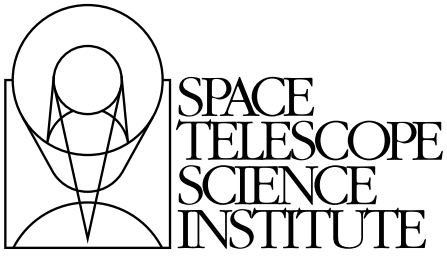
October 2006

Hubble Space Telescope Call for Proposals for Cycle 16

Policies, Procedures & Phase I Proposal Instructions



Space Telescope Science Institute
3700 San Martin Drive
Baltimore, Maryland 21218
help@stsci.edu

Operated by the Association of Universities for Research in Astronomy, Inc., for the National Aeronautics and Space Administration

Call for Proposals

We invite scientists to participate in Cycle 16 of the Hubble Space Telescope (HST). The telescope and its instruments were built under the auspices of the National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA). Management of HST's scientific program is carried out by the Space Telescope Science Institute (STScI). We anticipate allocating up to 3000 orbits in Cycle 16, including up to 1000 orbits for Large and Treasury proposals, with the remainder allocated to regular GO Programs. An additional 500-800 SNAPSHOT targets may also be allocated. Abstracts of previously accepted programs can be found on the HST proposal catalogs Web page, listed in Appendix D.

- Phase I Deadline: **Friday January 26, 2007, 8:00 pm EST.**
- E/PO Deadline: **Friday August 17, 2007, 5:00 pm EDT.**

Where to Get Help

- Read this Call for Proposals and the HST Primer (see Section 1.4.3)
- STScI has created a roadmap as a guide to Phase I submissions at: http://apst.stsci.edu/apt/external/help/roadmap1.html
- Visit STScI's Web Site at http://www.stsci.edu/
- Contact the STScI Help Desk. Either send e-mail to help@stsci.edu or call 1-800-544-8125; from outside the United States and Canada, call [1] 410-338-1082.

Who's Responsible

The STScI Science Policies Division (SPD) is responsible for the HST science program selection process. SPD staff includes astronomers Neill Reid (Division Head), Mike Fall, Claus Leitherer, Eva Villaver, Bob Williams, Technical Manager Brett Blacker, and Administrative Assistant Darlene Spencer.

The Cycle 16 Call for Proposals was edited by

I. Neill Reid and **Jim Younger**,

based in part on versions from previous cycles, and with text and assistance from many different individuals at STScI.

Send comments or corrections to:
Science Policies Division
Space Telescope Science Institute
3700 San Martin Drive
Baltimore, Maryland 21218
E-mail:help@stsci.edu

Table of Contents

Chapter 1: General Information 1
- 1.1 About this Document 1
- 1.2 New and Important Features of Cycle 16 2
- 1.3 General Guidelines for Proposal Preparation 4
- 1.4 Resources, Documentation and Tools 5
  - 1.4.1 Cycle 16 Announcement Web Page 5
  - 1.4.2 Phase I "Roadmap" 5
  - 1.4.3 HST Primer 5
  - 1.4.4 Two-Gyro Handbook 6
  - 1.4.5 Instrument Handbooks 6
  - 1.4.6 The Astronomer's Proposal Tool (APT) 6
  - 1.4.7 The Visual Target Tuner (VTT) and Aladin 6
  - 1.4.8 Exposure Time Calculators (ETCs) 6
  - 1.4.9 HST Data Archive 7
  - 1.4.10 Duplication checking 7
- 1.5 STScI Help Desk 7
- 1.6 Organization of this Document 8
  - 1.6.1 Policies, Procedures and General Information 8
  - 1.6.2 Preparing and Submitting Your Proposal 8
  - 1.6.3 Information Pertaining to Accepted Proposals 8
  - 1.6.4 Appendices 8

Chapter 2: Proposal Submission Policies 9
- 2.1 The Proposal Process: Phase I and Phase II 9
- 2.2 Deadlines 10
- 2.3 Who May Submit 11
  - 2.3.1 Principal Investigator and Co-Investigators 11
  - 2.3.2 ESA Scientists 11
  - 2.3.3 Student PIs 12

2.4 Institutional Endorsement 12
2.5 Funding 12
2.6 Proposal Confidentiality 13

Chapter 3: Proposal Categories 15
3.1 Overview of Proposal Categories 15
3.2 General Observer (GO) Proposals 16
3.2.1 Regular GO Programs 16
3.2.2 Large GO Programs 17
3.2.3 Survey GO Programs 17
3.2.4 Calibration GO Programs 19
3.2.5 Long-Term GO Programs 21
3.2.6 Treasury GO Programs 22
3.3 Snapshot (SNAP) Proposals 24
3.3.1 Characteristics of SNAPs 24
3.3.2 Calibration SNAP Programs 25
3.3.3 Guidelines for SNAP Programs 26
3.4 Archival Research (AR) Proposals 27
3.4.1 Regular AR Proposals 28
3.4.2 Legacy AR Proposals 28
3.4.3 Calibration AR Programs 29
3.4.4 Theory Proposals 30
3.4.5 Guidelines for AR Programs 32
3.4.6 Suggestions for AR Proposals 32
3.5 Joint HST-Chandra Observing Proposals 33
3.6 Joint HST-NOAO Observing Proposals 34
3.7 Joint HST-Spitzer Observing Proposals 35
3.7.1 Regular HST-Spitzer proposals 36
3.7.2 Coordinated HST-Spitzer proposals 37
3.8 Director's Discretionary (DD) Time Proposals 38
3.9 Guaranteed Time Observer Programs 39

Chapter 4: Observation Types and Special Requirements 41
4.1 Primary Observations 41
4.1.1 Continuous Viewing Zone (CVZ) Observations 41
4.1.2 Target-of-Opportunity (TOO) Observations 43
4.1.3 Special restrictions on observations with the ACS/SBC 45

4.1.4 Solar System Targets 46
4.1.5 Observations of Targets that have not yet been discovered or identified 46
4.1.6 Time-Critical Observations 47
4.1.7 Real-Time Interactions 47
4.1.8 Observations of Multiple Targets 48
4.1.9 Dithering strategies with ACS 48
4.2 Parallel Observations 48
4.2.1 Coordinated Parallel Observations 49
4.2.2 Pure Parallel Observations 50
4.2.3 Restrictions and Limitations on Parallel Observations 51
4.3 Special Calibration Observations 52

Chapter 5: Data Rights and Duplications 53
5.1 Data Rights 53
5.2 Policies and Procedures Regarding Duplications 54
5.2.1 Duplication Policies 54
5.2.2 How to Check for Duplications 56

Chapter 6: Proposal Selection Procedures 57
6.1 How STScI Evaluates Submitted Proposals 57
6.1.1 The Review Panels 57
6.1.2 The Telescope Allocation Committee (TAC) 58
6.1.3 The Joint HST-Spitzer Telescope Allocation Committee (Joint TAC) 59
6.2 Selection Criteria 59

Chapter 7: Guidelines and Checklist for Phase I Proposal Preparation 63
7.1 General Guidelines 63
7.1.1 Deadline 63
7.1.2 Phase I Proposal Format 64
7.1.3 Page Limits for PDF Attachment 65
7.2 Proposal Preparation Checklist 66

Chapter 8: Filling Out the APT Proposal Form 67

8.1 Title 68
8.2 Abstract 68
8.3 Proposal Phase 68
8.4 Category 68
8.5 Cycle 68
8.6 Requested Resources 69
8.6.1 Primary and Parallel Orbits 69
8.6.2 Total Targets 69
8.6.3 Budget 69
8.6.4 Budget Explanation 69
8.6.5 Archival Resources 70
8.7 Proprietary Period 70
8.8 Scientific Category 70
8.9 Keywords 72
8.10 Special Proposal Types 72
8.10.1 Chandra ksec 72
8.10.2 Spitzer hours 73
8.10.3 NOAO Nights 73
8.10.4 Theory 73
8.10.5 Legacy 73
8.10.6 Calibration 73
8.10.7 Treasury 74
8.10.8 Large 74
8.10.9 Coordinated HST-Spitzer 74
8.10.10 Survey 74
8.11 Proposal PDF Attachment 74
8.12 Principal Investigator 74
8.13 Co-Investigators 75
8.14 Targets 75
8.14.1 Target Number 76
8.14.2 Target Name 76
8.14.3 Provisional Coordinates 76
8.14.4 V-Magnitude 76
8.14.5 Other Fluxes 77

8.15 Observation Summary (OS) 77
8.15.1 Target 78
8.15.2 Instrument 78
8.15.3 Instrument Setup(s) 78
8.15.4 Config 79
8.15.5 Science Mode 79
8.15.6 Coronagraphy 79
8.15.7 Polarizer 79
8.15.8 Spectral Element 79
8.15.9 Orbits 79
8.15.10 Number of Iterations 80
8.15.11 Special Requirement Checkboxes 80
8.15.12 Scheduling Requirements 80
8.15.13 Verifying Schedule Constraints 82

Chapter 9: Preparation of the PDF Attachment 83
9.1 Scientific Justification 84
9.2 Description of the Observations 85
9.3 Special Requirements 86
9.4 Coordinated Observations 87
9.4.1 Joint HST-Chandra Observations 88
9.4.2 Joint HST-Spitzer Observations 89
9.4.3 Joint HST-NOAO Observations 89
9.5 Justify Duplications 90
9.6 Analysis Plan 90
9.7 Budget Narrative 91

Chapter 10: Proposal Implementation and Execution 93
10.1 Notification 93
10.2 Phase II Submission 94
10.3 Program Coordinator and Contact Scientist Support 94
10.4 Duplication Checking 95
10.5 Technical Review 95
10.6 Proposal Scheduling 95
10.6.1 Unschedulable or Infeasible Programs 96

10.7 Access to Data Products 96
10.8 Archival Research Support 97
10.9 Visits to STScI 97
10.10 Failed Observations 98
10.11 Publication of HST Results 99
10.12 Dissemination of HST Results 100

Chapter 11: Education & Public Outreach Proposals 101
11.1 NASA SMD E/PO Policies 101
11.2 HST E/PO Proposals 102
11.2.1 Assistance for the Preparation of E/PO Proposals 103
11.3 The Initiative to Develop Education Through Astronomy and Space Science (IDEAS) Grant Program 103

Chapter 12: Grant Funding and Budget Submissions 105
12.1 Overview 105
12.2 Eligibility for STScI Grant Funds 106
12.3 Allowable Costs 107
12.4 Grant Period 108
12.5 Award of Funds 108

Appendix A: Contact Information 109
A.1 Space Telescope Science Institute 109
A.2 Space Telescope - European Coordinating Facility 110
A.3 Canadian Astronomy Data Centre 111

Appendix B: Scientific Keywords 112

Appendix C: Glossary of Acronyms and Abbreviations 115

Appendix D: Internet Links 118

CHAPTER 1:

General Information

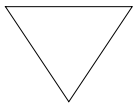
In this chapter . . .

1.1 About this Document / 1
1.2 New and Important Features of Cycle 16 / 2
1.3 General Guidelines for Proposal Preparation / 4
1.4 Resources, Documentation and Tools / 5
1.5 STScI Help Desk / 7
1.6 Organization of this Document / 8

1.1 About this Document

Two documents are of primary relevance for HST proposers: this *Call for Proposals* and the *HST Primer* (see Section 1.4.3). The Call for Proposals discusses policies and procedures, and explains how to submit a Phase I proposal. The HST Primer provides a basic introduction to the technical aspects of HST and its instruments, and explains how to calculate the appropriate number of orbits for your Phase I observing time requests.

The Call for Proposals is only available electronically in HTML and PDF formats. The HTML version is optimized for on-line browsing, and contains many links to related or more detailed information, both within the document itself and in other STScI documents. You are therefore encouraged to use the HTML version electronically. Nonetheless, some people may prefer to read a hardcopy, and with this in mind, the PDF version was optimized for printing.



In a hardcopy printout of the PDF version any links to information on the internet will appear as underlined text. You can look up the internet address of the corresponding link in Appendix D.

1.2 New and Important Features of Cycle 16

- Cycle 16 will start in July 2007 and is likely to be shorter than the usual duration of one year. NASA is in the early stages of planning for a Servicing Mission 4 (SM4) to the Hubble Space Telescope, subject to final authorization by the NASA Administrator. Current plans are to schedule SM4 during the nominal Cycle 16 period, potentially as early as December 2007. Cycle 16 will terminate at that point. Cycle 17 will commence with the new suite of instrumentation, including Wide Field Camera 3 (WFC3), the Cosmic Origins Spectrograph (COS) and, possibly, a refurbished Space Telescope Imaging Spectrograph (STIS). An attempt to refurbish STIS will be made on a best effort basis.
- ACS suspended operations on 19 June 2006 due to a problem with the Side 1 electronics. Operations were switched to the Side 2 electronics on 2 July 2006, and the instrument is currently operating nominally.
- HST switched to two-gyro operations on 29 August 2005, and will continue to operate in this mode in Cycle 16. On-orbit tests indicate that there is little degradation in image quality, and hence scientific performance, while the overall observing efficiency is generally degraded by less than 5%; however, there are significantly tighter constraints in scheduling individual observations, and observers should use the information in the Two-Gyro Handbook and the web-based tools on the Two-Gyro Web Page or the APT (the Astronomer's Proposal Tool; see Section 1.4.6) to check the viability of their observing strategy. Full details of two gyro operations are given in the HST Two-Gyro Handbook.
- A new type of GO program, Survey Proposals, has been introduced in Cycle 16 in response to requests for an alternative option for programs that are statistical in nature. Survey proposals are like SNAP proposals in that they allow a large pool of candidate targets to be specified from which a subset will be selected for execution. However, Survey proposals are GO programs, which will be ranked

against Regular GO programs in peer review and, if selected, will be assigned a guaranteed number of orbits. Therefore, while specific targets are not guaranteed, Survey proposals are appropriate where it can be demonstrated that a fixed number of targets must be observed to accomplish the science goals of the proposal (see Section 3.2.3 for full details). The observations cannot require special scheduling constraints(e.g., CVZ, timing requirements, or telescope orientation requirements), and, to enhance scheduling efficiency, are limited to durations of less than 48 minutes per orbit. Survey proposals are subsidised at a higher rate than other GO proposals in the time assignment process (see Section 6.1.1).

- Snapshot proposals are limited to less than 40 minutes duration (including target acquisition) for each target. Scientific programs that require longer duration exposures should be subnitted as GO Survey programs.
- Joint HST-Spitzer proposals have been expanded to include a new category, Coordinated HST-Spitzer proposals. This category, equivalent to Large/Treasury GO programs, accommodates proposals that require substantial allocations of time on both HST and Spitzer. These proposals will be considered by a Joint HST-Spitzer TAC, comprised of members of the separate HST and Spitzer TACs. ***Proposers intending to submit a Coordinated HST-Spitzer proposal must submit a non-binding Notice of Intent by 1 December 2006 (see Section 3.7.2)***
- Proposers submitting multi-cycle proposals should assume two-gyro operations for Cycles 17 and 18. This will ensure their programs will continue to be implementable in the event that SM4 is delayed substantially. Proposers should note that WFPC2 will not be available following SM4, and proposals using that instrument in Cycles 17 and 18 will not be accepted. In addition, NICMOS operations after SM4 may need to be curtailed due to spacecraft power considerations. While WFC3 observations cannot be proposed now, we encourage proposers of multi-year NICMOS programs to consider whether future portions of their programs could be carried out with WFC3, if necessary.

The following features also deserve special mention, but have not changed since the last cycle:

- The Phase I proposal deadline for Cycle 16 is January 26, 2007.
- Starting in Cycle 12, a java-based software tool, APT (the Astronomer's Proposal Tool; see Section 1.4.6) is the interface for all Phase I and Phase II proposal submissions for HST. Please refer to Chapter 7, Chapter 8 and Chapter 9 for a description of how to prepare and sub-

mit your Cycle 16 Phase I proposal using APT. ***The Phase I LaTeX templates that have been in use for many years are no longer accepted.***

- The instruments offered for observations in Cycle 16 are: the Advanced Camera for Surveys (**ACS**); the Fine Guidance Sensor (**FGS**); the Near Infrared Camera and Multi-Object Spectrometer (**NICMOS**); and the Wide Field and Planetary Camera 2 (**WFPC2**). ACS was installed on HST in March 2002 during servicing mission SM3B. NICMOS resumed operations after the installation of a cryo-cooling system. Those instruments are working nominally at the time of writing this document (October 2006).
- STScI experience with scheduling Large and Treasury Programs in Cycles 11 through 15 has shown that some programs can introduce substantial difficulties in developing an effective and efficient long-range observing schedule. Proposers submitting Large and Treasury Programs are asked to include additional technical details (e.g., orient constraints, tiling strategy for large mosaic programs and time constraints) in the "Description of the Observations" section (see Section 9.2) to provide information on the scheduling aspects of their program.
- In addition to the proposal categories that have existed for many cycles, STScI continues to solicit proposals in the categories of *'Treasury Proposals'* (see Section 3.2.6), *'Theory Proposals'* (see Section 3.4.4) and *'Legacy AR Proposals'* (see Section 3.4.2), all of which were started successfully in Cycle 11. Also, it remains possible to request observing time on Chandra (see Section 3.5), NOAO telescopes (see Section 3.6) and Spitzer (see Section 3.7) in combination with requests for HST observations.

1.3 General Guidelines for Proposal Preparation

Here are some suggestions to keep in mind when writing your proposal.

- *Stress why your science is critically important and why it requires HST.*
- *Write for the appropriate audience*.
  Review panels span a broad range of scientific expertise. It is therefore crucial that your proposal provides sufficient introductory material for the non-specialist, and explains the importance of the program to astronomy in general.

- *Explain clearly and coherently what you want to do and why.*
  Make sure to get your point across to reviewers who have to judge on order of 100 proposals in a few days.
- *If you have a project that requires a significant investment of HST observing time, do not hesitate to propose it.*
  In recent cycles, the proposal acceptance rate has been approximately independent of proposal size. Thus, the odds of getting a large proposal accepted are no worse than for a small proposal.
- *Make sure that what you propose is feasible*.
  It is the responsibility of the proposer to ensure that the proposed observations are technically feasible. Proposals that are not technically feasible will be rejected, so familiarize yourself with the technical documentation provided by STScI. In particular, make sure that your observations do not exceed bright object safety limits (see Section 5.1 of the HST Primer). Contact the STScI Help Desk (see Section 1.5) if anything is not clear, or if you are unsure about the feasibility of a particular approach or observation.

1.4 Resources, Documentation and Tools

1.4.1 Cycle 16 Announcement Web Page

The Cycle 16 Announcement Web Page provides links to information and documentation (including this Call for Proposals) that will be useful to you while preparing your proposals. This page will also provide any late-breaking updates on the Phase I process, and answers to frequently asked questions.

1.4.2 Phase I "Roadmap"

The Phase I Proposal Roadmap
http://apst.stsci.edu/apt/external/help/roadmap1.html
is a high level step-by-step guide to writing a Phase I Proposal. Links to the appropriate sections of various documents (Call for Proposals, Primer, etc.) are given for each step.

1.4.3 HST Primer

The HST Primer provides a basic introduction to the technical aspects of HST and its instruments, and explains how to request the appropriate number of orbits in a Phase I proposal. The HST Primer is accessible from the Cycle 16 Announcement Web Pages.

1.4.4 Two-Gyro Handbook

The Two-Gyro Handbook summarizes the impact of two-gyro operations on HST scheduling and observing efficiency. Should it prove necessary to update information on scientific performance, notification will be placed on the Cycle 16 Announcement page and relevant information will be provided at the Two-Gyro Science Mode Web Page. .

1.4.5 Instrument Handbooks

The Instrument Handbooks are the primary source of information for the HST instruments. You should use current versions of the Instrument Handbooks when preparing a proposal. They are available for all instruments, including former instruments that may be of interest for Archival Research. Instrument-specific concerns related to two-gyro observations are included in the appropriate Instrument Handbooks. The Handbooks are distributed electronically, and can be accessed from the HST Instruments Web Page. This page also provides links to more detailed technical information, such as that provided in Instrument Science Reports.

1.4.6 The Astronomer's Proposal Tool (APT)

The Astronomer's Proposal Tool (APT) was introduced in Cycle 12 as the interface for all Phase I and Phase II proposal submissions for HST. The Cycle 16 version of APT has some minor bug fixes and enhancements included, but is basically the same system that was used in Cycle 15. See the What's New button in APT for details on the changes. The APT Web Page contains information on the installation and use of APT.

1.4.7 The Visual Target Tuner (VTT) and Aladin

The Visual Target Tuner (VTT), used to display HST apertures on images of the sky, has been replaced by a new tool based on the Aladin Sky Atlas interface. This change provides more options for future enhancements, and brings a variety of benefits to users including access to a wide variety of images and catalogs, as well as more capabilities for displaying and manipulating images. Detailed information about the new Aladin-based tool can be found on the APT Web page.

1.4.8 Exposure Time Calculators (ETCs)

STScI provides Exposure Time Calculators (ETCs) for each of the HST instruments. Please use those electronic tools to estimate how long you need to integrate to achieve the signal-to-noise ratio required for your

project. The ETCs will also issue warnings about target count rates that exceed linearity and safety limits. The ETCs can be accessed from the individual instrument Web pages, which in turn are accessible from the HST Instruments Web Page.

1.4.9 HST Data Archive

The HST Data Archive is a part of the Multimission Archive at STScI (MAST). The HST Data Archive contains all the data taken by HST. Completed HST observations from both GO and GTO Programs are available to the community upon the expiration of their proprietary periods. Observations taken under the Treasury and public parallel programs carry no proprietary period.

The MAST Web page provides an overview of the HST Data Archive, as well as the procedures for retrieving archival data (see also the introductory description in Section 7.2 of the HST Primer). A copy of the HST Data Archive is maintained at the Space Telescope - European Coordinating Facility (ST-ECF; see Appendix A.2) in Garching, to which European requests should normally be addressed. The Canadian Astronomy Data Centre (CADC; see Appendix A.3) also maintains a copy of HST science data (only), and is the preferred source for Canadian astronomers.

1.4.10 Duplication checking

The HST Data Archive provides access to several tools that allow you to check whether planned observations duplicate any previously executed or accepted HST observations. See Section 5.2.2 for details.

1.5 STScI Help Desk

If this Call for Proposals and the materials referenced above do not answer your questions, or if you have trouble accessing or printing Web Documents, then contact the STScI Help Desk. You can do this in either of two ways:

- Send e-mail to help@stsci.edu.
- Call 1-800-544-8125, or from outside the United States and Canada, [1] 410-338-1082.

1.6 Organization of this Document

1.6.1 Policies, Procedures and General Information

Chapter 2 summarizes the policies regarding proposal submission. Chapter 3 describes the types of proposals that can be submitted. Chapter 4 describes the types of observations that are possible with HST; it includes discussions of special requirements. Chapter 5 addresses policies regarding data rights and duplications. Chapter 6 describes procedures and criteria for proposal evaluation and selection.

1.6.2 Preparing and Submitting Your Proposal

Chapter 7 outlines the steps to follow when preparing and submitting a Phase I proposal. **A proposal consists of a completed APT proposal form and an attached PDF file.** Chapter 8 describes the items that must be filled out in the APT proposal form; this information is also available from the context-sensitive 'Help' in APT. Chapter 9 describes the items that must be addressed in the attached PDF file.

1.6.3 Information Pertaining to Accepted Proposals

Chapter 10 provides information on the implementation and scheduling process for accepted proposals. Chapter 11 describes Education/Public Outreach (E/PO) proposals. Chapter 12 provides information on budgets, grants and funding policies.

1.6.4 Appendices

The appendices provide a variety of additional information, including contact information (Appendix A), lists of scientific keywords (Appendix B) that can be used in proposals, a glossary of acronyms and abbreviations (Appendix C) and a list of internet links used in the document (Appendix D).

CHAPTER 2:

Proposal Submission Policies

In this chapter . . .

2.1 The Proposal Process: Phase I and Phase II / 9
2.2 Deadlines / 10
2.3 Who May Submit / 11
2.4 Institutional Endorsement / 12
2.5 Funding / 12
2.6 Proposal Confidentiality / 13

2.1 The Proposal Process: Phase I and Phase II

STScI manages the review of HST proposals and carries it out in two phases.

In Phase I, proposers submit a scientific justification and observation summary for peer review. The Review Panels and Telescope Allocation Committee (TAC) recommend a list of programs to the STScI Director for preliminary approval and implementation (see Chapter 6). This Call for Proposals focuses on Phase I policies and procedures. Separate documentation is available for Phase II.

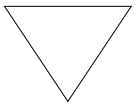
In Phase II, investigators *with approved Phase I proposals* must provide complete details of the observations in their proposed observing program. This allows STScI to conduct a technical feasibility review, and to schedule and obtain the actual observations. Programs are not approved fully until after submission of an acceptable Phase II program. In addition to this, Phase II investigators may do the following:

- Eligible investigators who request funding must submit detailed budgets (see Chapter 12).
- Interested, eligible investigators can submit an Education/Public Outreach (E/PO) proposal (see Chapter 11).

2.2 Deadlines

Cycle 16 has the following deadlines:

- *Phase I proposals:* **Friday January 26, 2007, 8:00 pm EST.**
- *Education/Public Outreach proposals:* **Friday August 17, 2007, 5:00 pm EDT.**



Late proposals will not be considered.

The deadlines remain to be determined for:

- *Phase II Observing Programs*
- *Budgets for Funding*

The deadline for these submissions, which will be announced in the notification letter to proposers with approved programs, is likely to be in mid-May 2007.

2.3 Who May Submit

Scientists of any nationality or affiliation may submit an HST proposal. Endorsement signatures are not required for Phase I observing proposals (unless required by the regulations of the proposing institution).

2.3.1 Principal Investigator and Co-Investigators

Each proposal must have only one Principal Investigator (PI). Any other individuals who are actively involved in the program should be listed as Co-Investigators (CoIs). The PI is responsible for the scientific and administrative conduct of the project, and is the formal contact for all communications with STScI.The proposal itself may be submitted through APT by either the PI or a Co-I.

Proposals by non-U.S. PIs that have one or more U.S. CoIs *must* designate one of the U.S. CoIs as the 'Administrative PI' (see Section 8.13). This person will have overall oversight and responsibility for the budget submissions of the U.S. CoIs in Phase II. Proposals with a U.S. PI have the option of designating a Contact Co-I, who will serve as the contact person for that proposal. The PI remains responsible for oversight of the proposal.

All proposals are reviewed without regard to the nationalities or affiliations of the investigators.

2.3.2 ESA Scientists

An agreement between NASA and ESA states that a minimum of 15% of HST observing time (on average over the lifetime of the HST project) will be allocated to scientists from ESA member states. It is anticipated that this requirement will continue to be satisfied via the normal selection process, as it has been in previous cycles. In order to monitor the allocation to scientists from ESA member states, *affiliations of investigators with ESA member-state institutions should be identified as such in the proposal* (see Section 8.12 and Section 8.13).

2.3.3 Student PIs

Observing proposals from student PIs will be considered. The proposal should indicate if the proposed research is part of a doctoral thesis. These proposals should be accompanied by a letter from the student's faculty advisor certifying that

- the student is qualified to conduct the observing program and data analysis;
- he or she is in good academic standing.

This letter from the advisor should be e-mailed before the deadline to student-pi@stsci.edu.

The faculty advisor's statement is not required in cases where a student is listed in the proposal as a CoI.

2.4 Institutional Endorsement

STScI does not require the signature of an Authorizing Official (AO) on GO/AR proposals in Phase I. However, some institutions do require AO approval of all submitted proposals. It is the responsibility of each PI to follow all applicable institutional policies concerning the submission of proposals.

2.5 Funding

Subject to availability of funds from NASA, STScI will provide financial support for U.S. PIs and CoIs of approved Cycle 16 programs. Budgets are not due in Phase I, but are required in Phase II from successful proposers. Details of the STScI Funding Policies (including the definition of the term 'U.S. Investigators') are outlined in Chapter 12.

Median awards for Regular AR and Theory proposals have been about $50,000. For reference, 42 Regular AR and 12 Theory proposals were approved in Cycle 15.

ESA does not fund HST research programs. Therefore, successful ESA member-state proposers should seek any necessary resources from their respective home institutions or national funding agencies. ESA observers do, however, have access to the data-analysis facilities and technical support of the staff of the ST-ECF (see Appendix A.2), in addition to those of STScI.

2.6 Proposal Confidentiality

Proposals submitted to STScI will be kept confidential to the extent allowed by the review process described in Chapter 6. For accepted proposals, the scientific justification section of the proposal remains confidential, but other sections become publicly accessible, including PI and CoI names, project titles, abstracts, description of observations, special scheduling requirements, and details of all targets and exposures. Phase II programs submitted for approved proposals become publicly accessible in their entirety.

CHAPTER 3:

Proposal Categories

In this chapter . . .

3.1 Overview of Proposal Categories / 15
3.2 General Observer (GO) Proposals / 16
3.3 Snapshot (SNAP) Proposals / 24
3.4 Archival Research (AR) Proposals / 27
3.5 Joint HST-Chandra Observing Proposals / 33
3.6 Joint HST-NOAO Observing Proposals / 34
3.7 Joint HST-Spitzer Observing Proposals / 35
3.8 Director's Discretionary (DD) Time Proposals / 38
3.9 Guaranteed Time Observer Programs / 39

3.1 Overview of Proposal Categories

HST observations can be requested with a General Observer (GO; see Section 3.2) or a Snapshot (SNAP; see Section 3.3) proposal. A GO Program can be a Regular GO (see Section 3.2.1), a Large GO (see Section 3.2.2), Survey (see Section 3.2.3), a Long-term GO (see Section 3.2.5), or a Treasury Program (see Section 3.2.6). Funding for projects that do not require new HST observations can be requested with an Archival Research (AR; see Section 3.4) or a Theory (see Section 3.4.4) Proposal. An AR Program can be either a Regular AR (see Section 3.4.1) or a Legacy AR (see Section 3.4.2) Program. A special proposal type exists for Calibration Programs (see Section 3.2.4). Proposals can also request observing time on Chandra (see Section 3.5), NOAO facilities (see Section 3.6) or on Spitzer (see Section 3.7). At any time scientists can request Director's Discretionary (DD) time for unanticipated and scientifically compelling astronomical observations (see Section 3.8). U.S. Investigators with approved proposals are strongly encouraged to submit an associated Education/Public Outreach (E/PO) Proposal (see Chapter 11).

3.2 General Observer (GO) Proposals

A GO proposal may be submitted for any amount of HST observing time, counted in terms of HST orbits. Chapter 6 of the HST Primer describes how the required number of orbits can be calculated for a particular set of observations. Programs that require fewer than 100 orbits are called Regular Programs (see Section 3.2.1), and those that require 100 or more orbits are called Large Programs (see Section 3.2.2). Programs in these categories can request observing time in future cycles when this is scientifically justified (see Section 3.2.5). The additional category of Treasury Programs (see Section 3.2.6) was started in Cycle 11 to stimulate certain types of ambitious and innovative proposals that may not naturally fit in the Regular or the Large Program categories.

Proposers are strongly encouraged to develop competitive Large and Treasury proposals.

Large and Treasury proposals will be evaluated by the TAC (see Section 6.1.2). Typically, approximately 1/3 of the available time is allocated to these types of programs; in a full cycle, this amounts to ~1000 orbits, but the allocation may be less in Cycle 16 if that cycle is truncated.

Proposers of large programs should note that all HST observations are accepted with the understanding that the timescale on which the observations will actually be obtained will depend on scheduling opportunities and demands on HST resources. Experience has shown that large programs with scheduling constraints may require execution over an extended period.

In recent cycles the acceptance rate of submitted GO Programs has been approximately independent of size. In general, proposals are either accepted or rejected in their entirety. Accordingly, you are urged to request the actual number of orbits required to achieve your science goals.

3.2.1 Regular GO Programs

Regular GO Programs are programs that request 99 orbits or less.

3.2.2 Large GO Programs

Large GO Programs are programs that request 100 orbits or more.

Large Programs should lead to a clear advance in our understanding in an important area of astronomy. They must use the unique capabilities of HST to address scientific questions in a comprehensive approach that is not possible in smaller time allocations. Selection of a Large Program for implementation does not rule out acceptance of smaller projects to do similar science, but target duplication and overall program balance will be considered.

Proposers submitting Large Programs are asked to include additional technical detail in the "Description of the Observations" section to provide information on the scheduling aspects of their program. Investigators interested in proposing Treasury/Large Programs are encouraged to consult the Treasury/Large Program User Information Report (available on the Cycle 16 Announcement Page) and the Large Program Web Page, which provide general information on how these programs are scheduled and summarize important technical and scheduling information.

Some Large Programs require substantial pipeline processing of their data to generate the final products. Examples are large mosaics for surveys, or co-additions of many exposures in deep fields. There may be situations where it would be advantageous to the PI to use the data processing infrastructures at the STScI for bulk processing of observations from a Large Program. Typically, this possibility would be explored during the budget submission process. See the Archive Large Programs Web Page for a technical description of this opportunity.

Depending on the duration of Cycle 16, we anticipate selection of two to six programs in the 100-300 orbit range. For comparison, in Cycle 15 seven Large Programs were accepted for a total of 1209 primary orbits. Descriptions of these programs are available on the Treasury, Archival Legacy and Large (TALL) Programs Web Page.

3.2.3 Survey GO Programs

Survey Programs, introduced in the present cycle, are designed to complement Snapshot programs in providing an opportunity for statistical astronomical projects. Like other GO programs, Survey Programs are allocated a fixed number of orbits, and therefore provide guaranteed observations of a specified number of sources drawn from a larger target list. The availability of a pool of unconstrained targets is also expected to increase the overall scheduling efficiency of HST.

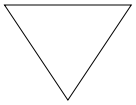
Survey programs have the following characteristics:

- Proposers request a specific number of orbits, corresponding to observing N *targets.* If the proposal is approved, the program will be allocated the requested number of orbits.
- As with Snapshot proposals, the Phase I submission requires a representative list of targets; the full target list is submitted in Phase II. Survey programs may not be used for targets of opportunity (see also Section 4.1.2).
- Proposers should submit a list of M > N targets in the Phase II stage of the proposal, where 1.5 N < M < 3N. This permits greater flexibility in scheduling observations. Survey proposals should target sources that are well distributed over a wide range of Right Ascension. Examples of programs that are not well suited to survey proposals (because they do not help improve scheduling efficiency) are surveys of targets confined to an area of a few square degrees (e.g. the LMC). or surveys confined to a few such areas (e.g. surveys of galaxies in two or three galaxy clusters). If in doubt, please consult the help desk (help@stsci.edu).
- In the case of duplications, Regular GO proposals have priority over Survey proposals, since observations of particular Survey targets are not guaranteed.
- Proposers may not assign priorities to individual targets in a survey program. Targets will be selected for execution based on available observatory resources as determined by STScI. This selection will occur as part of the normal science planning process with the other GO programs prior to the start of the observing cycle. As for all GO programs, the proposal will be deemed complete when it has exhausted the total number of orbits allocated.
- Survey proposals can request multi-orbit visits for each target.
- In order to increase scheduling efficiency, survey proposals must limit observations to less than 48 minutes per orbit (including target acquisition).
- Individual visits in a Survey proposal can be tailored in duration (number of orbits) and/or instrumental configuration for individual targets. PIs that include visits of different durations should use the Description of Observations to explain how the the total orbit request was computted.
- Survey observations are not permitted to use any special scheduling constraints (e.g., CVZ, timing requirements, or telescope orientation requirements).

- Moving-target Survey Programs are acceptable only if the scheduling windows are at least one month duration. Observations of Solar system targets interior to the orbit of Mars are not permitted. Due to the amount of effort required in implementing moving target programs, these observations ordinarily cannot be revised during the observing cycle, once the initial processing has been completed.
- Survey Programs with the ACS/SBC are not allowed.
- Survey proposals cannot request time in future cycles.
- Regular Survey proposals are assessed by the review panels, in conjunction with other GO programs (see Section 6.1.1). Survey programs that request more than 100 orbits will be treated as Large Programs, and reviewed by the TAC (see Section 6.1.2).

3.2.4 Calibration GO Programs

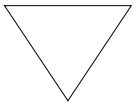
HST is a complex observatory, with many possible combinations of observing modes and spectral elements on each instrument. Calibrations and calibration software are maintained by STScI for all of the most important and most used configurations. However, STScI does not have the resources to calibrate fully all potential capabilities of all instruments. On the other hand, the astronomical community has expressed interest in receiving support to perform calibrations for certain uncalibrated or poorly calibrated modes, or to develop specialized software for certain HST calibration and data reduction tasks. In recognition of this, STScI is encouraging outside users to submit proposals in the category of *Calibration Proposals*, which aims at filling in some of the gaps in our coverage of the calibration of HST and its instruments.



Calibration Proposals should not be linked explicitly to a specific science program, but should provide a calibration or calibration software that can be used by the community for existing or future programs.

Successful proposers will be required to deliver documentation, and data products and/or software to STScI to support future observing programs or archival research.

Funding is available to support Calibration Proposals in the same manner as for normal science programs. However,



Scientists affiliated with STScI are not eligible for any funding to support their role (as PI or CoI) in a Calibration Proposal.

Calibration Programs will be reviewed internally by the Instrument Division. The internal review will provide the TAC with an assessment of the feasibility of the proposal, how the proposal complements/extends the existing calibration program, and the type of science impacted by the proposed calibrations. Proposers should summarize the relevance and overall scientific utility of the calibration techniques and products described in their proposal.

Note that a specific science program that has special calibration requirements is not a Calibration Proposal; such a proposal should be submitted as a normal GO proposal and the necessary calibration observations should be added to the science program as described in Section 4.3.

Investigators interested in the submission of a Calibration Proposal are encouraged to study the Instrument Handbooks to determine the level at which STScI provides calibration and characterization, and to discuss ideas for extending these calibrations with STScI staff. Examples of the kinds of topics that have been addressed by calibration outsourcing programs of the type discussed here are:

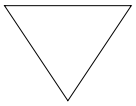
- Calibration of faint photometric standards for ACS and WFPC2
- NICMOS polarimetric calibrations
- ACS photometric zero point verification
- Calibration of the ACS emission line filters

For a complete description of the instrument calibration plans/accuracies, and for other potential topics, please see the Scientific Instruments Web Page.

The data obtained for a GO Calibration Proposal will nominally be non-proprietary, as is the case for regular calibration observations. Proposers may request a proprietary period (which should be explained in the ‘Special Requirements’ section of the proposal; see Section 9.3), but such a request will be subject to panel and TAC review and will be granted only in exceptional circumstances if exceedingly well justified. Calibration

proposals can also be submitted as Snapshot Programs (see Section 3.3.2) or Archive Programs (see Section 3.4.3). Archival Research proposals are appropriate in cases where the necessary data have already been taken, or for programs that do not require specific data but aim to develop specialized software for certain HST calibration and data reduction tasks.

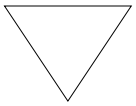
All proposers are strongly encouraged to contact the appropriate instrument group to discuss their program prior to submission.



Calibration Proposals must be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10).

3.2.5 Long-Term GO Programs

Regular and Large GO Programs may request HST observing time for more than one cycle.



Long-Term Programs must be limited to cases where long-baseline, multi-epoch observations are clearly required to optimize the scientific return of the project.

Long-term Programs require a long time baseline, but not necessarily a large number of HST orbits, in order to achieve their science goals. Examples include astrometric observations or long-term monitoring of variable stars or active galactic nuclei.

You may request time in as many as three observing cycles (i.e., Cycles 16, 17 and 18), but you cannot request instruments other than those presently offered in Cycle 16. Proposers should assume that WFPC2, scheduled to be replaced in SM4, will not be available in Cycles 17 and 18. Long-term proposals should describe the entire requested program and provide a cycle-by-cycle breakdown of the number of orbits requested. The scientific justification for allocating time beyond Cycle 16 should be presented in detail. For long-term programs, it is the sum of all orbits requested for Cycle 16, 17 and 18 that determines whether the program is Large or Regular.

The Cycle 16 Review Panels and TAC will be able to award limited amounts of time to Long-Term Programs for Cycles 17 and 18. GOs with approved Long-Term Programs need not submit continuation proposals in the subsequent cycles (and hence, GOs who had Cycle 16 time approved in Cycles 14 or 15 do not have to submit a Phase I continuation proposal, although a new Phase II submission will be required).

3.2.6 Treasury GO Programs

Starting in Cycle 11, the opportunities for large-scale research with HST were expanded with the introduction of the Hubble Treasury Program. This allows proposals for datasets of lasting value to the HST program that should be obtained before HST ceases operations. A Treasury Program is defined by the following characteristics:

- The project should focus on the potential to solve multiple scientific problems with a single, coherent dataset. It should enable a variety of compelling scientific investigations.
- Enhanced data products are desirable to add value to the data. Examples are reduced images, object catalogs, or collaborative observations on other facilities (for which funding can be provided). Funding for the proposed data products will depend on their timely availability, as negotiated with the STScI Director. They should be delivered to STScI in suitable digital formats for further dissemination via the HST Data Archive or related channels.
- Data taken under the Treasury Program will usually have no proprietary period (see Section 5.1), although brief proprietary periods may be requested if that will enhance the public data value.

The following additional characteristics are particularly encouraged:

- Development of new techniques for observing or data reduction.
- Creation and dissemination of tools (software, Web interfaces, models, etc.) for the scientific community to work with the data products.
- Inclusion of an Education/Public Outreach component. Note that a Phase I Treasury proposal need only summarize the planned E/PO component briefly; typically, one paragraph at the end of the Scientific Justification section. A detailed E/PO proposal should be submitted later as discussed in Chapter 11.

The emphasis in Cycle 16 remains on observations whose value is maximal if taken soon. For example, the on-orbit degradation of CCD detectors means that deep observations with ACS are of most value when obtained early in its lifetime.

Treasury Programs may request observing time to be distributed in future cycles with appropriate justification (similar to the situation for Regular and Large GO Programs; see Section 3.2.5). In addition, Treasury Programs may request observing time in future cycles if the requested number of orbits is large enough to make implementation in a single cycle impractical or impossible.

Approximately 1/3 of the available HST observing time in upcoming cycles (~1000 orbits for a full cycle, scaled appropriately for the expected duration of Cycle 16) will be available for allocation to the combination of Large Programs and Treasury Programs. As a reference, in Cycle 15 three Treasury Programs were accepted for a total of 587 primary orbits. Descriptions of all Treasury Programs are also available on the HST Treasury, Archival Legacy and Large Programs Web Page.

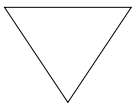
Selection of Treasury Programs will be handled by the TAC as part of the normal peer review process (see Section 6.1.2). Successful proposals will be reviewed by STScI to ensure observing efficiency. STScI resources may be made available to approved Treasury Programs by decision of the STScI Director. In particular, some programs require substantial pipeline processing of their data to generate the final products. Examples are large mosaics for surveys, or co-additions of many exposures in deep fields.

If scientifically justified, it is possible to propose a multi-cycle Treasury Program of order 1,000 orbits, with commensurate funding, to produce an enhanced dataset of high impact.

STScI reserves the right to conduct midterm progress reviews of Treasury Programs, to ensure that adequate progress is being made to achieve the goals of the project. Ongoing funding is contingent on the results of such reviews. For Treasury Programs above a certain cost threshold, STScI may require successful proposers to use professional project management personnel to aid the scientific team in such areas as planning, scheduling, budgeting, cost-control, and reporting.

Proposers submitting Treasury Programs are asked to include additional technical detail in the “Description of the Observations” section to provide information on the scheduling aspects of their program. Investigators interested in proposing Treasury/Large Programs are encouraged to consult the Treasury/Large Program User Information Report (available on the Cycle 16 Announcement Page) and the Large Program Web Page, which provide general information on how these programs are scheduled and summarize important technical and scheduling information.

Those interested in submitting a Treasury proposal are encouraged to read the Hubble Second Decade Committee Treasury Program Report. The report sets out the main motivations for the Treasury Program. Following the recommendation of the HST Second Decade Committee and the recent external HST TAC review (J. Toomre, chair), the Institute may organize workshops in the months before each annual TAC meeting to stimulate ideas, strategies, and collaborations for Treasury Programs. Updates on the status of Cycle 16 will be posted on the STScI home Web page, which should be visited periodically by all scientists interested in participating in Cycle 16 in any way.



Treasury Programs should be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10).

The 'Scientific Justification' section of the proposal (see Section 9.1) should include a description of the scientific investigations that will be enabled by the final data products, and their importance. The 'Description of the Observations' section of the proposal (see Section 9.2) should not only describe the proposed observations and plans for data analysis, but should also describe the data products that will be made available to STScI and the community, the method of dissemination, and a realistic time line.

3.3 Snapshot (SNAP) Proposals

Snapshot (SNAP) Programs consist of separate, relatively short observations whose durations should be limited to 40 minutes or less (including all overheads). During the process of optimizing the HST observing schedule, the scheduling algorithm occasionally finds short time intervals where it is impossible to schedule any exposures from the pool of accepted GO Programs. In order to make the HST schedule more efficient, STScI has developed the capability to insert Snapshot exposures of objects selected from a large list of available candidates.

3.3.1 Characteristics of SNAPs

Proposers request a specific number of Snapshot *targets.* If the proposal is approved, a specific number of targets is allocated. However, *there is no guarantee that any individual target will actually be observed.* SNAPs are placed on the schedule only after the observing sequence has been determined for the higher-priority GO targets. The number of observations

actually executed depends on the availability of appropriate schedule gaps. In general, only a fraction of the sample targets will actually be observed. There is no commitment on the part of STScI to obtain any specific completion factor for Snapshot Programs. Increased scheduling efficiency has led to fewer Snapshot opportunities in recent cycles, and the restricted sky coverage offered by two-gyro observations has limited the number of targets available at any given time. As a result, the typical completion rates for Snapshot programs in Cycle 14 were in the range 10-40%, significantly lower than the average value of ~50% attained in earlier cycles. Proposers who require higher completion rates should consider submitting their programs as Survey GO Proposals (see Section 3.2.3).

The duration of a Snapshot visit, including guide-star acquisition, should not exceed 40 minutes. Proposals that require longer on-target times should be submitted as GO Survey programs.

Nominally, SNAP Programs terminate at the end of each cycle. However, they may be kept active, for scheduling efficiency reasons, for up to one additional cycle at decreased priority. *In contrast to GO Programs (see Section 3.2.5), SNAP Programs cannot request observing time in future cycles.*

Approximately 400 Snapshot observations were scheduled in Cycle 14. This number is expected to rise to some extent for Cycle 15. The number of Snapshot opportunities available in Cycle 16 will depend on the duration of the cycle and other factors that are unknown at this time.

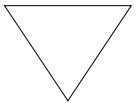
Investigators interested in proposing for SNAPs are encouraged to consult the SNAP User Information Report, which contains details on how SNAPs are scheduled, the rules pertaining to them, completion rates for recent cycles, and other useful information.

3.3.2 Calibration SNAP Programs

Calibration proposals (see Section 3.2.4) may also be submitted as a Snapshot Program. As with GO Programs, all data obtained will be non-proprietary unless proposers specifically request a proprietary period. Successful proposers will be required to deliver documentation, and data products and/or software to STScI to support future observing or archival programs

Note that a specific science program that has special calibration requirements is not a Calibration Proposal; such a proposal should be submitted as a normal SNAP proposal and the necessary calibration observations should be added to the science program as described in Section 4.3.

All proposers are strongly encouraged to contact the appropriate instrument group to discuss their program prior to submission.



Calibration Proposals must be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10).

3.3.3 Guidelines for SNAP Programs

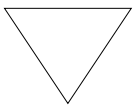
Please consider the following when developing your SNAP proposal:

- Your willingness to waive part, or all, of the proprietary data-rights period is included in the selection criteria (see Section 6.1).
- You need not give a complete list of all targets and their coordinates in your Phase I proposal. However, you *must* specify the number of targets, and unambiguously identify the targets (e.g., reference to target lists in papers, or give a detailed description of the target characteristics). SNAP exposures may not be used for targets of opportunity (see also Section 4.1.2).
- In the 'Observation Summary' section of the proposal (see Section 8.15) you should provide a typical example of a snapshot exposure.
- SNAP programs cannot request observation times longer than 40 minutes, including target acquisition. Shorter duration snapshot observations have more scheduling opportunities than longer ones.
- SNAP observations should not be proposed with any special scheduling constraints (e.g., CVZ, timing requirements, or telescope orientation requirements). However, the special requirement **`BETWEEN`** may be used in the Phase II Program in some circumstances; for details see the SNAP User Information Report.
- A snapshot must not have any links to other snapshots (e.g., relative timing or orientation constraints), even if the snapshots are of the same source.
- A SNAP Program may not contain identical observations of the same source in different visits, unless there is a scientific motivation for obtaining observations of the same source at different times (e.g., science programs that require monitoring or follow-up). In the latter case, multiple identical visits of the same source may be requested; they should be counted as multiple targets (e.g., 10 different snapshot visits of the same galaxy count as 10 targets). Due to the nature of snapshot programs, repeated observations are not guaranteed.

- Moving-target Snapshot Programs are acceptable only if the timing requirements are at least one month duration. Solar system targets interior to the orbit of Jupiter are not permitted. Please note that timing constraints will reduce the chance of a target being scheduled. Due to the amount of effort required in implementing moving target SNAP programs, these observations ordinarily cannot be revised during the observing cycle, once the initial processing has been completed.
- SNAP Programs with the ACS/SBC are not allowed.
- Programs that require both GO orbits and SNAP targets should be submitted as two separate proposals. The proposals should refer to each other so that the reviewers will be aware that the proposals are part of the same project. This allows you to ensure that some essential targets are observed (the GO Program) with the rest of the targets being sampled statistically (the SNAP Program).
- It is no longer possible to assign priorities to snapshot targets.

3.4 Archival Research (AR) Proposals

Observations in the HST Data Archive that are no longer proprietary (see Section 1.4.9) are available for analysis by interested scientists through direct retrieval (which is free and does not involve financial support). The HST Archival Research (AR) Program can provide financial support for the data analysis. An AR Proposal must request a specific amount of funding (see Section 8.6.3) and must provide a narrative that describes the proposed use of the funds (see Section 9.7). Detailed budgets are *not* requested in Phase I, but are due in Phase II only (as is the case for GO and SNAP proposals; see Chapter 12 for details). Proposals for AR funding are considered at the same time, and by the same reviewers, as proposals for observing time. Observing and AR proposals are compared competitively on the basis of scientific merit.



Only U.S. Investigators (as defined in Section 12.2) are eligible for funding of Archival Research.

An Archival Research Proposal may be submitted by a non-U.S. PI if there are one or more U.S. CoIs who request funding.

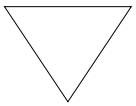
HST has produced an extraordinary quantity of high-quality observations over its fifteen years in orbit. The category of Regular AR Proposals (see

Section 3.4.1) has existed for many cycles. To encourage fuller use of available data and to achieve the full potential of the Data Archive, the opportunities for large-scale archival research were expanded in Cycle 11 with the introduction of the category of Legacy AR Proposals (Section 3.4.2). In particular, we encourage the submission of proposals that combine HST archival data with data from other astronomical missions, such as the datasets maintained at the Multimission Archive at STScI (MAST).

3.4.1 Regular AR Proposals

The general goal of a Regular AR Proposal is to analyze a subset of data from the HST Archive to address a specific scientific issue. The analysis must improve on the previous use(s) of the data, or the scientific questions that are being addressed must differ from those tackled by the original programs that obtained the data.

There is no limit to the amount of funding that may be requested for a Regular AR Program. The majority of the awards in recent cycles have been under $100,000, with a median around $50,000. However, STScI actively encourages the submission of more ambitious AR programs for which larger amounts of funding may be justified. For reference, 42 Regular AR Proposals were approved in Cycle 15.



An AR proposal will be considered to be a Regular AR Proposal, unless it is identified in the 'Special Proposal Types' section of the proposal (see Section 8.10) as a Legacy AR or Theory Proposal.

3.4.2 Legacy AR Proposals

A Legacy AR project is defined by the following characteristics:

- The project should perform a homogeneous analysis of a well-defined subset of data in the HST Archive.
- The main goal should be to provide a homogeneous set of calibrated data and/or ancillary data products (catalogs, software tools, Web interfaces etc.) to the scientific community.
- The results of the project should enable a variety of new and important types of scientific investigations.

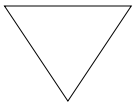
The main difference between a Regular and a Legacy AR project is that the former aims at performing a specific scientific investigation, while the latter will also create data products and/or tools for the benefit of the community. While Legacy AR Proposals will be judged primarily on the

basis of scientific merit, the importance and broad applicability of the products produced by the Legacy Program will be key features in judging the overall scientific merit of the proposal.

It is a strict requirement for Legacy AR Proposals that the proposed data products be created and distributed to the community in a timely manner. Data products should also be delivered to STScI in suitable digital formats, to allow dissemination via the HST Data Archive or related channels.

It is anticipated that Legacy AR Proposals will be larger in scope and requested funds than most Regular AR Proposals. While there is no lower limit on the requested amount of funding, it is expected that most proposals will require at least $100,000, and possibly up to a few times more than this, to accomplish their goals. Commensurate with the expected scope, Legacy AR Proposals are allowed to be multi-year projects, although this is not a requirement. Multi-year projects will be funded on a yearly basis, with continued funding beyond the first year subject to a performance review. Legacy AR Proposals will be evaluated by the TAC (see Section 6.1.2) in conjunction with Large and Treasury GO Programs (see Section 3.2.2 and Section 3.2.6).

For reference, three AR Legacy Proposals were approved in Cycle 15 and four in Cycle 14. Descriptions of these programs are available on the HST Treasury, Archival Legacy and Large Programs Web Page.



Legacy AR Proposals must be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10).

The 'Scientific Justification' section of the proposal (see Section 9.1) should include a description of the scientific investigations that will be enabled by the final data products, and their importance. The 'Analysis Plan' section of the proposal (see Section 9.6) should not only describe the plans for data analysis, but should also discuss the data products that will be made available to STScI and the community, the method of dissemination, and a realistic time line.

3.4.3 Calibration AR Programs

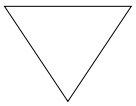
Calibration proposals (see Section 3.2.4) may also be submitted as an Archival Research Program. Archival proposals are appropriate in cases where the necessary data have already been taken, or for programs that do not require specific data but aim to develop specialized software for certain

HST calibration and data reduction tasks. Examples of topics that have been addressed by calibration outsourcing programs of the type discussed here are:

- Calibration of Lyman-alpha flat fields
- Creation of a coronagraphic PSF library for STIS/CCD
- Characterization of the spectroscopic PSF for STIS/CCD

For a complete description of the instrument calibration plans/accuracies, and for other potential topics, please see the Scientific Instruments Web Page.

All proposers are strongly encouraged to contact the appropriate instrument group to discuss their program prior to submission.



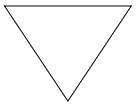
Calibration Proposals must be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10).

3.4.4 Theory Proposals

There is the opportunity under the HST Archival Research Program to obtain support for theoretical research. Research that is primarily theoretical can have a lasting benefit for current or future observational programs with HST, and it is appropriate to propose theory programs relevant to the HST mission. Recent trends in HST funding suggest that of order 5% of the total HST GO Funding might be used to support Theory Proposals.

A Theory Proposal should address a topic that is *of direct relevance* to HST observational programs, and this relevance should be explained in the proposal. Funding of mission-specific research under the HST Theory Program will be favored over research that is appropriate for a general theory program (e.g., the NASA Science Mission Directorate Astrophysics Theory Program; ATP). The primary criterion for a Theory Proposal is that the results should enhance the value of HST observational programs through their broad interpretation (in the context of new models or theories) or by refining the knowledge needed to interpret specific observational results (a calculation of cross sections may fall under the latter category). The results of the theoretical investigation should be made available to the community in a timely fashion.

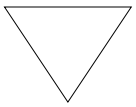
A Theory Proposal must request a specific amount of funding (see Section 8.6.3) and must provide a narrative that describes the proposed use of the funds (see Section 9.7). Detailed budgets are *not* requested in Phase I, however, but are due in Phase II only (see Chapter 12 for details). Theoretical research should be the primary or sole emphasis of a Theory Proposal. Analysis of archival data may be included, but should not be the main aim of the project. GO or AR proposals which include a minor component of theoretical research will be funded under the appropriate GO or AR Program.



Only U.S. Investigators (as defined in Section 12.2) are eligible for funding under the HST Theory Program.

A Theory Proposal may be submitted by a non-U.S. PI if there are one or more U.S. CoIs who request funding.

Award amounts for Theory Proposals are anticipated to be similar to those made for 'Regular AR' proposals (see Section 3.4.1), for which the majority of the awards in recent cycles have been under $100,000, with a median around $50,000. For reference, 12 Theory Proposals were approved in Cycle 15. STScI also allows the submission of more ambitious proposals for which larger amounts of funding may be justified.



Theory Proposals should be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10).

The 'Scientific Justification' section of the proposal (see Section 9.1) should describe the proposed theoretical investigation and also its impact on observational investigations with HST. Review panels will consist of observational and theoretical astronomers with a broad range of scientific expertise (see Section 6.1.1). They will not necessarily have specialists in all areas of astrophysics, particularly theory, so the proposals must be written for general audiences of scientists. The 'Analysis Plan' section of the proposal (see Section 9.6) should discuss the types of HST data that will benefit from the proposed investigation, and references to specific data sets in the HST Data Archive should be given where possible. This section should also describe how the results of the theoretical investigation will be made available to the astronomical community, and on what time scale the results are expected.

3.4.5 Guidelines for AR Programs

Please consider the following when developing your AR proposal:

- Any HST data that you wish to analyze must reside (or be expected to reside) in the Archive, and be released from proprietary rights, by the start of Cycle 16 (nominally, 1 July 2007).
- System resources required for On-the-Fly Reprocessing may significantly delay availability of data to programs that require large data volumes. The Large Searches and Requests Webpage guides users who expect to request more than 500 ACS, 1000 STIS, 500 NICMOS or 750 WFPC2 datasets at one time (a dataset consists of associated exposures).
- Programs that require funding for Archival Research and also new observations should be submitted as two separate proposals: one requesting funding for the Archival Research, and the other proposing the new observations. The proposals should refer to each other so that the reviewers will be aware that the proposals are part of the same project.
- Investigators are allowed to submit an AR proposal to analyze data that was obtained in a previous GO program on which they were themselves PI or CoI, but only if the goals of the AR proposal differ significantly from those for which GO-funding was awarded previously.
- STScI encourages the submission of AR proposals that combine HST data with data from other space-missions or ground-based observatories, especially those data contained in the Multimission Archive at STScI (MAST). Also, STScI is an active partner of the National Virtual Observatory (NVO), and MAST is implementing VO technology to make its data holdings available. Any (pilot) programs that tie in with the NVO effort are particularly encouraged; see the US National Virtual Observatory and the International Virtual Observatory Alliance Web pages for information. Note however that HST data must form the major focus of any AR proposal; requests for support of AR programs using data primarily from other missions should follow the guidelines in the appropriate NASA Research Announcements.

3.4.6 Suggestions for AR Proposals

STScI would like to point out the following rich sources for Archival Research:

- The data obtained in the context of the HST Archival Pure Parallel Program (see Section 4.2.2).

- The data obtained for the Hubble Deep Field (HDF), the Hubble Deep Field-South (HDF-S) and the Hubble Ultradeep Field (UDF).
- The data obtained in the context of the HST Treasury Programs. Descriptions of these programs are available on the HST Treasury, Archival Legacy and Large Programs Web Page. Community contributed high level science products from imaging and spectroscopic surveys (including GOODS, GRAPES and GEMS) are available from this link.

3.5 Joint HST-Chandra Observing Proposals

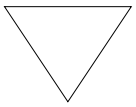
If your science project requires observations from both HST and the Chandra X-ray Observatory, then you can submit a single proposal to request time on both observatories to either the HST Cycle 16 or the Chandra Cycle 9 review. This avoids the "double jeopardy" of having to submit proposals to two separate reviews.

By agreement with the Chandra X-ray Center (CXC), STScI will be able to award up to 400 kiloseconds of Chandra observing time. Similarly the CXC will be able to award up to 100 orbits of HST time to highly rated proposals awarded Chandra time in its TAC process. The only criterion above and beyond the usual review criteria is that the project is fundamentally of a multi-wavelength nature, and that both sets of data are required to meet the science goals. It is not essential that the project requires simultaneous Chandra and HST observations. Chandra time will only be awarded in conjunction with HST observations (and should not be proposed for in conjunction with an Archival Research or Theory Proposal).

Of the 400 kiloseconds of Chandra observing time that can be awarded in the HST review, only approximately 15% of the targets may be time-constrained. In addition, only one rapid TOO can be awarded (less than 20 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. HST Cycle 16 proposers should keep their Chandra requests within these limits.

Proposals for combined HST and Chandra observations should be submitted to the observatory that represents the prime science (not to both observatories). Similarly, proposals for observations with HST, Chandra and Spitzer (Section 3.7) should only be submitted to the observatory that represents the prime science. *The Chandra Cycle 9 deadline is 15 March 2007.* While there is multi-wavelength expertise in the review panels for both observatories, typically the HST panels will be stronger in IR/optical/UV science and the Chandra panels in X-ray science.

Evaluation of the technical feasibility is the responsibility of the observer, who should review the Chandra documentation or consult with the CXC (see Section 9.4.1 for details). For proposals that are approved, the CXC will perform detailed feasibility checks in Chandra Cycle 9. The CXC reserves the right to reject any previously approved observation that proves infeasible, 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 HST observations. Duplicate Chandra observations may also be rejected by the CXC.



Joint HST-Chandra Proposals must be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10). Also, you must include technical information about the Chandra observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.1).

3.6 Joint HST-NOAO Observing Proposals

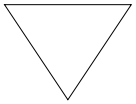
By agreement with the National Optical Astronomy Observatory (NOAO), STScI will be able to award time on NOAO facilities for highly ranked proposals that request time on both HST and NOAO telescopes. The award of time on NOAO facilities will be subject to approval by the NOAO Director, after nominal review by the NOAO TAC to avoid duplication of programs. The important additional criterion for the award of NOAO time is that both the HST and the ground-based data are required to meet the science goals of the project. It is not essential that the project requires simultaneous NOAO and HST observations. Under this agreement, NOAO time will only be awarded in conjunction with HST observations (and should not be proposed for in conjunction with an Archival Research or Theory Proposal). Major results from these programs would be credited to NOAO and HST.

NOAO has offered up to 5% of its available time to proposals meeting the stated criteria. NOAO observing time will be implemented during the two semesters from August 2007 through July 2008. Time cannot be requested for the preceding semester, 2007A. Time may be requested only for those facilities listed on the NOAO/NASA Collaboration Web Page. Under this agreement approximately 15-20 nights per telescope per year will be available on most telescopes, with the following exceptions: only 1-2 nights will be available on the MMT and HET, and no time will be

available on Keck or Magellan. Note also that only a fraction of the time is available on some facilities - WIYN and the SMARTS telescopes - and so the 5% cap applies only to this fraction. In addition, time on the CCD Mosaic cameras or other heavily-subscribed resources may be limited by the NOAO Director.

Evaluation of the technical feasibility of the proposed ground-based observations is the responsibility of the observer, who should review the NOAO documentation or consult NOAO directly (see Section 9.4.3 for details). The proposal should include an explanation of how the requested observing allocation was calculated. If approved for NOAO time, the PI must submit, by 30 April 2007, an NOAO Phase II form giving detailed observing information appropriate to the particular NOAO telescope and instrument. In addition, for NOAO time on Gemini (only), successful PIs will be required to submit a full scientific justification to NOAO on the standard NOAO proposal form. This will be reviewed by the regular NOAO Time Allocation Committee in order to determine into which Gemini queue the observations will be placed.

NOAO will perform feasibility checks, and NOAO reserves the right to reject any approved observation determined to be infeasible, impossible to schedule, and/or dangerous to the telescopes or instruments. Any NOAO observations that prove infeasible or impossible could jeopardize the overall science program and may cause revocation of the corresponding HST time allocation.

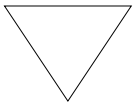


Joint HST-NOAO Proposals must be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10). Also, you must include technical information about the NOAO observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.3).

3.7 Joint HST-Spitzer Observing Proposals

If your science project requires observations from both HST and Spitzer, then you can submit a single proposal to request time on both observatories. This avoids the "double jeopardy" of having to submit proposals to two separate reviews. Technical information about Spitzer instrumentation and observations is available from the Spitzer Science Center (SSC) Web site and specific questions can be addressed to the SSC Help desk (help@spitzer.caltech.edu).

There are two types of Joint HST-Spitzer proposal: Regular proposals (Section 3.7.1), that require relatively modest allocations on Spitzer; and the new category of Coordinated HST-Spitzer proposals (Section 3.7.2), that require more substantial allocations. In either case, evaluation of the technical feasibility is the responsibility of the observer, who should review the Spitzer documentation or consult with the SSC (see Section 9.4.2 for details). For proposals that are approved, the SSC will perform detailed feasibility checks in Spitzer Cycle 4. The SSC reserves the right to reject any previously approved observation that proves infeasible, impossible to schedule, and/or dangerous to the Spitzer instruments. Any Spitzer observations that prove infeasible or impossible could jeopardize the overall science program and may cause revocation of the corresponding HST observations. Duplicate Spitzer observations may also be rejected by the SSC.



Joint HST-Spitzer Proposals must be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10). Also, you must include technical information about the Spitzer observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.3).

3.7.1 Regular HST-Spitzer proposals

By agreement with the SSC, STScI will be able to award up to 125 hours of Spitzer observing time. Similarly the SSC will be able to award up to 90 orbits of HST time to highly rated proposals awarded Spitzer time in its TAC process. 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. Spitzer time will only be awarded in conjunction with HST observations (and should not be proposed for in conjunction with an Archival Research or Theory Proposal). Proposers may request up to 50 hours of Spitzer time in any one HST Cycle 16 proposal. Any program requiring 50 hours or more of Spitzer time should be submitted as a Coordinated HST-Spitzer proposal.

Proposers may not request either high-impact (<1 week; minimum 48 hours) or medium-impact (1-5 week) ToO observations. Spitzer high- and medium-impact ToOs require substantial time overheads, and requests should be directed to the Spitzer TAC. See Appendix E of the Spitzer Cycle-4 Call for Proposals for details.

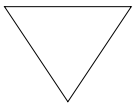
Proposals for combined HST and Spitzer observations should be submitted to the observatory that represents the prime science (not to both

observatories). Similarly, proposals for observations with HST, Spitzer and Chandra (Section 3.5) should only be submitted to the observatory that represents the prime science. *The Spitzer Cycle 4 deadline is 14 February 2007.* While there is multi-wavelength expertise in the review panels for both observatories, typically the HST panels will be stronger in optical/UV science and the Spitzer panels in infrared science.

3.7.2 Coordinated HST-Spitzer proposals

Scientific programs that require substantial allocations of time on both HST and Spitzer are not accommodated easily by Regular HST-Spitzer proposals. The new category of Coordinated HST-Spitzer proposals is designed to enable large-scale projects that require both Great Observatories. Progams submitted in this category must require at least 70 orbits of HST time and at least 50 hours of Spitzer observations. These proposals are therefore equivalent to Large GO proposals allocated by HST and Large Programs allocated by Spitzer.

As described in Section 6.1.3, Coordinated HST-Spitzer proposals will be assessed by a Joint TAC, drawn from both the HST and Spitzer TACs. As an aid in determining both the size and membership of the Joint TAC, proposers considering submitting a Coordinated HST-Spitzer Proposals are required to submit a non-binding Notice of Intent (NOI). The NOI should include the following information: the name of the PI, names of known co-Is, the title of the proposal, a short (<200 word) abstract and an estimate of the time to be requested on both HST and Spitzer.



Notice of Intent to submit a Coordinated HST-Spitzer proposal should be submitted by e-mail to I.N. Reid (inr@stsci.edu) and to L. Storrie-Lombardi (lisa@ipac.caltech.edu) by 1 December 2006.

The Cordinated HST-Spitzer proposals themselves should be submitted to *both* observatories. *The deadline for submission is the HST deadline, 26 January 2007.* As described in Section 6.1.3, proposals in this category will be reviewed separately by a joint HST-Spitzer TAC, comprised of members of the HST TAC and the Spitzer TAC. HST will allocate up to 300 orbits and Spitzer up to 500 hours of observing time for programs in this category.

3.8 Director's Discretionary (DD) Time Proposals

Up to 10% of the available HST observing time may be reserved for Director's Discretionary (DD) allocation. Scientists wishing to request DD time can do so at any time during the year, by using the APT. Instructions and updated information can be found on the DD Submission Web page.

Observations obtained as part of a DD Program generally do not have a proprietary period, and are made available immediately to the astronomical community. However, DD proposers may request and justify proprietary periods in their proposals.

Upon receipt of a DD proposal, the STScI Director will usually seek advice on the scientific merit and technical feasibility of the proposal from STScI staff and outside specialists. A proposal for DD time might be appropriate in cases where an unexpected transient phenomenon occurs or when developments since the last proposal cycle make a time-critical observation necessary.

Recognizing the limited lifetimes for major space facilities such as HST, Chandra and Spitzer, DD proposals for timely follow-up of new discoveries will also be considered even if the astrophysics of the phenomena do not require such rapid follow-up. In such cases, the proposers must demonstrate that the observations will provide a critical link in the understanding of the phenomena and that carrying them out quickly is particularly important for planning future observations with major facilities. They should then also indicate their plans for quickly making the scientific community aware of their discoveries, to enable subsequent wider community follow-up.

DD observations should *not* generally be requested if any of the following is true:

- The observations could plausibly have been proposed for in the most recent regular proposal Cycle, possibly as a Target-of-Opportunity proposal (see Section 4.1.2).
- The observations were proposed in a previous regular proposal Cycle, and were rejected.
- The proposed observations could wait until the next proposal Cycle with no significant reduction in the expected scientific return.

The primary criteria for acceptance of DD proposals are high scientific merit and a strong demonstration of the timeliness of the observations.

Weekly HST Command Loads are uplinked to the telescope on Sunday evenings; for nominal operations, the observing schedule is determined eleven days in advance of the uplink date. Although it is technically feasible to interrupt the schedule and initiate observations of a new target, short-notice interruptions place severe demands on the planning and scheduling process, decreasing overall observing efficiency and delaying other programs. Hence, requests for DD time must be submitted at least two months before the date of the requested observations, if possible. Requests for shorter turn-around times must be exceedingly well justified. In the case that a DD Program with a turn-around time of less than one month is accepted, the PI or his/her designee is required to be reachable by STScI personnel on a 24 hour basis between the submission and the implementation of the program, for Phase II preparation.

Subject to availability of funds from NASA, STScI will provide financial support for U.S. PIs and CoIs of approved DD programs. Details of the STScI Funding Policies (including the definition of the term 'U.S. Investigators') are outlined in Section 12.2. Please contact the STScI Grants Administration Office (see Appendix A.1) for more information about budget submissions for DD proposals using the Grants Management System.

3.9 Guaranteed Time Observer Programs

NASA has generally awarded a portion of the observing time in the years following the installation of a new instrument to those scientists involved in the development of this instrument. The interests of these Guaranteed Time Observers (GTOs) are protected through duplication policies, as described in Section 5.2.1.

CHAPTER 4:

Observation Types and Special Requirements

In this chapter. . .

4.1 Primary Observations / 41
4.2 Parallel Observations / 48
4.3 Special Calibration Observations / 52

4.1 Primary Observations

Primary observations are those observations that determine the telescope pointing and orientation. GO or SNAP Programs with external targets are normally scheduled as primary. Primary observations can use a variety of special requirements and observation types, as described in the following subsections. There is also the opportunity for *parallel* observations, described in Section 4.2, which are simultaneous observations with instruments other than the primary instrument.

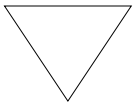
4.1.1 Continuous Viewing Zone (CVZ) Observations

Most targets are geometrically occulted in part of every HST orbit. However, this is not true for targets that lie close to the orbital poles. This gives rise to so-called Continuous Viewing Zones (CVZ) in two declination bands near +/– 61.5 degrees. Targets in those bands may be viewed without occultations at some time during the 56-day precessional cycle of the HST orbit. The number and duration of CVZ passages depend on the telescope orbit and target position, and may differ significantly from previous cycles. Use the 'Available Science Time and Orientation Tool' on the Two-Gyro Web Page to determine the number of CVZ opportunities in Cycle 16 and

their approximate duration for a given target location. Passages of HST through the South Atlantic Anomaly restrict the longest *uninterrupted* observations to about 5-6 orbits. See Section 2.3.1 of the HST Primer for technical details about the CVZ.

CVZ orbits are a limited resource whose use can lead to scheduling conflicts. If CVZ orbits are scientifically necessary for your program, check that sufficient opportunities exist that it is likely that your orbit request can be accommodated. (It is not possible, at present, to determine the exact number of CVZ orbits available during a particular opportunity.) In the observations description section (see Section 9.2), you must include the number of CVZ opportunities available for each target in your proposal for which you are requesting CVZ time.

STScI will make every effort to schedule the observations in this optimal way. However, because the number of CVZ opportunities are limited and unpredictable conflicts may occur between the proposed CVZ observations and other observations, a particular target's CVZ times may be oversubscribed. Therefore, it may be necessary to schedule the requested CVZ observations using standard orbit visibilities (i.e., using a larger number of total orbits). This will be done at no penalty to the observer.



Continuous Viewing Zone observations must be marked in the 'Observation Summary' section of the proposal (see Section 8.15).

Restrictions on Using the CVZ

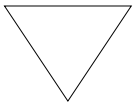
The following special requirement is generally incompatible with use of the CVZ.

- Special timing requirements (including telescope orientation constraints; see Section 4.1.6)

Observations that require special timing requirements should *not* be proposed for execution in the CVZ, and orbit estimates in the Phase I proposal should be based on standard orbit visibility (see Table 6.1 of the HST Primer). Please note that because of the extra scattered earthshine that enters the telescope on the day side of the orbit, sky-background limited observations through broadband optical or infrared filters do not gain significant observing efficiency from CVZ observations. If it is determined during the Phase II proposal implementation that an observation is unschedulable because of conflicts between the CVZ requirement and any other Special Requirements (e.g., SHD, LOW, timing, etc.), then the observing time may be revoked. Proposers who are in doubt about whether or not to request CVZ observations should contact the STScI Help Desk (see Section 1.5).

4.1.2 Target-of-Opportunity (TOO) Observations

A target for HST observations is called a 'Target-of-Opportunity' (TOO) if the observations are linked to the occurrence of an event that may occur at an unknown time. TOO targets include objects that can be identified in advance but which undergo unpredictable changes (e.g., specific dwarf novae), as well as objects that can only be identified in advance as a class (e.g., novae, supernovae, gamma ray bursts, newly discovered comets, etc.). TOO proposals must present a detailed plan for the observations that are to be performed if the triggering event occurs.



Target-of-Opportunity observations must be marked in the 'Observation Summary' section of the proposal (see Section 8.15). In the 'Special Requirements' section of the proposal (see Section 9.3) you must provide an estimate of the probability of occurrence of the TOO during the observing cycle, and describe the required turn-around time.

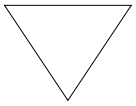
Turn-Around Time

The turn-around time for a TOO observation is defined as the time between an observer's request for TOO activation and the execution of the observations. The HST observing schedule is constructed eleven days in advance of the actual observations. Therefore, any short-notice interruptions to the schedule place extra demands on the scheduling system, and may lead to a decrease in overall efficiency of the observatory. For this reason, the *minimum* turn-around time for TOO activation, while depending on the particular circumstances, is normally 2-5 days; this can be achieved only if *all* details of the proposal (except possibly the precise target position) are available in advance. Because of the significant effect TOO observations have on the short and medium-term HST schedule, the number of rapid TOO activations (i.e., 2 weeks turnaround or shorter) will be limited to approximately 6 in Cycle 16. Requests for rapid turnaround should be strongly justified in the Phase I proposal.

Ultra-Rapid Turn-Around Time

STScI has been endeavoring to reduce the turn-around time for activated TOO proposals that require fast response and are of the highest scientific importance. This has made it possible to reduce the nominal minimum 2-5 day interval to as short as 1 day *but only for those detectors that do not require bright object checking* (i.e., ACS/WFC, ACS/HRC, NICMOS and WFPC2). We therefore encourage the community to identify exciting HST science that would be enabled by a 2 day (or less) TOO turnaround time, and to submit proposals accordingly.

In order to reflect the true cost of such ultra-rapid TOOs, and to enable the TAC to weigh science and resources appropriately, note that:



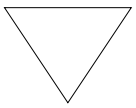
Proposers requesting a less than 2-day turnaround should add a fixed overhead of 15 orbits per activation to the total orbit request in their proposal.

This is the average expected telescope down-time associated with this very fast TOO response.

The number of ultra-rapid TOO activations (less than 2 days turn-around) will be limited to 1-2 in Cycle 16.

Activation of a TOO

A Phase II program must be submitted *before* the TOO event occurs. If the observing strategy depends on the nature of the event, then the Phase II program should include several contingencies from which the observer will make a selection. The PI is responsible for informing STScI of the occurrence of the event and must provide an accurate target position. Implementation of a TOO observation after notification of the event requires approval by the STScI Director and is not guaranteed (e.g., high-priority GO observations, critical calibrations, and engineering tests may take precedence over TOO programs). If approval is granted, then the HST observing schedule is replanned to include the new observations. A turn-around time of less than 1 month requires the PI or his/her designee to be reachable by STScI personnel on a 24 hour basis between the TOO activation and the scheduling of the program.



If the triggering event for an approved TOO program does not occur during Cycle 16, the program will be deactivated at the end of the cycle. Unused TOO time does not carry over to the following cycle.

TOO Programs with ACS/SBC

TOO proposals that use the ACS/SBC must pass bright object checking before they can be scheduled. Ultra-rapid turn-around programs are not allowed with the ACS/SBC. For rapid turn-around proposals, where the target may be varying in intensity, a strategy must be outlined to ensure that the TOO will be safe to observe. A description of how you plan to deal with this issue should be provided in the ‘Special Requirements’ section of the proposal (see Section 9.3).

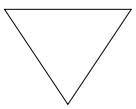
4.1.3 Special restrictions on observations with the ACS/SBC

The ACS/SBC employs a MAMA detector and is therefore vulnerable to damage through exposure to bright sources. Consequently, there are a number of restrictions on the use of this configuration. All targets and field objects falling on the ACS/SBC detector must pass bright-object safety reviews (see Section 5.1.2 of the Primer). All SBC Phase I proposals must include a discussion of the safety of the proposed targets and fields in the Description of the Observations (see Section 9.2), based on the ACS Instrument Handbook Section 7.2 and calculations with the appropriate APT and ETC tools.

Observations of variable sources

Proposals to observe variable objects with the ACS/SBC must pass bright object checking before they can be scheduled (see Section 5.1.2 of the Primer). Proposers should assume the maximum flux values for targets unless there are specific reasons for adopting other values (for example, time constrained observations of periodic variables at flux minima); the justification for adopting alternative flux values should be given in the 'Special Requirements' section of the proposal (see Section 9.3).

In the case of aperiodic variables that are either known to undergo unpredictable outbursts, or belong to classes of objects that are subject to outbursts, the proposer must determine whether the target will violate the ACS/SBC bright object limits during outburst. If violation is possible, the proposer must outline a strategy that will ensure that the target is safe to observe with the ACS/SBC.



A description of how you plan to deal with bright object checking for variable sources must be included in the 'Special Requirements' section of the proposal (see Section 9.3).

The observing strategy might include additional observations, obtained over a timescale appropriate to the particular type of variable object, with either HST or ground-based telescopes. Proposers should be aware that this type of SBC observation requires real-time interactions with HST, with the associated additional operational overheads (see Section 4.1.7). If you are planning such observations, please contact help@stsci.edu for more information on the options and requirements for confirming quiescence.

Additional restrictions

- ACS/SBC observations cannot be scheduled in orbits affected by passages of HST through the South Atlantic Anomaly (SAA), which limits the duration of a MAMA visit to 5 orbits (see Section 2.3.2 of the HST Primer).
- Pure Parallel observations with the ACS/SBC are not permitted.
- SNAP programs using the ACS/SBC are not permitted
- GO Survey programs using the ACS/SBC are not permitted.
- Coronagraphic observations with the ACS/SBC are not permitted.

4.1.4 Solar System Targets

HST can observe most targets within our Solar System, although there are exceptions. Both Mercury and Venus are always well within the (two-gyro) 60 degree Solar pointing exclusion, and cannot be observed. Observations of comets can be made while they are further than 60 degrees from the Sun. The HST pointing control system and the HST scheduling systems were not designed to support observations of objects as close as the Moon. *Observations of the Moon are not possible in Two-Gyro Mode.*

Pointing constraints are discussed further in Section 2.4 of the HST Primer.

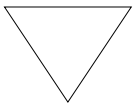
4.1.5 Observations of Targets that have not yet been discovered or identified

There are a variety of plausible scenarios in which investigators may wish to propose for HST observations of targets that have not yet been discovered or identified (i.e., for which the coordinates are unknown; e.g., the next supernova in our own Galaxy, the next gamma-ray burst on the southern hemisphere, etc.). In general, such proposals are allowed only if there is a certain time-criticality to the observations; i.e., proposing for the same observations in the next regular review cycle (*after* the target has been discovered) would be impossible or would make the observations more difficult (e.g., the object fades rapidly, or its temporal behavior is important), or would lead to diminished scientific returns. These criteria are generally satisfied for GO observations of TOO targets, and there may also be other circumstances in which proposals for such targets are justified. However, in the absence of demonstrated time-criticality, observations will generally not be approved for targets that have not yet been discovered or identified.

4.1.6 Time-Critical Observations

Proposals may request that HST observations be made at a specific date and time, or within a range of specific dates, when scientifically justified. Some examples of such cases are:

- astrometric observations,
- observing specific phases of variable stars,
- monitoring programs,
- imaging surface features on solar-system bodies,
- observations requiring a particular telescope orientation (since the orientation is fixed by the date of the observations; see Section 2.5 of the HST Primer),
- observations coordinated with observations by another observatory.



Any requests for time-critical observations must be listed in the 'Special Requirements' section of the proposal (see Section 9.3).

Time-critical observations impose constraints on the HST scheduling system, particularly in two-gyro mode, and should therefore be accompanied by an adequate scientific justification in the proposal.

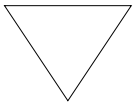
Limitations Related to Time-Critical Observations

Time-critical events that occur over short time intervals compared to the orbital period of HST (such as eclipses of very short-period binary stars) introduce a complication because it will not be known to sufficient accuracy, until a few weeks in advance, where HST will be in its orbit at the time of the event, and hence whether the event will occur above or below the spacecraft's horizon (see Section 2.3.3 of the HST Primer). Proposals to observe such events can therefore be accepted only conditionally.

4.1.7 Real-Time Interactions

Communications with HST in "real-time" are a limited resource, which require additional operational overheads, reduce observing efficiency, and greatly increase the scheduling complexities. However, in exceptional circumstances, some science programs may require such interactions. These observations will generally require the presence of the PI (or his/her

designee) at STScI during such exposures, and STScI personnel will be present to assist the PI and send the command requests.



Any requests for real-time interactions must be listed in the 'Special Requirements' section of the proposal (see Section 9.3).

In such cases the scientific and operational justification for this should be presented clearly in the observing proposal. Typically, two-way real-time interactions for position updates should only be used when early-acquisition or reuse target offset techniques to refine the telescope pointing cannot be used (see Section 5.2 of the HST Primer).

4.1.8 Observations of Multiple Targets

Guide star acquisitions in two-gyro mode are more complicated than in three-gyro mode. The time required for target acquisition at the beginning of an orbit in the two modes is similar (~6 minutes). However, it is generally not possible to observe multiple targets within a single HST orbit in two-gyro mode, unless the separation of targets is small enough (<2') that the telescope can be repositioned with a small angle maneuver that does not break guide star tracking. Maneuvers that require a full guide star acquisition, which include observations of the same target with multiple HST insturments, will be forced into a new orbit.

4.1.9 Dithering strategies with ACS

Experience has shown that ACS imaging observations are best taken as dithered exposures (see Section 5.4 of the HST Primer). Proposers who do not intend to use dithering must provide a justification for their choice of strategy in the Description of Observations section of the pdf attachment (Section 9.2). In general, undithered observations with the ACS CCD detectors will not be approved without strong justification that such is required for the scientific objectives. Otherwise, hot pixels and other detector artefacts may compromise the archival value of the data.

4.2 Parallel Observations

Since all of the scientific instruments are located at fixed positions in the telescope focal plane, it is possible to increase the productivity of HST by observing simultaneously with one or more instruments *in addition* to the primary instrument. Those additional observations are called *parallel* observations.

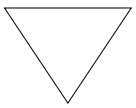
Since each instrument samples a different portion of the HST focal plane (see Section 2.2 of the HST Primer), an instrument used in parallel mode will normally be pointing at a "random" area of sky several minutes of arc away from the primary target. Thus parallel observations are usually of a survey nature. However, many HST targets lie within extended objects such as star clusters or galaxies, making it possible to conduct parallel observations of nearby portions of, or even specific targets within, these objects.

Parallel observations are never permitted to interfere significantly with primary observations; this restriction applies both to concurrent and subsequent observations. Some examples of this policy are the following:

- A parallel observation will not be made if its inclusion would shorten the primary observation.
- Parallel observations will not be made if the stored command capacity or data volume limits would be exceeded.

Depending on whether a parallel observation is related to any specific primary observation, it is defined either as a *coordinated parallel* or *pure parallel*. Coordinated Parallel Observations are observations related to a particular primary observation in the same proposal. Pure Parallel Observations are unrelated to any particular primary observation (i.e., the primary observation is in another program). Investigators interested in proposing for parallels are encouraged to consult the Parallel Observations User Information Report, which contains details on how parallels are scheduled, completion rates for recent cycles, and other useful information.

4.2.1 Coordinated Parallel Observations



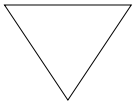
Coordinated Parallel Observations must be marked in the 'Observation Summary' section of the proposal (see Section 8.15).

Coordinated Parallels use one or more instruments, in addition to and simultaneously with the prime instrument in the same proposal, e.g., to observe several adjacent targets or regions within an extended object. Proposals that include Coordinated Parallel Observations should provide a scientific justification for and description of the parallel observations. It should be clearly indicated whether the parallel observations are essential to the interpretation of the primary observations or the science program as a whole, or whether they address partly or completely unrelated issues. The

parallel observations are subject to scientific review, and can be rejected even if the primary observations are approved.

Proposers are not allowed to add Coordinated Parallel Observations in Phase II that were not explicitly included and approved in Phase I.

4.2.2 Pure Parallel Observations



Pure Parallel Observations must be marked in the 'Observation Summary' section of the proposal (see Section 8.15).

Proposals for Pure Parallel Observations may specify either specific or generic targets, although the latter are more common. In order to prolong the lifetime of the transmitters on HST, Pure Parallel Observations will be limited to a total of 300 orbits in Cycle 16. Appropriate scheduling opportunities will be identified by STScI.

Experience with Pure Parallel Observations over the last several years indicates that parallel observing programs should be kept simple, to allow scheduling with typical prime observing programs. Parallel programs requiring multiple successive orbits are less likely to schedule than those that can be executed in a single orbit. Due to resource constraints at STScI, only a limited number of Pure Parallel Programs can be accepted in each cycle.

For Cycles 13, 14 and 15, the Advanced Camera for Surveys (ACS) was the most heavily subscribed instrument for primary science observations. This is expected to be true for Cycle 16 as well. Therefore, proposers should be aware that opportunities to use the ACS for Pure Parallel Observations will be more limited than for other instruments, and propose accordingly.

A "Default" HST Archival Pure Parallel Program was in place from Cycle 7 to midway through Cycle 13. This program, which was discontinued during Cycle 13 to prolong the lifetime of the transmitters on HST, consists of observation types using each of the possible pure parallel instruments, and was used to obtain uniform, non-proprietary data sets for the HST Data Archive during parallel observing opportunities that were not allocated to Coordinated or Pure Parallel GO Observations. A description of the observations and additional information can be found on the HST Archival Pure Parallel Program Web Page. STScI encourages submission of

Archival Research proposals to analyze data obtained as part of this program.

The Review Panels and TAC will select the best science and prioritize the parallel programs. All GO Pure Parallel Programs will have zero proprietary period. Pure Parallel Programs will not be carried over to the next cycle. No Pure Parallel programs were awarded time in Cycle 15.

4.2.3 Restrictions and Limitations on Parallel Observations

Parallel Observations with ACS

When ACS is the prime instrument, WFC parallel observations are permitted with HRC in prime and vice versa (so called "auto-parallels"). The filter choice for auto-parallels is predetermined by the filter used in the primary observation (see the ACS Instrument Handbook for details). For this reason, auto-parallels are created by software and execute automatically as pure parallels. Even though the observer does not specify auto-parallels in his/her proposal, the parallel data are proprietary, exactly in the same way as the primary data. Whether or not auto-parallels can be created depends on the primary exposure.

The ACS/WFC and ACS/HRC may be used for either Pure or Coordinated Parallel Observations with any other instrument as prime.

The ACS/SBC may be used for Coordinated Parallel Observations with any other instrument as primary, but only if the telescope orientation is exactly specified and the field passes bright-object checking. The ACS/SBC may not be used for pure parallel observations.

Parallel Observations with FGS

The FGS cannot be used as a parallel instrument.

Parallel Observations with NICMOS

NICMOS may be used for either Pure or Coordinated Parallel Observations with any other instrument as prime. Observations that use different NICMOS cameras at the same time are considered parallel observations and must be requested in Phase I.

Parallel Observations with WFPC2

The WFPC2 may generally be used for either Pure or Coordinated Parallel Observations with any other instrument as prime.

Pointing Accuracy for Parallel Observations

The spacecraft computers automatically correct the telescope pointing of the primary observing aperture for the effect of differential velocity aberration. This means that image shifts at the parallel aperture of 10 to 20 mas can occur during parallel exposures.

4.3 Special Calibration Observations

Data from HST observations are normally provided to the GO after application of full calibrations. Details of the standard calibrations are provided in the Instrument Handbooks (see Section 1.4.5).

In order to obtain quality calibrations for a broad range of observing modes, yet not exceed the time available on HST for calibration observations, only a restricted set, the so-called 'Supported' modes, may be calibrated. Other modes may be available but are not supported. Use of these 'Available-but-Unsupported' modes is allowed to enable potentially unique and important science observations, but is discouraged except when driven by scientific need. *Observations taken using Available-but-Unsupported modes that fail due to the use of the unsupported mode will not be repeated.* Use of these modes must be justified prior to the Phase II submission. For details consult the Instrument Handbooks (see Section 1.4.5).

Projects may need to include special calibration observations if either:

- a Supported mode is used, but the calibration requirements of the project are not addressed by the standard STScI calibration program, or
- an Available-but-Unsupported mode is used.

Any special calibration observations required in these cases must be included in the total request for observing time and in the Observation Summary of the proposal, and must be justified explicitly. Proposers can estimate the time required for any special calibration observations from the information provided in the Instrument Handbooks (see Section 1.4.5). Also, the STScI Help Desk (see Section 1.5) can assist you on this estimate, but such requests must be made at least 14 days before the submission deadline.

The data reduction of special calibration observations is the responsibility of the observer.

All data flagged as having been obtained for calibration purposes will normally be made non-proprietary.

CHAPTER 5:

Data Rights and Duplications

In this chapter . . .

5.1 Data Rights / 53
5.2 Policies and Procedures Regarding Duplications / 54

5.1 Data Rights

Observers have exclusive access to their science data during a proprietary period. Normally this period is the 12 months following the date on which the data, for each target, are archived and made available to the investigator after routine data processing. At the end of the proprietary period, data are available for analysis by any interested scientist through the HST Archive.

Proposers who wish to request a proprietary period shorter than one year (3 or 6 months), or who are willing to waive their proprietary rights altogether, should specify this in the proposal (see Section 8.7). Because of the potential benefit to the community at large, particularly (but not exclusively) in the case of Snapshot Programs, proposers should give this possibility serious consideration (it is one of the selection criteria; see Section 6.2).

Data taken under a GO Pure Parallel Program (see Section 4.2.2) will have zero proprietary period. Data taken under a GO Treasury Program (see Section 3.2.6) will usually have no proprietary period, although brief proprietary periods may be requested if that will enhance the public data value.

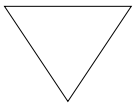
If you request a shortened proprietary period, then you should explain the benefits of this in the 'Special Requirements' section of the proposal (see Section 9.3). Proprietary periods longer than 12 months may on rare occasions be appropriate for long-term programs (see Section 3.2.5). Requests for data-rights extensions beyond 12 months must also be made in the 'Special Requirements' section of the proposal (see Section 9.3); such requests are subject to panel and TAC review and approval by the STScI Director.

5.2 Policies and Procedures Regarding Duplications

Special policies apply to cases in which a proposed observation would duplicate another observation already obtained with HST, or currently in the pool of accepted HST programs.

5.2.1 Duplication Policies

An observation is a duplication of another observation if it is on the same astronomical target or field, with the same or a similar instrument, with a similar instrument mode, similar sensitivity, similar spectral resolution and similar spectral range. It is the responsibility of proposers to check their proposed observations against the catalog of previously executed or accepted programs.



If any duplications exist, they must be identified in the 'Observation Summary' section of the proposal (see Section 8.15), and justified strongly in the 'Justify Duplications' section of the proposal (see Section 9.5) as meeting significantly different and compelling scientific objectives.

Any *unjustified* duplications of previously executed or accepted observations that come to the attention of the peer reviewers and/or STScI could lead to rejection during or after the Phase I deliberations. Without an explicit Review Panel or TAC recommendation to retain duplicating exposures, they can be disallowed in Phase II. In such cases, no compensatory observing time will be allowed and the associated observing time will be removed from the allocation.

ACS Duplications of WFPC2 or STIS imaging

ACS has imaging capabilities superior to WFPC2 and STIS for many purposes. Nonetheless, ACS proposers should note any duplications of previously approved or executed WFPC2 or STIS imaging exposures that lie in their fields, and justify why the new ACS observations are required to achieve the scientific goals of the project.

Snapshot Targets

The following policies apply to snapshot targets, in addition to the duplication policies already mentioned:

- Snapshot targets may not duplicate approved GO or GTO programs in the same cycle.
- Snapshot observations may *not* be proposed that duplicate snapshot observations that were approved in Cycle 15, independent of whether or not they have executed.
- Snapshot targets may be proposed that duplicate snapshot observations that were approved in Cycle 14 or earlier, if they have not yet executed. If the previously approved observation executes after the Phase I deadline, then the new observation will be disallowed (unless there is an explicit panel/TAC recommendation to retain the exposure even if it is a duplication).

GTO Observations

Under NASA policy, GTO programs (see Section 3.9) are protected against duplication by GOs. Proposed GO observations that are judged to infringe upon this protection will be disallowed. However, the duplication protection is as specifically defined above; entire classes of objects or broad science programs are not protected. The GTOs are entitled to revise their programs after each cycle of GO selection, but they in turn may not duplicate previously approved GO programs. GTOs may not modify their programs in the time interval between the publication of the GTO/GO catalog in each cycle and the final submission of the Phase II GO programs selected for that cycle. The protection of each observation is in force throughout its proprietary data-rights period (see Section 5.1) and then expires.

Early-Acquisition Images

Occasionally it may happen that a proposer requests an early-acquisition image (see Section 5.2.1 of the HST Primer) that is already in a GTO program, and would be protected according to the NASA policies outlined above. If an early-acquisition image is determined to be in conflict with a protected GTO image, then the GO-requested image may still be permitted, but may be used only for acquisition purposes.

5.2.2 How to Check for Duplications

To check for duplications among the observations that you wish to propose, please use the tools and links on the HST Proposal Support Web Page at MAST. The following three options are available:

- The HST Duplication Checking Web Form, which you can find on the HST Proposal Support Web Page at MAST..
- The Duplication Check Screen in Starview, which is available for download from the Starview Web Page (see also the introductory text in Section 7.2.1 of the HST Primer).
- The Planned and Archived Exposures Catalog (PAEC). This catalog contains summary information about exposures in ASCII format and can be browsed with any text editor. It is normally updated monthly, but will be kept fixed between the release of this Call for Proposals and the Phase I deadline.

Please make sure that you are either searching in the HST duplication table (automatic if you use the Duplication Checking Web Form or the Starview Duplication Check Screen) or the PAEC. Other archive tables, such as the science table or the ASCII format Archived Exposures Catalog (AEC) do not include exposures that have been approved but have not yet executed, and are therefore not suitable for a complete duplication check.

CHAPTER 6:

Proposal Selection Procedures

In this chapter . . .

6.1 How STScI Evaluates Submitted Proposals / 57
6.2 Selection Criteria / 59

6.1 How STScI Evaluates Submitted Proposals

HST Programs are selected through competitive peer review. A broad range of scientists from the international astronomical community evaluates all submitted proposals, using a well-defined set of criteria (see Section 6.2). They rank the proposals and offer their recommendations to the STScI Director. Based on these recommendations, the STScI Director makes the final allocation of observing time.

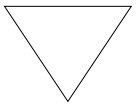
6.1.1 The Review Panels

Review Panels will consider Regular GO (fewer than 100 orbits; see Section 3.2.1), Regular Survey (see Section 3.2.3), Calibration (see Section 3.2.4), SNAP (see Section 3.3), Regular AR (see Section 3.4.1), Calibration AR (see Section 3.4.3) and Theory (see Section 3.4.4) Proposals. Each Review Panel has an allocation of a specific number of orbits and a dollar amount; the Panel can recommend GO Proposals up to its orbit allocation, and Theory and AR Proposals up to the budgetary allocation. In order to encourage the acceptance of larger GO Proposals, a progressive orbit "subsidy" is allocated to the panels, with orbits in the subsidy coming from

outside the direct panel allotment. The algorithm for this "subsidy" has the goal of creating an acceptance rate of Regular GO programs that is approximately independent of size. Survey programs will receive an additional subsidy, since those programs offer advantages in scheduling the telescope more efficiently.

The panel recommendations generally do not require further approval of the TAC (see Section 6.1.2) and scientific balance will be determined within each panel rather than by the TAC. The panels do not adjudicate Large GO Programs (100 orbits or more; see Section 3.2.2), Treasury GO Programs (see Section 3.2.6) or AR Legacy Proposals (see Section 3.4.2), but they will send comments on those proposals to the TAC for their consideration.

Panelists are chosen based on their expertise in one or more of the areas under review by the panel. Each panel spans several scientific categories (as defined in Section 8.8). For example, in Cycle 15 there were two panels dealing with Hot Stars, ISM and Circumstellar Medium; three panels dealing with Star Formation, Cool Stars and Stellar Populations; two panels dealing with Galaxies, AGN and Quasars; three panels dealing with Quasar Absorption Lines and Cosmology; and one panel dealing with the Solar System. The division of scientific categories over panels may be different in Cycle 16, but the breadth of the panels will remain the same. Within a panel, proposals are assigned to individual expert reviewers based on the keywords given in the proposal (see Section 8.9). These keywords should therefore be chosen with care.



Given the breadth of the panels, proposers should frame their scientific justification in terms appropriate for a panel with a broad range of astronomical expertise.

6.1.2 The Telescope Allocation Committee (TAC)

As in previous years, the TAC will include the TAC chair and the panel chairs. In order to ensure broad expertise across the full scope of scientific categories, several at-large members will be added to the TAC in Cycle 16. The primary responsibility of the TAC is to review the Large GO Programs (100 orbits or more; see Section 3.2.2), including Large Survey programs (see Section 3.2.3), Treasury GO Programs (see Section 3.2.6), AR Legacy Proposals (see Section 3.4.2), and any other particularly large requests of resources (GO Calibration programs, SNAP, AR, Theory or Pure Parallel). The HST TAC is also the arbiter of any extraordinary or cross-panel issues.

6.1.3 The Joint HST-Spitzer Telescope Allocation Committee (Joint TAC)

Coordinated HST-Spitzer proposals will be reviewed by a special TAC that is comprised of members of both the HST and Spitzer TACs. The Joint TAC will meet in mid-March 2007, before the HST and Spitzer TAC meetings. This allows the Coordinated HST-Spitzer Proposals to be reviewed in conjunction with other Large Proposals submitted to both observatories. Comments on each proposal will be solicited from the relevant HST and Spitzer panels.

6.2 Selection Criteria

Evaluations of HST proposals are based on the following criteria.

Criteria for all Proposals

- The scientific merit of the project and its potential contribution to the advancement of scientific knowledge.
- The proposed program's importance to astronomy in general. This should be stated explicitly in the 'Scientific Justification' section of the proposal (see Section 9.1).
- The extent to which the expertise of the proposers is sufficient to assure a thorough analysis of the data.
- The evidence for a coordinated effort to maximize the scientific return from the program.
- A demonstration of how the results will be made available to the astronomical community in the form of scientific or technical publications in a timely manner.
- A demonstration of timely publication of the results of any previous HST programs.

Additional Criteria for all GO and SNAP Proposals

- What is the rationale for selecting the type and number of targets? Reviewers will be instructed to recommend or reject proposals as they are and to refrain from orbit or object trimming. Therefore, it is very important to justify strongly both the selection and the number of targets in your proposal, as well as the number of orbits requested.

- Why are the unique capabilities of HST required to achieve the science goals of the program? Evidence should be provided that the project *cannot* be accomplished with a reasonable use of ground-based telescopes (irrespective of their accessibility to the proposer).
- Is there evidence that the project has already been pursued to the limits of ground-based and/or other space-based techniques?
- What are the demands made on HST and STScI resources, including the requested number of orbits or targets, and the efficiency with which telescope time will be used?
- Is the project technically feasible and what is the likelihood of success? Quantitative estimates of the expected results and the needed accuracy of the data must be provided.

Additional Criteria for Large GO Proposals, Treasury GO Proposals and Legacy AR Proposals

- Is there a plan to assemble a coherent database that will be adequate for addressing all of the purposes of the program?
- Will the work of the proposers be coordinated effectively, even though a large team may be required for the proper analysis of the data?
- Is there evidence that the observational database will be obtained in such a way that it will be useful also for purposes other than the immediate goals of the project?

Additional Criteria for Coordinated HST/Spitzer Proposals

- Does the science program *require* observations with both HST and Spitzer?

Additional Criterion for SNAP Proposals

- Willingness to waive part or all of the proprietary period. While this is not the primary criterion for acceptance or rejection, it can provide additional benefit to any proposal and will be weighed by the reviewers as such.

Additional Criterion for Calibration Proposals

- What is the long-term potential for enabling new types of scientific investigation with HST, and what is the importance of these investigations?

Additional Criteria for all Archival Research Proposals

- What will be the improvement or addition of scientific knowledge with respect to the previous original use of the data? In particular, a strong justification must be given to reanalyze data if the new project has the same science goals as the original proposal.
- What are the demands on STScI resources (including funding, technical assistance, feasibility of data requests, archiving and dissemination of products)?
- Is there a well-developed analysis plan describing how the scientific objectives will be realized?
- Does the proposal provide a justification for the requested funds?

Additional Criteria for Treasury GO and Legacy AR Proposals

- What scientific investigations will be enabled by the data products, and what is their importance?
- What plans are there for timely dissemination of the data products to the community?

Additional Criteria for Theory Proposals

- What new types of investigations with HST or with data in the HST Data Archive will be enabled by the theoretical investigation, and what is their importance?
- What plans are there for timely dissemination of theoretical results, and possibly software or tools, to the community?

CHAPTER 7:

Guidelines and Checklist for Phase I Proposal Preparation

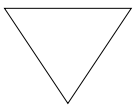
In this chapter . . .

7.1 General Guidelines / 63
7.2 Proposal Preparation Checklist / 66

The present chapter provides general guidelines and a checklist for Phase I proposal preparation. Specific instructions for construction of a Phase I proposal are presented in Chapter 8 and Chapter 9.

7.1 General Guidelines

7.1.1 Deadline



The deadline for proposal submission is Friday 26 January 2007, 8:00 pm EST.

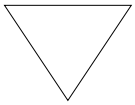
Please submit well before the deadline if possible, to avoid possible last-minute hardware or overloading problems, or network delays/outages. Late proposals will not be considered.

We strongly recommend that proposers start preparing their proposals early in order to give themselves enough time to learn the APT. However, the APT will not be made available/released for Cycle 16 Phase I use until 6 December 2006. If you need a version prior to the formal release, please send your request to the STScI help desk, help@stsci.edu.

Questions about policies and technical issues should be addressed to the STScI Help Desk (see Section 1.5) well before the deadline. While we attempt to answer all questions as rapidly as possible, we cannot guarantee a speedy response in the last week before the deadline.

7.1.2 Phase I Proposal Format

Cycle 16 proposals must be submitted electronically. Starting in Cycle 12, a java-based software tool, APT (the Astronomer's Proposal Tool; see Section 1.4.6) is the new interface for all Phase I and Phase II proposal submissions for HST.



The Phase I LaTeX templates that have been in use for many years will not be accepted in Cycle 16.

A Phase I proposal consists of two parts:

- a completed APT proposal form (see Chapter 8); and
- an attached PDF file (see Chapter 9).

Both are submitted to STScI directly from within APT. Note that Student Principal Investigators should also arrange for a certification letter to be sent by their faculty advisor (see Section 2.3.3).

Please study Chapter 7, Chapter 8 and Chapter 9 carefully. Please do so well before the submission deadline, to give the STScI Help Desk (see Section 1.5) ample time to answer any questions that you may have about the new procedures.

7.1.3 Page Limits for PDF Attachment

There are page limits on the size of your PDF attachment. Table 7.1 outlines these limits for different proposal categories.

Table 7.1: PDF Attachment Page Limits

Proposal Category	Reference Section in CP	Total Page Limit for PDF Attachement	Page Limit for the Scientific Justification (Section 9.1)
Regular GO[1]	3.2.1	8	3
Large GO[2]	3.2.2	11	6
Treasury GO	3.2.6	11	6
Survey	3.2.3	8	3
Snapshot	3.3	8	3
Theory	3.4.4	8	3
Regular AR[3]	3.4.1	8	3
Legacy AR	3.4.2	11	6

1. Regular GO proposals include Calibration GO programs (Section 3.2.4), Joint HST/Chandra (Section 3.5), Joint HST-NOAO proposals (Section 3.6) and Regular HST/Spitzer Proposals (Section 3.7.1).
2. Coordinated HST/Spitzer proposals (Section 3.7.2) have the same page limits as Large GO proposals.
3. Regular AR proposals include Calibration AR programs (Section 3.4.3).

In relation to these page limits, note the following:

- Proposals that exceed the page limits will be penalised in the review process; pages beyond the specified limits may be removed and will not be available to reviewers.
- The figures and tables must appear after the text of the Science Justification. There are no limits on the numbers of figures, tables and references in the PDF attachment. However, the total page limit must be obeyed.
- Your PDF attachment must be prepared with a font size of 12pt. Do not change the format of any of the templates that are provided by STScI.

7.2 Proposal Preparation Checklist

Table 7.2: Proposal Preparation Checklist

Step	Procedure
1) Install APT	Download the latest version of the APT. Go to the APT Web Page. Follow the instructions there to download and install APT onto your machine. You can also ask your system administrator to do an institution-wide installation.
2) Fill out the APT Phase I form	Use APT to fill out the APT Phase I form. Information on the use of APT, including movie tutorials, are available on the APT Web Page. A description of which items are requested as well as guidelines for answering are presented in Chapter 8. Proposers can save work in progress, so APT submission can be completed over several sessions.
3) Download a template file for the creation of your PDF attachment	Go to the Cycle 16 Announcement Web Page. Download one of the templates for the creation of your PDF attachment. There are separate template files for GO/SNAP and for AR/Theory proposals. Template files are available in several popular word-processing environments, including LaTeX and Microsoft Word.
4) Edit the template	Edit the template using your favorite word-processing environment. A description of which issues need to be discussed, and guidelines for how to discuss them, are presented in Chapter 9.
5) Create the PDF attachment.	Transform your edited template into a PDF file. Any figures in your proposal must be included into this PDF file. Go to the Cycle 16 Announcement Web Page for instructions on how to create a PDF file from your edited template, and for instructions on how to include figures. We will provide the reviewers with the electronic PDF files so that color figures can be viewed in color. However there is no guarantee that the reviewers will view the files electronically, so please make sure your figures are useful when printed using grey scales.
6) Add the PDF filename path to the APT form	In your APT form, list in the appropriate box the path that points to the PDF attachment file on your local disk (see Section 8.11).
7) Review your proposal	In APT, click on 'PDF Preview' to get a preview of all the final information in your proposal. What you see is exactly what the reviewers who judge your proposal will see. If you are not satisfied, make any necessary changes.
8) Institutional Endorsement	STScI does not require institutional endorsement of GO/AR proposals in Phase I. However, some institutions do require such endorsement of all submitted proposals. It is the responsibility of each PI to follow all applicable institutional policies concerning the submission of proposals.
9) Submit your proposal	In APT, click 'Submit' to submit your proposal to STScI. All parts are sent together (i.e., both the APT Form information and the PDF attachment).
10) Receive an STScI acknowledgment of your submission	Verification of a successful submission will appear in the Submission Log on the Submission Screen in the APT within about a minute. Within a few days the PI and all CoIs will receive an email acknowledgment that the Merged PDF submission was printed successfully. That email will mark the completion of the submission. **If you do not receive an acknowledgement within a week, please contact the STScI Help Desk and provide the submission ID information from the APT Submission Log window.** If there are any problems in the printing of your PDF attachment, you will be contacted by email separately.

CHAPTER 8:

Filling Out the APT Proposal Form

In this chapter . . .

8.1 Title / 68
8.2 Abstract / 68
8.3 Proposal Phase / 68
8.4 Category / 68
8.5 Cycle / 68
8.6 Requested Resources / 69
8.7 Proprietary Period / 70
8.8 Scientific Category / 70
8.9 Keywords / 72
8.10 Special Proposal Types / 72
8.11 Proposal PDF Attachment / 74
8.12 Principal Investigator / 74
8.13 Co-Investigators / 75
8.14 Targets /66
8.15 Observation Summary (OS) / 77

As described in Chapter 7, a Phase I proposal consists of a completed APT proposal form and an attached PDF file. The present chapter describes the items that must be filled out in the APT proposal form; this information is also available from the 'Help' in APT. Note that not every item described here needs to be filled out for every proposal. For example, some items are only relevant for observing proposals, while others are only relevant for archival proposals. APT will automatically let you know which items need to be filled out, depending on which proposal type you choose. Chapter 9 describes the items that must be addressed in the attached PDF file.

8.1 Title

The title of your proposal should be informative, and must not exceed 2 printed lines. Please use mixed case instead of all caps.

8.2 Abstract

Please write a concise abstract describing the proposed investigation, including the main science goals and the justification for requesting observations or funding from HST. The abstract must be written in standard ASCII and should be no longer than 20 lines of 72 characters of text.

8.3 Proposal Phase

No action is required by the proposer at this time. For Cycle 16 the Phase will automatically be set to '**`PHASE I`**'. See Section 2.1 for a description of the different phases in the HST proposal process.

8.4 Category

Select one of the following categories:

- **`GO`**—General Observer proposal
- **`SNAP`**—Snapshot proposal
- **`AR`**—Archival Research proposal (this category includes the Theory Proposals described in Section 3.4.4)

Proposals for Director's Discretionary Time (see Section 3.8) submitted outside of the normal review cycles should select:

- **`GO/DD`**—Director's Discretionary Time proposal

8.5 Cycle

For a Cycle 16 proposal, enter '**`16`**' (this will be the default).

8.6 Requested Resources

8.6.1 Primary and Parallel Orbits

(This item appears in the APT form only for GO proposals)

Enter the total number of orbits requested for primary observations and the total orbits requested for coordinated or pure parallel observations. If only ACS auto-parallel observations are being taken, then enter '0' for the number of parallel observations. Only whole orbits can be requested, and only whole orbits will be allocated. In general, only the boxes for 'This Cycle' need to be filled out. However, long-term proposals (see Section 3.2.5) should provide a year-by-year breakdown of the orbits requested by also filling out the boxes for 'Next Cycle' (i.e., Cycle 17) and 'After Next' (i.e., Cycle 18).

8.6.2 Total Targets

(This item appears in the APT form only for SNAP proposals)

Specify the total number of targets requested. Note that multiple visits to the same source should be counted as multiple targets (see Section 3.3)..

8.6.3 Budget

(This item appears in the APT form only for AR and Theory proposals)

Please enter a U.S. dollar figure for your total budget request. See Chapter 12 for details on Grant Policies and allowable costs. Make sure that all applicable indirect costs and overheads are included in the listed amount. Please note that the budget submitted for an accepted proposal *cannot* exceed the dollar figure listed in the Phase I submission.

8.6.4 Budget Explanation

(This item appears in the APT form only for AR and Theory proposals)

This is an optional field that may be used to explain the budget request. It is a 40-character, free text field. An example would be ''Budget to be split over 2 years''.

8.6.5 Archival Resources

(This item appears in the APT form only for AR proposals)

Please fill in the keywords in the table in the APT form, specifying the approximate number of datasets requested for each instrument, the retrieval method (cd, ftp, dvd or disk), and the planned schedule for data retrieval (e.g. over one weekend, 100 datasets/week, etc).

8.7 Proprietary Period

(This item appears in the APT form only for GO and SNAP proposals)

Enter the requested proprietary period, either 0, 3, 6 or 12 (months), that will apply to all observations in the program. Pure Parallel Programs have 0 proprietary period. The default proprietary period is 0 for GO Treasury Programs, and 12 for all other programs. See Section 5.1 on Data Rights for more information. The benefits of or need for a non-default proprietary period must be discussed in the 'Special Requirements' section of the proposal (see Section 9.3).

8.8 Scientific Category

Specify *one* Scientific Category from the list below. Please adhere to our definitions of these categories. If you find that your proposal fits into several categories, then please select the one that you consider most appropriate. If you are submitting a Calibration Proposal, then choose the Scientific Category for which your proposed calibration will be most important. The following are the available categories:

- **SOLAR SYSTEM**: This includes all objects belonging to the solar system (except the Sun, Mercury and the Moon), such as planets, comets, minor planets, asteroids, planetary satellites, Kuiper-belt objects, etc.
- **STAR FORMATION:** This includes forming and newly-formed stars, the material surrounding them, studies of proto-planetary disks, extra-solar planets, early stellar evolution, pre-main sequence stars, T-Tauri stars, HH objects and FU Orionis stars.

- **COOL STARS**: This applies to stars with effective temperatures less than 10,000 K, including halo subdwarfs, subgiants, giants, supergiants, AGB stars, pulsating/variable stars, brown dwarfs, stellar activity, atmospheres, chromospheres, mass loss and abundance studies.
- **HOT STARS:** This applies to stars that spend a significant fraction of their observable lives at an effective temperature higher than 10,000 K. It includes OB stars, neutron stars, white dwarfs, Wolf-Rayet stars, blue stragglers, central stars of PN, luminous blue variables, hot subdwarfs, supernovae, pulsars, X-ray binaries and CVs.
- **ISM AND CIRCUMSTELLAR MATTER:** This applies to the general properties of the diffuse medium within the Milky Way and nearby galaxies, including planetary nebulae, nova shells, supernova remnants, winds and outflows, HII regions, giant molecular clouds, diffuse and translucent clouds, ionized gas in the halo, diffuse gas observed in emission or absorption, dust, dust extinction properties, dark clouds and deuterium abundance studies.
- **RESOLVED STELLAR POPULATIONS**: This includes resolved stellar populations in globular clusters, open clusters or associations, and the general field of the Milky Way and other nearby galaxies. Studies of color-magnitude diagrams, luminosity functions, initial-mass functions, internal dynamics and proper motions are in this category.
- **UNRESOLVED STELLAR POPULATIONS AND GALAXY STRUCTURE**: This includes studies of the initial mass function, stellar content and globular clusters in distant galaxies, galaxy morphology and the Hubble sequence, and low surface-brightness galaxies. Starbursts, IR-bright galaxies, dwarf galaxies, galaxy mergers and interactions may also fall under this heading.
- **ISM IN EXTERNAL GALAXIES:** This category includes studies of gas distribution and dynamics in distant galaxies. Starbursts, IR-bright galaxies, dwarf galaxies, galaxy mergers, and interactions may also fall under this heading.
- **AGN/QUASARS**: This encompasses active galaxies and quasars, including both studies of the active phenomena themselves, and of the properties of the host galaxies that harbor AGNs and quasars. The definition of AGN is to be interpreted broadly; it includes Seyfert galaxies, BL Lac objects, radio galaxies, blazars and LINERS.

- **QUASAR ABSORPTION LINES AND IGM**: This includes the physical properties and evolution of absorption line systems detected along the line of sight to quasars and of other diffuse IGM. It includes spectroscopy and imaging of damped Ly-alpha systems.
- **COSMOLOGY**: This includes studies of the structure and properties of clusters and groups of galaxies, strong and weak gravitational lensing, galaxy evolution through observations of galaxies at intermediate and high redshifts (including for example, the Hubble Deep Fields), cosmology in general, the structure of the universe as a whole, cosmological parameters and the extra-galactic distance scale

Proposals in the Scientific Categories **Star Formation**, **Cool Stars**, **Hot Stars**, **ISM and Circumstellar Matter** and **Resolved Stellar Populations** will be reviewed by the **Galactic** Panels; proposals in categories **Unresolved Stellar Populations, ISM in External Galaxies**, **AGN/Quasars**, **Quasar Absorption Lines and IGM** and **Cosmology** will be reviewed by the **Extragalactic** panels.

8.9 Keywords

From the list of Scientific Keywords in the pull-down menu (see also Appendix B), please select appropriate ones that best describe the science goals of the proposal. Your choice here is important! Based on the keywords that you specify, your proposal will be assigned by software to specific reviewers during the Proposal Review (see Section 6.1). Please give as many keywords as possible, but not more than five. You *must* give at least three.

8.10 Special Proposal Types

8.10.1 Chandra ksec

(This item appears in the APT form only for GO proposals)

If you are asking for both HST and Chandra observing time (see Section 3.5) then list the requested number of Chandra kiloseconds. You should then also provide detailed information on the Chandra observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.1). If you are not requesting any new Chandra observations (or if you have Chandra time that has already been awarded), then enter **'0'**.

8.10.2 Spitzer hours

(This item appears in the APT form only for GO proposals)

If you are asking for both HST and Spitzer observing time (see Section 3.7) then list the hours required for the Spitzer observations. You should then also provide detailed information on the Spitzer observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.2). If you are not requesting any new Spitzer observations (or if you have Spitzer time that has already been awarded), then enter **'0'**.

8.10.3 NOAO Nights

(This item appears in the APT form only for GO proposals)

If you are asking for both HST and NOAO observing time (see Section 3.6) then list the requested number of nights on NOAO telescopes. You should then also provide detailed information on the NOAO observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.3). If you are not requesting any new NOAO observations (or if you have NOAO time that has already been awarded), then enter **'0'**.

8.10.4 Theory

(This item appears in the APT form only for AR proposals)

Mark this keyword if you are submitting a Theory Proposal (see Section 3.4.4).

8.10.5 Legacy

(This item appears in the APT form only for AR proposals)

Mark this keyword if you are submitting an AR proposal in the AR Legacy category (see Section 3.4.2).

8.10.6 Calibration

Mark this keyword if you are submitting a Calibration Proposal (see Section 3.2.4)

8.10.7 Treasury

(This item appears in the APT form only for GO proposals)

Mark this keyword if you are submitting a GO proposal in the Treasury category (see Section 3.2.6).

8.10.8 Large

(This item appears in the APT form only for GO proposals)

Mark this keyword if you are submitting a GO proposal in the Large Program category (see Section 3.2.2).

8.10.9 Coordinated HST-Spitzer

(This item appears in the APT form only for GO proposals)

Mark this keyword if you are submitting a GO proposal in the Coordinated HST-Spitzer category (see Section 3.7.2).

8.10.10 Survey

(This item appears in the APT form only for GO proposals)

Mark this keyword if you are submitting a GO proposal in the Survey category (see Section 3.2.3).

8.11 Proposal PDF Attachment

List the location on your computer of the PDF file that is to be attached to your Phase I submission. This file should contain the items described in Chapter 9.

8.12 Principal Investigator

Enter the name (last name first) and e-mail address of the PI. Please use standard ASCII. There can be only one PI per proposal. Entering the first few letters (at least two) and pressing enter or tab will bring up a window containing a list of matches from our proposer database. Clicking on your

entry will populate the APT form with the information. If you are not in the database, click on "New Entry" and enter the information. Choose the correct institutional affiliation. For U.S. PIs (see Section 12.2), the institutional affiliation is defined as the institution that will receive funding if the proposal is approved. If you are in the database, but the address information is incorrect, do not click on "New Entry." Instead, select your entry in the list and click on "OK." Your information will be entered into the form editor where you can update it. Please mark the appropriate box for PIs with an institutional affiliation in an ESA member country.

For Large and Treasury programs, we will be contacting each proposer within 1-2 weeks of the submission deadline to verify our understanding of the appropriate scheduling constraints. If a Co-Investigator is to serve as the contact for this verification, then the Contact Keyword box should be set accordingly. Only one person may be designated as the Contact.

8.13 Co-Investigators

Co-investigators (CoIs) can be added in APT as necessary in Phase I; once a program is approved (Phase II), a CoI can only be added with prior approval (see Section 10.2). By default, APT will provide one blank CoI template. Please add other CoIs or delete as necessary. There is a limit of 99 CoIs on any proposal. For each CoI, list the name and e-mail address. Choose the correct institutional affiliation. For U.S. CoIs (see Section 12.2), the institutional affiliation is defined as the institution that will receive funding if the proposal is approved.

Please mark the appropriate box for PIs with an institutional affiliation in an ESA member country. If a proposal has a non-U.S. PI and one or more U.S. CoIs, then you *must* mark the 'Admin US PI' box for one of the U.S. CoIs. This indicates which U.S. CoI will be the Administrative PI for overseeing the grant funding for U.S. investigators (see Chapter 12).

8.14 Targets

Your proposal can include observations of fixed targets (i.e., all targets outside the solar system whose positions can be defined by specific celestial coordinates), generic targets (i.e., targets defined by certain general properties, rather than by specific coordinates), and solar-system targets (i.e., moving targets). Targets that have not yet been discovered or identified may generally be included only under special circumstances (see Section 4.1.5), and should be given generic target names.

GO proposals must include a list of all targets. *Snapshot and Survey proposals need only include a representative subset of targets in the Phase I submission.* For proposals with a large number of fixed targets, please note that there is a capability to ingest a comma-separated text file with the appropriate target information. See the APT Phase I Roadmap ("Fill in the Target Information") for details.

8.14.1 Target Number

Each target in your program will be assigned a unique number by APT. A different target must be defined when different coordinates or a different target description are required. Separate targets should be defined and listed if observations are planned at several points within an extended object. For example, acquiring spectra at three different locations within the Crab nebula requires each point to have its own target number, name and co-ordinates, such as CRAB1, CRAB2 and CRAB3. However, if you are proposing a large field mosaic with the same exposures at each point, you may define one target for the object. You should specify in the Description of Observations the exact number of fields you plan to observe.

8.14.2 Target Name

The target naming conventions for HST are defined in detail in the STScI Phase II Proposal Instructions. Please adhere to these naming conventions throughout your proposal. For generic targets use a short text description either of the target location (e.g., **`RANDOM-FIELD`**) or of the target itself (e.g., **`NEXT-SUPERNOVA`**).

8.14.3 Provisional Coordinates

Supply the coordinates for fixed targets only. In Phase I, target positions with accuracies of ~1 arc minute are sufficient for the TAC and panel review (except in crowded fields where the identity of the target may be in question). However, in Phase II significantly more accurate coordinates will be required, and it is the responsibility of the proposers to provide these. See the STScI Phase II documentation for details.

8.14.4 V-Magnitude

A magnitude or flux should be specified for every target. In the case of observations with the ACS/SBC, you are required to specify the V magnitude of the brightest object in the field of view (this may not be the primary target). Supply the apparent *total* magnitude in the V passband for

the entire target (galaxy, planet, etc.), if known. For variable targets, please give the brightest V magnitude expected during the observations. The MAMA detectors have bright object safety limits, and observations that violate those limits are infeasible. See Section 5.1 of the HST Primer, or the ACS Instrument Handbook (see Section 1.4.5) for details. With the exception of the safety checks for the ACS/SBC, this information is used only for scientific review, not for exposure-time calculations.

8.14.5 Other Fluxes

For each target you should specify either a V-magnitude (see above, required for ACS/SBC observations) or another magnitude or flux. Supply the apparent *total* magnitude or flux in the relevant passband for the entire target (galaxy, planet, etc.), if known. For variable targets, please give the brightest magnitude expected during the observations. This information is used only for scientific review, not for exposure-time calculations. The format is free text.

8.15 Observation Summary (OS)

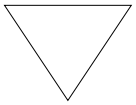
(This item appears in the APT form only for GO and SNAP proposals)

The OS lists the main characteristics of the observations that you propose to obtain. In general you must include in the OS *all* the configurations, modes and spectral elements that you propose to use, and *all* the targets that you propose to observe. Configurations or targets that are not specified in the Phase I proposal, but are included in Phase II, may delay the program implementaton, and may be disallowed. Note the following:

- For SNAP and Survey proposals, the OS should describe a typical observation for one or a few of the targets. A complete and unique description of the target list should be provided in the 'Scientific Justification' section of the proposal (see Section 9.1).
- For Long-Term Programs, the OS should include information for *all* the proposed observations, not just those requested in Cycle 16.
- Parallel observations must be included in the OS, and marked as such using the relevant special requirement flags (see Section 8.15.11 and Table 8.1). Auto-parallel observations with ACS (see Section 4.2.3) should *not* be listed. For NICMOS, list all observations with all cameras which will be used for parallel observations.

- Target acquisition observations (see Section 5.2 of the HST Primer) need not be included in the OS, unless they are themselves used for scientific analysis.
- Normal calibration observations that are often or routinely taken (e.g, fringe flats) need not be included in the OS. However, the OS should include any special calibration exposures of internal sources or external targets (see Section 4.3). Special internal calibrations should be listed separately from external calibration exposures. When these special calibrations require additional orbits, that should be specified and the orbits included in the total allocation. The need for these calibrations should be justified in the 'Description of the Observations' (see Section 9.2).

The OS consists of individual 'observation blocks', each containing several separate pieces of information.



All exposures of a given target made with a particular instrument may be summarized in a single observation block; observations of the same target with a second instrument (e.g. coordinated parallels) must be specified in a separate observation block.

Observation blocks are numbered sequentially in the APT Phase I proposal form. Each observation block should include the items that are listed and discussed below in separate sub-sections.

8.15.1 Target

Select the target from the pull down menu. The menu will contain all the targets you have entered on the "Targets" page.

8.15.2 Instrument

Select an instrument from the pull down menu. The menu will contain all the available instruments. *Note that only one instrument can be selected in each observation block.*

8.15.3 Instrument Setup(s)

Under "Instrument Setups" click on "Add". This will bring up a pop-up menu which will allow you to select the parameters for the observation (e.g., config, science mode, spectral elements).

8.15.4 Config

Enter the Scientific Instrument configuration. A pull-down menu shows the available and allowed options for the instrument you have selected.

8.15.5 Science Mode

Enter the science mode. A pull-down menu shows the available and allowed options (which depend on the choice of Configuration).

8.15.6 Coronagraphy

If you are proposing coronagraphic observations with NICMOS or ACS, then set this keyword to '**yes**'. Coronagraphic observations with the ACS/SBC are not permitted (see Section 4.2 of the Primer and Section 3.3.2 of the *ACS Instrument Handbook*).

8.15.7 Polarizer

If you are proposing polarimetric observations with WFPC2, ACS or NICMOS, then set this keyword to '**yes**'. There is no polarimetry keyword in the proposal pdf file, but this sets the appropriate flag in the Phase I submission.

8.15.8 Spectral Element

Enter the desired spectral elements (i.e., filters and gratings) using the 'Spectral Element' pull-down menus which show the available and allowed options (which depend on the choice of Configuration and Science Mode). Each Instrument Setup denotes a set of exposures with the same spectral elements. For example if you are taking 4 exposures with the B filter and 2 with the V filter, one instrument setup would give the B filter as the Spectral Element, and a separate instrument setup would give the V filter as the Spectral Element.

8.15.9 Orbits

Enter the number of orbits (i.e., the sum of the orbits required for all the instrument setups in the observation block). Consult Chapter 6 of the HST Primer for instructions on how to calculate the appropriate number of orbits for your observations.

8.15.10 Number of Iterations

If you require multiple sets of observations, enter the number of iterations. (For example, if you will reobserve at a different time or if you have a large mosaic). This will automatically update the total number of orbits requested for the target.

8.15.11 Special Requirement Checkboxes

Mark one or more of the special requirement checkboxes, if applicable. The meanings of the checkboxes are indicated in the table below. Note that for snapshot observations, only the 'duplication' checkbox is allowed.

Table 8.1: Special Requirement Flags for the Observation Summary

Flag	Use this flag for
Coordinated Parallel	All of the exposures specified in this observation block are to be done in coordinated parallel mode (see Section 4.2).
CVZ	Continuous Viewing Zone observations (see Section 4.1.1).
Duplication	Observations which duplicate or might be perceived to duplicate previous or upcoming GO and/or GTO exposures (see Section 5.2.1).
Target of Opportunity	Target-of-Opportunity observations (see Section 4.1.2).
Pure Parallel	All of the exposures specified in this observation block are to be done in pure parallel mode (see Section 4.2.2).

8.15.12 Scheduling Requirements

For all proposals, we are requesting additional scheduling information for your observations; note that this request does not apply to either observations of solar system or generic targets. The additional information will help STScI understand and assess the scheduling implications of your program. Be sure also to read Section 9.2, 'Description of the Observations', as that is the primary place for describing your observing strategy.

For each Observation Block, please provide the following when appropriate;

- *ORBITAL VISIBILITY*: enter the value that you used for the orbital visibility when determining your orbit request (either from Table 6.1 of the Primer or from the tables/plots available on the Two Gyro Science Mode Web Page). This is required for all GO observations, even if there are no scheduling constraints.

- *NO SCHEDULING CONSTRAINTS:* setting this requirement means that there are no scheduling constraints on the Observation Block.
- *SHADOW:* set this requirement when all exposures defined in the Observation Block are affected adversely by geocoronal Lyman-alpha background emission, and therefore need to be obtained when HST is in Earth shadow. This requirement complicates scheduling and reduces HST observing efficiency, and must therefore have adequate scientific justification in the Phase I proposal. *SHADOW* is generally incompatible with *CVZ*. Note that this requirement should not be used if low continuum background is required: in that case use *LOW SKY* instead.
- *LOW SKY:* set this requirement when all exposures defined in the Observation Block are affected adversely by scattered light (e.g zodiacal light and earthshine), and therefore need to be obtained with minimal sky background. The continuum background for HST observations is a function of when and how a given target is observed. Observations can be scheduled when the sky background is within 30% of its yearly minimum for the given target, which is done by restricting the observations to times that minimize both zodiacal light and earthshine scattered by the OTA. To minimize the zodiacal light, the scheduling algorithm places seasonal restrictions on the observations; to reduce the earthshine, the amount of time data is taken within an orbit is reduced by approximately 15%. The former complicates scheduling, while the latter reduces the observing efficiency of HST. Therefore, using the *LOW SKY* restriction must have adequate scientific justification included in the Phase I proposal. With this restriction, the zodiacal background light for low-ecliptic latitude targets can be reduced by as much as a factor of 4. Avoiding earthshine at the standard earth-limb avoidance angle (see Section 2.4 of the HST Primer) can make a similar difference. Note that *LOW SKY* is generally incompatible with *CVZ*.
- *SAME ORIENT:* setting this requirement means that all exposures defined in the Observation Block MUST be observed at the exact same *ORIENT*. This requirement is only meaningful if the observations are to occur in multiple visits (e.g. Number of Iterations is greater than 1, or if the Total Orbits is greater than 5).
- *ORIENT:* enter the *ORIENT* range that all the exposures defined in the Observation Block MUST be observed within. If multiple *ORIENT* ranges are acceptable, then enter all values.
- *BETWEEN:* enter the range of dates that all exposures defined in the Observation Block MUST be observed within. If multiple *BETWEEN*s are acceptable, then enter all values.

- *AFTER OBSERVATION BY:* enter any timing requirements between Observation Blocks. Timing requirements between observations WITHIN an Observation Block do not need to be specified. This is intended to capture repeated visits with spacings of multiple days or greater, not timing requirements of less than 1-2 days.
- Note that we will be contacting each Large and Treasury proposer within 1-2 weeks of the submission deadline to verify our understanding of the appropriate scheduling constraints. As noted previously (Section 8.12), if a CoI is to serve as the contact for this verification, the Contact CoI keyword box should be set.

8.15.13 Verifying Schedule Constraints

If you have specified any scheduling constraints, you should use APT to verify that your observations are indeed schedulable. Detailed instructions for performing this verification can be found in the APT Help menu.

In addition, if you are submitting a Large (more than 100 orbits of prime observations), Coordinated HST-Spitzer or Treasury program (which may also be Large), we are requesting further processing of your proposal. See the Large Program Web Page for details.

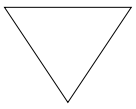
CHAPTER 9:

Preparation of the PDF Attachment

In this chapter . . .

9.1 Scientific Justification / 84
9.2 Description of the Observations / 85
9.3 Special Requirements / 86
9.4 Coordinated Observations / 87
9.5 Justify Duplications / 90
9.6 Analysis Plan / 90
9.7 Budget Narrative / 91

As described in Chapter 7, a Phase I proposal consists of a completed APT proposal form and an attached PDF file. The present chapter describes the items that must be addressed in the attached PDF file. As described in Section 7.2, template files are available in several popular word-processing environments for the creation of the PDF file. Chapter 8 describes the items that must be filled out in the APT proposal form. Note that you must use Adobe Acrobat version 5.0 or higher (or equivalent software) in order to properly view and print the PDF attachment in APT.



Your PDF Attachment should obey the page limits discussed in Section 7.1.3. Note that there is a limit on the total number of pages, as well as on the amount of text in the 'Scientific Justification' section.

9.1 Scientific Justification

This section should present a balanced discussion of background information, the program's goals, its significance to astronomy in general, and its importance for the specific sub-field of astronomy that it addresses. The members of the review panels will span a range of scientific expertise (see Section 6.1.1), so you should write this section for a general audience of scientists.

Depending on the type of proposal, the following items should also be included:

- GO Treasury, AR Legacy and Pure Parallel proposals should address the use to the astronomical community of the data products that will be generated by the program.
- Proposals to use ACS/WFC or ACS/HRC for undithered imaging must explain why this strategy is required for the scientific objectives; dithering is required to eliminate hot pixels and other detector artefacts that may compormise the archival value of the data.
- ACS/SBC proposers must address the safety of their targets and fields with respect to the MAMA countrate limits (see Chapter 5 of the Primer and the ACS Instrument handbook).
- Snapshot and Survey proposals should provide a complete and unique description of the target sample.
- AR Proposals should describe how the project improves upon or adds to the previous use of the data.
- Theory Proposals should include a description of the scientific investigations that will be enabled by the successful completion of the program, and their relevance to HST.
- Calibration Proposals should describe what science will be enabled by the successful completion of the program, and how the currently supported core capabilities, their calibrations, and the existing pipeline or data reduction software are insufficient to meet the requirements of this type of science.

9.2 Description of the Observations

(This item is required only for GO and SNAP proposals)

This section of the PDF file should be used to provide a short description of the proposed observations. All HST observations in Cycle 16 will be undertaken in the Two-Gyro Science Mode that has been developed by the HST project. The principal change with respect to Three-Gyro Mode, the standard in cycles prior to Cycle 15, is reduced scheduling flexibility (fewer orbits available for a given target). Image quality is virtually indistinguishable from that in Three-Gyro Mode; observers should expect nearly identical scientific performance in Two-Gyro Mode, albeit at the reduced scheduling efficiency noted above. Further details are given in the HST Two-Gyro Science Handbook.

The description of the proposed observations should explain the amount of exposure time and number of orbits requested (e.g., number of objects, examples of exposure-time calculations and orbit estimates for some typical observations). You should summarize your target acquisition strategies and durations where relevant. For CVZ targets, state the number of CVZ opportunities available in the cycle.

Discuss and justify any non-standard calibration requirements (see Section 4.3). You should estimate the number of orbits required for these special calibrations, and include them in the OS (see Section 8.15).

Depending on the type of proposal, the following items should also be included:

- Survey proposals should state explicitly the number of orbits required for each visit to a target. If the program targets require visits of different duration, the proposer should explain how the total number of orbits requested was estimated.
- Proposals to use ACS for non-dithered image exposures should provide a justification for this choice of strategy.
- Long-term projects should provide summary information for the entire project, along with a cycle-by-cycle breakdown of the requested spacecraft orbits.
- Treasury Programs should discuss the data products that will be made available to the community, the method of dissemination, and a realistic time line. It is a requirement that data products be delivered to

STScI in suitable digital formats for further dissemination via the HST Data Archive or related channels. Any required technical support from STScI and associated costs should be described in detail.

- Proposers submitting Large, Coordinated HST-Spitzer and Treasury Programs should discuss how they have designed their program with regard to schedulability.
  - All proposers should include the number and durations of the schedulability windows for each observation.
  - Proposers of programs with timing constraints and timing relationships between observations should describe those constraints, including allowable flexibility.
  - Proposers of programs containing large blocks of orbits at constrained orientation angles, such as mosaics and surveys, should describe those constraints and allowable flexibility.
  - Proposers requesting large blocks of orbits with a single target should estimate how many orbits/day will be required for their programs, during the scheduling windows that meet their timing and orientation restrictions.
  - If a target visibility other than that indicated on the Large Program Web page is used, state the value used and explain why you used that value.
- Calibration Proposals should present a detailed justification of how they will achieve the goals of the program, and if applicable, a description of the conditions under which these goals will be achieved.
- Calibration Proposals should discuss what documentation, and data products and/or software will be made available to STScI to support future observing programs

9.3 Special Requirements

(This item is required only for GO and SNAP proposals)

List and justify any special scheduling requirements, including requests for:

- Target of Opportunity (TOO) observations. For TOO observations, estimate the probability of occurrence during Cycle 16, and state how soon HST must begin observing after the occurrence (see Section 4.1.2).

- CVZ observations (see Section 4.1.1).
- Time-critical observations (see Section 4.1.6).
- Early acquisition observations (see Section 5.2.1 of the HST Primer).
- Coordinated Parallel (CPAR) or Pure Parallel (PPAR) observations
- Target acquisitions that use the 'Re-use target offset' function (see Section 5.2.2 of the HST Primer).
- Real-time interactions (see Section 4.1.7, and Section 2.6.1 of the HST Primer).
- Requests for expedited data access (see Section 7.2 of the HST Primer).
- Other special scheduling requirements (e.g., requests for non-SAA impacted observations).

Also, if applicable, discuss the benefits of or need for a non-default proprietary period request (see Section 5.1 and Section 8.7).

9.4 Coordinated Observations

(This item is required only for GO proposals)

If you have plans for conducting coordinated observations with other facilities that affect the HST scheduling, please describe them here (examples are coordinated or simultaneous observations with other spacecraft or ground-based observatories). Describe how those observations will affect the scheduling.

If you have plans for supporting observations that do *not* affect HST scheduling, then *don't* describe them here. If they improve your science case, then describe them in the 'Scientific Justification' section of the proposal (see Section 9.1).

A limited feasibility check on coordinated observations between HST and a few other observatories (Chandra, XTE, and FUSE) may be performed via the Visual Observation Layout Tool (VOLT), developed at the Goddard Space Flight Center. See the VOLT Web site for more information. Note that VOLT cannot be used for detailed (Phase II) scheduling of HST observations.

9.4.1 Joint HST-Chandra Observations

Proposers requesting joint HST-Chandra observations (see Section 3.5) *must* provide a full and comprehensive technical justification for the Chandra portion of their program. This justification must include:

- the choice of instrument (and grating, if used),
- the requested exposure time, justification for the exposure time, target count rate(s) and assumptions made in its determination,
- 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 HST observations),
- the exposure mode and chip selection (ACIS) or instrument configuration (HRC),
- information about nearby bright sources that may lie in the field of view,
- a demonstration that telemetry limits will not be violated,
- a description of how pile-up effects will be minimized (ACIS only).

Proposers should note the current restrictions on uninterrupted observations of more than 40 ksecs at certain pitch angles. Please refer to the Chandra Proposers' Observatory Guide (POG), Section 3.3.2, for details. Proposers should check the pitch angles of their targets and be sure that any constraints they request do not render the proposed observation infeasible. Please note that the Chandra Proposal Documentation and observation planning software will be updated for Cycle 9 in mid-December 2006.

Technical documentation about Chandra is available from the Chandra X-ray Center (CXC) Web Page, which also provides access to the Chandra Help Desk. The primary document is the Proposer's Observatory Guide, available from the Chandra Proposer Web Page. Full specification of approved observations will be requested during the Chandra Cycle 9 period when detailed feasibility checks will be made.

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

9.4.2 Joint HST-Spitzer Observations

Proposers requesting joint HST-Spitzer observations (see Section 3.7) *must* provide a full and comprehensive technical justification for the Spitzer portion of their program. This justification must include:

- the choice of instrument and Astronomical Observation Template(s),
- the requested observing time, justification for the requested time, target fluxes, required sensitivity and assumptions made in its derivation,
- information on whether the observations are time-critical; indicate whether the observations must be coordinated in a way that affects scheduling of either HST or Spitzer observations.

Technical documentation about the Spitzer Space Telescope is available from the Spitzer Science Center (SSC) Web Page, which also provides access to the Spitzer Help desk (help@spitzer.caltech.edu). The primary document is the Spitzer Observer's Manual, available, together with other relevant documents, from the Proposal Kit Web Page. The SSC strongly recommends that observers proposing Spitzer observations estimate the required observing time using *Spot*, the Spitzer proposal planning software, also available from the online proposal kit.

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

9.4.3 Joint HST-NOAO Observations

Proposers requesting joint HST-NOAO observations (see Section 3.6) must provide a full and comprehensive technical justification for the NOAO portion of their program. This justification must include:

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

Successful proposers will be asked to supply additional details about the observations, i.e., the same details required for NOAO proposals for the particular telescope/instrument. This "Phase II - NOAO" information must be submitted by the 30 April 2007 NOAO deadline for the Fall 2007 semester. Submission instructions will be forthcoming following notification of the results of the HST review.

Technical documentation about the NOAO facilities is available from the NOAO Web Page. Questions may be directed to the NOAO Proposal Help Desk by email to noaoprop-help@noao.edu. NOAO will perform feasibility checks on any approved proposals.

Proposers requesting joint HST-NOAO observations must specify whether they were recently (in the last two years) awarded NOAO time for similar or related observations.

A full and comprehensive scientific justification for the requested NOAO observing time and facilities must be given in the 'Scientific Justification' section of the proposal (see Section 9.1).

9.5 Justify Duplications

(This item is required only for GO and SNAP proposals)

Justify, on a target-by-target basis, any potential duplication with previously accepted GO or GTO observing programs. Use the 'Duplication' checkbox in the OS (see Section 8.15) to identify the duplicating observations. See Section 5.2.1 for policies on duplications.

9.6 Analysis Plan

(This item is required only for AR, Calibration, and Theory proposals)

All AR proposals should provide a detailed data analysis plan and describe the data sets that will be analyzed. Proposers should complete the information required in the APT dataset table (see Section 8.6.5): the number of datasets (not pointings) per instrument needed to carry out the research and the type of data retrieval (ftp, CD, DVD or disk: see the HST Archive Data Retrieval Options for a description of the available options). Proposers must provide a schedule indicating the timescale for the data

request(s) (e.g. all datasets at once, 1/12th of the datasets per month, etc.). Inclusion of a complete target list is not required.

Legacy AR Proposals should also discuss the data products that will be made available to the community, the method of dissemination, and a realistic time line. It is a requirement that data products be delivered to STScI in suitable digital formats for further dissemination via the HST Data Archive or related channels. Any required technical support from STScI and associated costs should be described in detail.

Theory Proposals should discuss the types of HST data that will benefit from the proposed investigation, and references to specific data sets in the HST Data Archive should be given where possible. They should also describe how the results of the theoretical investigation will be made available to the astronomical community, and on what time scale the results are expected.

Calibration Proposals should discuss what documentation, and data products and/or software will be made available to STScI to support future observing programs. Proposers should explain how their proposed programs complement ongoing calibration efforts by the instrument groups. They may contact the relevant groups to ensure that efforts are not duplicated.

9.7 Budget Narrative

(This item is required only for AR and Theory proposals)

Describe concisely, but completely, what the requested funds will support (if awarded). Use words rather than dollar amounts (e.g., 2 months summer salary for the P.I.; 3 months of support, including overhead and fringe benefits, for a graduate student who will work on the data reduction; an 18 GByte hard disk drive for storage of the data and data analysis products). *Proposers should note that each review Panel has a limited budget allocation for AR and Theory Proposals*. They should therefore provide a careful justification of the requested items, and explain why they are necessary to achieve the scientific goals of the program. See Chapter 12 for details on Grant Policies and allowable costs.

CHAPTER 10:

Proposal Implementation and Execution

In this chapter . . .

10.1 Notification / 93
10.2 Phase II Submission / 94
10.3 Program Coordinator and Contact Scientist Support / 94
10.4 Duplication Checking / 95
10.5 Technical Review / 95
10.6 Proposal Scheduling / 95
10.7 Access to Data Products / 96
10.8 Archival Research Support / 97
10.9 Visits to STScI / 97
10.10 Failed Observations / 98
10.11 Publication of HST Results / 99
10.12 Dissemination of HST Results / 100

10.1 Notification

The panels and the TAC will meet approximately two months after the proposal submission deadline. Electronic notification of the outcome of the Phase I selection process will be sent to all proposers within a few weeks thereafter (April 2007).

10.2 Phase II Submission

Successful GO/SNAP proposers must submit a Phase II program which provides complete details of the proposed observations. Detailed instructions on the preparation of Phase II programs are provided in the STScI Phase II documentation. Complete observational details must be provided by the Phase II submission deadline, approximately one and a half months after notification of the Phase I outcome (mid-May 2007). Accurate target coordinates must also be supplied at this time, except for certain Targets of Opportunity (or in other exceptional circumstances, provided that those circumstances were described clearly in the Phase I proposal).

Failure to submit a Phase II program by the required deadline *will* result in loss of the time allocation. Program changes after the Phase II deadline are allowed as described in the Policy Document for the Telescope Time Review Board (TTRB), available on the Web.

Proposers are not allowed to make changes to the list of investigators (PI and CoIs) after acceptance of the Phase I proposal, unless permission for this is granted by the Head of the Science Policies Division. Requests for this should be well-justified, and must be submitted to spd_staff@stsci.edu.

10.3 Program Coordinator and Contact Scientist Support

Accepted observing programs are assigned a Program Coordinator (PC), whose role is to help the observer deliver a Phase II program that is syntactically correct and will schedule successfully on the telescope.

Selected programs (e.g., Large, Treasury, DD, Target of Opportunity or Moving Target Programs, or those using complicated observing strategies) will also be assigned a Contact Scientist (CS). The role of the CS is to provide advice on observing strategies, and to answer specific questions about instrument performance. Observers who are not automatically assigned a CS may request one. The CS is generally an Instrument Scientist involved in the calibration and characterization of the primary instrument used in the observer's program. The role of the CS ceases at program execution. Please contact the help desk for post-execution assistance.

10.4 Duplication Checking

Some computer-aided duplication checks are carried out in Phase II, in part by STScI and also by observers who wish to check whether any of their own observations are being duplicated. Any duplications found that were not justified explicitly in the Phase I proposal *and* recommended by the Review Panels or TAC will be disallowed. No compensatory observing time will be allowed and the observing time will be removed from the allocation. In the case of duplications between Survey proposals and Regular GO proposals, the duplicate source(s) will be removed from the Survey proposal, but the time allocation will not be changed.

10.5 Technical Review

In Phase I STScI does not perform technical reviews for the majority of the submitted proposals (exceptions include, Large, DD, Calibration, TOO and Treasury Programs). In Phase II a technical/feasibility review is performed and special attention is given to observations/modes that may damage the instrument, are particularly complex, are recent/experimental, are human and technical resource-intensive, or require the use of limited resources (such as real-time acquisitions or TOO Programs). All technically challenging or infeasible observations are flagged. Note that it is the responsibility of the PI to ensure that none of the observations violate bright objects constraints (see Section 5.1 of the HST Primer).

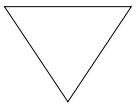
10.6 Proposal Scheduling

After Technical Review, observations determined to be feasible are scheduled for execution. The scheduling process attempts to optimize the overall HST efficiency. STScI will not contemplate requests to advance or postpone the scheduling of individual programs based on other considerations, with the possible exception of compelling scientific arguments.

10.6.1 Unschedulable or Infeasible Programs

Proposers should be aware that after acceptance of a proposal, the actual execution of the observations may in some cases prove impossible. Possible reasons include:

- The accepted observation may be found to be infeasible or extremely difficult for technical reasons only after receipt of the Phase II information; TOO and time-critical observations can be particularly complex to plan and execute, and will be completed only to the extent that circumstances allow.
- The observing mode or instrument selected may not be operational; or
- Suitable guide stars or scheduling opportunities may not exist.



Hence: All HST observations are accepted with the understanding that there can be no guarantee that the observations will actually be obtained.

Note also that the STScI Director reserves the right to disallow at any time any or all observations of an approved program if it is demonstrated that incorrect or incomplete information was provided in the Phase I proposal that may have significantly influenced the approval recommendation by the Review Panels or TAC.

10.7 Access to Data Products

Data products are stored in the HST Data Archive (see Section 7.2 of the HST Primer). Any processing or scientific analysis of the data beyond the standard "pipeline" calibrations performed by STScI is the responsibility of the observer.

Observers retrieve their data directly from the Data Archive, either through the MAST Web site or the StarView interface. In order to retrieve proprietary data from the Archive, proposal PIs and those designated by them must first register as Archive users. This can be done using the Data Archive Registration Web page at http://archive.stsci.edu/registration.html. PIs should register before their observations are made. PIs wishing to allow others to access their proprietary data should make that request to

archive@stsci.edu. HST data normally become non-proprietary one year after they are taken.

The HST Data Handbook describes the data produced by the instruments. The Space Telescope Science Data Analysis Software (STSDAS) Web Page has links to the software used to calibrate and analyze HST data, and to documentation on its use (see also Section 7.1.1 of the HST Primer).

- Observers with questions about the *retrieval* of their data should contact the Archive Hotseat (see Appendix A.1).
- Observers with questions about the *analysis and calibration* of their data should contact the STScI Help Desk (see Section 1.5).

10.8 Archival Research Support

STScI provides limited assistance in the reduction and analysis of archived data. Although a Contact Scientist is not usually assigned to a funded AR program, STScI will do so upon request. The CS will serve as a single point of contact to help resolve calibration and data analysis issues. However, proposers should plan to conduct the bulk of their archival research at their home institutions, and should request funds accordingly. Limited resources preclude extensive assistance in the reduction and analysis of data by non-funded archival researchers.

- Archival Researchers with questions about the *retrieval* of data should contact the Archive Hotseat (see Appendix A.1).
- Archival Researchers with questions about the *analysis and calibration* of data should contact the STScI Help Desk (see Section 1.5).

10.9 Visits to STScI

Most GOs will find that they can analyze their data most efficiently at their home institution, using the STScI Help Desk (help@stsci.edu) to illuminate issues that are not clear from the available documentation. However, observers who are new to HST may find it useful to visit STScI for 2-3 days to learn how to deal with their data. Also, in cases of particularly complex or difficult programs, observers may consider visiting STScI before the Phase II deadline.

Expenses for such visits to STScI can be included in budgets for STScI grant funding if they conform to STScI's General Grant Provisions (see Chapter 12 for details).

Visits can be arranged through the STScI Help Desk (see Section 1.5). Observers who visit STScI will be assisted by STScI staff to the extent that resources permit.

10.10 Failed Observations

HST observations fail at a rate of a few percent. Some of these failures result from occasional guide stars that cannot be acquired, or from an instrument anomaly, or the telescope happening to be in a safe mode when a particular observation was scheduled. Such failures, which are obviously beyond the proposer's control, can usually be scheduled for a repeat observation. When this is the case, the proposer receives a notice of the failure and information on obtaining a repeat observation.

A smaller fraction of failures do not have a clear cause, and may not be evident from our internal reviews of data quality. If you believe your observation has failed or is seriously degraded, then you may request a repeat using the Hubble Observation Problem Report (HOPR) Web Form. The HOPR must be filed within 90 days after the observations are taken. In cases where the failure resulted from proposer error (e.g., incorrect target coordinates), a repeat will not be granted. In cases where the failure was a result of incorrect instrument performance, or incorrect information provided by STScI, a repeat is usually granted.

The policies that apply to failures and repeats are described in the Policy Document for the Telescope Time Review Board (TTRB), available on the Web. We wish to emphasize in particular:

- Standard policy dictates that if observations are to be repeated, the degraded/failed observations will be made public.
- If an observer has obtained more than 90% of the planned observations and the missing data are not uniquely important, then a repeat is not normally granted.
- If a snapshot or pure parallel exposure fails during execution it will *not* be repeated, regardless of the cause of the failure.
- Observations taken using Available-but-Unsupported modes that fail due to the use of the unsupported mode will not be repeated.
- Observations that are lost due to bright object violations will not be repeated.

10.11 Publication of HST Results

It is expected that the results of HST observations and Archival Research will be published in the scientific literature. All refereed publications based on HST data must carry the following footnote (with the first phrase in brackets included in the case of Archival Research):

"Based on observations made with the NASA/ESA Hubble Space Telescope, obtained [from the Data Archive] at the Space Telescope Science Institute, which is operated by the Association of Universities for Research in Astronomy, Inc., under NASA contract NAS 5-26555. These observations are associated with program # ____."

If the research was supported by a grant from STScI, the publication should also carry the following acknowledgment at the end of the text:

"Support for program #____ was provided by NASA through a grant from the Space Telescope Science Institute, which is operated by the Association of Universities for Research in Astronomy, Inc., under NASA contract NAS 5-26555."

The relevant proposal ID should be entered in these phrases where indicated.

Because of the importance of maintaining the accuracy and completeness of the HST bibliography, a link to an electronic version of each preprint of publications based on HST research should be sent via email to the following addresses:

- Chief Institute Librarian, Space Telescope Science Institute, 3700 San Martin Dr., Baltimore, MD 21218, USA (library@stsci.edu)
- Dr. David Leckrone, Senior Scientist, HST Project, Code 440, Goddard Space Flight Center, Greenbelt, MD 20771 USA (dleckrone@hst.nasa.gov).
- Office of Public Outreach, STScI, 3700 San Martin Drive, Baltimore, MD 21218, USA (villard@stsci.edu).

Note that this requirement includes both refereed and non-refereed publications, but *not* abstracts or poster papers. As soon as links are received, they are entered into the publicly available bibliography http://stepsheet.stsci.edu.

10.12 Dissemination of HST Results

We remind HST observers that they have a responsibility to share interesting results of their HST investigations with the public at large. The Office of Public Outreach (OPO) of STScI is available to help observers use their HST data for public information and education purposes. Proposers can find guidelines and examples of these activities on the OPO Web page that discusses the Release of Scientific Findings to the Public.

The Hubble Heritage project aims to give wide exposure to HST observations that are visually stimulating to the lay public. Investigators who feel that their data may be relevant to the Hubble Heritage project, either as-is, or with a small investment of extra observing time (for example to obtain an extra waveband) are encouraged to send an email to heritage@stsci.edu. Information on the project is available at the Hubble Heritage Project Web Page.

CHAPTER 11:

Education & Public Outreach Proposals

In this chapter . . .

11.1 NASA SMD E/PO Policies / 101
11.2 HST E/PO Proposals / 102
11.3 The Initiative to Develop Education Through Astronomy and Space Science (IDEAS) Grant Program / 103

11.1 NASA SMD E/PO Policies

The National Aeronautics and Space Administration (NASA) and its Science Mission Directorate (SMD) have developed a comprehensive approach to providing education and public outreach (E/PO) to enhance the public's understanding of space science. NASA and the SMD have incorporated those objectives as integral components of all missions and research programs. The documents that establish the basic E/PO policies and guidelines are as follows:

- Partners in Education: A Strategy for Integrating Education and Public Outreach into NASA's Space Science Programs (March 1995) [http://spacescience.nasa.gov/admin/pubs/edu/educov.htm],
- Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy (October 1996) [http://space-science.nasa.gov/admin/pubs/edu/imp_plan.htm], and
- An explanatory Guide to NASA Office of Space Science Education and Public Outreach evaluation Criteria (March 2004) [http://ssibroker.colorado.edu/Broker/Eval_criteria/Guide/Guide3_0.Final.pdf].

All of these documents can be found at the NASA Science Web site, http://science.hq.nasa.gov/research/guidelines.html.

11.2 HST E/PO Proposals

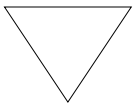
In accordance with NASA SMD E/PO policies, a portion of the HST Cycle 16 budget has been allocated for E/PO funding. STScI is announcing the opportunity for *accepted* U.S. HST Cycle 16 General Observers, Archival, Theory, and Snapshot researchers and current Hubble Fellows to submit proposals for an E/PO supplement to the parent research program to develop an education program related to their research. Guaranteed Time Observers (see Section 3.9) are not eligible to apply for an HST Cycle 16 E/PO Grant.

The spirit of the HST Cycle 16 E/PO Grant Program is to encourage collaborative efforts between professional astronomers/space scientists and professional educators that would broaden the knowledge and understanding of the latest discoveries of the Hubble Space Telescope. The HST Cycle 16 E/PO proposal must have clear intellectual linkage to the science and/or science theme of the parent research program(s).

There are three HST Cycle 16 E/PO funding categories:

- Individual - an HST Cycle 16 GO/AR/SNAP Principal Investigator or Co-Investigator may request up to $20,000 for an E/PO program. A current Hubble Fellow may also request up to $20,000 for an E/PO program.
- Teamed - A maximum of three (3) science research programs can team together, including Hubble Fellows, at $20,000 each, for up to $60,000.
- Treasury - Programs may request up to $50,000 but are not able to request a larger funding amount through a teamed effort.

NASA SMD and STScI encourage awarded HST Cycle 16 GO/AR/SNAP programs and current Hubble Fellows to give serious consideration to this opportunity.



The deadline for submitting an HST Cycle 16 E/PO proposal is Friday 18 August 2007 at 5:00 p.m. EDT. The HST Cycle 16 E/PO Grant Program's Call for Proposals will be available on the program's Web site at the end of June 2007. For more information or questions about the HST E/PO Grant program, please send email to cycle_epo@stsci.edu.

11.2.1 Assistance for the Preparation of E/PO Proposals

NASA's SMD has established a nation-wide E/PO Support Network, whose purpose is to directly aid investigators in identifying and developing high quality E/PO opportunities. The E/PO Support network includes Forums that represent SMD science themes and Broker/Facilitators who represent geographical regions of the country. Prospective proposers are strongly encouraged to make use of the E/PO Support Network to help identify suitable opportunities and arrange appropriate alliances. This infrastructure provides coordination, background, and linkages that would foster partnerships between the space science and E/PO communities, as well as the services needed to establish and maintain a vital national, coordinated, long-term E/PO program. Information on how to contact a Forum and Broker representative can be found at http://science.hq.nasa.gov/research/ecosystem.htm.

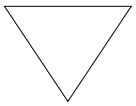
Note: Forums and Broker/Facilitators have been established to provide help, but the proposer is fully responsible for the development of the EPO program as well as writing the proposal.

11.3 The Initiative to Develop Education Through Astronomy and Space Science (IDEAS) Grant Program

The IDEAS Grant Program provides start-up funding for innovative, creative education and public outreach projects that feature active collaboration between astronomers/space scientists and formal education/informal education professionals. Through this effort, the IDEAS objective is to enhance science, mathematics and/or technology education in the United States for K-14 students, teachers and the general public by promoting partnerships that explore new ways to translate astronomy and space science into contexts that will educate and stimulate the interest of students, teachers and the general public.

The range of funding available through the IDEAS Grant Program is:

- Up to $20,000 for programs to be completed in one year. (Programs may request additional time, up to two years, due to school schedules, etc. which the panel review will consider.); OR
- From $20,001 to $50,000 for programs which may request up to two years to complete.



The proposal submission deadline is Friday, 19 October 2007 at 5:00 p.m. ET. The 2007 Call for Proposals will be available on the IDEAS Web site in July 2007. For more information about the IDEAS Grant Program, please send email to ideas@stsci.edu.

CHAPTER 12:

Grant Funding and Budget Submissions

In this chapter . . .

12.1 Overview / 105
12.2 Eligibility for STScI Grant Funds / 106
12.3 Allowable Costs / 107
12.4 Grant Period / 108
12.5 Award of Funds / 108

12.1 Overview

Subject to availability of funds from NASA, STScI will provide financial support to eligible investigators of approved Cycle 16 programs. Such funding is awarded under the general conditions contained in the document General Grant Provisions of the Space Telescope Science Institute, referred to hereafter as the 'General Grant Provisions'. The most recent version of this document is available at the STScI Grants Administration Office Web Page.

Budgets are not due in Phase I, but are required in Phase II from successful (GO, SNAP, AR, Theory and E/PO) U.S. proposers only. Separate budgets must be submitted by all investigators who request funding. Investigators who are not eligible for or who do not request funding do not need to send a budget. Detailed instructions for budget preparation and submission using the Grants Management System will be sent to successful proposers after the Phase I review has been completed.

Joint HST-Spitzer Programs will be funded separately by both the STScI and the SSC, following their respective funding policies. Details of the SSC funding policies are given in the Spitzer Cycle 4 Call for Proposals and at http://ssc.spitzer.caltech.edu/funding/. Similarly, Joint HST-Chandra Programs will be funded separately by both the STScI and the CXC, following their respective policies. Details of the CXC funding policies are given in the Chandra Cycle 9 Call for Proposals and at http://cxc.harvard.edu/proposer/.

Below we present a brief overview of the STScI funding policies and procedures. The information presented here is of an introductory nature only, and is not intended to be complete. The governing policies are always those contained in the General Grant Provisions. Investigators preparing AR or Theory Proposals should not include any costs that violate the General Grant Provisions in the total dollar amount (see Section 8.6.3) and budget narrative (see Section 9.7) of their Phase I proposal.

Questions concerning funding policies and budget submissions should be directed to the STScI Grants Administration Office (see Appendix A.1).

12.2 Eligibility for STScI Grant Funds

Proposals for funding will be accepted from Universities and other nonprofit research institutions, private for-profit organizations, Federal employees, and unaffiliated scientists. *Only U.S. PIs and CoIs* are eligible to request funding.

U.S. Investigators are defined to be those investigators that fall in one of the following categories:

- U.S. Citizens residing in the U.S., or abroad if salary and support are being paid by a U.S. institution.
- U.S. Permanent residents and foreign national scientists working in and funded by U.S. institutions in the U.S.

These definitions include U.S. CoIs on observing projects with non-U.S. PIs.

Proposals by non-U.S. PIs that have one or more U.S. CoIs *must* designate one of the U.S. CoIs as the 'Administrative PI' (see Section 8.13). This person will have overall oversight and responsibility for the budget submissions of the U.S. CoIs.

When a U.S. investigator obtains grant funds for a project that also involves non-U.S. investigators, then no funding may flow through the U.S. investigator to the non-U.S. investigators.

12.3 Allowable Costs

Support may be requested for the acquisition, calibration, analysis, and publication of HST data, and related costs. Costs of the following types may be acceptable, if they conform to the General Grant Provisions:

- Salaries and wages.
- Costs for individuals providing research assistance, such as graduate students, post-doctoral research associates or science data aides.
- Fringe benefits.
- Publication costs.
- Travel.
- Computer services. Note that PIs of Large and Treasury Programs may be able to take advantage of the data processing infrastructures at STScI. This possibility would typically be explored during the budget submission process. See the HST Large Programs Web Page for a technical description of this opportunity.
- Permanent equipment.
- Materials and supplies.
- Indirect costs.
- Funds to support ground-based observations.

Some of these costs should not amount to more than a certain absolute amount, or percentage of the total budget (this is the case, e.g., for funds to support ground-based observations). Please refer to the General Grant Provisions for details.

For-profit organizations should note that profit is not an allowable cost.

Preparatory funding may be requested if necessary to prepare for the receipt of HST data. Proposers may request up to 25% of the funds for their programs to be awarded prior to the start of the Cycle 16 observing schedule. Preparatory funds are part of the overall funding allocated for the program, and are not additional funds. Note that all pre-award expenditures are incurred at the risk of the investigator, and that all funding is contingent upon the availability of funds from NASA at the time the award is made.

12.4 Grant Period

It is anticipated that STScI will award funding for a period of one to two years, depending on the nature and complexity of the project. If the requested support is for more than one year, funding for the project will be on an annual basis, with additional funding for each subsequent grant year awarded after a favorable review of an annual performance report that will be required.

Long-term projects that are approved for more than one cycle of observations will be funded on an annual basis. A budget for the analysis of current cycle observations must be submitted with an estimate of the funding requirements for subsequent cycles. Funding for subsequent cycles will be provided through an amendment to an existing STScI grant after the receipt of a detailed budget for each subsequent cycle by the budget deadline for that cycle.The Institute may request confirmation from PIs that the originally proposed allocation of funds among Co-investigator institutions remains appropriate after the first year of the multi-year program, and honor PI requests for readjustments that fit within the originally proposed total budget.

12.5 Award of Funds

Near the start of Cycle 16, each PI or Administrative PI of a program that has requested funding will receive notification from the STScI Director concerning the specific funding allocation. It is anticipated that requested preparatory funding will be awarded soon thereafter. Additional funding up to the approved funding allocation will be awarded after the receipt of observational data for the given program.

APPENDIX A:

Contact Information

In this appendix . . .

A.1 Space Telescope Science Institute / 109
A.2 Space Telescope - European Coordinating Facility / 110
A.3 Canadian Astronomy Data Centre / 111

A.1 Space Telescope Science Institute

Internet:
http://www.stsci.edu/

Address:
3700 San Martin Drive, Baltimore, Maryland 21218, USA

Telephone:
[1] 410-338-xxxx (where xxxx is the extension number)
Main switchboard extension: 4700

Fax:
ext: 4767

STScI Help Desk:
ext: 1082; email: help@stsci.edu
from within the U.S. and Canada, call toll-free: 1-800-544-8125

Archive Hotseat:
ext: 4547; email: archive@stsci.edu

Director's Office:
Director: Matt Mountain; ext: 4710; email: mmountain@stsci.edu

Science Policies Division:

Head: I. Neill Reid; ext: 4971; email: inr@stsci.edu
Technical Manager: Brett Blacker; ext: 1281; email: blacker@stsci.edu

Grants Administration Office:

Manager: Elyse Wagner; ext: 4200; email: wagner@stsci.edu
Branch Chief: Ray Beaser; ext: 4200; email: beaser@stsci.edu

Office of Public Outreach:

Head: Jim Manning; ext: 4714; email: jmanning@stsci.edu

Observation and Data Management Division:

Observation Planning Branch Chief**:** Denise Taylor; ext: 4824; email: dctaylor@stsci.edu

Instruments Division:

ACS Group Lead: Kenneth Sembach; ext 5051; email: sembach@stsci.edu

WFPC2 Group Lead: John Biretta; ext 4917; email biretta@stsci.edu
NICMOS Group Lead: Keith Noll; ext 1828; email: noll@stsci.edu
STIS Group Lead: Paul Goudfrooij; ext 4981; email: goudfroo@stsci.edu

A.2 Space Telescope - European Coordinating Facility

Internet:

http://www.stecf.org/

Address:

ST-ECF, European Southern Observatory, Karl-Schwarzschild-Strasse 2, D-85748 Garching bei München, Germany

Telephone:

[49] 89-320-06-291

Fax:

[49] 89-320-06-480

Email:

stdesk@eso.org

Comments:

The ST-ECF provides assistance to HST users in Europe. The ST-ECF produces a Newsletter, which, although aimed primarily at European HST users, includes articles of general interest to the HST community. To receive the Newsletter, send full name and postal address to the ST-ECF email address.

A.3 Canadian Astronomy Data Centre

Internet:

http://cadcwww.hia.nrc.ca/

Address:

CADC, Dominion Astrophysical Observatory, 5071 W. Saanich Rd., Victoria, B.C. V8X 4M6, Canada

Telephone:

[1] 604-363-0025

Email:

cadc@dao.nrc.ca

Comments:

The CADC provides assistance to HST users in Canada.

APPENDIX B:

Scientific Keywords

The Tables in this Appendix list the Scientific Keywords that are valid for use in the Phase I proposal template (see Section 8.9).

Table B.1:Generic Keywords

ASTROMETRY	DYNAMICS
CHEMICAL ABUNDANCES	EVOLUTION
DYNAMICS	RADIATIVE TRANSFER
DUST	VARIABILITY

Table B.2:Solar System Keywords

ASTEROIDS	PLANETARY SATELLITES
COMETS	SUPPORT OF NASA PLANETARY MISSIONS
GIANT PLANETS	SURFACES OF PLANETS/MOONS/OTHER
KUIPER BELT OBJECT	TERRESTRIAL PLANETS
PLANETARY ATMOSPHERES	

Table B.3:Galactic Keywords

ATMOSPHERES AND CHROMOSPHERES	OPEN STAR CLUSTERS
CENTRAL STARS OF PLANETARY NEBULAE	PLANETARY NEBULAE
CLUSTER BINARY STARS AND BLUE STRAGGLERS	PROTO-PLANETARY DISKS
DETACHED BINARIES	PROTO-PLANETARY NEBULAE
ECLIPSING BINARIES	STELLAR ACTIVITY
ERUPTIVE BINARY STARS AND CATACLYSMIC VARIABLES	STELLAR EVOLUTION AND MODELS
EXTRA-SOLAR PLANETS	SUPERNOVA REMNANTS
GALACTIC BULGE	T TAURI STARS
GALACTIC CENTER	UV-BRIGHT STARS
GALACTIC HALO	VARIABLE AND PULSATING STARS
GALACTIC STRUCTURE	VERY LOW MASS STARS AND BROWN DWARFS
GIANTS AND AGB STARS	WHITE DWARFS
HERBIG-HARO OBJECTS	WINDS/OUTFLOWS/MASS-LOSS
LOW-MASS AND COOL STARS	WOLF-RAYET STARS
MAIN SEQUENCE STARS	X-RAY BINARIES
MASSIVE STARS	YOUNG STARS AND PROTOSTELLAR OBJECTS
NEUTRON STARS AND PULSARS	
NOVAE	

Table B.4:Galactic or Extra-Galactic Keywords

ACCRETION DISKS	JETS
BLACK HOLES	MICROLENSING
DARK MATTER	MOLECULAR CLOUDS
GLOBULAR CLUSTERS	STAR FORMATION
H II REGIONS	RESOLVED STELLAR POPULATIONS
INTERSTELLAR AND INTERGALACTIC MEDIUM	

Table B.5:Extra-Galactic Keywords

AGN PHYSICS	HUBBLE DEEP FIELDS
BAL QUASARS	INTERACTING AND MERGING GALAXIES
CLUSTERS OF GALAXIES	INTRACLUSTER MEDIUM
COOLING FLOWS	IR-LUMINOUS GALAXIES
COSMOLOGICAL PARAMETERS AND DISTANCE SCALE	IRREGULAR GALAXIES
DAMPED LYMAN-ALPHA ABSORPTION SYSTEMS	LARGE SCALE STRUCTURE AND PECULIAR VELOCITIES
DWARF GALAXIES	LOCAL GROUP GALAXIES
ELLIPTICAL GALAXIES	MAGELLANIC CLOUDS
GALAXY BULGES	LOW SURFACE BRIGHTNESS GALAXIES
GALAXY CENTER	LYMAN-ALPHA FOREST CLOUDS
GALAXY DISKS	METAL ABSORPTION SYSTEMS
GALAXY FORMATION AND EVOLUTION	RADIO GALAXIES
GALAXY HALOS	RADIO-LOUD QUASARS
GALAXY MORPHOLOGY AND STRUCTURE	RADIO-QUIET QUASARS
GAMMA-RAY BURSTS	SEYFERT GALAXIES
GLOBULAR CLUSTER SYSTEMS	SPIRAL GALAXIES
GRAVITATIONAL LENSING	STARBURST GALAXIES
GROUPS OF GALAXIES	STELLAR POPULATIONS IN EXTERNAL GALAXIES
HIGH REDSHIDT GALAXIES	SU{ERNOVAE
HOST GALAXIES	YOUNG STAR CLUSTERS IN EXTERNAL GALAXIES

APPENDIX C:

Glossary of Acronyms and Abbreviations

ACIS	AXAF CCD Imaging Spectrometer
ACS	Advanced Camera for Surveys
APT	Astronomer's Proposal Tool
AR	Archival Research
ATP	Astrophysics Theory Program
AURA	Association of Universities for Research in Astronomy, Inc.
CADC	Canadian Astronomy Data Centre
CCD	Charge-Coupled Device
CoI	Co-Investigator
CPAR	Coordinated Parallel Observation
CS	Contact Scientist
CVZ	Continuous Viewing Zone
CXC	Chandra X-ray Center
DD	Director's Discretionary
DEC	Declination
DUP	Duplicate Observation
EDT	Eastern (U.S.) Daylight Time
E/PO	Education/Public Outreach

ESA	European Space Agency
EST	Eastern (U.S.) Standard Time
FGS	Fine Guidance Sensor(s)
FTP	File Transfer Protocol
FUV	Far Ultraviolet
GO	General Observer
GSFC	Goddard Space Flight Center
GTO	Guaranteed Time Observer
HDF	Hubble Deep Field
HET	Hobby-Eberly Telescope
HOPR	Hubble Observation Problem Report
HRC	High Resolution Channel (on ACS) or High Resolution Camera (on Chandra)
HST	Hubble Space Telescope
HTML	Hyper Text Markup Language
IDEAS	Initiative to Develop Education through Astronomy and Space Science
IR	Infrared
LOW	Low Sky Background
MAMA	Multi-Anode Microchannel Array
MAST	Multi-mission Archive at Space Telescope
MMT	Multiple Mirror Telescope
MSD	NASA Mission Science Directorate
NASA	National Aeronautics and Space Administration
NICMOS	Near Infrared Camera and Multi-Object Spectrometer
NOAO	National Optical Astronomy Observatory
NUV	Near Ultraviolet
NVO	National Virtual Observatory
OS	Observation Summary

PAEC	Planned and Archived Exposures Catalog
PC	Planetary Camera or Program Coordinator
PDF	Portable Document Format
PI	Principal Investigator
PPAR	Pure Parallel Observation
RA	Right Ascension
SAA	South Atlantic Anomaly
SBC	Solar Blind Channel
SHD	Shadow Time
SM	Servicing Mission
SMD	Science Mission Directorate
SNAP	Snapshot
SSC	Spitzer Science Center
STAC	Space Telescope Advisory Committee
ST-ECF	Space Telescope - European Coordinating Facility
STIS	Space Telescope Imaging Spectrograph
STScI	Space Telescope Science Institute
STSDAS	Space Telescope Science Data Analysis Software
TAC	Telescope Allocation Committee
TOO	Target of Opportunity
U.S.	United States
UTC	Coordinated Universal Time
UV	Ultraviolet
VTT	Visual Target Tuner
WFC	Wide Field Camera (on WFPC2) or Wide Field Channel (on ACS)
WF/PC	Wide Field and Planetary Camera 1
WFPC2	Wide Field and Planetary Camera 2

APPENDIX D:

Internet Links

APT (Astronomer's Proposal Tools)

http://apt.stsci.edu/

Archival Pure Parallel Program

http://www.stsci.edu/instruments/parallels/

Canadian Astronomy Data Centre

http://cadcwww.hia.nrc.ca/

Chandra Proposer Information

http://asc.harvard.edu/proposer/

Chandra X-ray Observatory

http://chandra.harvard.edu/

Chandra X-ray Center (CXC)

http://asc.harvard.edu/

Cycle 15 Approved Programs

http://www.stsci.edu/hst/proposing/exp_abstract-catalogs/cycle15-approved-programs

Cycle 16 Announcement Web Page

http://www.stsci.edu/hst/proposing/docs/cycle16announce

Data Archive

http://archive.stsci.edu/

Data Archive Registration

http://archive.stsci.edu/registration.html

Data Handbook

http://www.stsci.edu/hst/HST_overview/documents/datahandbook

DD Submission Web Page

http://www.stsci.edu/hst/proposing/docs/dd-submission/

Duplication Checking

http://archive.stsci.edu/cgi-bin/duplication

Explanatory Guide to the NASA Office of Space Science Education & Public Outreach Evaluation Criteria

http://ssibroker.colorado.edu/Broker/Eval_criteria/Guide/Default.htm

General Grant Provisions of the Space Telescope Science Institute

http://www.stsci.edu/ftp/stsci/grants/ggp302.pdf

Grants Administration Office

http://www.stsci.edu/institute/brc/ga

Grants Management System

http://gms.stsci.edu/

Great Observatories Origins Deep Survey (GOODS)

http://www.stsci.edu/science/goods/

HST Archive Data Retrieval Options

http://archive.stsci.edu/hst/help/retrieval_help.html

HST E/PO Program

http://cycle-epo.stsci.edu/

HST Instruments Web Page

http://www.stsci.edu/hst/HST_overview/instruments

HST Primer

http://www.stsci.edu/hst/proposing/documents/cp/primer_cover_.html

HST Program Information

http://www.stsci.edu/hst/scheduling/program_information

HST Proposal Catalogs

http://archive.stsci.edu/hst/catalogs.html

HST Proposal Support Web Page

http://archive.stsci.edu/hst/prop_support.html

HST TAC review

http://www.stsci.edu/institute/org/spd/spd-reports/tpac-report

HST Treasury, Archival Legacy and Large Programs

http://archive.stsci.edu/hst/tall.html

Hubble Deep Field (HDF)

http://www.stsci.edu/ftp/science/hdf/hdf.html

Hubble Deep Field-South (HDF-S)

http://www.stsci.edu/ftp/science/hdfsouth/hdfs.html

Hubble Heritage Project

http://heritage.stsci.edu/

Hubble Observation Problem Report (HOPR)

http://www.stsci.edu/hst/programs/major_changes

Hubble Second Decade Committee Treasury Program Report

http://sco.stsci.edu/second_decade/recommendations/index.html

Hubble Ultradeep Field (UDF)

http://www.stsci.edu/hst/udf

IDEAS (Initiative to Develop Education through Astronomy and Space Science)

http://ideas.stsci.edu/

International Virtual Observatory Alliance

http://www.ivoa.net/

Large and Treasury Programs

http://www.stsci.edu/hst/proposing/LargePrograms/

Large Searches and Requests Web Page

http://archive.stsci.edu/hst/bigsearch_request.html/

Multi-mission Archive at STScI (MAST)

http://archive.stsci.edu/

NASA Science Mission Directorate (SMD) (formerly OSS)

http://science.hq.nasa.gov/

NASA SMD EPO Support Network

http://science.hq.nasa.gov/research/ecosystem.htm

NASA Strategic Planning and Policy

http://science.hq.nasa.gov/

NASA Strategic Plan 2003

http://www.nasa.gov/pdf/1968main_strategi.pdf

National Astronomical Observatory of Japan

http://dbc.nao.ac.jp/

National Optical Astronomy Observatory (NOAO)

http://www.noao.edu/

NOAO/NASA Collaboration Web Page

http://www.noao.edu/gateway/nasa/

Origins Forum

http://origins.stsci.edu/

NASA SMD EPO Strategy

http://science.hq.nasa.gov/research/epo.htm#strategy

Parallel Observations User Information Report

http://www.stsci.edu/hst/HST_overview/documents/

Phase I Proposal Roadmap

http://apst.stsci.edu/apt/external/help/roadmap1.html

Phase II proposal Instructions

http://www.stsci.edu/public/p2pi.html

Planned and Archived Exposures Catalog

http://archive.stsci.edu/hst/catalogs.html

Policy Document for the Telescope Time Review Board (TTRB)

http://www.stsci.edu/hst/HST_overview/documents/UIR/UIR_policy_0207

Release of Scientific Findings to the Public

http://outreachoffice.stsci.edu/news/newspolicy.shtml

Scientific Instruments

http://www.stsci.edu/hst/HST_overview/instruments

Spitzer Approved Programs

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

Spitzer Science Center (SSC)

http://ssc.spitzer.caltech.edu

SNAP User Information Report

http://www.stsci.edu/hst/HST_overview/documents/

Space Science Enterprise 2000 Strategic Plan

http://spacescience.nasa.gov/admin/pubs/strategy/2003/

Space Telescope - European Coordinating Facility

http://www.stecf.org/

Space Telescope Science Data Analysis Software (STSDAS)

http://www.stsci.edu/resources/software_hardware/stsdas

Space Telescope Science Institute

http://www.stsci.edu/

StarView

http://starview.stsci.edu/

Treasury Program Advisory Committee

http://www.stsci.edu/institute/org/spd/spd-reports/tpac-members

Two-Gyro Science Mode Web Page

http://www.stsci.edu/hst/HST_overview/TwoGyroMode

Two-Gyro Science Mode Handbook

http://www.stsci.edu/hst/HST_overview/TwoGyroMode/handbook/cover.html

US National Virtual Observatory

http://www.us-vo.org/

Visual Observation Layout Tool (VOLT)

http://aaaprod.gsfc.nasa.gov/VOLT/WebSite/home.cfm