# Spitzer Space Telescope

# Cycle-12 Call for Proposals

**Version 1.1 5 August 2015**
**General Observer Program**

**Key Dates:**

| | |
|---|---|
| **Call for Proposals Issued:** | June 5, 2015 |
| Call for Proposals Updated: | August 5, 2015 |
| **Proposal Deadline:** | PDT 4:00pm, Friday, September 11, 2015 |

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

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# Document Change Control Record

| Date | Version | Author | Description |
|---|---|---|---|
| 2015 June 5 | 1.0 | Lisa Storrie-Lombardi, Nancy Silbermann & the SSC Community Affairs Team | Initial version issued |
| 2015 August 5 | 1.1 | Lisa Storrie-Lombardi, Nancy Silbermann & the SSC Community Affairs Team | Minor Spot version updates. |

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

# 1 Executive Summary

The Spitzer Space Telescope was launched in 2003 as NASA's Great Observatory for Infrared Astronomy. Warm mission operations began July 28, 2009 after the successful completion of the five and a half year cryogenic mission. The observatory and the 3.6 and 4.5-micron channels on the IRAC instrument continue to operate superbly. The observing efficiency remains high (> 80%). All available time on the observatory is devoted to General Observer (GO) science through annual calls for proposals and Director's Discretionary time.

The NASA Science Mission Directorate budget currently supports Spitzer operations through September 2016. Both the Astrophysics and the Planetary Science Divisions are supporting Spitzer operations. The Spitzer project plans to submit a proposal to the next NASA Senior Review for operations beyond September 2016.

The key planned features of Cycle-12 are summarized below.

1. As in Cycle-11, priority will be given to observing programs that highlight:
   - Astro2010 science themes
   - Planetary science programs observing targets in our Solar System.
   - Investigations that concentrate on developing the scientific landscape that JWST will explore, or will help maximize the JWST scientific return.

   Approximately 1,000 hours of priority 1 GO science will be selected for Cycle-12. Additional observations with scheduling priority 2 and 3 will also be selected.

   - Innovative investigations with scientific high risk/gain are particularly encouraged.

   The Director plans to select up to 250 hours of the high risk/gain programs. The PI should identify the proposal as high risk/gain by selecting type DDT (Director's Discretionary Time) instead of GO in the proposal selection tool and by stating "This is a high risk/gain proposal." at the beginning of the Science Justification.

2. Proposals are due Friday, September 11, at 4pm PDT. The results from the review will be announced by the end of October.

3. The maximum proposal size for Cycle-12 is 100 hours. All of the 2015-16 time for programs > 100 hours was awarded in Cycle-11. The nominal execution dates for Cycle-12 programs are December 1, 2015 – September 30, 2016.

4. Programs that do not utilize the standard Astronomical Observing Template (AOT) are supported only through Director's Discretionary time.

5. Direct data analysis funding is expected to be available for medium programs (10 – 100 hours) in the amount of $10,000/program for eligible investigators. See §6.3 for more information.

## 1.1 Cycle-12 Deadlines

The deadlines and milestones for the proposal cycle are listed in Table 1.

| Milestone | Date |
|---|---|
| Issue Call for Proposals | June 5, 2015 |
| Proposal Deadline | September 11, 2015 |
| Review Complete | October 16, 2015 |
| Announce Results | October 30, 2015 |
| Cycle-12 begins executing | December 2015 |

**Table 1: Cycle-12 proposal deadlines and milestones.**

## 1.2 Available Observing Time & Scheduling Priorities

Over 9,000 hours of observing time for February 2015 – September 2016 was awarded in Cycle-11. This CP invites investigators worldwide to submit Spitzer Space Telescope Cycle-12 General Observer (GO) and Snapshot proposals to execute in December 2015 – September 2016. Cycle-12 reviewers will be asked to recommend to the SSC Director approximately 1,000 hours of priority 1 observing time. The Director plans to select up to 250 hours of innovative investigations with scientific high risk/gain. The Cycle-12 reviewers can also recommend additional hours of time for priority 2 and 3 observations to facilitate efficient scheduling of the observatory. The scheduling priority (1, 2, or 3) assigned to the selected programs will be primarily based on the review ranking and the program's responsiveness to the selection criteria outlined in §7.2.

## 1.3 Proposal Sizes and Types

**The maximum proposal size for Cycle-12 is 100 hours. Both regular GO and Snapshot programs are solicited. Program sizes and the guidelines for proprietary periods are summarized in Table 2.**

| Program Type | Size (Hours) | Proprietary Period |
|---|---|---|
| Medium | $10 < \text{Hrs} \leq 100$ | Default = 1 year |
| Small | $\text{Hrs} \leq 10$ | Default = 1 year |

**Table 2: The definition of the program types by hours.**

## 1.4 Proposal Review Process Overview

External science reviewers will evaluate proposals received by the submission deadline. The reviewers will be members selected at large from the astronomical community. The SSC will use the grades submitted by the reviewers to rank and recommend the time allocations for the proposals. This is the same process used for the selection of small and medium proposals in Cycle-11. The recommendations will be forwarded to the SSC Director who will make the final selections.

## 1.5 Observing and Data Volume Constraints

Regular GO proposals can include science programs that are constrained, with the caveat that the more constrained the program, the harder it is to schedule. Though the project has implemented enhanced data compression strategies, data volume is a limiting factor due to the lower downlink rate, as Spitzer is more than 1AU from the Earth. Very high data volume programs are not prohibited but are more difficult to schedule and may require additional downlink time.

The difficulty in scheduling high data rate modes increases directly with the duration of the AORs. Staring mode 0.02s sub-array observations are particularly problematic. High data volume normally must be very highly ranked to be successful in the review process. Table 3 summarizes the observing modes, frame times and a rating of the expected data volume.

If your observation requires a mode that is listed as 'high' data volume, please consult with the SSC before you submit your proposal to determine the feasibility of your proposed observation.

| Mode | Frame Time (secs) | Data Volume |
|---|---|---|
| Full-array | 0.4, 2 | High |
| Full-array & HDR | 6, 12 | Moderate |
| Full-array & HDR | 30, 100 | Low |
| Sub-array | 0.02 | High |
| Sub-array | 0.1 | Moderate |
| Sub-array | 0.4, 2 | Low |

**Table 3: The Data Volume Ratings for the available observing modes and frame times. These ratings apply to data taken with "data collection" turned on for one or both arrays.**

## 1.6 PCRS Peak-Up

During Cycle-8, the PCRS Peak-Up capability was added to the IRAC Post-Cryo Mapping AOT. PCRS Peak-Up provides enhanced accuracy in positioning a target on an array and can greatly improve the photometric precision in staring mode observations. It is designed to facilitate high precision relative photometry (e.g., any very long staring observation). Observations that do not require high-precision relative photometry will not benefit from this option. **All observers that use the PCRS Peak-Up should include an additional 30-minute AOR at their target position BEFORE their first long PCRS Peak-Up staring AOR (use a "chain" constraint) to accommodate a transient drift effect.** See the Warm SOM (http://ssc.spitzer.caltech.edu/warmmission/propkit/som/) and the IRAC Peak-Up Memo (http://irsa.ipac.caltech.edu/data/SPITZER/docs/irac/pcrs_obs.shtml) for details.

For science targets that are too faint or too bright to peak-up on, it is imperative that the relative astrometry between the target and the guide star is known precisely; otherwise, the observation will miss optimal position on the array. We strongly recommend that observers submit an astrometric observation, to be taken in advance of any staring mode observation, if the astrometry needs to be determined by Spitzer. Observers should plan on at least three months between the astrometric and staring mode epochs for data acquisition, analysis time and scheduling. The SSC can provide assistance with planning such astrometric observations. Please contact the Helpdesk at help@spitzer.caltech.edu.

## 1.7 Generic Targets

Generic targets are defined as targets that can be described scientifically, but lack specific celestial coordinates and/or the brightness estimate is known only to within a factor of 1.5 *at the time of the proposal submission deadline*. Studies of newly discovered extra-solar planets, near-Earth asteroids, main-belt asteroids, Kuiper Belt Objects, or targets from large surveys that have yet to be released are examples of such science categories. For a moving generic target (e.g., Solar System object) proposers must submit an AOR with a target position 'to be determined' from the Navigation and Ancillary Information Facility (NAIF) identification, or from orbital elements. See §3.7 for more details or contact the Helpdesk with any questions.

Given the short duration of Cycle-12 (10 months), generic targets must be defined and AORs submitted to the SSC by December 1, 2015 to retain scheduling priority 1.

## 1.8 Scheduling Priorities

We will make every effort to schedule all priority 1 observations. Priority 2 observations will be placed in the scheduling pool as gaps develop. Observations with priority 3 will not enter the scheduling pool until the number of priority 1 and 2 AORs in the scheduling pool becomes too low to allow even moderately efficient scheduling. If Spitzer is extended for operations past September 2016, unexecuted priority 1 observations will likely be carried forward into Cycle-13 for execution.

## 1.9 Programs not available in Cycle-12

1. Exploration Science and Large GO/Snapshot proposals are not solicited in Cycle-12.
2. High- and medium-impact ToO observations, and programs that require Instrument Engineering Requests (IERs), are not supported in warm mission GO proposals. They may be requested via Director's Discretionary Time.
3. The 200-second frame time for IRAC full-array observations is not supported. The maximum supported frame time is 100 seconds.
4. Multi-cycle proposals are not supported in Cycle-12 as funding for future cycles has not yet been approved.

# 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-Warm Mission (Warm SOM,* hereafter*)*, for complete technical details of the telescope and the IRAC instrument. The *Warm SOM* is available in the Proposal Kit section of the Spitzer Science Center (SSC) website (http://ssc.spitzer.caltech.edu/warmmission/propkit/).

The Spitzer Space Telescope is the fourth and final element in NASA's family of Great Observatories and represents an important scientific and technical component of NASA's astrophysics program. The telescope was launched from Cape Canaveral, Florida into an Earth-trailing heliocentric orbit on August 25, 2003. The Spitzer primary mirror is 0.85 meters in diameter. After the cryogen was depleted May 15, 2009, the 3.6 and 4.5-micron IRAC arrays continued to be operational. The telescope operates at an ambient temperature of 27.5 K. Warm mission science observations began on July 28, 2009 after a characterization period of the IRAC instrument and Warm Mission astronomical observation template (AOT). Observatory performance is excellent and basically unchanged from the cryogenic mission.

## *2.1 Telescope*

The Spitzer telescope is of Cassegrain design, with beryllium optics, and operates during the warm mission at ambient temperature (27.5 K). The telescope offers pointing accuracy of better than 1.0 arcsec (1-sigma radial rms), and pointing stability of 0.1 arcsec (1-sigma radial rms, 200 sec) with the star-tracker. The imaging field-of-view is ~5 arcmin square. 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 is in an Earth-trailing heliocentric orbit with radius 1 AU, and is drifting away from Earth at a rate of about 0.1 AU per year. In this orbit, the telescope is in a benign thermal environment. Moreover, this choice of orbit substantially reduces the projection of the Sun-Earth-Moon avoidance zones on the sky, yielding high astronomical observing efficiencies.

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

The amount of time that any particular target is visible to Spitzer is a function of ecliptic latitude. Objects with |ecliptic-latitude| > 82.5° are located within the CVZ, and those with 60° < |ecliptic-latitude| < 82.5° are annually visible to Spitzer in one continuous ~7-month time interval. Targets with |ecliptic-latitude| < 60° are observable twice per year in ~40-day windows. For any

given target position, sky visibility is available using *Spot*, Spitzer's observation planning software (§4.2).

## 2.3 Science Payload

In the warm mission, the Spitzer Space Telescope science payload consists of the InfraRed Array Camera (IRAC) 3.6 and 4.5-micron channels. The IRAC arrays are thermally controlled to 28.7 K and the temperature is stable to 10 mK (the precision of the temperature sensors). In addition to the temperature set points, several of the programmable biases for the 3.6 and 4.5 micron arrays were optimized for warm operations. Most significantly, the applied bias across the 3.6 micron array was reduced from 750 mV to 500 mV to mitigate the increased number of noisy pixels at the higher operating temperature. The arrays exhibit both bias and photometric stability consistent with cryogenic performance and demonstrate no significant radiation-induced damage at the higher operating temperature.

Warm IRAC provides simultaneous ~5 arcmin square images in two channels ( $\lambda / \Delta\lambda \sim 4$) centered at 3.6 microns (Channel 1) and 4.5 microns (Channel 2). The 256 x 256 pixel focal-plane arrays use Indium Antimonide (InSb) detectors. The pixel scale for each detector array is ~1.2 arcsec/pixel. Two nearby fields of view (FOV) are simultaneously imaged, with Channel 1 comprising one FOV, and Channel 2 the other FOV. The Principal Investigator for IRAC is Giovanni G. Fazio, Smithsonian Astrophysical Observatory, Harvard-Smithsonian Center for Astrophysics.

## 2.4 Warm Mission Observing Mode

In the warm mission observations are executed with one observing mode–IRAC Post-Cryo Mapping. Observers completely specify their observations through the use of an Astronomical Observation Template (AOT). The complete specification of targets and observing parameters is done using *Spot*, the software for Spitzer observation planning. The AOT in *Spot* provides observers with control of all the relevant parameters for their observation. An AOT with target information and observer-selected parameters specified becomes an Astronomical Observation Request (AOR), the fundamental unit of Spitzer observing. Details about observing with IRAC and the available choice of AOT parameters are provided in the *Warm SOM.*

The maximum duration for warm IRAC AORs is 24 hours, *BUT since instrument and observatory calibrations generally occur every 12 hours, only when the science requires longer uninterrupted on-source time should AOR durations exceed 6-8 hours.* AOR durations longer than this must be justified in the proposal.

### 2.4.1 Special Observing Modes - IERs

In special circumstances, observations that cannot be supported with the warm IRAC AOT have been executed with Instrument Engineering Requests (IERs). Programs requiring IERs are no longer supported except through Director's Discretionary time. *Long staring observations that in the past used IERs (e.g. extrasolar planets) should now use AORs with a PCRS Peak-Up.*

## 2.5 Observation Scheduling

Observations are scheduled with interruptions for downlinks every 24 – 48 hours. Interruptions for quick turn-around (high/medium impact) target of opportunity observations will be supported only through DDT (§3.8). Low-impact ToO observations with *at least* an 8-week lead-time can be supported through the proposal process (or through DDT).

## 2.6 Science Operations

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

# 3 Proposal Categories

Proposals are solicited covering all science topics. Investigations (except Snapshot programs) can include programs that are highly constrained or produce high data volumes, with the usual caveat that more constrained programs are harder to schedule. All scheduling constraints require a strong scientific justification. Please consult with the SSC Helpdesk (help@spitzer.caltech.edu) in advance of the proposal deadline if you have questions about AOR submission for your proposals.

## *3.1 Small & Medium General Observer Proposals*

Small and Medium GO proposals must meet the following criteria:

- Small: 10 hours or less of observing time requested.
- Medium: Greater than 10 hours and less than 100 hours of time requested.
- A full set of AORs must be submitted with the proposal. Successful programs will move immediately into the scheduling pool.
- Default proprietary period of one year.

## *3.2 Statistical Programs*

Statistical programs, where a specific number of observations are required for the science but the set of observations required is not unique, may be submitted. For example if your program requires observations of 100 targets and you have 200 targets total in the sample, the proposal can be submitted with AORs specifying observations of 200 targets but time is only requested to observe 100 of them. This should be clearly described in the technical justification section of the science plan.

## *3.3 Snapshot Proposals*

Snapshot proposals are solicited in Cycle-12. Snapshot programs are needed to provide a substantial number of hours of easy to schedule, lower data volume science that can fill gaps in the observing schedule introduced by highly constrained ES and GO programs.

Snapshot programs have the following specific features:

1. The restriction on 'no scheduling constraints' for Snapshot programs is relaxed. Loose grouping constraints can be supported, e.g. two epochs of each target are desired greater than 3 weeks apart.
2. For filling typical gaps in the schedule the ideal AOR length is ~ 30 minutes or less.
3. The maximum single AOR length is ~ one hour.
4. Allowed frame times are full-array/HDR $\geq$ 30 secs and sub-array $\geq$ 0.4 secs
5. Snapshot programs are assigned scheduling priority 2.
6. Distribution of Targets:
    a. Programs with targets in or near the CVZ (see §2.2) are most desirable.
    b. Programs with targets spread throughout the sky can also be supported.

c. Smaller programs with targets in one region can be supported but are the least desirable for filling in gaps in the schedule.

7. A full set of AORs must be submitted with the proposal.
8. Default proprietary period of one year.

The SSC will endeavor to execute at least 50% of any Snapshot program that is started. Proposers should discuss how the science will be accomplished if only 50% of the program is executed.

If you are uncertain if your proposed program is appropriate as a Snapshot proposal, please send questions to the SSC Helpdesk (help@spitzer.caltech.edu) well in advance of submitting the proposal. The total time requested on the cover sheet for Snapshot proposals should be the total for the AORs submitted, not the 50% expected to be executed.

## 3.4 Multi-Cycle Observations

Multi-cycle proposals are not supported in Cycle-12 as funding for future cycles has not yet been approved.

## 3.5 Joint Observing Proposals

Observing programs in which the primary science is obtained from the Spitzer Space Telescope and in which observing time utilizing the Hubble Space Telescope and/or the Chandra X-Ray Observatory is required are supported in Cycle-12. Joint observing proposals should be submitted in response to this call for proposals only if Spitzer provides the primary science. *The SSC can only support a limited number of programs that require simultaneous or highly constrained joint observations.* Proposers should contact all relevant science centers in advance of submitting such a proposal. Joint time can be requested for regular GO proposals but not Snapshot proposals.

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

Data analysis funding for HST or Chandra observations approved as part of a joint proposal may be provided directly through the Space Telescope Science Institute or the Chandra X-Ray Center using their data analysis funding processes. Investigators should contact STScI or CXC for details.

### 3.5.1 Joint Spitzer/HST Observations

If your science project requires observations from both Spitzer and the Hubble Space Telescope, then you can submit a single proposal to request time on both observatories in Cycle-12. By agreement with the Space Telescope Science Institute (STScI), the SSC will be able to award up to 60 orbits of HST observing time *with no more than 20 orbits awarded to a single Spitzer proposal*. Similarly, STScI will be able to award up to 60 hours of Spitzer time to highly rated

proposals, *with no more than 20 hours awarded to any single HST proposal*. The only criterion above and beyond the usual review criteria is that the project is fundamentally of a multi-wavelength nature, and that both sets of data are required to meet the science goals. Proposals for combined Spitzer and HST observations should be submitted to the observatory that represents the prime science, not to both observatories.

The HST Cycle-24 deadline is expected to be in April 2016. While there is multi-wavelength expertise in the review panels for both observatories, typically the Spitzer panels will be stronger in infrared science and the HST panels in the optical/UV science. Evaluation of the technical feasibility of the proposed HST observations is the responsibility of the observer, who should review the HST documentation or contact the STScI Helpdesk (help@stsci.edu). STScI will perform detailed feasibility checks for proposals that are approved. Proposers must also complete a Phase II proposal for their approved programs. STScI reserves the right to reject any previously approved observation that proves to be non-feasible, impossible to schedule, and/or dangerous to the HST instruments. Any HST observations that prove infeasible or impossible could jeopardize the overall science program and may cause revocation of the corresponding Spitzer observations. STScI may also reject duplicate HST observations. Data analysis funding for HST observations approved as part of a joint proposal will be provided to U.S. proposers directly through the Space Telescope Science Institute using their normal funding process.

Spitzer proposers requesting HST time must enter '**HST**' into the Joint Observatories field in the *Spot* proposal tool.

### *3.5.2 Joint Spitzer/Chandra Observations*

If your science project requires observations from both Spitzer and the Chandra X-ray Observatory, you can submit a single proposal to request time on both observatories to either the Spitzer or the Chandra review. By agreement with the Chandra X-ray Center (CXC), the SSC will be able to award up to 200 kiloseconds of Chandra observing time. Similarly, the CXC will be able to award up to 60 hours of Spitzer time to highly rated proposals*, with no more than 20 hours awarded to any one proposal*. The only criterion above and beyond the usual review criteria is that the project is fundamentally of a multi-wavelength nature, and that both sets of data are required to meet the science goals.

Of the 200 kiloseconds of Chandra observing time that can be awarded in the Spitzer review only ~25% of the observations, where an observation is an individual pointing at a target, may be time-constrained. No rapid ToOs can be awarded (less than 30 days turn-around time). A Chandra ToO is defined as an interruption of a command load, which may include several predictable observations within that one-week load. Spitzer proposers should keep their Chandra requests within these limits. Proposals for combined Spitzer and Chandra observations should be submitted to the observatory that represents the prime science, not to both observatories.

Chandra time approved in Spitzer Cycle-12 will be expected to execute in Chandra Cycle 17. While there is multi-wavelength expertise in the review panels for both observatories, typically the Spitzer panels will be stronger in infrared science and the Chandra panels in X-ray science. The proposer is responsible for assessing, specifying and justifying the technical feasibility of the proposed Chandra observations. Proposers should review the Chandra documentation and/or

consult with the CXC. For proposals that are approved, the CXC will perform detailed feasibility checks.

The CXC reserves the right to reject any previously approved observation that proves to be non-feasible, impossible to schedule, and/or dangerous to the Chandra instruments. Any Chandra observations that prove infeasible or impossible could jeopardize the overall science program and may cause revocation of the corresponding Spitzer observations. Duplicate Chandra observations may also be rejected by the CXC. Data analysis funding for Chandra observations approved as part of a joint proposal will be provided directly through the Chandra X-ray Center using their budget proposal process.

Spitzer proposers requesting Chandra time must enter '**CXO**' into the Joint Observatories field in the *Spot* proposal tool.

### *3.5.3 Joint Spitzer/HST/Chandra Observations*

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

## *3.6 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., newly discovered comets or near-earth asteroids, weather patterns on outer planets, gamma ray bursts and other transients) are typically submitted as General Observer Target of Opportunity (ToO) proposals. **ToO observations classified as low-impact ONLY (see below) can be requested.**

Targets of Opportunity are categorized by the extent to which the execution of such an observation affects normal scheduling and observing procedures. A *low-impact* ToO is one where the time between triggering the ToO and the execution of the observations is longer than eight weeks. There is no limit on the number of these low-impact ToO observations that can be approved.

Observations of unanticipated phenomena should be requested through Director's Discretionary Time (DDT) procedures (see §3.8). **High/medium impact ToOs must be requested via DDT proposals. The Spitzer project will support a limited number of such observations annually (1-2 per cycle), as permitted by available resources.** Additional overheads are assessed for high/medium-impact Targets of Opportunity and are described in Appendix A.

An approved ToO observation will be executed only in the event that the specified phenomenon actually occurs within the Cycle. Additional information on Targets of Opportunity, including the procedures for activation of an approved AOR, can be found in the *Spitzer Warm Mission Observing Rules (http://ssc.spitzer.caltech.edu/warmmission/propkit/sor/). Unexecuted ToO observations expire at the end of the cycle in which they are selected*.

## 3.7 Generic Targets

*Generic targets* have more refined and predictive spatial and temporal information than a ToO. Generic targets can be described scientifically, but lack *precise* celestial coordinates or brightness estimates *at the time of the proposal submission deadline*. A generic target can be selected from a complementary observing program with Spitzer, or with any other telescope, but one in which the conditional observations (assumed to be under the control of or clearly available to the Spitzer Principal Investigator) are scheduled or will be scheduled with high likelihood, but have not been executed or analyzed prior to the Spitzer proposal deadline. Studies of newly discovered extra-solar planets or targets from large surveys that have yet to be released are examples of such science categories.

An investigator may propose observations of generic targets, describing them in as much detail as possible in the proposal. 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 and the AOR duration must be specified to within a factor of 1.5. Examples of generic moving targets can include near-Earth asteroids, main-belt asteroids, comets, and Kuiper Belt Objects. Because of the time urgency of observations, comets near perihelion should be treated as Targets of Opportunity.

The observations must be completed within the observing time allocation awarded when the proposal was approved. Examples of generic targets and additional details and limitations pertaining to their use can be found in the *Spitzer Warm Mission Observing Rules (http://ssc.spitzer.caltech.edu/warmmission/propkit/sor/)*.

Given the short duration of Cycle-12 (10 months), generic targets must be defined and final AORs submitted to the SSC by December 1, 2015 to retain scheduling priority 1.

Please contact the Helpdesk before submitting your proposal if you have questions or issues regarding generic targets.

## 3.8 Director's Discretionary Time

Up to ten 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 and unanticipated phenomena. Also, any observation requiring execution in less than 8 weeks from the time the phenomenon is identified and any observation that must use IERs must be requested via a DDT proposal.

Scientists wishing to request DDT can do so at any time during the year through the online DDT Proposal Submission form available at the SSC website (http://ssc.spitzer.caltech.edu/warmmission/ddttoo). Abstracts of approved DDT proposals are also available at the website. Investigators should not utilize DDT to resubmit all or part of a proposal that was rejected by the normal peer review process.

## 3.9 Data Proprietary Periods

Cycle-12 observing programs have a nominal proprietary data period of twelve months. The proprietary period commences when scientifically usable data from commissioned pipelines are made available to the Principal Investigator via the Spitzer Heritage Archive. Once the proprietary period for an AOR expires, the raw and pipeline-processed data enter the public domain and are available to anyone through the Spitzer Heritage Archive.

*Note that each observation (AOR) has its own proprietary period. This means that the AORs within a program are, as their proprietary periods expire, released to the public regardless of how many unobserved AORs remain in the program.*

For observations with a proprietary period, observers expect exclusive access to their science data, intended to facilitate the processing and scientific analysis of the data by the relevant investigator. The SSC does not have the resources to do duplication checks or embargo data from duplicating observations in the warm mission. Therefore the SSC cannot ensure that all proprietary periods will be protected for observations taken in Cycle-5 onwards (though we expect only a small number of observations to possibly be impacted by this.)

Though DDT proposals have a nominal proprietary period of 90 days, the SSC Director reserves the right to designate any Target of Opportunity or DDT data for early release when such a release is deemed to be in the interest of the community.

The Spitzer Time Allocation Committee and reviewers may recommend a shorter proprietary period for individual proposals due to the high value of the data to the general astronomical community. As part of their proposal, observers may request that the SSC Director waive all or part of their proprietary period if the proposal is approved. This information should be provided in the coversheet information in the *Spot* proposal submission tool.

# 4 Proposal Planning

This call for proposals (CP) provides an overview of the technical capabilities of the observatory (§2), eligibility criteria (§6), the current research opportunities (§3) and information on planning and submitting a proposal (this section). The CP is accompanied by other technical documents (§4.1). Interested scientists may retrieve digital copies of these documents from the Proposal Kit section of the Spitzer Science Center (SSC) website (http://ssc.spitzer.caltech.edu/warmmission/propkit/). An important component of the Proposal Kit is *Spot*, the Spitzer software required for observation planning and proposal submission. **All Cycle-12 proposals must be submitted with *Spot,*** a free software package available now within the online Proposal Kit. *Spot* must be downloaded to your computer.

In addition to handling proposal submission, *Spot* allows observers to construct detailed Astronomical Observation Requests (AORs) by specifying observation parameters for the required observing mode. The observing mode IRAC Post-Cryo Mapping is available in *Spot* to support warm operations. *Spot* also includes useful visualization tools to permit the investigator to see how proposed Spitzer observations will be laid out on the sky.

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

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

The documentation listed in §4.1 provides details on how 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.

### ** The Cycle-12 proposal templates are available now in the proposal kit and the proposal system is open for submission of proposals. **

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

- A science justification for the program.
- A technical justification describing how the scientific investigation will be implemented, including an explanation of target selection and observing strategy, and how the data will be analyzed.

- Detailed specification of Spitzer observations, through Astronomical Observation Requests (AORs) generated by *Spot*. Only AORs utilizing the *IRAC Post-Cryo Mapping* Astronomical Observation Template (AOT) will be accepted for Cycle-12.

No cost plans are required for the proposals.

## *4.1 Technical Documentation*

The documents needed to plan, prepare and submit a proposal are listed below and are available in the Proposal Kit (§4.2). The version numbers are current as of the date of publication of this CP and may be superseded by a later version.

**Spitzer Space Telescope Cycle-12 Call for Proposals (CP)** *Version 1.1 (Aug. 5, 2015)*
The *Call for Proposals* is the present document.

**Spitzer Space Telescope Warm Mission Observing Rules** *Version 2.2 (September 17, 2014)*
The Observing Rules describe the rules and processes governing duplicate observations, the declaration and modification of AORs, and other policies governing Spitzer observations.

**High Precision IRAC Photometry Using PCRS Peak-up** Memo (*April 10, 2013)*
This memo provides detailed information for observers to plan high precision observations (i.e. long staring observations for extrasolar planets). The memo is online with the IRAC documentation: http://irsa.ipac.caltech.edu/data/SPITZER/docs/irac/pcrs_obs.shtml.

**Spitzer Space Telescope Observer's Manual-Warm Mission** *Version 12.1 (July 19, 2013)*
The *Spitzer Observer's Manual-Warm Mission (Warm SOM)* provides technical information about the telescope and the IRAC Instrument. It includes information on planning, editing and submitting Astronomical Observation Requests (AORs), the user-provided specification of individual observation parameters. The *Warm SOM* is an essential document for all investigators. http://ssc.spitzer.caltech.edu/warmmission/propkit/som/

**IRAC Instrument Handbook** *Version 2.1 (February 2015)*
The *IRAC Instrument Handbook* is the primary reference for planning and analyzing observations using IRAC.
http://irsa.ipac.caltech.edu/data/SPITZER/docs/irac/iracinstrumenthandbook/.
For recent IRAC information updates please see the News page at
http://ssc.spitzer.caltech.edu/warmmission/news/.

**Spot User's Guide** *Spot version 18/19 (September 2011)*
The *Spot* User's Guide is a comprehensive guide to the Spitzer observation planning software package (see §4.2). All proposals must be submitted using *Spot*.

**Leopard User's Guide** *Leopard version 18/19 (June 2008)*
Leopard is the primary tool that proposers should be using to search the contents of the Reserved Observations Catalog (ROC). Data downloads via Leopard were deactivated on November 4, 2010. All users should use the Spitzer Heritage Archive (http://sha.ipac.caltech.edu/applications/Spitzer/SHA/) for obtaining Spitzer data.

**Spitzer Space Telescope Reserved Observations Catalog (ROC)** *Version 16.0 (June 1, 2015)*
The *Reserved Observations Catalog* includes an itemized list of all executed and approved observations. Proposers should use *Leopard* or *Spot* to query for executed or approved observations. The ROC is also available online in ASCII text format.

**Spitzer Space Telescope Observation Planning Cookbook** *Version 10.0 (April 17, 2013)*
The Observation Planning Cookbook provides detailed examples of how to construct Spitzer observations. http://ssc.spitzer.caltech.edu/warmmission/propkit/cookbook/

**Solar System Observing with Spitzer** *Version 6.1 (September 11, 2014)*
This webpage provides helpful tips and a summary of information specifically related to observing objects in our Solar System. http://ssc.spitzer.caltech.edu/warmmission/propkit/sso/

## *4.2 The Proposal Kit*

The online Proposal Kit is the web page that provides all of the information necessary for the prospective General Observer (GO) researcher. It includes each of the documents listed in §4.1 and can be found on the SSC website (http://ssc.spitzer.caltech.edu/warmmission/propkit). The reader is urged to regularly consult the SSC Website for the latest observatory news.

The Kit also includes instructions for installing *Spot*, the Spitzer observation-planning tool, on the user's host machine. *Spot* is used to plan and prepare observations, and to submit all proposals electronically to the SSC. It allows observers 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 investigator to see how proposed observations will be laid out on the celestial sky. These capabilities allow users 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.

***Spot* requires JAVA version 1.6 or 1.7. It does not work with version 1.8. Prospective GO investigators are strongly encouraged to download *Spot* and to start planning their observing programs well before the proposal submission deadline. Allow *Spot* to auto-update to the latest version (Options => Use Automatic Spot Version Update), if you have not already. If you use Linux and JAVA version 1.8, we recommend you download Spot for Linux from the Proposal Kit webpage and do a clean re-install, then let Spot auto-update. See the Proposal Kit webpage for more detailed instructions.**

*Spot* allows prospective investigators to plan, develop and modify their proposal in an iterative manner. That is, a proposer can write a portion of their proposal and define their accompanying AORs, save the results locally, and then re-load those results at a later time for subsequent modification. The saved cover sheet information, proposal text and AORs can be modified repeatedly until the proposal is submitted to the SSC. The submitted proposal can be updated at any time before the proposal deadline.

A separate section of the online Proposal Kit contains information specifically designed for Solar System researchers. It includes asteroid count estimates and tips for utilizing the HORIZONS database supported by the Solar System Dynamics Group at the Jet Propulsion Laboratory.

## 4.3 Solar System Observations - Moving Target Ephemerides

Spitzer is capable of achieving tracking rates of ~1 arcsec/sec for fast-moving (e.g., Solar System) targets. The online Proposal Kit (http://ssc.spitzer.caltech.edu/warmmission/propkit/) contains a section specifically designed to support Solar System researchers. It includes asteroid count estimates and tips for utilizing the HORIZONS database supported by the Solar System Dynamics Group at the Jet Propulsion Laboratory.

To obtain an accurate estimate of the observing time required for your moving target observation, an ephemeris file for your target must be installed at the SSC. *Spot* can query the HORIZONS database at JPL for an ephemeris file if the SSC does not have the file installed locally. Spot will do this when you do a visibility calculation or calculate resource estimates. There is a slightly longer delay (on the order of ~5 seconds during 'normal' periods) for this transaction to occur. As with all internet-based resources, there are likely to be peak demand periods and times when the resource is not available due to unforeseen events. Proposers are encouraged to start early in planning their observations.

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

**Late ephemeris updates, i.e., specification of the final ephemeris less than 5 weeks prior to scheduling, are no longer supported in GO proposals. Any observations requiring a late ephemeris update must be submitted via a DDT proposal.**

## 4.4 Additional Guidelines for Observers

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

### 4.4.1 Duplicate Observations

In general, duplicate observations with the Spitzer Space Telescope are not permitted. *It is the responsibility of the investigator to avoid the duplication of previously approved observations.* A list of all such observations is available in the *Reserved Observations Catalog* (ROC). Quantitative descriptions of what constitutes a duplicate observation can be found in the *Spitzer Space Telescope Warm Mission Observing Rules* (http://ssc.spitzer.caltech.edu/warmmission/propkit/sor/). Because of resource limitations in the warm mission, the SSC will not identify such duplications. Approved observers that identify potential duplications should submit these to the SSC, where the potential duplication will be reviewed and acted upon accordingly. For example, if the duplicating observation has not yet

been executed it may be deleted from the program. In cryogenic cycles, approved duplicate observations were generally embargoed until the proprietary period of the prior observation expired. Due to resource limitations, this is not done during the warm mission.

### 4.4.2 Constrained Observations

If your program requires scheduling constraints to achieve your science goals, please use the minimum number of constraints that you need for your science and provide a clear justification in the proposal. Contact the Helpdesk early in your planning process for advice on how to best utilize scheduling constraints. As a rule of thumb any constraint that involves a time range should be at least twice as long as the AORs you want scheduled within the time range. For example, if you have 10 hours of mapping AORs, any timing or grouping constraints should allow a *minimum* of 20 hours for their execution. **Observing constraints must be specified in *Spot*.**

### 4.4.3 Calibration Observations

The SSC establishes and maintains the calibration of the science instrument to levels specified in the *Warm SOM*. Data resulting from these routine calibrations will generally enter the Science Archive upon processing and validation by the SSC.

The initial on-orbit calibration of the telescope was performed as part of the commissioning of each observing mode. The IRAC Post-Cryo Mapping AOT was validated during the characterization phase after the depletion of the cryogen. The SSC continues to conduct the periodic observations necessary to maintain the calibration. Observations of celestial targets necessary for calibration are not subject to rules regarding duplicate observations.

For investigations that require a higher level of calibration, it is the responsibility of the Principal Investigator to include those *special calibrations* as part of their proposal. The SSC will process such observations through its normal data processing pipeline(s), and the data will be subject to the applicable proprietary data periods (§3.9). Observers are encouraged to contact the SSC to discuss and plan special calibrations for those programs requiring a higher level of calibration.

### 4.4.4 Bright Object Observations

Given the high sensitivity of Spitzer, it is perhaps not surprising that bright objects affect the detector arrays. While saturation will not permanently damage the detector arrays, latency effects will compromise subsequent observations.

Proposals that involve observations of bright sources are not precluded. However, investigators should be aware of infrared sources that may saturate the Spitzer detectors, whether they are the intended target, or whether their celestial position is near the proposed target. They can also complicate scheduling in our effort to prevent observations of bright targets from impacting other programs. **Programs with substantial numbers of bright targets (http://ssc.spitzer.caltech.edu/warmmission/propkit/som/brights) will be identified as difficult to schedule by the SSC, and their evaluation will be affected accordingly.**

The *Warm SOM* provides current estimates of the saturation limits for each wavelength. A list of bright celestial sources likely to exceed the saturation limits is provided in the online Proposal

Kit. *Spot* also has a bright object search feature to check for bright objects near your target(s). Note that the SSC reserves the right to exclude some targets as a result of impacts that these bright objects might have on subsequent observations. Observers proposing observations of bright objects should discuss their impact in the technical justification.

## 4.5 SSC Assistance

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

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

# 5 Proposal Submission

The Spitzer Cycle-12 submission process is a single-phase process. Investigators are required to submit all of their completed Astronomical Observation Requests (AORs) with their science proposal. These AORs should be the final set you expect to have executed if the proposal is successful.

All proposals must be submitted through *Spot*, a downloadable software package developed by the SSC. The AORs and cover sheet information are entered directly into *Spot* for transmittal. ***The science justification and all other required elements must be submitted as a single PDF file attachment.*** The AORs and cover sheet information created in *Spot* can be saved as text files on your local computer. The cover sheet information, the proposal PDF file and the AORs are all submitted electronically via *Spot*. ***Cycle-12 proposals must be submitted with the S19 (or later) version of Spot which is available to download from the Proposal Kit website.***

There is no limit to the number of proposals that may be submitted by a Principal Investigator or by Co-Investigators. Proposals should not contain classified information or depend on access or use of classified information or facilities for any portion of the proposed activities. The Principal Investigator may withdraw a proposal from consideration at any time prior to the completion of the selection process by contacting the Helpdesk (help@spitzer.caltech.edu).

## *5.1 Proposal Submission Deadline*

**The proposal submission deadline is:**

**Friday, September 11, 2015, 4:00pm PDT**

Proposals must be submitted electronically via *Spot* prior to the deadline. Proposals received after the deadline will not be accepted. If you need information from a source outside of the SSC that you do not directly control, particularly a service available via the Internet, then we recommend obtaining this information well in advance of the deadline. You may update your submitted proposal as many times as you want prior to the deadline. If the SSC servers have started (or completed) processing of your proposal when the deadline is reached, the proposal will be accepted. There will be a clock on the SSC website that tells you what time it is at the SSC and you can therefore accurately gauge when the deadline is.

If you experience computer or Internet problems just prior to the deadline such that you are not able to submit your proposal by 4:00 pm, please call us immediately at 626-395-8000 (SSC central phone line) so that we can assist you.

## 5.2 Proposal Components

### 5.2.1 Cover Sheet

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

#### 5.2.1.1 Science Category

An important piece of information that is provided in the Cover Sheet is the **Science Category.** All proposals must include a single science category. This information is used to help distribute the proposals to the panels for the review. Please select the science category that best describes your proposal. The categories are divided into three broad groups: Extragalactic, Galactic and Solar System. The Solar System group is for observations in our local Solar System. If your proposal is related to extra-solar planets, please select that in the Galactic group. The Galactic group includes a category for proposals that are doing detailed stellar studies outside of our Galaxy. These proposals have historically ended up in extragalactic panels while the best expertise to review them is in the Galactic panels.

Broad topical science panels will review all proposals. The proposal review will utilize parallel panels, as in previous cycles, so that proposers can serve as reviewers.

### 5.2.2 Astronomical Observation Requests (AORs)

The submission of Astronomical Observation Requests (AORs) is required for observing proposals. All AORs must be created using the IRAC Post-cryo Mapping AOT. The IRAC Mapping AOT used during the cryogenic mission is no longer valid. Cycle-12 investigators are required to submit a complete set of AORs with the proposal. For statistical programs (§3.2) this should include AORs for all possible targets.

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

### 5.2.3 PDF Attachment

Templates in Latex and Microsoft Word formats will be provided on the SSC Proposal Kit web page (http://ssc.spitzer.caltech.edu/warmmission/propkit/) to use in preparing your PDF attachment.

**The Cycle-12 templates must be used to prepare your proposal.**

Additional details pertaining to proposal contents are listed in §5.4. All proposals must be written in English and a printable version must utilize fonts that are *no smaller than 12 point, and must adopt one-inch margins on all sides on 8.5 × 11-inch paper*. Color figures or tables can be

included but proposers should confirm that they reproduce legibly in black and white. *The PDF file size limit for submission is 10 megabytes, so extremely large or complex color figures may not be acceptable.* No preprints or reprints should accompany the proposal.

Proposals will be provided to each reviewer as PDF files. It is the responsibility of the proposer to ensure that their PDF file is legible when opened with Acrobat Reader. Proposals with flagrant violations of the page limits, font size, etc. will be deemed not responsive to the Call for Proposals and rejected without review.

## 5.3 Proposal Page Limits

The page limits for Cycle-12 proposals are summarized in Table 4. The descriptions of what should be included in each section are provided in §5.4. Figures and tables can be embedded in the narrative or segregated.

| Proposal Size | Small | Medium |
|---|---|---|
| **Science Plan Sections** | **hr ≤ 10** | **10 < hr ≤ 100** |
| Science Justification | 1 | 3 |
| Technical Justification | 1 | 1 |
| Figures, Tables, Refs | 1 | 3 |
| ***Total for Science Plan*** | **3** | **7** |
| Additional Required Sections - subject to page limits | | |
| **Summary of Existing Programs** | **1** | **1** |
| Additional Required Sections - NOT subject to page limits | | |
| **Observations Summary Table** | | |
| **Modification of Proprietary Period** | | |
| **Summary of Duplicate Observations** | | |
| **Summary of Scheduling Constraints/Targets of Opportunity** | | |

**Table 4: Page limits for Cycle-12 proposals. SNAPSHOT proposals should conform to the size limit based on the hours requested. ONE ADDITIONAL PAGE for each observatory is allowed in the technical section describing requested joint Hubble and/or Chandra observations.**

For joint observatory proposals **one additional page per joint observatory** should be included to describe the **technical justification** of the joint observations. Therefore the total number of allowed pages increases by one page for each joint observatory included.

## 5.4 Proposal Contents

Proposals must include the following sections and are subject to the page limits provided in §5.3. The required proposal templates are available from the Proposal Kit web page. Proposals not using the Cycle-12 templates will be rejected outright. The required sections (except the AORs) must be combined into a single PDF file for submission with *Spot*.

### *5.4.1 The Science Plan*

All investigators should recognize that the peer review process (§7) uses external scientists, many of whom are not experts in your subfield. Reviewers are selected such that their expertise reflects the proportional mix of proposals submitted in previous cycles. *Proposals should be written for a knowledgeable, but broad-based, audience.* Proposals will be evaluated according to the criteria listed in §7.2.

#### 5.4.1.1 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 justification and its underlying rationale should be readily comprehensible to broad-based scientists. It must include a justifiable and reasonably accurate request for observing time and must be based on the resource estimates calculated with *Spot*, the SSC proposal planning and submission software.

#### 5.4.1.2 Technical Justification

The technical justification must include a description of the proposed observing strategy and information about target selection. For all observations the technical justification must include quantitative descriptions of the required sky/target position(s), expected target flux density or surface brightness, required sensitivity/depth (1-sigma noise or S/N ratio), wavelength(s), and coverage strategy (including redundancies). The technical justification should also show that the proposers have checked the sky background brightness and saturation issues for their observations and provide the maximum expected flux densities or surface brightness in the fields of view. The proposal must define the photometric accuracy needed and any special calibration requirements.

**All flux densities and surface brightnesses should be provided in the following units:**

| | |
|---|---|
| **Point Sources** | **micro-Jy, milli-Jy, or Jy** |
| **Extended Sources** | **MJy/sr** |

Telescope and scheduling constraints placed by investigators on proposed observations must include a compelling scientific justification (§4.4.2). Observers proposing observations of bright objects (§4.4.4) should discuss their impact in the technical justification.

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. For proposals requesting time for targets that have yet to be discovered, the provenance of the targets must be explained. The reviewers must be able to determine the likelihood that the targets will be discovered and that the proposers have access to the necessary data.

Statistical programs (§3.2) should be explicitly declared and described in the technical justification.

The technical justification should include a data analysis plan. Description of the IRAC pipeline can be found in *Spitzer Observer's Manual-Warm Mission* and the *IRAC Instrument Handbook.*

The technical justification should include a description of how the proposers have validated their particular technical strategy, e.g. from previous observations or modeling. This should be described in detail.

If your proposed targets are not known at the time of proposal submission you must provide a credible schedule for determining the targets and delivering the AORs to the SSC for scheduling within Cycle-12. Details will be worked with all successful teams.

Joint Observatory proposals must include technical information for all proposed observations. Up to one additional page for each observatory is allowed in the technical justification for joint proposals requesting observations from HST and/or CXO.

#### *5.4.1.2.1 Joint Spitzer/HST Observations*

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

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

Proposers should refer to the HST Cycle-23 Call for Proposals (http://www.stsci.edu/hst/proposing/documents/cp/cp_cover.html) for the HST observing modes offered in Cycle-23 and to the HST Primer (http://www.stsci.edu/hst/proposing/documents/primer/primer_cover.html) for instrument-specific information and constraints. Full specification of approved observations will be requested by STScI and detailed feasibility checks will be made (http://www.stsci.edu/hst/programs/phase2_overview).

#### *5.4.1.2.2 Joint Spitzer/Chandra Observations*

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

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

7. A description of how pile-up effects will be minimized (ACIS only).

Proposers should note the current restrictions on uninterrupted observations in several pitch angle ranges. Long observations at certain pitch angles must be split into segments. Please refer to the information on Pitch Angle restrictions on the CXC website. Also refer to the Chandra Proposers' Observatory Guide (POG) and available web tools for more information (http://cxc.harvard.edu/proposer).

Technical documentation about Chandra is available from the Chandra X-ray Center (CXC) website, which also provides access to the Chandra Helpdesk. Full specification of approved observations will be requested by the CXC if the proposal is approved.

#### 5.4.1.3 Figures, Tables and References

Figures, tables and references that support the science justification and technical sections should be included in the Science Plan. Figure captions and tables may be listed in 10-point font (rather than 12-point). **The Observation Summary table required for all observing proposals is not included in this page limit (it is a separate section, see below).** Color figures or tables can be included but should be legible when reproduced in black-and-white. They should be of adequate size to be comprehended by a reader. *The PDF file size limit for submission is 10 megabytes so extremely large or complex color* figures may not be acceptable.

### *5.4.2 Other Contents*

#### 5.4.2.1 Summary of Existing Programs

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

Proposers that are the PI/Technical contact for multiple Spitzer programs are not required to provide a detailed status for every program. They should provide a summary that includes the number of programs, overall status (e.g. 75% observed, 50% data analysis complete, 20 papers published, 20 papers submitted, etc.) that will allow the reviewers to understand the state of the programs. This section should be a maximum of one page in length.

#### 5.4.2.2 Observation Summary Table

An Observation Summary Table is required for **all** proposals. The Observation Summary Table is not subject to the proposal page limits. For each proposed observation the table must include all target position(s), imaging array(s) (e.g., 3.6 and/or 4.5 microns), integration time per array, and estimated source flux. The background flux, sensitivities and depth reached should be included in the technical justification and can optionally be included here. Low-impact targets of opportunity should be identified in the table. All flux densities and surface brightnesses must be provided in correct units:

Point Sources: micro-Jy, milli-Jy, or Jy
Extended Sources: MJy/sr

As discussed in §3.2 the SSC will accept 'statistical programs' in which a specific number of observations are required for the science but the set of observations required is not unique. For example, if your program requires observations of 10 targets in your sample and you have 20 targets total in the sample the proposal can be submitted with AORs specifying observations of 20 targets but time is only requested to observe 10 of them. All of the targets should be described in the Observation Summary Table for all proposal types and sizes.

A Perl script that parses information from the AOR file into a format that can be reformatted into a table is available in the Proposal Kit.

#### 5.4.2.3 Modification of Proprietary Period

If a proprietary period of other than than 365 days is requested, this should be specified here. There is a field specifying the number of days in the proprietary period in the *Spot* proposal submission tool. Any modifications should also be entered there. Note that each observation (AOR) has its own proprietary period. This means that the AORs within a program are, as their proprietary periods expire, released to the public regardless of how many unobserved AORs remain in the program.

#### 5.4.2.4 Summary of Duplicate Observations

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

#### 5.4.2.5 Summary of Scheduling Constraints/Targets of Opportunity

Briefly summarize the justification for any proposed scheduling constraints. The details should have been provided in the Science Plan. Also provide a summary of any ToO scheduling issues.

### *5.4.3 Astronomical Observation Requests (AORs)*

Cycle-12 proposals must be accompanied by a complete list of Astronomical Observation Requests (AORs). For statistical programs (§3.2) this should include AORs for all possible targets. The submitted AORs should be the final ones you expect to have executed if the proposal is successful.

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

You can create or edit your AORs in *Spot* at any time prior to submitting or updating your proposal. They can be saved as an ASCII text file on your local computer and then reloaded for editing or submission at a later time. The AORs include the total time required to execute a given observation with the telescope. **Each AOR includes an assessed overhead of 210 seconds to account for the average time required to acquire the target, regardless of the actual time utilized.** The average acquisition time is based on our experience to date. **Each moving target**

**AOR is assessed an additional 300 seconds (510 seconds total) overhead per AOR.** Moving target AORs require an additional 5 minutes to execute compared to an identical fixed target AOR.

Providing robust, ready-to-execute AORs with your proposal is the fastest way to ensure that your observations get quickly into the scheduling pool. **Observers approved for Cycle-12 will not, in general, have any opportunity to make major modifications (**see the *Spitzer Space Telescope Warm Mission Observing Rule*) **to their AORs after selection. Proposers are urged to carefully plan and construct the AORs that accompany their proposal.** AORs submitted with the proposals can be updated at any time prior to the proposal submission deadline.

## 5.5 Submission of Proposals

Proposals must be submitted to the SSC electronically through *Spot*, the Spitzer observation planning software (*Spot*; see §4.2), and must be consistent with the page and format guidelines listed throughout this section. The PDF file must be created using one of the templates available at the Proposal Kit website. Proposals not using the Cycle-12 templates will be rejected outright. Detailed instructions on using the software are available in the *Spot User's Guide*, and are summarized below.

### 5.5.1 Submitting Your Proposal for the First Time

1. Download *Spot* from the Proposal Kit section of the SSC website (http://ssc.spitzer.caltech.edu/warmmission/propkit/) and install it on your host machine. Use the S19 version of *Spot*, which was released September 9, 2011. Turn on the auto-update feature to make sure you get the relevant updates. **If you use Linux and JAVA version 1.8, we recommend you download Spot for Linux from the Proposal Kit webpage and do a clean re-install, then let Spot auto-update. See the Proposal Kit webpage for more detailed instructions.**
2. Download a proposal template from the Proposal Kit website and use it to create the proposal PDF file.
3. Start up *Spot* and open the Proposal Tool (Tools -> Proposal Tool).
4. Enter the coversheet information or load any previously generated cover sheet information file, into the Proposal Tool.
5. Select the correct Proposal Type (either **GO** or **Snapshot**). Please select **DDT** for high-risk/high-gain proposals.
6. Enter the total observing time required.
7. Make sure you have updated the proprietary period, if necessary.
8. Load the AORs that comprise your program. Make sure you have updated the resource estimates for the AORs.
9. For low-impact ToO proposals, check the Target of Opportunity box.
10. Click on the SUBMIT Menu in the Proposal Tool and select 'Submit proposal to SSC.'
11. Prior to the proposal submission deadline, proposals can be modified by using the 'Update Proposal at SSC' option.
12. The proposal PDF file, cover sheet, and any accompanying AORs that reside at the SSC at the time of the proposal submission deadline shall be defined to be the final version of the proposal.

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

### *5.5.2 Updating Your Submitted Proposal*

At any time during the Call for Proposals you may modify any aspect of your submitted proposal, except proposal username and password. You can submit a revised science plan, updated set of AORs, and/or corrected coversheet information.

1. Start up Spot.
2. Load in new/revised set of AORs if you are updating the AORs.
3. Open the Proposal Tool under the Tools menu in Spot.
4. Load in the coversheet file saved from your earlier submission (i.e., filename.cs) by clicking on File-> Open Proposal.
5. Make any desired changes to the coversheet information. Be sure the 'Hours Requested' is accurate and that the Proposal Tool is pointing to the proper justification file (if submitting an updated file).
6. Click on the 'Submit' menu item and then 'Update proposal at SSC.'
7. Enter your password and email address when requested.
8. If you made any changes to the coversheet information, Spot will again require you to save your coversheet file.
9. Spot will inform you when it has successfully transferred your updated proposal to the SSC. You will also receive an email confirmation.
10. You may submit as many updates as needed prior to the proposal deadline. The software will automatically reject submissions after the deadline and Spot will return an error message.

Modifications to proposals are not permitted after the deadline. Please proofread your proposal before the final submission.

# 6 Eligibility & Funding Support

Investigators worldwide, subject to NASA Grant Circular 12-01 (below), are eligible to submit a proposal in response to the Spitzer Space Telescope Cycle-12 *Call for Proposals*. The Spitzer Science Center (SSC) may offer NASA funding to investigators affiliated with U.S.-based institutions, subject to availability and the limitations cited in this call for proposals, to support the analysis of data from proposals selected by the SSC.

## *6.1 Who May Submit a Proposal*

This solicitation for proposals is open to investigators of any nationality, subject to NASA Grant Circular GIC 12-01 (§6.2). Each proposal must identify a single individual who will serve as Principal Investigator (PI) and will be responsible for the scientific and administrative conduct of the project. *The PI for GO proposals may have any institutional affiliation.* There is no limit to the number of Co-Investigators (Co-Is) that may appear on a proposal. The PI may designate a Technical Contact for purposes of communications with the SSC Science User Support Team.

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

An administrative PI can be designated for funding purposes for any program. This information will be collected *after* the proposal is approved.

## *6.2 NASA Grant Circular GIC 12-01*

This rule effectively says that no proposals may be accepted that include ONLY investigators from Chinese institutions or Chinese plus U.S. institutions, i.e. a bilateral program between the US and China. Proposals can be accepted that include investigators from institutions in China, the US and investigators from institutions in another country. The text below is extracted from NASA GIC 12-01 and describes the rules which apply to possible US/China observing proposals.

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An Assurance of Compliance with The Department of Defense and Full-Year Appropriation Act, Public Law 112-10 Section 1340(a); The Consolidated and Further Continuing Appropriation Act of 2012, Public Law 112-55, Section 539; and future-year appropriations herein after referred to as "the Acts", whereas:
(1) NASA is restricted from using funds appropriated in the Acts to enter into or fund any grant or cooperative agreement of any kind to participate, collaborate, or coordinate bilaterally with China or any Chinese-owned company, at the prime recipient level and at all subrecipient levels, whether the bilateral involvement is funded or performed under a no-exchange of funds arrangement.
(2) Definition: "China or Chinese-owned Company" means the People's Republic of China, any company owned by the People's Republic of China, or any company incorporated under the laws of the People's Republic of China.

(3) The restrictions in the Acts do not apply to commercial items of supply needed to perform a grant or cooperative agreement.
(4) By submission of its proposal, the proposer represents that the proposer is not China or a Chinese-owned company, and that the proposer will not participate, collaborate or coordinate bilaterally with China or any Chinese-owned company, at the prime recipient level or at any subrecipient level, whether the bilateral involvement is funded or performed under a no-exchange of funds arrangement.

## 6.3 Funding Support

The Spitzer Science Center (SSC) may offer NASA funding to investigators affiliated with U.S.-based institutions, subject to availability and the limitations cited in this call for proposals, to support the analysis of data from proposals selected by the SSC. For Cycle-12 the nominal plan is:

1. Small: page charges will be supported
2. Medium: $10,000/program

Snapshot proposals are treated the same, for funding purposes, as regular GO proposals.

The SSC manages Spitzer research funds and the Jet Propulsion Laboratory (JPL) administers the disbursement of most of the funds. The funding instrument used by JPL (not always a contract) will depend on the size of the award and the nature of the Principal Investigator's home institution. JPL is unable to issue grants. Additional details about Spitzer research funding contracts are provided below.

### 6.3.1 Overview of Research Funding Instruments

#### 6.3.1.1 RSA -- Research Support Agreement

The Research Support Agreement (RSA) is a Fixed Price, Advance Paid, subcontract provided through JPL that is used for basic research funding where scientific reports and technical data are the only deliverables and can be awarded to educational and non-profit institutions. RSA amounts are determined formulaically. **No budget submission to the SSC or JPL is required**, though your institution may require you to create a budget for internally handling the funds. Your institution is sent the RSA paperwork, returns the completed forms, and JPL then mails your institution a check for the entire award amount. The administrative overhead for executing RSAs is about half that of standard contracts so using these instruments allows us to send out more money for research and pay less for the administrative costs. We plan to issue the RSAs with a 3-year period of performance. No-cost extensions beyond a three-year contract length are generally not offered. Institutions that are eligible to receive RSAs but elect not to accept them will generally be issued cost-reimbursable contracts**.** The additional cost in issuing these contracts, rather than RSAs, may be deducted from the science funding for those investigators eligible for RSA funding but whose institutions request a different funding instrument.

The only reporting necessary for RSAs is a final 'end of contract' report outlining the work done and listing publications from the research. The RSAs are the fastest contracts to execute and are therefore funded first in the cycle. The SSC does not have all the funding for the Cycle available when it starts; therefore the funding awards are issued over a period of several months.

#### 6.3.1.2 Other JPL Contracts

If you are at an institution that cannot accept RSAs (e.g., a for-profit institution) then you will be funded by JPL with the appropriate contract. An institutionally endorsed budget may be required and will be requested after the proposal is selected.

#### 6.3.1.3 Direct NASA Funding

Investigators affiliated with NASA Centers will receive their award of formulaically determined funds directly from NASA, following guidance provided by the SSC. The SSC and JPL provide NASA Headquarters with the investigators, institutions and formulaically determined funding amounts, and Headquarters sends these funds directly to the appropriate NASA centers.

# 7 Proposal Evaluation and Selection

Spitzer Space Telescope Cycle-12 programs will be selected through a competitive peer review process.

## *7.1 Peer Review*

External science reviewers will evaluate proposals received by the submission deadline. The reviewers will be members selected at large from the astronomical community. The SSC will use the grades submitted by the reviewers to rank and recommend the time allocations. This is the same process utilized in Cycle-11. The recommended allocations will be forwarded to the SSC Director who will make the final selection.

Proposals will be provided to reviewers as PDF files. It is the responsibility of the proposer to ensure that their PDF file is legible when opened with Acrobat Reader.

All proposals will be reviewed by groups of reviewers with broad, topical expertise in Extragalactic, Galactic, or Solar System science. The SSC works to avoid conflicts of interest during the review process to the extent possible. Based on the preliminary grades, proposals with low average grades are triaged and are not further considered in the review process. After programs are selected, scheduling priorities are assigned based on the final proposal rankings.

## *7.2 Evaluation Criteria*

External science reviewers will evaluate proposals received by the submission deadline. The evaluations will be based on the criteria listed in this section. The criteria are listed in descending order of importance.

(1) The overall scientific merit of the proposed investigation and its potential contribution to the advancement of scientific knowledge.

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

(3) The extent to which the proposed investigation addresses the main themes highlighted in the Astro2010 decadal survey report, supports Planetary science observations of targets in our Solar System, and/or develops the scientific landscape that will be explored by JWST or will help maximize the JWST scientific return.

(4) The technical feasibility and robustness of the proposed observations.

(5) The extent to which the observations can be accommodated within routine Spitzer operations and the extent to which the overall science program enables an efficient use of the observatory.

(6) The long-term archival value of the proposed observations.

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

(8) 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 Spitzer Science Center (SSC) will organize the external science reviewers. The end results of the review process is a list of recommended programs that is provided to the SSC Director, who is the selection official for all Cycle-12 programs. Upon selection by the SSC Director, observing programs are entered into the Spitzer observations database for execution as part of Cycle-12.

## 7.4 Proposal Confidentiality

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

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."

# 8 Contacting the Spitzer Science Center (SSC)

The mailing address is:

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

The telephone number is:

**Phone: +1-626-395-8000**

The science community should consult the Spitzer Science Center Website 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 scientific results obtained through Spitzer observations, archival research, and theory investigations will be published in the scientific literature. All publications based on Spitzer data or theory investigations must carry an appropriate acknowledgement. Investigators should consult the SSC website for the appropriate acknowledgement template(s) (http://ssc.spitzer.caltech.edu/spitzermission/publications/ackn).

In papers describing Spitzer results, investigators should provide reference(s) to seminal papers describing the telescope, including the relevant science instruments. These references are posted on the SSC website (http://ssc.spitzer.caltech.edu/spitzermission/publications/). 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 and Exploration Science Programs should cite appropriate references to the appropriate program (http://ssc.spitzer.caltech.edu/spitzermission/observingprograms).

## *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. The SSC utilizes the public affairs resources of NASA and the Jet Propulsion Laboratory to maximize the impact of discoveries and newsworthy items resulting from Spitzer research investigations. NASA has "first right of refusal" for such items and has a policy to distribute all information and news fairly and equitably. This policy also means that exclusive news releases are not supportable.

Scientists with potentially newsworthy observations should contact the SSC Director's Office via the Helpdesk (*help@spitzer.caltech.edu*). *Spitzer investigators should initiate such contact well before the expected publication of those results,* in order to allow the SSC, JPL, and NASA to prepare press releases and supporting materials. The contact may either be initiated by the Principal Investigator of the Spitzer investigation, or through the public affairs office of their home institution. For a potential press release, the SSC and NASA will coordinate with the PI and/or institutional public affairs office in the preparation of a draft news release and other supporting materials. In general, the press release date will be timed to coincide with acceptance of the research for publication in a science journal, or presentation at a major astronomical meeting. For additional information on Spitzer public affairs, including guidelines on what may constitute a newsworthy result, consult the 'Got News' link on the SSC website.

# 10 Cycle-12 Checklist

1. Read a summary of the capabilities of the Spitzer Space Telescope (§2).
2. Download the *Warm SOM* from the Proposal Kit section of the SSC website (http://ssc.spitzer.caltech.edu/warmmission/propkit/) to obtain additional details about the telescope and the IRAC Post-Cryo Mapping AOT.
3. Download and install the v19 version of *Spot*, the Spitzer proposal planning and submission software package, available in the online Proposal Kit, to your host machine. Allow *Spot* to auto-update to the latest version. **If you use Linux and JAVA version 1.8, we recommend you download Spot for Linux from the Proposal Kit webpage and do a clean re-install, then let Spot auto-update. See the Proposal Kit webpage for more detailed instructions**.
4. Download and read the *Spot User's Guide* and learn how to create and edit an Astronomical Observation Request (AOR), the fundamental unit of Spitzer observing.
5. Download and read the *Spitzer Space Telescope Observation Planning Cookbook*, also in the Proposal Kit, to see examples of typical observations.
6. Use *Spot* to create, edit and save AORs.
7. Be sure that your proposed observations do not duplicate existing Spitzer Space Telescope observations by consulting the *Reserved Observations Catalog* or searching the Spitzer database with *Leopard*. If duplicate observations are proposed be sure you have provided a strong scientific justification.
8. Contact the electronic Spitzer Helpdesk (help@spitzer.caltech.edu) for assistance, if needed.
9. Prepare your observing proposal according to the guidelines listed in §5.2. Templates for preparing the PDF proposal attachment in Latex and Microsoft Word formats are available in the online Proposal Kit. Proposals submitted that do not utilize the Cycle-12 templates will be rejected outright.
10. Note the evaluation criteria listed in §7.2.
11. Follow the steps described in §5.5 to electronically submit your proposal, cover sheet, and accompanying AORs to the SSC prior to the deadline of **4:00pm PDT, Friday, September 11, 2015.**
12. If you experience computer or Internet problems just prior to the deadline such that you are not able to submit your proposal by 4:00 pm, do not wait until after the deadline to contact us. Call us immediately at 626-395-8000 (SSC central phone line) and let us know.

# 11 Appendix A: Special Telescope Overheads

**Resource limitations in terms of staff during the warm mission preclude continued support for medium and high impact ToO programs, late ephemeris updates for Solar System observations, and IERs as part of GO proposals. These observations may be submitted via DDT proposals. The Spitzer project may support a limited number of such observations annually as permitted by available resources.**

Special overhead burdens are applied to high/medium-impact Targets of Opportunity (ToO). This special overhead is added to the normal overhead applied to each Astronomical Observation Request (AOR) computed by *Spot*, the software required for Spitzer observation planning and proposal submission. It accounts for the time required to prepare for the observation and to return the Telescope to its nominal schedule. As described in the *Spitzer Space Telescope Warm Mission Observing Rules*, the special overhead is intended to reflect the observing time lost in other programs as a result of executing the relevant observation(s).

In evaluating ToO proposals, peer reviewers will assess the value of observations with special overhead burdens against other proposed observations. Proposals *must* include these overheads in the total requested observation time. The relevant special overheads during the warm mission are:

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

**Medium-Impact Target of Opportunity: 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. For observations that are constrained with a *follow-on* constraint, the overhead must be applied to every AOR individually.

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

# 12 Appendix B: Acronyms and Abbreviations

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|---|---|
| AOR | Astronomical Observation Request(s) |
| AOT | Astronomical Observation Template(s) |
| AR | Archival Research |
| Co-I | Co-Investigator |
| CP | Call for Proposals |
| CREI | Cost Reimbursement with an Educational Institution |
| CXC | Chandra X-Ray Center |
| CXO | Chandra X-Ray Observatory |
| CVZ | Continuous Viewing Zone |
| DDT | Director's Discretionary Time |
| ES | Exploration Science |
| FAQ | Frequently Asked Questions(s) |
| FOV | Field of View |
| GO | General Observer(s) |
| GTO | Guaranteed Time Observer(s) |
| HST | Hubble Space Telescope |
| IDC | Indirect Cost(s) |
| IER | Instrument Engineering Request(s) |
| IRAC | InfraRed Array Camera |
| JPL | Jet Propulsion Laboratory |
| NAIF | Navigation and Ancillary Information Facility |
| NASA | National Aeronautics and Space Administration |
| PCRS | Pointing Calibration and Reference Sensor |
| PDF | Portable Document Format |
| PDT | Pacific Daylight Time |
| PI | Principal Investigator |
| ROC | Reserved Observations Catalog |
| RSA | Research Support Agreement |
| STScI | Space Telescope Science Institute |
| SHA | Spitzer Heritage Archive |
| SOM | Spitzer Observer's Manual |
| SSC | Spitzer Science Center |
| TAC | Time Allocation Committee |
| ToO | Target(s) of Opportunity |
| TR | Theoretical Research |
| Warm SOM | Spitzer Observer's Manual – Warm Mission |