visits should not be used to follow up, at will, interesting results uncovered in the initial observations. Such "follow-up" observations should be proposed as part of a GO program in a subsequent cycle.

Unlike multi-cycle monitoring observations (§4.1.5), SLOs are presumed to be a subsequent observation(s) of a target with a different observing mode, with the intention of conducting a diagnostic observation related to an earlier discovery.

The SSC cannot guarantee that an approved SLO will be scheduled and observed before the end of the observing cycle. In such cases, the SLO will be executed during Cycle-2. No more than ten percent of the total observing time being requested in a GO proposal may be allocated towards SLOs. Additional details and limitations pertaining to SLOs can be found in Appendix A.7.

4.1.8 Generic Targets

Generic targets denote observations that fail to qualify as Targets of Opportunity (see §4.1.6); that is, they have more refined and predictive spatial and temporal information than ToOs. Generic targets can be described scientifically, but lack *precise* celestial coordinates or brightness estimates *at the time of the proposal submission deadline*. A generic target can be selected from a complementary observing program with Spitzer, or with any other telescope, but one where the conditional observations (assumed to be under the control of the Spitzer Principal Investigator) are scheduled, but not yet executed or analyzed prior to the Spitzer proposal deadline. Note that the specification of generic targets from Spitzer Legacy Science projects for subsequent second-look observations is limited to the pertinent Legacy Science team executing the approved project.

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.

Examples of generic targets and additional details and limitations pertaining to their use can be found in Appendix A.6.

4.1.9 Coordinated Observing Projects

There is no opportunity in Cycle-1 to propose joint and coordinated projects in concert with new observations with either the Hubble Space Telescope or the Chandra X-ray Observatory. Nor is there an option to submit a single proposal for coordinated observations with the Spitzer Space Telescope and the National Optical Astronomy Observatories. The SSC is examining the feasibility of offering these options in the future.

4.1.10 Director's Discretionary Time

Five percent of the total Spitzer observing time is allocated by the SSC Director as Director's Discretionary Time (DDT). This time is intended to facilitate proposals that address emerging scientific topics. Observations of completely unanticipated phenomena that cannot be proposed as a Target of Opportunity (§4.1.6) 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 public Web site. 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 public Web site.

4.1.11 Data Analysis Support

For approved GO programs (but not for AR investigations; see §4.2.3), 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, the complexity of the data analysis tasks associated with the observing mode(s) utilized, and a term that partially accounts for variations in the indirect cost rates among institutions. Since a formulaic approach will be used to determine funding levels, *GO investigators do not need to submit cost plans as part of their science proposal.*

For Cycle-1, approximately $15 million in NASA funding will be available to approved General investigators to support the analysis of 3700 hours of Spitzer observational data.

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

4.1.12 Data Rights

General Observers retain control of their data for a proprietary period that cannot exceed one year from the time of data delivery from the SSC. This period commences once the data, for each target, are made available to the Principal Investigator after SSC pipeline processing and quality control. At the end of this period, the raw and pipeline-processed data are entered into the Spitzer Science Archive and are publicly and freely available for analysis by any interested person.

4.2 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 (see §4.2.3 for eligibility requirements). *For Cycle-1 only, financial support for archival research is limited to the analysis of data from the Spitzer First-Look Survey*.

4.2.1 First-Look Survey

The ~110-hour Spitzer First-Look Survey (FLS) is the inaugural Director's Discretionary Time (DDT) program. It was executed at the start of the science mission in December 2003. The primary purpose of the FLS is to provide an early and representative sample of reliable infrared data that will enable effective and efficient planning of Spitzer observing programs. In addition to probing a carefully selected extragalactic high-latitude field, the FLS characterizes the infrared cirrus, source counts and confusion in two strips at low Galactic latitudes, and in a region towards a molecular cloud. The FLS also includes characterization of the Ecliptic Plane, main-belt asteroids, and the Zodiacal Light for Solar System observers. The SSC will process and disseminate the FLS data to the science community as rapidly as possible, with the initial release of data by January 15, 2004.

The details of the FLS fields/targets, accompanied by ancillary data collected at other wavelengths, are available on the SSC public Web site. An itemized list of corresponding AORs is included in the *Reserved Observations Catalog* (ROC). The ROC is available online within the Proposal Kit section of the SSC public Web site.

4.2.2 FLS Data Dissemination

The SSC will disseminate the FLS basic calibrated data as soon as they are pipeline-processed and deemed reliable for scientific analysis. The SSC is committed to releasing *all* of the FLS data by the time the online Science Archive opens in May 2004. However, this milestone occurs after the Cycle-1 proposal deadline. The SSC will make its best effort to release as much of the FLS data as feasible prior to the proposal deadline. It is conceivable that there will be phased releases of the FLS data, with the near- and mid-infrared IRAC data and the mid-infrared MIPS data available before the far-infrared MIPS data. *Not all of the FLS data may be in the public domain at the time of the proposal submission deadline.* Nonetheless, AR proposals should be based on the FLS information provided online by January 15, 2004.

4.2.3 Funding Support

The SSC will provide financial support for Principal Investigators selected to conduct Archival Research, subject to the availability of NASA funds. Only PIs affiliated with U.S.-based institutions, regardless of nationality, are eligible for funding support. *The SSC cannot award NASA supporting funds to investigators affiliated with non-U.S. institutions*. Investigators may be affiliated with universities, industry, NASA Centers, federally funded research and development centers, national laboratories, other non-profit institutes, or military facilities.

Up to $750,000 of direct support for Archival Research of Spitzer First-Look Survey data will be available in Cycle-1. All AR proposals must be accompanied by an institutionally endorsed cost plan that is submitted separately to the SSC (§6.3.4). Guidelines for allowable costs are provided in Appendix F. The evaluation of AR proposals will take into account the cost effectiveness of the proposed investigation and the available funds for Archival Research.

The SSC will approve AR awards to Principal Investigators only. If a PI seeks funding for Co-Investigators, those sub-awards must be included in the cost plan submitted by the PI, and must be administered by the PI home institution. The SSC will not accept cost plans from U.S.-based Co-Investigators on foreign-led AR proposals.

5 Proposal Planning

Before submitting a Spitzer Space Telescope Cycle-1 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. The Spitzer Planning Observations Tool (SPOT) and other online resources within the Science User Tools package are provided for this purpose. All of these tools may be found within the Proposal Kit section of the SSC public Web site (http://ssc.spitzer.caltech.edu/).

The documentation listed in §5.1 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 §5.1 through §5.6. Researchers proposing to conduct AR investigations may read §5.1 and §5.2, then skip directly to §5.6.

5.1 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) proposers should follow the reading recommendations provided.

- ***Spitzer Space Telescope Cycle-1 Call for Proposals (CP)***
  Version 2.0 (December 19, 2003) Required Reading: GO, AR
  The *Call for Proposals* is the present document, and its contents supersede those of Version 1.0, issued on November 8, 2002.

- ***Spitzer Space Telescope Observer's Manual (SOM)***
  Version 4.0 (December 19, 2003) Required Reading: GO, AR
  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 Research investigators understand how Spitzer data are collected and processed.

- ***Spitzer Space Telescope Observation Planning Cookbook***
  Version 3.0 (December 30, 2003) Recommended Reading: GO
  The *Observer's Cookbook* provides detailed examples of how to construct Spitzer observations.

- ***Spitzer Planning Observations Tool (SPOT) User's Guide***
  SPOT version 9.0 (December 30, 2003) Required Reading: GO (all)
  AR (Chapter 15)
  The *SPOT User's Guide* is a comprehensive guide to the Spitzer Planning Observations Tool software package (see §5.2).

- ***Spitzer Space Telescope Observing Rules***
  Version 4.1 (December 19, 2003) Required Reading: GO
  Recommended Reading: AR
  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 5.0 (December 19, 2003) Required Reading: GO, AR
  The *Reserved Observations Catalog* includes an itemized list of observations that comprise the Guaranteed Time Observer programs, the First-Look Survey, the Legacy Science Program, and Director's Discretionary Time awards. The ROC is available online in a searchable ASCII text format.

The documents described above are available within the Proposal Kit section of the SSC public Web site.

Proposers are urged to rely on the electronic versions of these documents. A small number of paper copies of the first five documents listed above will be printed and made available to investigators upon request through the Helpdesk. The reader is urged to regularly consult the SSC public Web site for the latest news, technical information and telescope performance updates. This is particularly important for GO investigators, who must plan their observational program based on the on-orbit performance of the telescope. The *Frequently Asked Questions (FAQ)* sections of the site, organized by topic, will be updated regularly with new questions and answers.

5.2 The Proposal Kit

The online Proposal Kit provides all of the information necessary for the prospective General Observer (GO). It can be found on the SSC public Web site at http://ssc.spitzer.caltech.edu/propkit/ and includes each of the documents listed in §5.1.

The Kit also includes instructions for installing the Spitzer Planning Observations Tool (SPOT) software on the user's host machine. SPOT is used to plan and prepare observations, and to submit GO and AR proposals electronically to the SSC. It allows GO investigators to construct and edit detailed Astronomical Observation Requests (AORs) by selecting from a variety of preset instrument-specific functions. SPOT also includes useful visualization tools to permit the GO investigator to see how proposed observations will be laid out on the celestial sky. These capabilities allow GOs to retrieve relevant images from other astronomical surveys and archives. It also describes how an investigator can obtain estimates of observing time for a proposed program. Prospective GO investigators are encouraged to download SPOT and to start planning their observing programs well before the proposal submission deadline.

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

In addition, the Proposal Kit includes guidelines pertinent to the calculation of the special overhead burdens (Appendix E) applied to Targets of Opportunity (§4.1.6), targets requiring rapid instrument changes, and targets with late ephemeris changes. The Proposal Kit includes an Infrared Compendium, an online resource for professional scientists new to infrared astronomy.

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 Horizon database supported by the Solar Systems Dynamics Group at the Jet Propulsion Laboratory.

Finally, the Proposal Kit contains a multitude of links to useful general-purpose astronomical tools (such as coordinate conversion), observation planning tools (IRSKY, Skyview), astronomical databases (IRSA, NED, SIMBAD), and archived datasets (2MASS, ISO, DSS).

5.3 GTO Observations

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

5.4 Legacy Science Program

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

Additional details pertaining to the six approved Legacy Science projects are available in Appendix C. Extended project abstracts (~5-pages in length) are available on the SSC public Web site. The individual observations that comprise each project are listed in the *Reserved Observations Catalog*. In addition, each project has its own Web site, accessible via the SSC public Web site.

5.5 Additional Guidelines for General Observers

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

5.5.1 Duplicate Observations

In general, duplicate observations with the Spitzer Space Telescope are not permitted. *It is the responsibility of the GO investigator to avoid duplication of previously approved observations.* A list of all such observations is available in the *Reserved Observations Catalog* (ROC). This ROC lists all observations submitted to date through the Guaranteed Time Observations (§5.3), the Legacy Science Program (§5.4), the First-Look Survey (§4.2.1), and Director's Discretionary Time (§4.1.10). The Proposal Kit contains a search utility tool that allows researchers to check newly planned observations against the ROC.

Quantitative descriptions of what constitutes a duplicate observation can be found in Appendix A.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.2.1.

Proposed AORs deemed to duplicate previously approved observations will be identified by the SSC, and this information will be forwarded to peer reviewers. These reviewers will be instructed to omit such duplicate observations and to assess the proposal's merits excluding those observations. However, in rare cases, the SSC Director may approve the execution of a duplicate observation. In such a case, the observation deemed to be a duplicate will be executed, but the resultant data withheld from the second observer until the proprietary period of the first observer ends.

5.5.2 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 (§2.2), there are various means by which an observer may place scheduling and relational constraints on proposed observations (see §5.5.3 of the *Spitzer Observer's Manual* for details). Constraints limit the flexibility of telescope scheduling and reduce the overall observing efficiency. Therefore, proposers should carefully consider the impact of constrained observations. The SSC discourages GO investigators from placing undue constraints on proposed AORs. Programs with heavily constrained AORs will be identified as difficult to schedule by the SSC, and their evaluation will be affected accordingly (see §7.2). For Cycle-1 as a whole, the SSC will allow no more than 20 percent of all approved observations to have user-imposed constraints (*i.e.*, timing, follow-on, group-within, chain and sequence constraints available to the proposer within SPOT).

5.5.3 Calibration Observations

The SSC will establish and maintain 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 immediately 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 §2.4) during the Science Verification phase. After an AOT is commissioned for general use, the SSC will conduct the periodic observations necessary to maintain such calibrations. It is expected that calibration observations equivalent to about one day per week will be required. Celestial and internal calibrations will be a component of each 5-10 day instrument campaign.

Observations of celestial targets necessary to maintain the calibration of each AOT will not be subject to policies regarding duplicate observations.

For GO investigations that require a higher level of calibration, it is the responsibility of the Principal Investigator to include those *special calibrations* as part of their proposal. The SSC will process such observations through its normal data processing pipeline(s), and the data will be subject to the normal proprietary data periods (§4.1.12).

5.5.4 Bright Object Observations

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

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

5.6 SSC Assistance

The SSC anticipates that the research community will pose additional questions of a scientific, technical, programmatic, or financial nature. These questions 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 public Web site. Therefore, all questions and comments submitted to the Helpdesk become the property of the SSC and California Institute of Technology.

6 Proposal Submission

The SSC has adopted a single-phase proposal submission process for Cycle-1. This process is motivated primarily by the fact that Cycle-1 observations start shortly after the selection process concludes. Therefore, GO investigators are required to submit completed Astronomical Observation Requests (AORs) with their science proposal. The AORs are submitted as an ASCII text file and the parent proposal must be submitted as a PDF file. Both are submitted to the SSC through the Spitzer Planning Observations Tool (SPOT).

Proposals must be submitted prior to the deadline of February 14, 2004 (12:00 noon Pacific Standard Time). Proposals received after the deadline will not be considered. There is no limit to the number of proposals that may be submitted by a Principal Investigator or by Co-Investigators. All categories of proposals must be submitted through SPOT, a downloadable software package developed by the SSC. Proposals should not contain security classified information or depend on access or use of security classified information or facilities for any portion of the proposed activities. A proposal may be withdrawn from consideration by the Principal Investigator at any time prior to the completion of the selection process.

6.1 Proposal Formats

The proposal length depends on the proposal category. Medium GO proposals are those requesting 50 to 200 hours of observing time; small GO proposals request less than 50 hours of observing time. [Large proposals are not solicited in this *Call for Proposals.*]

Relevant page limits for each proposal category are summarized in the table below.

Subject to Page Limits	***GO(medium)***	***GO(small)***	***AR***
Science Justification	4 pp.	3 pp.	3 pp.
Technical Plan	3	2	1
Figures + Tables + References	2	2	1
Curriculum Vita/Bibliography	1	1	1
TOTAL	***10 pp.***	***8 pp.***	***6 pp.***

Peer reviewers will be instructed to disregard any pages in excess of the limit.

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

NOT Subject to Page Limits	***GO***	***AR***
Cover Sheet	required	required
Observations Summary Table	required	not required
Astronomical Observation Requests (AORs)	required	not required
Summary of Existing Spitzer Research Programs	required	required
Financial Contact Information	required	required
Cost Plan	not required	required
Budget Narrative	not required	as needed

Additional details pertaining to proposal contents are listed in §§6.2-6.4. Regardless of the proposal category, the proposal must be written in English and a printable version must utilize fonts that are no smaller than 12 points, and must adopt one-inch margins. No color figures or tables should be included since the SSC will reproduce proposals in black-and-white only for review. No preprints or reprints should accompany the proposal.

All investigators should recognize that the peer review process (§7.1) utilizes external scientists organized into topical Review Panels. While reviewers will be selected such that their expertise reflects the proportional mix of submitted proposals, a given Review Panel will necessarily span a wide variety of research disciplines. *Therefore, proposals should be written for a knowledgeable, but broad-based, audience.* Proposals will be evaluated according to the criteria listed in §7.2.

Additional proposal guidelines for General Observers (§6.2) and Archival Research investigators (§6.3) are provided in the following sub-sections.

6.2 General Observer Proposal Contents

General Observer (GO) proposals must include the following sections, each subject to the individual page limits listed in §6.1.

6.2.1 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 time estimators available in the Spitzer Planning Observations Tool (SPOT). All proposed targets must have corresponding AORs, although some information may be omitted for Targets of Opportunity (§4.1.6), second-look observations (§4.1.7), and generic targets (§4.1.8).

6.2.2 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. In the case of imaging observations, the technical plan should include quantitative descriptions of the required sky position(s), sensitivity/depth, wavelength(s), and coverage strategy (including redundancies). For spectroscopic observations, the proposal must include a list of targets, wavelength coverage, required sensitivities, positional accuracy needed, and the strategies by which targets will be acquired. For projects conducting photometric measurements, the proposal must include a list of targets, wavelength coverage, the photometric accuracy needed, and any special calibration requirements. For other types of observations, similar levels of technical details should be specified.

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 (§5.5.2).

The technical plan should include a data analysis plan, in which the investigator describes in detail 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 proposing investigators. [Descriptions of the instrument-specific pipelines can be found within Chapters 6-8 of the *Spitzer Observer's Manual.*]

If a GO proposal includes U.S.-based Co-Is who require data analysis support from NASA, the PI (whether U.S.-based or not) must explicitly identify them and the fractional extent to which each U.S.-based investigator (including the PI) will be involved in the investigation's total data analysis efforts. In this context, the term "data analysis" is taken to include activities that directly support the processing, analysis and scientific interpretation 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%.

6.2.3 Other Contents

The equivalent of up to two pages of figures, tables and references may be included in the proposal. These sections can either be integrated into the Science Justification and Technical Plan, or consolidated into two separate pages. Figures must be in black-and-white, and of adequate size to comprehend. The references may be listed in 10-point font (rather than 12-point). One additional page may be devoted to the curriculum vita of the Principal Investigator and summary bibliographies of key investigators. This page should list the major publications related to the proposed research.

The proposal should include an Observations Summary Table (not subject to the cited page limits) that lists the main characteristics of the observations being proposed. The table should list the total number of AORs and the total observation time requested (as computed by SPOT) for *each* observing mode requested (§2.4). The table should also include similar information for any Second-Look Observations (§4.1.7) being proposed. Any generic targets (§4.1.8) being proposed must also be summarized in the table. The total number of AORs being proposed as Targets of Opportunity (§4.1.6), classified by their impact, must be listed within the table.

Proposers must explicitly summarize their current involvement as a Principal Investigator on existing Spitzer Space Telescope research programs. The proposer should indicate the status of each GTO and/or GO program and of its data analysis efforts.

The Principal Investigator must also include contact information (e.g., name, address, phone number, email address) for an authorized financial representative of their home 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.

6.2.4 AORs

Each GO proposal must be accompanied by a complete list of Astronomical Observation Requests (AORs). This ASCII text file contains detailed information for each of the proposed observations. The AORs are generated via the Spitzer Planning Observations Tool (SPOT), and include the total time required to execute a given observation with the telescope. Each AOR includes an assessed overhead of

three minutes to account for the averaged time to acquire the target, regardless of the actual time utilized. 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 §9.4 of 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.

GO investigators approved for Cycle-1 will not, in general, have any opportunity to make major modifications to their AORs after selection. Hence, proposers are urged to carefully plan and construct the AORs that accompany their GO proposal.

6.3 Archival Research Proposal Contents

Archival Research (AR) proposals must be submitted to the SSC electronically, using the proposal submission software integrated into the Spitzer Planning Observations Tool (SPOT) software package. Archival research proposals are limited to analysis of First-Look Survey (FLS) data (see §4.2.1). AR proposals must include the following sections, each subject to individual page limits listed in §6.1.

6.3.1 Science Justification

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

6.3.2 Technical Plan

The technical plan should describe the data analysis plans of the AR investigator. It should describe the extent to which the SSC pipeline processed data contribute towards achieving the stated scientific goals of the investigation, and the extent to which post-pipeline data analysis must be performed by the investigator. [Descriptions of the instrument-specific pipelines can be found within Chapters 6-8 of the *Spitzer Observer's Manual.*] The proposal should also describe explicitly any special services being requested from the SSC, beyond the standard electronic advice available to the community (§5.6).

6.3.3 Other Contents

The equivalent of up to one page of figures, tables and references may be included in the proposal. These sections can either be integrated into the Science Justification and Technical Plan, or consolidated into one separate page. The figures must be in black-and-white, and of adequate size to comprehend. The references may be listed in 10-point font (rather than 12-point). One additional page may be devoted to a curriculum vita of the Principal Investigator and a bibliography list of the major publications related to the proposed research.

Proposers must explicitly summarize their current involvement as a Principal Investigator on existing Spitzer Space Telescope research programs. The proposer should indicate the status of each GTO and/or GO program and of its data analysis efforts.

The Principal Investigator must also include contact information (e.g., name, address, phone number, email address) for an authorized financial representative of their home institution. This will facilitate the efficient processing of the supporting data analysis contract.

6.3.4 Cost Plan

Cost effectiveness and reasonableness are evaluation criteria for Archival Research proposals. One copy of the printed proposal and three copies of the cost plan (including budget narratives, as necessary) must be mailed to 'Cycle-1 Proposal Submission' at the address listed in §8. The cost plans should be received at the SSC within one week of the proposal submission deadline.

The cost plan will include budget form(s) and, if necessary, a supplementary budget narrative. Neither of these is subject to the overall proposal page limit. The plan should include a request for total project funds itemized by major categories, with supporting justifications provided in a supplementary budget narrative. Cost plans are limited to one year in duration, with a period of performance starting in July 2004. Investigators can use the budget form provided in the Proposal Kit section of the SSC public Web site or a form utilized by their home institution.

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

6.4 Submission of Proposals

Proposals must be submitted to the SSC electronically through the Spitzer Planning Observations Tool (SPOT; see §5.2), and must be consistent with the page and format guidelines listed throughout §6. Detailed instructions on submitting a proposal are available in Chapter 15 of the *SPOT User's Guide*, and are summarized below.

1. Go to the Proposal Kit section on the SSC public Web site (http://ssc.spitzer.caltech.edu/) and download the Spitzer Planning Observations Tool (SPOT) to your host machine.
2. Start up SPOT and open the Proposal Tool.
3. Load any previously generated cover sheet information, the proposal text, and (for General Observer investigations) the accompanying AORs that comprise your program.
4. Modify the proposal (and AORs, as needed) to take into account the on-orbit performance of the telescope, including any late updates released by the SSC through January 15, 2004.
5. Click on the SUBMIT Menu in the Proposal Tool and select 'Submit proposal to SSC.'
6. Prior to the proposal submission deadline of February 14, 2004, proposals can be modified by using 'Update Proposal at SSC' option.
7. The version of the proposal, 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.

8. For Archival Research proposals, submit one printed copy of the proposal and three copies of the cost plan (and budget narrative, as necessary). The proposal must be received at the SSC by the submission deadline, and the cost plan must be received within one week of the proposal deadline. These documents should be mailed to "Cycle-1 Proposal Submission" at the address listed in §8.

Proposals received after the deadline of 12:00 noon (Pacific Standard Time) on Saturday, February 14, 2004 will not be considered. Note that neither NASA nor JPL/Caltech will be responsible for any cost incurred in submitting a proposal.

6.5 Proposal Confidentiality

Proposals submitted in response to this *Call for Proposals* will be kept confidential to the extent allowed by the review process (§7). For approved investigations only, the SSC will make the titles, investigator names, and abstracts publicly available after the selections are announced. The remainder of the approved proposal, and the entirety of proposals not selected, shall remain confidential. In addition, AORs from the approved General Observer investigations will be incorporated into future versions of the *Reserved Observations Catalog.*

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."

7 Proposal Evaluation and Selection

Spitzer Space Telescope Cycle-1 research programs will be selected through a competitive peer review process, using the evaluation criteria listed in §7.2.

7.1 Peer Review

Proposals received by the submission deadline will be organized into broad science topics by the SSC Director's Office, based primarily on the proposal category identified by the Principal Investigator. The Director's Office will then assign the proposals to Science Review Panels, with members selected from the community-at-large. In order to minimize institutional, professional and personal conflicts of interest there will be parallel Panels for each broad-based topic. A given set of parallel Panels will review and rank all relevant GO and AR proposals, based on the evaluation criteria listed in §7.2. 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-1 research program.

7.2 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.

Proposals submitted to the **General Observer Program,** whether small- or medium-sized, 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 Spitzer.

(3) The technical feasibility and robustness of the proposed observations in light of the on-orbit observatory performance, and the extent to which the observations can be accommodated within routine Spitzer operations.

(4) 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.

7.3 Proposal Selection

The Science Review Panels and Time Allocation Committee will conduct their peer reviews in early May 2004. The SSC Director, the NASA-designated selection official, will announce the final selections on about May 14, 2004. The GO observations will start in July 2004.

8 Addresses

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 Spitzer Space Telescope public Web site is located at:

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

The science community should consult the SSC public Web site at:

http://ssc.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.

9 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.

9.1 Science Publications

It is expected that useful scientific results obtained through Spitzer observations and archival research will be published in the scientific literature. All publications based on Spitzer data must carry an appropriate acknowledgement. Investigators should consult the SSC public Web site for the appropriate acknowledgement template(s).

In papers describing Spitzer results, investigators should provide reference(s) to seminal papers describing the telescope, including the relevant science instruments. These references will be posted on the SSC public Web site. Moreover, the SSC advises investigators to accurately trace the original heritage of any Spitzer archival data. In particular, scientific results based on data from the Legacy Science Program should cite appropriate references to the original Legacy Science project. The most relevant of these references will also be listed on the SSC public Web site.

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 (§9.2).

9.2 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. This system 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. *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 (PAO) of their home institution. For a potential press release, the SSC and NASA will coordinate with the PI and/or institutional PAO 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 SSC public Web site.

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.

A.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-1 *Call for Proposals (CP)*, each AOR will be assessed three minutes 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 (§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. These overhead burdens are summarized online within the 'Proposal Kit' section of the Spitzer Science Center (SSC) public Web site and are subject to change in future CPs.

Any proposals seeking multiple-instrument observations on timescales shorter than the normal instrument campaign (5-10 days) will be assessed special overheads in observing time by the SSC. These overhead burdens are described online within the 'Proposal Kit' section of the SSC public Web site and are subject to change in future CPs.

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.

A.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.

A.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(a) Both of the observations are executed with the same Astronomical Observation Template (AOT), *or*

1(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, *or*

1(c) One of the observations is executed with the MIPS Photometry/Super-Resolution Imaging mode and the other is executed with the MIPS Freeze-Frame Scan Mapping mode.

2. The integration time per pixel for each observation agrees to a corresponding factor of three in sensitivity; *and*

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 of the original observer end.

A.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* will be accompanied by a comprehensive list of targets and AORs previously approved (§A.3.2). To assist users in checking for duplications, the SSC will develop suitable software for checking newly proposed observations against a comprehensive catalog of approved AORs. Any newly proposed AOR meeting the criteria listed in §A.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.

One exception to the duplicate observation policy described in §A.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 deemed to be duplicates of observations already listed in the SODB will be noted by the SSC, and this information will be provided to the Time Allocation Committee (TAC). In general, the TAC shall not recommend duplicate observations. If the TAC elects to recommend a duplicate observation, it must specify in writing (to the SSC Director) why the duplicate observation(s) should be permitted.

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

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

A.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).

A.3.1 Definition of Approved Programs

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

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

For Legacy Science projects, the approved programs consist of the full list of AORs (and corresponding abstracts) submitted in 2001, following the proposal peer review and selection in late 2000.

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.

A.3.2 Reserved Observations Catalog

Each *Call for Proposals* (CP) will be 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 will also include 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.

A.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.

A.4.1 Types of Modifications

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

All requests for modification of approved AORs must be approved by the SSC Observer Support Team, which will characterize the request as one of two types. *Minor modifications* consist of small changes of target parameters, typically a few arcseconds in celestial coordinates, or small changes in AOR execution time (< 20%), subject to the total observing time in an investigation remaining constant. Minor modifications could also include small changes of other parameters in the AOR (*e.g.*, change to high-dynamic mode in the IRAC AOR), as long as the changes do not alter the scientific content or intent of the original AOR.

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

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

The execution of an approved observation may become infeasible (§12) or prove to be scientifically useless because of unanticipated circumstances. If these events occur, and if a General Observer can *a priori* demonstrate that the approved AOR will yield useless data, the Principal Investigator can submit a request to make major modifications to the AOR. The proposed modifications must be consistent with the original scientific intent of the approved observation and the observing time granted. In addition, it cannot duplicate any other approved observation, and must be approved by the SSC Director.

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

A.4.2 Blackout Periods

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

An exception to the ROC freeze during active CPs will be granted during the Cycle-1 solicitation process, in order to enable GTO and Legacy Science investigators to react to significant on-orbit variances from pre-launch predictions. The SSC Director issued guidelines to the GTO investigators and Legacy Science teams that define which AORs can be modified during this period.

A.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.5.1).

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.

A.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 (§A.5.2) and the execution of the corresponding observation:

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

Apart from the overhead burdens applied to all Spitzer observations (§A.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 public Web site (and in Appendix E of this CP) and are subject to change in future CPs.

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 (5-10 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.

A.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.*

A.5.3 Regulation of Observations

The SSC Director will rely on the recommendations of the Time Allocation Committee to assess the benefits of a proposed ToO observation against any disruptions to the efficient planning and scheduling of

science observations with the Spitzer Space Telescope. Because of the heavy impact that high-impact ToO observations will have on the short- and medium-term schedule, no more than six of these rapid-execution ToO observations will be approved and executed in any given observing cycle. Moreover, the SSC does not intend to approve any high-impact ToO observations within the first three months of Cycle-1.

A.6 Generic Targets

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

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

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 five weeks prior to observing. [If a more rapid response is required, the observations must be treated as a Target of Opportunity; see §5.]

Generic targets could be a primary component of second-look observations (§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.

A.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 §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 §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.* The specification of generic targets from Spitzer Legacy Science projects for subsequent second-look observations (§7) is limited to the pertinent Legacy Science team executing the approved project.

- 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.

A.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 (§5).

A.7 Second-Look Observations

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

For example, an investigator can propose to conduct IRAC or MIPS imaging observations to identify objects with extreme color ratios, and then conduct IRS spectroscopy to characterize these objects. The spectroscopic observations comprise the second-look observations, and comprise a legitimate portion of the proposed scientific investigation. No more than ten percent of the total observing time being requested in a GO proposal may be allocated towards SLOs. Moreover, SLOs can include generic targets (see §A.6). In all cases, the SLOs must be justified as an integral part of the proposed science program at the time of proposal submission.

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

A.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 six of the seven Spitzer Space Telescope AOTs to be available to Cycle-1 General Observers:

- IRAC Mapping/Photometry
- IRS Staring-Mode Spectroscopy
- MIPS Photometry/Super-Resolution Imaging
- MIPS Freeze-Frame Scan Mapping
- IRS Spectral Mapping
- MIPS Spectral Energy Distribution.

A seventh AOT, MIPS Total Power Measurement, will be available for Cycle-2 GO investigators.

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

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

A.9 Routine Calibrations

The SSC will establish and maintain 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 will be described on the SSC public Web site at the time of each *Call for Proposals*. Data resulting from routine facility calibrations will generally enter 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 policies regarding duplicate observations (§A.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.

After an AOT is commissioned for general use, the SSC will maintain the calibration of the AOT, and will conduct celestial observations, as necessary to maintain such calibrations. It is expected that calibration observations equivalent to about one day per week will be required, at least for the first year of

the mission. Celestial and internal calibrations will be a component of each instrument campaign. (The scheduling of observations will generally be blocked into instrument campaigns of 3-10 days duration.) The celestial calibrations will be counted as part of the overall overhead of the Observatory, and will be assessed across all approved observing programs according to the precepts described in §1. Observations of celestial targets necessary to maintain the calibration of each AOT will not be subject to policies regarding duplicate observations.

The SSC will publish, as part of the *Spitzer Observer's Manual*, the expected and achieved calibration accuracy for AORs processed with the normal calibration pipelines. For observations that require a higher level of calibration, and therefore special calibration observations (see §10), it is the responsibility of the requesting investigator to include those special calibration observations as part of their proposed observational program.

A.10 Special Calibrations

Any additional calibration(s) that are not included as part of routine calibrations (§A.9) conducted by the SSC will be regarded as *special calibrations*, and are the responsibility of the approved investigator. The observing time required to conduct such special calibrations will be charged against the observer's allocation and, for General Observers, must be included in the original science proposal. The SSC will process such observations through the normal data processing pipeline(s). The investigator is responsible for using these data for the special calibration requirements of their program. The normal proprietary data period applies to special calibration data that are part of an approved science program.

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

A.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.

A.12 Infeasible or Non-Schedulable Observations

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

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

A.13 Failed Observations

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

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

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

A.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. Once the proprietary period expires, the raw and pipeline-processed data will enter the public domain and be available to anyone through the Science Archive. Special rules may pertain to the era prior to the formal opening of the Science Archive (about eight months after launch); such rules will be formulated by the SSC Director and disseminated to the community via the public Web site. The SSC Director reserves the right to

designate any Target of Opportunity data for early release when such a release is deemed to be in the interest of the community.

There are no proprietary data rights for observations obtained through the Legacy Science Program. These data will enter the public domain immediately after pipeline-processing and quality assurance is performed by the SSC..

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

A.15 Publication and Dissemination of Science Results

It is expected that useful scientific results obtained through Spitzer Space Telescope observations and archival research will be published in the scientific literature. All publications based on Spitzer data must carry an appropriate acknowledgement. Investigators should consult the SSC public Web site for the appropriate acknowledgement template(s).

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 public Web site. Moreover, the SSC encourages investigators to provide reference(s) to seminal Legacy Science project results, where appropriate.

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.

Appendix B: Spitzer Space Telescope Science Schedule

The monthly calendar of Spitzer events pertaining to the science user community appears below and is subject to change. The reader is advised to always consult the SSC public Web site (*http://ssc.spitzer.caltech.edu/*) for the most up-to-date science schedule.

MONTH	EVENT(S)
Aug 2003	Spitzer Space Telescope launch; In-Orbit Checkout (IOC) begins
Sep 2003	IOC continues
Oct 2003	IOC concludes; Science Verification (SV) begins
Nov 2003	SV concludes
Dec 2003	Science mission begins; Cycle-1 *Call for Proposals* (Version 2.0) issued
Jan 2004	
Feb 2004	Cycle-1 proposals due
Mar 2004	
Apr 2004	
May 2004	Cycle-1 proposal review; Science Archive opens
Jun 2004	
Jul 2004	Cycle-1 observations begin
Aug 2004	Initial Legacy Science data products delivered to SSC
Sep 2004	
Oct 2004	
Nov 2004	Cycle-2 CP issued
Dec 2004	
Jan 2005	
Feb 2005	Cycle-2 proposals due
Mar 2005	
Apr 2005	Cycle-2 proposal review
May 2005	Cycle-2 observations begin
Jun 2005	
Jul 2005	
Aug 2005	
Sep 2005	
Oct 2005	
Nov 2005	Cycle-3 CP issued
Dec 2005	
Jan 2006	
Feb 2006	Cycle-3 proposals due
Mar 2006	
Apr 2006	Cycle-3 proposal review
May 2006	Cycle-3 observations begin
Jun 2006	
Jul 2006	
Aug 2006	
Sep 2006	
Oct 2006	
Nov 2006	Cycle-4 CP issued
Dec 2006	
Jan 2007	
Feb 2007	Cycle-4 proposals due

{See SSC public Web site for remainder of schedule.}

Appendix C: Legacy Science Program

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

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

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

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

The six approved projects utilize a total of 3160 hours of Spitzer observing time, primarily in the first year of the mission, and integrate substantial ancillary data from ground-based observatories and other space-borne telescopes. Many of the Legacy Science observations will be interleaved with GO and GTO observations during Cycle-1. Each Legacy Science project is also developing post-pipeline data products and/or analysis tools that will be delivered to the SSC for wider dissemination to the community. These products, including catalogs and image mosaics, will be invaluable to researchers planning future GO proposals.

The 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 200 square degree IRAC survey of the inner Galactic plane, extending from 10 to 60 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 (Space Telescope Science Institute), 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 lookback 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 SIRTF (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 SIRTF (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 ~70 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.

A 40-page booklet of Extended Abstracts describing the Legacy Science Program is available on the SSC public Web site (http://ssc.spitzer.caltech.edu/).

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 public Web site

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 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.

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 §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 5-10 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. 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.

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

- **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.

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

- **Non-Standard Sequential Observations: 2.6 hours per instrument change**
  The normal cycle of scheduled instrument campaigns (of 5-10 days duration) will be IRAC → MIPS → IRS → IRAC, et seq. Requests for observations, to be executed in rapid succession, that violate this sequence will be assessed additional overheads per instrument change. For example, a request for IRAC observations, followed shortly thereafter by an IRS observations, will be assessed an additional 2.6 hours of overheads. A request for near-contemporaneous observations of a target with all three instruments will be assessed 5.2 hours of special overheads.

- **Late Ephemeris Change: 0.5 hour**
  This overhead will be applied to the first AOR in a group, chain or sequence of AORs to be executed consecutively on the same moving target during a single observing session, using a single science instrument. Use of multiple instruments will incur yet additional special overheads, as described above.

Appendix F: Allowable Costs

Archival Research (AR) 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. Details that cannot be accommodated within standard budget forms should be included in a supplementary budget narrative (not subject to the overall proposal page limit).

- ***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).

- ***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.

- ***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.

- ***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."

- ***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 should 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."

- ***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."

- ***Equipment***

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

- ***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."

- ***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.

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
Co-I	Co-Investigator
CP	Call for Proposals
DDT	Director's Discretionary Time
DSS	Digital Sky Survey
EPO	Education and Public Outreach
FAQ	Frequently Asked Questions(s)
FLS	First-Look Survey
FOV	Field of View
GO	General Observer(s)
GTO	Guaranteed Time Observer(s)
IBC	Impurity-Band Conductor(s)
IDC	Indirect Cost(s)
IOC	In-Orbit Checkout
IPAC	Infrared Processing & Analysis Center
IRAC	InfraRed Array Camera
IRS	InfraRed Spectrograph
IRSA	InfraRed Science Archive
ISO	Infrared Space Telescope
JPL	Jet Propulsion Laboratory
L	Launch
MIPS	Multiband Imaging Photometer for Spitzer
NAIF	Navigation and Ancillary Information Facility
NASA	National Aeronautics and Space Administration
NED	NASA/IPAC Extragalactic Database
OSS	Office of Space Science
PAO	Public Affairs Office
PDF	Portable Document Format
PI	Principal Investigator
ROC	Reserved Observations Catalog
SA	Science Archive
SED	Spectral Energy Distribution(s)
SIMBAD	Set of Identifications, Measurements, and Bibliography for Astronomical Data
SIRTF	Space Infrared Telescope Facility
SLO	Second-Look Observation(s)
SODB	Science Operations DataBase
SOM	Spitzer Observer's Manual
SPOT	Spitzer Planning Observations Tool
SSC	Spitzer Science Center
SV	Science Verification
TAC	Time Allocation Committee
ToO	Target(s) of Opportunity