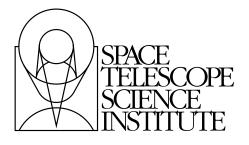
Hubble Space Telescope Call for Proposals for Cycle 14

Policies, Procedures & Phase I Proposal Instructions



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

Call for Proposals

We invite scientists to participate in Cycle 14 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 about 3000 orbits in Cycle 14, including up to 1000 orbits for Large and Treasury proposals, with the remainder allocated to regular GO Programs. An additional 500-1000 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: Friday January 21, 2005, 8:00 pm EST.
- E/PO: Friday August 19, 2005, 5:00 pm EDT.

Where to Get Help

- Read this Call for Proposals and the HST Primer (see Section 1.4.3)
- 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 Duccio Macchetto (Division Head), Mike Fall, Claus Leitherer, Neill Reid, Eva Villaver, Bob Williams, Technical Manager Brett Blacker, and Administrative Assistants Darlene Spencer, Lisa Spurrier and Loretta Willers.

The Cycle 14 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 14	2
1.3 General Guidelines for Proposal Preparation	
1.4 Resources, Documentation and Tools	5
1.4.1 Cycle 14 Announcement Web Page	5
1.4.2 Two-Gyro Science Mode Web Page	
1.4.3 HST Primer	
1.4.4 Instrument Handbooks	6
1.4.5 The Astronomer's Proposal Tools (APT)	6
1.4.6 Exposure Time Calculators (ETCs)	6
1.4.7 The Visual Target Tuner (VTT)	7
1.4.8 HST Data Archive	
1.4.9 Duplication checking	8
1.5 STScI Help Desk	٤
1.6 Organization of this Document	٤
1.6.1 Policies, Procedures and General Information	٤
1.6.2 Preparing and Submitting Your Proposal	٤
1.6.3 Information Pertaining to Accepted Proposals	g
1.6.4 Appendices	g
Chapter 2:	
Proposal Submission Policies	11
2.1 The Proposal Process: Phase I and Phase II	
2.2 Deadlines	
2.3 Who May Submit	
2.3.1 Principal Investigator and Co-Investigators	
2.3.2 ESA Scientists	
2.3.3 Student Pls	
2.0.0 Gludofft i 10	10

2.4 Institutional Endorsement	14
2.5 Funding	14
2.6 Proposal Confidentiality	14
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	
3.2.2 Large GO Programs	
3.2.3 Long-Term GO Programs	
3.2.4 Treasury GO Programs	19
3.3 Snapshot (SNAP) Proposals	22
3.3.1 Characteristics of SNAPs	23
3.3.2 Guidelines for SNAP Programs	23
3.4 Archival Research (AR) Proposals	25
3.4.1 Regular AR Proposals	26
3.4.2 Legacy AR Proposals	27
3.4.3 Guidelines for AR Programs	28
3.4.4 Suggestions for AR Proposals	
3.5 Theory Proposals	
3.6 Calibration Proposals	31
3.7 Joint HST-Chandra Observing Proposals	33
3.8 Joint HST-NOAO Observing Proposals	34
3.9 Joint HST-Spitzer Observing Proposals	35
3.9.1 Regular HST-Spitzer Observing Programs	35
3.9.2 Collaborative HST-Spitzer Observing Programs	36
3.10 Director's Discretionary (DD) Time Proposals	
3.11 Guaranteed Time Observer Programs	39
Chapter 4:	
Observation Types and Special Requi	re-
ments	
4.1 Primary Observations	41
4.1.1 Continuous Viewing Zone (CVZ) Observations	
4.1.2 Target-of-Opportunity (TOO) Observations	
4.1.3 Solar System Targets	

4.1.4 Observations of Targets that have not yet been dis	COV-
ered or identified	
4.1.5 Time-Critical Observations	
4.1.6 Real-Time Interactions	
4.2 Parallel Observations	48
4.2.1 Coordinated Parallel Observations	48
4.2.2 Pure Parallel Observations	
4.2.3 Restrictions and Limitations on Parallel Observation50	ns
4.3 Special Calibration Observations	51
Chapter 5:	
Data Rights	
and Duplications	53
5.1 Data Rights	
5.2 Policies and Procedures Regarding	55
Duplications	5 1
5.2.1 Duplication Policies	
5.2.2 How to Check for Duplications	
5.2.2 Flow to officor for Euphoditorio	00
Chapter 6:	
Proposal Selection	
Procedures	57
6.1 How STScI Evaluates Submitted Proposals	
6.1.1 The Review Panels	
6.1.2 The Telescope Allocation Committee (TAC)	
6.2 Two Gyro Observations	
6.3 Selection Criteria	
0.5 Selection Ontena	60
Chapter 7:	
Guidelines and Checklist for Phase I	
Proposal Preparation	63
7.1 General Guidelines	
7.1.1 Deadline	
7.1.2 Phase I Proposal Format	
7.1.3 Page Limits for PDF Attachment	
7 2 Proposal Preparation Checklist	66

10.6.1 Unschedulable or Infeasible Programs	
10.7 Access to Data Products	
10.8 Archival Research Support	
10.9 Visits to STScI	
10.10 Failed Observations	
10.11 Publication of HST Results	
10.12 Dissemination of HST Results	104
Chapter 11:	
Education & Public Outreach Pro	posals
105	, 10 0 0 0 0 0 0 0 0
11.1 NASA SMD E/PO Policies	105
11.2 HST E/PO Proposals	
11.2.1 Assistance for the Preparation of E/PO	
Proposals	
11.3 The Initiative to Develop Education Thro	
tronomy and Space Science (IDEAS) Grar	it Program
107	
Chapter 12:	
Grant Funding and Budget Subm	issions
109	
12.1 Overview	109
12.2 Eligibility for STScI Grant Funds	110
12.3 Allowable Costs	111
12.4 Grant Period	112
12.5 Award of Funds	112
Appendix A:	
Contact Information	112
A.1 Space Telescope Science Institute A.2 Space Telescope - European Coordinatir	
114	ig i acility
A.3 Canadian Astronomy Data Centre	115
A.4 National Astronomical Observatory of Jap	
Appendix B:	

Scientific Keywords	116
Appendix C: Glossary of Acronyms	and Abbreviations
119	
Appendix D: Internet Links	122

CHAPTER 1:

General Information

In this chapter . . .

1.1 About this Document / 1

1.2 New and Important Features of Cycle 14 / 2

1.3 General Guidelines for Proposal Preparation / 4

1.4 Resources, Documentation and Tools / 5

1.5 STScI Help Desk / 8

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 14

- The Space Telescope Imaging Spectrograph (STIS) suspended operations on 3 August 2004. A full investigation is currently under way, but at the present juncture it appears very unlikely that STIS will be available for scheduling in Cycle 14. Proposals to use STIS will not be distributed for review unless it is clear at the submission deadline (21 January 2005) that STIS will be operational in Cycle 14. Users should check the STIS web page for the most recent information.
- Cycle 14 will start nominally in July 2005 and have a duration of one year.



HST may be forced to switch from three-gyro to two-gyro mode operations during the course of Cycle 14. This will affect both scheduling efficiency and scientific performance. A number of changes have been instituted in both the proposal format and the review process to take this eventuality into account. The relevant sections in this document are flagged with this symbol.

• HST normally uses three gyros of the six installed to provide accurate pointing information. Gyro availability is predicted based on a model which includes both random and wear-out failure modes. Current predictions indicate a 50% chance that HST will be reduced to only 2 operating gyros by April 2006. HST Project personnel at GSFC and STScI are developing a "Two-Gyro Science" mode that will be used to extend the useful lifetime beyond this point. Full details can be found in "The HST Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Handbook", available from the Two-Gyro Science Mode Web Page. In order to maximize scientific efficiency in the three-gyro/two-gyro transition, assessing the likely

impact of two-gyro operations on their science and indicating how they would ameliorate that impact. The latter process might involve longer exposure times, fewer targets and/or a larger total number of orbits. Details on the required additional information are given in Section 8.6 and Section 9.3. The information will be used by the review panels to determine a parallel two-gyro ranking for each proposal, as summarized in Section 6.2. The Two-Gyro Science Mode Web Page will be updated as new information becomes available, so proposers are encouraged strongly to visit that site during the proposal-writing period.

- Proposers submitting multi-cycle proposals should assume two-gyro operations for Cycles 15 and 16.
- STScI experience with scheduling Large and Treasury Programs in Cycles 11 and 12 has shown that some of those 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 to provide information on the scheduling aspects of their program.
- STScI has entered into a collaborative agreement with the Spitzer Science Center for the allocation of complementary Spitzer time to successful HST observing proposals. Section 3.9 describes two new proposal categories: Joint HST-SSC proposals, which include a request for less than 50 hours of Spitzer observations; and Collaborative HST-Spitzer proposals, which request a substantial allocation of HST orbits and more than 50 hours of Spitzer observations. The latter proposals will also be subject to review by the Spitzer Time Allocation Committee.

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

The Phase I proposal deadline for Cycle 14, which fell in early September in Cycles 1 to 12, is January 21, 2005. Since the start of the cycle will continue to be in July, this change will shorten the time interval between the submission of observing proposals and the scheduling of the observations. This has important advantages. The pace of discoveries in astronomy has quickened and the possibility of writing proposals closer to the beginning of the observing cycle will allow the latest developments to be folded fully into the current round of proposals. Also, it will now be possible to write proposals that are based on data obtained early in the current observing cycle, thus making cogent follow-up proposals more likely.

- Starting in Cycle 12, a java-based software tool, APT (the Astronomer's Proposal Tools; see Section 1.4.5) is the new 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 submit your Cycle 14 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 14 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 2004). Proposals for the Space Telescope Imaging Spectrograph (STIS) may be submitted, but will be distributed for review only if it is clear at the submission deadline, 21 January 2005, that STIS will be operational in Cycle 14.
- 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 3.2.4), 'Theory Proposals' (see Section 3.5) 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 3.7) or NOAO telescopes (see Section 3.8) 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 14 Announcement Web Page

The Cycle 14 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.

Two-Gyro Science Mode Web Page 1.4.2



The Two-Gyro Science Mode Web Page provides links to documentation on the Two-Gyro Mode being developed by the HST Project at GSFC and STScI. The HST Two-Gyro Handbook summarizes the likely impact of two-gyro operations on the scientific performance of each HST instrument and on scheduling efficiency. Additional reports will provide updated information as it becomes available. Proposers are encouraged strongly to check this website frequently. Relevant information will be revised and updated throughout the proposal submission period. The final website updates will be made on 15 December 2004, five weeks before the submission deadline.

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 14 Announcement Web Page.

1.4.4 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. 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.

1.4.5 The Astronomer's Proposal Tools (APT)

In a continuing effort to streamline our systems and improve service to the science community, STScI developed and released the Astronomer's Proposal Tools (APT) in Cycle 12. This java-based software tool is now the interface for all Phase I and Phase II proposal submissions for HST. It brings state of the art technology and more visual tools into the hands of proposers to optimize the scientific return of their programs. APT helps to decrease the time between Phase I and the start of the observing cycle. The Cycle 14 version of APT has some minor bug fixes and enhancements included, but is basically the same system that was used in Cycle 13. See the What's New button in APT for details on the changes. The <u>APT Web Page</u> contains information on the installation and use of APT.

1.4.6 Exposure Time Calculators (ETCs)

STScI provides Exposure Time Calculators (ETCs) for each of the HST instruments. Please use these 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. Exposure Time Calculators will be available to compute exposure times for both three-gyro and two-gyro observations.

1.4.7 The Visual Target Tuner (VTT)

The Visual Target Tuner (VTT) displays HST apertures and fields of view that are superimposed on sky images. The VTT is available as both an integrated and a stand alone tool within the Astronomer's Proposal Tools (APT) software package (see Section 1.4.5). Detailed information about the VTT is accessible from the APT Web Page.

The VTT can be useful in Phase I proposal preparation to help answer questions such as: How many exposures will I need to mosaic my extended target? Which of my potential targets "fits best" in the aperture? Is there anything interesting I can observe with a coordinated parallel in another aperture? Do any of my potential targets have nearby bright objects that could spoil the observation? Is there an orientation that would avoid the bright object? Where are the guide stars in the field?

The VTT also includes an interface to StarView (the HST archive software; see Section 7.2.1 of the HST Primer). This means you can invoke the VTT from StarView to graphically represent StarView results on areas of the sky that have previously been observed. Conversely you can also call up StarView from the VTT to show what observations have been made near a particular pointing.

1.4.8 **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. The National Astronomical Observatory of Japan (NAOJ; see Appendix A.4) maintains a nearly complete copy of public HST science data, and should provide faster access for astronomers in Pacific rim nations. However, the NAOJ site does not yet have all public data available, since it does not provide the re-processing and re-calibration services that the other HST archive sites do, and it does not yet have a complete set of pre-Servicing Mission 2 data.

1.4.9 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 / 11

2.2 Deadlines / 12

2.3 Who May Submit / 12

2.4 Institutional Endorsement / 14

2.6 Proposal Confidentiality / 14

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 14 has the following deadlines:

- Phase I proposals: Friday January 21, 2005, 8:00 pm EST.
- Education/Public Outreach proposals: Friday August 19, 2005, 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 2005.

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.

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.

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 Pls

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 14 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, 31 Regular AR and 12 Theory proposals were approved in Cycle 13.

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 / 22

3.4 Archival Research (AR) Proposals / 25

3.5 Theory Proposals / 29

3.6 Calibration Proposals / 31

3.7 Joint HST-Chandra Observing Proposals / 33

3.8 Joint HST-NOAO Observing Proposals / 34

3.9 Joint HST-Spitzer Observing Proposals / 35

3.10 Director's Discretionary (DD) Time Proposals / 37

3.11 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 either a Regular GO (see Section 3.2.1), a Large GO (see Section 3.2.2), a Long-term GO (see Section 3.2.3), or a Treasury Program (see Section 3.2.4). 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 3.5) 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 3.6). Proposals can also request observing time on Chandra (see Section 3.7), NOAO facilities (see Section 3.8) or on Spitzer (see Section 3.9). At any time scientists can request Director's Discretionary (DD) time for unanticipated and scientifically compelling astronomical observations (see Section 3.10). 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 3.2.3). The additional category of Treasury Programs (see Section 3.2.4) 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), which can award up to a total of approximately 1000 orbits to proposals in these categories (approximately 1/3 of the total time to be allocated Cycle 14).

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.



As discussed in Section 1.2, HST may make the transition from three-gyro to two-gyro mode operations during the course of Cycle 14. This will result in reduced scheduling flexibility (effectively, fewer orbits will be available for an individual target), lower scheduling efficiency (lower on-target times due to increased overheads for guiding and target acquisition) and, possibly, reduced scientific performance (notably, degraded image quality due to reduced pointing stability). The HST Two-Gyro Handbook, together with associated updates, provides a thorough discussion of these issues (see the Two-Gyro Science Mode Web Page).

In order to maximize the scientific return from HST observations, we are requiring all GO proposers to consider how their programs would be affected by two-gyro operations, and to summarize how those programs would be modified to ameliorate the scientific impact. Such modifications might include longer exposure times, fewer targets and/or a larger orbit allocation. A new section has been added to the PDF attachment for this purpose (see Section 9.3), and the page limits increased by one page (two pages for Large and Treasury Programs: see Section 7.1.3). The total number of orbits required under two-gyro operations should also be listed on the proposal form (see Section 8.6.2).

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 14 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 HST Treasury, Archival Legacy and Large Proposals Web Page for a technical description of this opportunity.

A goal in Cycle 14 is to select several programs in the 100-300 orbit range. For comparison, in Cycle 13 seven Large Programs were accepted for a total of 956 primary orbits. Descriptions of these programs are available on the <u>HST Large Proposals Web Page</u>.

3.2.3 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 14, 15 and 16), but you cannot request instruments other than those presently offered in Cycle 14. 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 14 should be presented in detail. For long-term programs, it is the sum of all orbits requested for Cycle 14, 15 and 16 that determines whether the program is Large or Regular.



Proposers should assume two-gyro operations for all cycle 15 and 16 observations, so it is crucial that Long-Term GO Programs consider the resultant impact on the proposed science. As discussed in The HST Two-Gyro Handbook, this will result in reduced scheduling flexibility (fewer orbits available), lower observational efficiency (higher overheads per target) and, perhaps, reduced scientific performance (notably, degraded image quality). The HST Two-Gyro Handbook, together with associated performance updates, can be downloaded from the Two-Gyro Science Mode Web Page.

The Cycle 14 Review Panels and TAC will be able to award limited amounts of time to Long-Term Programs for Cycles 15 and 16. GOs with approved Long-Term Programs need not submit continuation proposals in the subsequent cycles (and hence, GOs who had Cycle 14 time approved in Cycles 12 or 13 do not have to submit a Phase I continuation proposal, although a new Phase II submission will be required).

3.2.4 **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 14 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 3.2.3). 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 (approximately 1000 orbits per cycle) will be available for allocation to the combination of Large Programs and Treasury Programs. For comparison, in <u>Cycle 13</u> one Treasury Program was accepted for a total of 104 primary orbits. Descriptions of all Treasury Programs are also available on the <u>HST Treasury/Large/Legacy Programs Web Page</u>.

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. 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 Treasury Program. This possibility would typically be explored during the budget submission process. See the <u>HST Large Programs Web Page</u> for a technical description of this opportunity.



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 data set of high impact. It is crucial that such a proposal considers the full impact of two-gyro operations, including the assumption that all cycle 15 and 16 observations will be obtained in that mode. As discussed in The HST Two-Gyro Handbook, this will result in reduced scheduling flexibility, lower observational efficiency and, perhaps, reduced scientific performance. The HST Two-Gyro Handbook, together with recent performance updates, can be downloaded from the Two-Gyro Science Web Page.

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 14 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 Director has constituted a standing committee (Treasury Program Advisory Committee, TPAC) whose mission is to advise the Institute Director on the identification of topics for workshops to foster collaborations among interested parties and to promote discussion of science objectives and observing strategies for possible Treasury Programs. As part of this process 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 14 will be posted on the <u>STScI</u> home web page, which should be visited periodically by all scientists interested in participating in Cycle 14 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. Particular attention should be paid to the potential implications should HST be forced to switch to two-gyro mode operations *part way* through the Treasury Program (see Section 9.3).

3.3 Snapshot (SNAP) Proposals

Snapshot (SNAP) Programs consist of separate, relatively short observations whose durations are usually limited to 45 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 into these gaps on objects selected from a large list of available candidates.



As discussed previously, HST may be forced to switch from three-gyro to two-gyro mode operations during the course of Cycle 14. This will affect Snapshot scheduling and may result in reduced scientific performance (notably, degraded image quality). The HST Two-Gyro Handbook, together with associated updates, provides a general discussion of scheduling issues and scientific performance (see the <u>Two-Gyro Science Mode Web Page</u>).

In order to maximize the scientific return from HST observations, we are requesting all SNAP proposers to consider how their programs would be affected by two-gyro operations, and how those programs could be modified to ameliorate the scientific impact (see Section 9.3).

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. Typical completion rates are in the range from 30-70%. For STIS/MAMA SNAPs, the inability to schedule these observations during SAA-impacted orbits reduces the completion rate to about 20%. However, there is no commitment on the part of STScI to obtain any completion factor for Snapshot Programs. Given these circumstances, we are not requesting proposers to provide a modified number of Snapshot targets for two-gyro operations.

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 3.2.3), SNAP Programs cannot request observing time in future cycles.

In recent years there have been approximately 500-1000 Snapshot observations scheduled per year, but this could be different in Cycle 14 and depends on 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 **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.
- Shorter duration snapshot observations have more scheduling opportunities than longer ones. While SNAP observations longer than 45 minutes (including all overhead times; e.g., guide-star acquisition, target acquisition and readout times) are not impossible, their probability of execution is small. The majority of executed SNAP observations are 30 minutes or less.
- 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. Moving target snapshots are *not* permitted with the MAMA detectors and targets interior to the orbit of Jupiter can be observed on gyro control only. Please note that timing constraints will reduce the chance of a target being scheduled.
- Users should note that STIS suspended operations on 3 August 2004 and this instrument is unlikely to be available in Cycle 14. Proposals to use STIS will not be distributed for review unless it is clear at the submission deadline (21 January 2005) that STIS will be operational in Cycle 14. Please consult the STIS web page for the most recent information. If STIS is available, both imaging

and spectroscopic STIS/MAMA SNAPs are allowed, but the combined total targets accepted from all programs will not exceed 300, with imaging targets limited to a total of 100, due to the target and field bright-object checking requirements. Variable STIS/MAMA SNAP targets must have well-defined MAXIMUM UV fluxes, which will be used for the bright-object checking. There are no restrictions on the numbers or variability of proposed STIS/CCD snapshot targets, which do not require bright-object checking and have a higher expected completion rate since they are not restricted to SAA-free orbits. Thus, use of the CCD NUV configurations should be considered instead of the MAMA NUV.

- In addition, STIS/MAMA SNAP proposals should be limited to one or a few straightforward configurations. Specifically, use of the NDQ filters is not allowed. Use of the 0.2X0.2 echelle aperture is recommended for first-order programs without a scientific long-slit requirement, in order to expedite the field screening process. Excessively complex STIS/MAMA snapshot targets, fields, or instrumental configurations may not be implemented in Phase II because of the limited resources available for bright-object checking, combined with the relatively low expected completion rate; if you are in doubt on this issue, contact the STScI Help Desk (see Section 1.5).
- 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 possible to assign relative priorities (high/medium/low) to approved snapshot targets within a program. Priorities can be assigned in the Phase II program (see Section 10.2), and need not be addressed in the Phase I proposal. See the **SNAP User Information** Report for details.

3.4 **Archival Research (AR) Proposals**

Observations in the HST Data Archive that are no longer proprietary (see Section 1.4.8) 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 8.6.4) and must provide a narrative that describes the proposed use of the funds (see Section 9.8). 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 fourteen 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, 31 Regular AR Proposals were approved in Cycle 13.



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.

Legacy AR Proposals 3.4.2

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 3.2.4).

For reference, one AR Legacy Proposal was approved in Cycle 13 and none in Cycle 12. Descriptions of these programs are available on the <u>HST Treasury/Large/Legacy Programs Web Page</u>.



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 9.7) 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 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 14 (nominally, July 2005).
- 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 actively participating in plans for a National Virtual Observatory (NVO), and 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 sup-

port of AR programs using data primarily from other missions should follow the guidelines in the appropriate NASA Research Announcements.

3.4.4 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 <u>Archival Pure Parallel</u> 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/Large/Legacy Programs Web Page.

3.5 **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 Office of Space Science 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 8.6.4) and must provide a narrative that describes the proposed use of the

funds (see Section 9.8). 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 13. However, STScI does allow 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 9.7) 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.

3.6 **Calibration Proposals**

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.

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.

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 or SNAP 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 WFPC2
- Creation of a coronagraphic PSF library for STIS/CCD
- Characterization of the spectroscopic PSF for STIS/CCD
- 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 <u>Scientific Instruments Web</u> Page.

A Calibration Program can be a GO, SNAP or AR Program, and should fall in one of these categories. For GO and SNAP Programs, the data obtained will 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 9.4), but such a request will be subject to panel and TAC review and will be granted only in exceptional circumstances if exceedingly well justified. Archival Research proposals may be 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).

3.7 **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 14 or the Chandra Cycle 7 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 20% of the targets may be time-constrained. In addition, only one rapid TOO can be awarded (less than 30 days turn-around time). A Chandra TOO is defined as an interruption of a command load, which may include several predictable observations within that one-week load. HST Cycle 14 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 3.9) should only be submitted to the observatory that represents the prime science unless the proposal falls in the Collaborative HST-Spitzer category (Section 3.9.2). The Chandra Cycle 7 deadline is in mid-March 2005. While there is multi-wavelength expertise in the review panels for both observatories, typically the 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 9.5.1 for details). For proposals that are approved, the CXC will perform detailed feasibility checks in Chandra Cycle 7. The CXC reserves the right to reject any previously approved observation that proves to be non-feasible, impossible to schedule, and/or dangerous to the Chandra instruments. Any Chandra observations that prove infeasible or impossible could jeopardize the overall science program and may cause revocation of the corresponding 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 9.5.1).

3.8 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 2005 through July 2006. Time cannot be requested for the preceding semester, 2005A. 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 Gemini, 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 9.5.3 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 April 30, 2005, an NOAO Phase II form giving detailed observing information appropriate to the particular NOAO telescope and instrument. 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 9.5.3).

3.9 **Joint HST-Spitzer Observing Proposals**

If your science project requires observations from both HST and the Spitzer Space Telescope, then you can submit a single proposal to request time on both observatories to either the HST Cycle 14 review or the Spitzer Cycle 2 review. Technical information about Spitzer instrumentation and observations is available from the Spitzer Science Center (SSC) website and specific questions can be addressed to the SSC Help desk (help@spitzer.caltech.edu). There are two types of joint HST-Spitzer proposal.

3.9.1 Regular HST-Spitzer Observing Programs

These are programs that require less than 50 hours of Spitzer observing time. These proposals are comparable to the Joint HST-Chandra Programs, and will be reviewed by either the HST Cycle 14 TAC/panels or the Spitzer Cycle 2 TAC/panels, avoiding the "double jeopardy" of having to submit proposals to two separate reviews.

By agreement with the <u>SSC</u>, STScI will be able to award up to 225 hours of Spitzer observing time. Similarly the SSC will be able to award up to 130

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).

No more than 20% of the Spitzer hours awarded may include timing constraints and no more than one high-impact (<1 week; minimum 48 hours) or one medium-impact (1-5 week) ToO will be approved. Spitzer high- and medium-impact ToOs require substantial time overheads that must be requested in the proposal. See Appendix E of the Spitzer Cycle-2 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 3.7) should only be submitted to the observatory that represents the prime science. The Spitzer Cycle 2 deadline is 12 February 2005. 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.

Evaluation of the technical feasibility is the responsibility of the observer, who should review the Spitzer documentation or consult with the SSC (see Section 9.5.2 for details). For proposals that are approved, the SSC will perform detailed feasibility checks in Spitzer Cycle 2. The SSC reserves the right to reject any previously approved observation that proves to be non-feasible, 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.

3.9.2 Collaborative HST-Spitzer Observing Programs

This new proposal category aims to maximize the scientific potential of the contemporary, but finite duration, availability of HST and the Spitzer Space Telescope. In collaboration with the SSC, we encourage the submission of Large or Treasury proposals that also require more than 50 hours of Spitzer time. The only criterion above and beyond the usual criteria is that the project is fundamentally multi-wavelength in nature and both datasets are required to meet the science goals.

As with other HST Large and Treasury Programs, Collaborative HST-Spitzer Observing Programs will be reviewed by the HST TAC. All proposals in this category will also be reviewed independently by the Spitzer TAC (which meets April 18-22 2005). Proposals in this category must therefore be submitted to **both** HST and Spitzer. Accepted proposals must receive a high ranking from both TACs. Further details on the review process are given in Section 6.1.2.

Collaborative HST-Spitzer Programs must complete the proposal submission process for **both** HST and Spitzer by the time of the HST Cycle 14 deadline. The same PDF attachment (see Chapter 9) should be provided to both observatories. The cover sheet information must be completed separately for both proposals and representative Astronomical Observation Requests (AORs) must be submitted with the Spitzer proposal.

Data taken for Collaborative HST-Spitzer Programs 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.



Joint HST-Spitzer Proposals must be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10). A request for more than 50 hours of Spitzer time automatically identifies the proposal as a Collaborative HST-Spitzer Observing Program. Technical information about the Spitzer observations must be included in the 'Coordinated Observations' section of the proposal (see Section 9.5.2) for both Regular and Coordinated HST-Spitzer proposals.

Director's Discretionary (DD) Time Proposals 3.10

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 <u>DD</u> 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 rapid 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 extremely high scientific merit and a strong demonstration of the urgency of the observations.

The HST observing schedule is determined eleven days in advance of the actual observations. 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.

3.11 **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 / 414.2 Parallel Observations / 48

4.3 Special Calibration Observations / 51

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 these bands may be viewed without occultations at some time during the 56-day precessional cycle of the HST orbit. Depending upon the telescope orbit and the target position, there may be up to 7 CVZ intervals with durations ranging from 1 to 105 orbits (7 days). Check the CVZ Tables on the Web to determine the number of CVZ opportunities in Cycle 14 and their 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 <u>Section 2.3.1 of the HST Primer</u> for technical details about the CVZ.

Observations of targets in the CVZ are nearly twice as efficient as non-CVZ observations. Therefore, *proposers should use CVZ visibility in their orbit estimates where possible*. In the observations description section (see Section 9.2), you must include the number of CVZ opportunities available (using the CVZ Tables on the Web) 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).

Note that it is to the proposer's advantage to request CVZ observations (where possible). It allows a given set of observations to be done in a smaller number of orbits, which gives the proposal a competitive advantage over non-CVZ proposals during peer review.

Restrictions on Using the CVZ

The following special requirements are generally incompatible with use of the CVZ.

• Special timing requirements (including telescope orientation constraints; see Section 4.1.5)

Hence, 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 <u>Table 6.1 of the HST Primer</u>). 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).

Target-of-Opportunity (TOO) Observations 4.1.2

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 9.4) you must provide an estimate of the probability of occurrence of the TOO during the observing cycle, and describe the required turn-around time.



The ability to schedule TOO observations will be affected by a transition to two-gyro operations. The HST Two-Gyro Handbook, together with associated documentation, provides a general discussion of scheduling issues (see the Two-Gyro Science Mode Web Page).

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 14. 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, STIS/CCD 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 due to this very fast TOO response.

The number of ultra-rapid TOO activations (less than 2 days turn-around) will be limited to 3 in Cycle 14.

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 the observing cycle, the program will be deactivated at the end of the cycle. Unused TOO time does not carry over into the following cycle.

TOO Programs with STIS/MAMA or ACS/SBC

TOO proposals that use the STIS/MAMA detectors or ACS/SBC must pass bright object checking before they can be scheduled. 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 9.4).

STIS/MAMA and 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). Note that STIS suspended operations on 3 August 2004 and this instrument is unlikely to be available in Cycle 14. Proposals to use STIS will not be distributed for review unless it is clear at the submission deadline (21 January 2005) that STIS will be operational in Cycle 14.

4.1.3 **Solar System Targets**



Observations of Solar System objects will be affected by a transition to two-gyro operations. The HST Two-Gyro Handbook, together with associated documentation, provides a general discussion of scheduling issues (see the Two-Gyro Science Mode Web Page).

HST can observe most targets within our Solar System, although there are a few exceptions. Mercury is always well within the (three-gyro) 50 degree Solar pointing exclusion, and cannot be observed. Venus is always within the 50 degree Solar pointing exclusion, but at maximum elongation can be over 45 degrees from the Sun. The STScI and the HST Project at GSFC have developed (and used) procedures that support observations of Venus when it is slightly within the 50 degree limit. Those procedures require extra planning and implementation steps. Venus observations may be proposed, but execution of these observations is subject to the availability of resources to carry out the extra work required for them. Observations of comets can be made while they are further than 50 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. The effort required to carry these out is well beyond the available resources, so observations of the Moon should not be proposed.

Pointing constraints are discussed further in <u>Section 2.4 of the HST Primer</u>.

4.1.4 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.

4.1.5 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 <u>Section 2.5 of the HST Primer</u>),
- 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 9.4).

Time-critical observations impose constraints on the HST scheduling system, 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.



The ability to schedule Time-Critical Observations will be affected by a transition to two-gyro operations. The HST Two-Gyro Handbook, together with associated documentation, provides a general discussion of scheduling issues (see the <u>Two-Gyro Science Mode Web Page</u>).

4.1.6 **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 9.4).

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).

4.2 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 <u>Parallel Observations User Information Report</u>, 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 primary 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 14. 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 (over the past year, of the parallel visits scheduled, 91% were a single orbit in duration, 6% were two orbits, 2% were three orbits, 1% were four orbits, and less than 1% were longer than 4 orbits). Due to resource constraints at STScI, only a limited number of Pure Parallel Programs can be accepted in each cycle.

For Cycles 11, 12 and 13, the Advanced Camera for Surveys (ACS) was the most heavily subscribed instrument for primary science observations. This is expected to be true for Cycle 14 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.

4.2.3 Restrictions and Limitations on Parallel Observations

Parallel Observations with ACS

When ACS is the primary 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 prime observation (see the <u>ACS Instrument Handbook for details</u>). 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 prime 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 primary.

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 primary. Note that observations with different NICMOS cameras at the same time are not considered parallel observations.

Parallel Observations with STIS

Users should note that STIS suspended operations on 3 August 2004 and this instrument is unlikely to be available in Cycle 14. Should STIS recover and become available, the STIS/CCD detector may be used for either Pure or Coordinated Parallel Observations with any other instrument as primary.

The STIS/MAMA detectors 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 STIS/MAMA detectors may not be used for pure parallel observations.

Parallel Observations with WFPC2

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

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 1.4.4).

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 1.4.4).

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 1.4.4). 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 3.2.4) or a Collaborative HST-Spitzer Program (see Section 3.9.2) 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 9.4). Proprietary periods longer than 12 months may on rare occasions be appropriate for long-term programs (see Section 3.2.3). Requests for data-rights extensions beyond 12 months must also be made in the 'Special Requirements' section of the proposal (see Section 9.4); 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 9.6) 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 13, independent of whether or not they have executed.
- Snapshot targets may be proposed that duplicate snapshot observations that were approved in Cycle 12 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 3.11) 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 <u>HST Proposal Support Web Page</u> at MAST. The following three options are available:

- The HST <u>Duplication Checking Web Form</u>, which you can find on the <u>HST Proposal Support Web Page</u> at MAST (follow the link Analysis/Prop support and go to Proposal Support).
- The Duplication Check Screen in Starview, which is available for download from the <u>Starview Web Page</u> (see also the introductory text in Section 7.2.1 of the HST Primer).
- The <u>Planned and Archived Exposures Catalog</u> (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 <u>Duplication Checking Web Form</u> 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 / 576.2 Two Gyro Observations / 596.3 Selection Criteria / 60

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), SNAP, Regular AR, and Theory Proposals. Each Review Panel can recommend Regular GO Proposals up to a certain limited number of orbits that it has been allocated. In order to encourage the acceptance of larger 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 submitted programs that is approximately independent of size.

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 3.2.4), Treasury GO Programs (see Section 3.2.4), Collaborative HST-Spitzer Proposals (see Section 3.9.2) or AR Legacy Proposals (see Section 3.4.2), but they will send comments on those proposals to the TAC for their consideration. Calibration Proposals (see Section 3.6) will be reviewed only by the TAC.

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 13 there were three panels dealing with Hot Stars, ISM and Circumstellar Medium; two panels dealing with Star Formation, Cool Stars and Stellar Populations; three panels dealing with Galaxies, AGN and Quasars; two 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 14, 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 14. The primary responsibility of the TAC is to review the Large GO Programs (100 orbits or more; see Section 3.2.2), Treasury GO Programs (see Section 3.2.4), AR Legacy Proposals (see Section 3.4.2), any other particularly large requests of resources (SNAP, AR, Theory or pure parallel), and Calibration Proposals (see Section 3.6). The HST TAC is also the arbiter of any extraordinary or cross-panel issues.

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

6.2 **Two Gyro Observations**

As discussed in Chapter 1, it is possible that gyro failure during Cycle 14 may require HST to switch from standard three-gyro operations to the two-gyro science mode currently being developed by the HST project. The main consequences of this change are likely to be degradation in image quality, reduced scheduling flexibility and lower observational efficiency.



A thorough discussion of the likely impact of two-gyro operations on HST science is given in The HST Two-Gyro Handbook. This document can be downloaded from the Two-Gyro Science Mode Web Page. Additional reports will be made available on this web-page as updated information becomes available. Proposers are encouraged strongly to check this website frequently. Relevant information will be revised and updated throughout the proposal submission period. The final website updates will be made on 15 December 2004, five weeks before the submission deadline.

In order to ensure an efficient transition to two-gyro operations, we are requesting GO proposers to provide additional information, describing how the scientific goals of their project would be affected by two-gyro operations and how the proposal would be modified to ameliorate that impact (see Section 9.3). The latter changes might include longer exposure times and/or a revised target list. Proposers are strongly encouraged to define the impact of two-gyro operations within the initially-requested total number of orbits. If a GO Program is rendered unfeasible, the proposers can request a larger orbit allocation for two-gyro observations, and this number will be used by the Review Panels and the TAC in their deliberations. (This option is not available for SNAP Programs, which are limited to no more than 1 orbit per target.) Based on the additional information, the Review Panels and the TAC will provide a parallel two-gyro ranking for each proposal.

The assessment process will operate as follows:

- The Review Panels and TAC will rank proposals using the standard criteria outlined in the following section. This ranking assumes normal three-gyro operations.
- Once the initial ranking is complete, the panels and the TAC will consider the additional information provided by the proposer on the impact of two-gyro operations, and produce a parallel two-gyro ranking of the proposals.
- Some proposals may be rejected for three-gyro observations, but accepted provisionally for two-gyro mode; conversely, some accepted proposals in three-gyro mode may fall below the cutoff in two-gyro mode.
- Proposers will be requested to submit the appropriate Phase II input, as discussed further in Section 10.2.

6.3 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 Two-Gyro Mode Criteria for all GO and SNAP **Proposals**

- What is the impact of two-gyro mode operations on the scientific goals of the proposal?
- How would the proposal be modified to accommodate two-gyro observations?

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 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, and archival/dissemination of products)?

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 January 21, 2005, 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 14 Phase I use until December 6, 2004. If you need a version prior to the formal release, please send your request to the STScI help desk, help@www.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 14 proposals must be submitted electronically. Starting in Cycle 12, a java-based software tool, APT (the Astronomer's Proposal Tools; see Section 1.4.5) 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 14.

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.

For Large GO proposals (see Section 3.2.2), and Treasury GO proposals (see Section 3.2.4) the page limits are:

- No more than 13 pages total;
- Any text in the 'Scientific Justification' section (see Section 9.1) may not extend beyond page 6;
- the increased limits allow 2 pages for a new section, Two Gyro Mode Observations (see Section 9.3). This section must be used to describe the science impact of two-gyro operations and, if necessary, to outline an alternative observing strategy.

For AR Legacy Proposals (see Section 3.4.2) the page limits are:

- No more than 11 pages total.
- Any text in the 'Scientific Justification' section (see Section 9.1) may not extend beyond page 6.

Regular AR Proposals (see Section 3.4.1) and Theory Proposals (Section 3.5) have the following page limits:

- No more than 8 pages total.
- Any text in the 'Scientific Justification' section (see Section 9.1) may not extend beyond page 3.

Finally, for all other proposals the limits are:

- No more than 9 pages total.
- Any text in the 'Scientific Justification' section (see Section 9.1) may not extend beyond page 3;
- the increased limits allow 1 page for a new section, Two Gyro Mode Observations (see Section 9.3). This section must describe the science impact of two-gyro operations and, if necessary, to outline an alternative observing strategy.

In relation to these page limits, note the following:

Any pages beyond the page limits will be removed by STScI 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.
- The section on previous observations does not count towards the total page limit.
- Your PDF attachment must be prepared with a font size of 12pt. Do not change the font size or layout in any of the templates that are provided by STScI.

7.2 Proposal Preparation Checklist

Table 7.1: 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.	
Download a template file for the creation of your PDF attachment	Go to the <u>Cycle 14 Announcement Web Page</u> . 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 14 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).	

Table 7.1: Proposal Preparation Checklist (Continued)

Step	Procedure	
7) Review your proposal	In APT, click on 'Proposal Preview' to get a preview of all the final information in your proposal. What you see under 'Show PDF View' is exactly what the reviewers who will 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 / 70
8.2 Abstract / 70
8.3 Proposal Phase / 70
8.4 Category / 70
8.5 Cycle / 71
8.6 Requested Resources / 71
8.7 Proprietary Period / 73
8.8 Scientific Category / 73
8.9 Keywords / 75
8.10 Special Proposal Types / 75
8.11 Proposal PDF Attachment / 77
8.12 Principal Investigator / 77
8.13 Co-Investigators / 77
8.14 Targets /66
8.15 Observation Summary (OS) / 79

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 14, Phase I, 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 3.5)

Proposals for Director's Discretionary Time (see Section 3.10) submitted outside of the normal review cycles should select:

• **GO/DD**—Director's Discretionary Time proposal

8.5 Cycle

For a Cycle 14 proposal, enter '14' (this will be the default).

8.6 Requested Resources

8.6.1 Primary and Parallel Orbits: Three Gyro mode

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

Enter the total number of orbits requested for primary observations and parallel observations. This total assumes that HST is operating in standard three-gyro mode. Consult <u>Chapter 6 of the HST Primer</u> for instructions on how to calculate the appropriate number of orbits. Note that 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 3.2.3) should provide a year-by-year breakdown of the orbits requested by also filling out the boxes for 'Next Cycle' (i.e., Cycle 15) and 'After Next' (i.e., Cycle 16).

8.6.2 Primary and Parallel Orbits: Two-Gyro mode

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

Enter the total number of orbits requested for primary observations and parallel observations. This total assumes that HST is operating in Two-Gyro Science Mode. Please consult The HST Two-Gyro Handbook, available from the Two-Gyro Science Mode Web Page, for instructions on how to calculate the appropriate number of orbits. Note that 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 3.2.3) should provide a year-by-year breakdown of the orbits requested by also filling out the boxes for 'Next Cycle' (i.e., Cycle 15) and 'After Next' (i.e., Cycle 16).



The HST Two-Gyro Handbook can be downloaded from the Two-Gyro Science Mode Web Page. Additional reports will be made available on this web-page as updated information becomes available. Proposers are encouraged strongly to check this web-site frequently. Relevant information will be revised and updated throughout the proposal submission period. The final website updates will be made on 15 December 2004, five weeks before the submission deadline.

8.6.3 Total Targets

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

Specify the total number of targets requested. As discussed in Section 3.3.1, this number is valid for **both** three-gyro and two-gyro operations. Note that multiple visits to the same source should be counted as multiple targets (see Section 3.3).

8.6.4 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.

8.6.5 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".

8.7 **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 for Collaborative HST-Spitzer 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 9.4).

Scientific Category 8.8

Specify *one* Scientific Category from the list below. Please adhere strictly 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. It includes subdwarfs, subgiants, giants, supergiants, AGB stars, pulsating/variable stars, brown dwarfs, stellar activity (coronae/flares), atmospheres, chromospheres, mass loss and abundance studies.
- **HOT STARS:** This applies to stars which 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, variable hot stars, 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, stellar jets (except star formation), 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.
- STELLAR POPULATIONS: This includes resolved stellar populations in globular clusters, open clusters or (OB) associations, in the Milky Way and in other nearby galaxies. Studies of color-magnitude diagrams, luminosity functions, initial-mass functions, internal dynamics and proper motions are in this category.
- GALAXIES: This includes studies of galaxies in the Hubble sequence, galaxy mergers and interactions, starburst galaxies, IR-bright galaxies, dwarf galaxies and low-surface brightness galaxies. Also included are studies of galaxy structure, morphology and dynamics, and observations of unresolved stellar populations and the globular clusters of galaxies.
- 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.

8.9 **Keywords**

From the list of Scientific Keywords in the pull-down menu (see also Appendix B), please select appropriate keywords 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 one keyword.

Special Proposal Types 8.10

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 3.7) 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 9.5.1). 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 3.9) 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 9.5.2). Requests for more than 50 hours of Spitzer observations automatically identify the proposal as a Collaborative HST-Spitzer Program (see Section 3.9.2 and Section 8.10.8). 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 3.8) 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 9.5.3). 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 3.5).

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 3.6)

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 3.2.4).

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). This specifically includes proposals in the Collaborative HST-Spitzer category, requiring more than 50 hours of Spitzer time.

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 4.1.3), and should be given generic target names.

For those proposals with a large number of targets, please note that there is a capability to ingest a comma-separated text file with the appropriate target information. See the APT help 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 <u>Phase II Proposal Instructions</u>. A direct internet link to these conventions is available on the <u>Cycle 14 Announcement Web Page</u>. 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 must be specified for every target. The target V-magnitude is required for observations which use one of the MAMA detectors. 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. This information is used only for scientific review, not for exposure-time calculations. Note that the MAMAs have bright object safety limits. Observations that violate these limits are infeasible. See Section 5.1 of the HST Primer, or the Instrument Handbooks (see Section 1.4.4) for details.

8.14.5 Other Fluxes

For each target you must specify either a V-magnitude (above, required for MAMA 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. Note the following:

- For SNAP proposals, the OS should describe a typical snapshot 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 14.

- Parallel observations must be included in the OS, and marked as such using the relevant special requirement flags (see 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 <u>Section 5.2 of the HST Primer</u>)
 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, STIS wavelength calibration exposures or 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 for a given target and instrument may be summarized in a single 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.

All parameters should be calculated under the assumption that HST is operating in normal three-gyro mode. Any modifications required to accommodate observation in two-gyro mode should be summarized in the Two-Gyro Observations section (see Section 9.3). Note that scheduling constraints for two-gyro mode observations are requested in the APT (see Section 8.15.12).

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 STIS, NICMOS, or ACS, then set this keyword to 'yes'.

8.15.7 Polarizer

If you are proposing polarimetric observations with WFPC2 or ACS, then set this keyword to 'yes'.

8.15.8 Selected 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). Note the following:

- 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.
- If a STIS grating is used, then first select the grating and subsequently give the central wavelengths in Angstroms for the exposures. Note that STIS suspended operations on 3 August 2004 and this instrument is unlikely to be available in Cycle 14. Proposals to use STIS will not be distributed for review unless it is clear at the submission deadline (21 January 2005) that STIS will be operational in Cycle 14.

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 <u>Chapter 6 of the HST Primer</u> 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 Requiremen	it Flaas 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).

Table 8.1: (Continued) Special Requirement Flags for the Observation Summary

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 both your two-gyro and three-gyro 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 (at least one of the keywords must be flagged);

- ORBITAL VISIBILITY (TWO-GYRO ONLY): enter the value that you used for the orbital visibility when determining your orbit request (either from Table 6.1 of The HST Two-Gyro Handbook or from the tables/plots available on the Two Gyro Science Mode Web Page.
- 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 observa-

tions; 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 *ORI-ENT* 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 2-gyro 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 HST Two-Gyro Handbook (see the <u>Two Gyro Science Mode Web Page</u>) and in the APT Help menu.

In addition, if you are submitting a Large (more than 100 orbits of prime observations) or Treasury program (which may also be Large), we are

requesting further processing of your proposal. See the <u>Large</u> <u>Program Web Page</u> for details.

CHAPTER 9:

Preparation of the PDF Attachment

In this chapter . . .

9.1 Scientific Justification / 88

9.2 Description of the Observations / 88
9.3 Two-Gyro Mode Observations / 90
9.4 Special Requirements / 91
9.5 Coordinated Observations / 92
9.6 Justify Duplications / 95

9.7 Analysis Plan / 95

9.8 Budget Narrative / 96

9.9 Previous Related HST Programs / 96

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.
- SNAP 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)

Please provide a short description of the proposed observations. 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:

- 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 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 Two-Gyro Mode Observations

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

This new section has been added to take account of the possible transition from standard three-gyro operations with HST to the Two-Gyro Science Mode currently under development by the HST project. This is likely to result in reduced scheduling flexibility (fewer orbits available for a given target), lower observational efficiency (longer overheads per target) and, possibly, degraded scientific performance. Those issues are discussed thoroughly in The HST Two-Gyro Science Handbook.



The HST Two-Gyro Handbook can be downloaded from the Two-Gyro Science Mode Web Page. Additional reports will be made available on this web-page as updated information becomes available. Proposers are encouraged strongly to check this website frequently. Relevant information will be revised and updated throughout the proposal submission period. The final website updates will be made on 15 December 2004, five weeks before the submission deadline.

Based on the information in the cited documents, proposers must address the following issues:

- Are the scientific goals of this proposal attainable with observations undertaken in two-gyro mode?
- How will the observations be modified to take account of two-gyro operations? Modifications might include increased integration times and/or fewer instrumental configurations for GO and SNAP Programs; GO Programs might envisage a reduced number of targets and/or increased orbit allocations.
- In the case of Large, Treasury and Long-Term GO Programs, what are the scientific implications if only a subset of the data are obtained in normal three-gyro mode?

9.4 **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 14, 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 4.1.5).
- Early acquisition observations (see <u>Section 5.2.1 of the HST Primer</u>).
- 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 4.1.6, and Section 2.6.1 of the HST Primer).
- Scheduling of STIS/MAMA and STIS/CCD observations (other than target acquisitions) in the same visit (see Section 6.2.3 of the HST Primer).
- Scheduling of coronagraphic observations in the same orbit with a roll of the spacecraft between observations (see Section 6.2.3 of the HST Primer).
- Requests for expedited data access (see Section 7.2 of the HST
- 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).

9.5 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.

9.5.1 Joint HST-Chandra Observations

Proposers requesting joint HST-Chandra observations (see Section 3.7) *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 (Chandra Cycle 6) restrictions on uninterrupted observations of more than 50 ksecs with pitch angle between 80 and 110 degrees. Long observations at these pitch angles will be split into segments of no more than 50 ksecs. Please note that the Chandra Proposal Documentation and observation planning software will be updated for Cycle 7 in mid-December 2004.

Technical documentation about Chandra is available from the Chandra X-ray Center (CXC) 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 7 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.

9.5.2 **Joint HST-Spitzer Observations**

Proposers requesting joint HST-Spitzer observations (see Section 3.9) 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 for Collaborative HST-Spitzer Programs must also complete the Spitzer proposal submission process by the HST Cycle 14 deadline. Both submissions should include the same PDF attachment. Detailed instructions for the Spitzer submission are in the Spitzer Cycle 2 Call for Proposals. In the case of Regular HST-Spitzer Programs, full specification of the Spitzer observations will be requested by Spitzer after the proposals are selected, at which time detailed feasibility checks will be made.

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

9.5.3 Joint HST-NOAO Observations

Proposers requesting joint HST-NOAO observations (see Section 3.8) 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 April 30, 2005 NOAO deadline for the Fall 2005 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).

9.6 **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.

9.7 **Analysis Plan**

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

All AR proposals should provide a detailed data analysis plan. Describe the data sets that will be analyzed and estimate how many data sets will be analyzed. Inclusion of a complete target list is not required. Discuss available resources, individual responsibilities where appropriate, and how the analysis will allow you to achieve your objectives.

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.

9.8 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., 3 months of support, including overhead and fringe benefits, for a graduate student who will work on the data reduction, and a 18 GByte hard disk drive for storage of the data and data analysis products). Provide a justification for why the requested items are necessary to achieve the goals of the program. See Chapter 12 for details on Grant Policies and allowable costs.

9.9 Previous Related HST Programs

Please list the program number and status of the data for all accepted GO/SNAP/AR programs of the PI which are relevant to the current proposal. Include a list of *major* publications resulting from the previous HST observations and provide a sentence or two describing the significance of each paper. Related publications based on theory and/or data from other telescopes should be included. Unpublished data from early cycles should be explained. A significant publication record will be regarded by the Review Panels and TAC as a strong plus. GTO programs and publications may be included at the PI's discretion.

CHAPTER 10:

Proposal Implementation and Execution

In this chapter . . .

10.1 Notification / 97

10.2 Phase II Submission / 98

10.3 Program Coordinator and Contact Scientist Support / 99

10.4 Duplication Checking / 99

10.5 Technical Review / 99

10.6 Proposal Scheduling / 100

10.6.1 Unschedulable or Infeasible Programs / 100

10.7 Access to Data Products / 101

10.8 Archival Research Support / 101

10.9 Visits to STScI / 102

10.10 Failed Observations / 102

10.11 Publication of HST Results / 103

10.12 Dissemination of HST Results / 104

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 2005). The comments on the proposal from the panel will be sent about 4 weeks after the notification emails.

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. Given the uncertainty regarding if and when HST will be forced to switch to two-gyro operations, we are only requesting successful proposers to submit a standard three-gyro Phase II program at this time. 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 (i.e. mid-May 2005). 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).

If HST should be reduced to having only three working gyros, a second Phase II submission, designed for two-gyro operations, will be requested. Detailed instructions and appropriate deadline will be provided on the Two-Gyro Science Web Page, and sent directly to successful proposers via their Program Coordinator.

Note that some proposals may be accepted for only three-gyro or two-gyro observations; under those circumstances, only the appropriate set of Phase II instructions should be submitted. 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 not generally allowed, but may be allowed in special situations. The policies that apply to such changes are described in the <u>Policy Document for the Telescope Time Review Board (TTRB)</u>, 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. For post-execution help please contact the help desk.

Duplication Checking 10.4

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.

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 observations may be feasible in standard three-gyro operations, but may prove infeasible after the transition to two-gyro science mode.
- 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, are usually rescheduled for an automatic repeat. When this is the case, the proposer receives a notice to this effect.

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 <u>Hubble Observation Problem Report (HOPR) Web Form.</u> 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 program 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:

- 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).
- Librarian, Space Telescope Science Institute, 3700 San Martin Dr., Baltimore, MD 21218, USA (library@stsci.edu).

Of course paper preprints remain acceptable. If desired, the OPO and Library copies can both be sent to the Library. Note that this requirement includes both refereed and non-refereed publications, but *not* abstracts or poster papers. Also, the advance information provided by a preprint is important for planning and evaluation of the scientific operation of the HST mission, and may be used for the selection and preparation of press releases.

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 <u>Release of Scientific Findings to the Public</u>.

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 / 105
11.2 HST E/PO Proposals / 106
11.3 The Initiative to Develop Education
Through Astronomy and Space Science
(IDEAS) Grant Program / 107

11.1 NASA SMD E/PO Policies

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

- The 2003 Education Enterprise Strategy
- The NASA Strategic Plan 2000
- The OSS E/PO Strategy
- The Space Science Enterprise 2000 Strategic Plan

11.2 HST E/PO Proposals

In accordance with NASA SMD E/PO policies, 2% of the HST Cycle 14 budget has been allocated for E/PO funding. STScI is announcing the opportunity for *accepted* U.S. HST Cycle 14 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 3.11) are not eligible to apply for an HST Cycle 14 E/PO Grant.

The spirit of the HST Cycle 14 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 14 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 14 E/PO funding categories:

- Individual an HST Cycle 14 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 14 GO/AR/SNAP programs and current Hubble Fellows to give serious consideration to this opportunity.



The deadline for submitting an HST Cycle 14 E/PO proposal is Friday August 19, 2005 at 5:00 p.m. EDT. The HST Cycle 14 E/PO Grant Program's Call for Proposals will be available on the program's web site at the end of June 2005. For more information or questions about the HST Cycle 14 E/PO Grant program, please send email to cycle_epo@stsci.edu.

11.2.1 Assistance for the Preparation of E/PO Proposals

NASA SMD has established a nation-wide Education Support Network, whose purpose is to directly aid investigators in identifying and developing high quality E/PO opportunities. Prospective proposers are strongly encouraged to make use of the Education 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 SMD E/PO program. Within the Education Support Network infrastructure are the E/PO Support Organizations.

- The science theme-oriented Forums are available to help orchestrate and organize the education/outreach aspects of all missions and research programs in a comprehensive way.
- The regional Broker/Facilitators are responsible for identifying and establishing high leverage opportunities, arranging alliances between educators and SMD-supported scientists, and helping scientists turn results from space science missions and programs into educationally appropriate activities that could be distributed regionally and nationally.

Points of contact and addresses for all of the E/PO Forums and Broker/Facilitators may be found at the Education Support Network Organisations web site. A more detailed description of the Education Support Network can be found in the OSS Education/Outreach Implementation Plan referred to in Section 11.1. Proposers should note that 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, October 21, 2005 at 5:00 p.m. ET. The 2005 Call for Proposals will be available on the <u>IDEAS</u> web site in July 2005. 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 / 109
12.2 Eligibility for STScI Grant Funds / 110
12.3 Allowable Costs / 111
12.4 Grant Period / 112
12.5 Award of Funds / 112

12.1 Overview

Subject to availability of funds from NASA, STScI will provide financial support to eligible investigators of approved Cycle 14 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 <u>Grants Management System</u> will be sent to successful proposers after the Phase I review has been completed.

Regular and Collaborative HST-Spitzer Programs will be funded separately by both the STScI and the <u>SSC</u>, following their respective funding policies. Details of the SSC funding policies are given in the Spitzer Cycle 2 Call for Proposals and <u>at http://ssc.spitzer.caltech.edu/funding/</u>. Similarly, Joint HST-Chandra Programs will be funded separately by both the STScI and the <u>CXC</u>, following their respective policies. Details of the CXC funding policies are given in the Chandra Cycle 7 Call for Proposals and <u>at http://cxc.harvard.edu/proposer/</u>.

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 8.6.4) and budget narrative (see Section 9.8) 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 14 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.

12.5 Award of Funds

Near the start of Cycle 14, 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 / 113
A.2 Space Telescope - European Coordinating Facility / 114
A.3 Canadian Astronomy Data Centre / 115
A.4 National Astronomical Observatory of Japan / 115

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: Steven Beckwith; ext: 4710; email: svwb@stsci.edu

Science Policies Division:

Head: Duccio Macchetto; ext: 4790; email: duccio@stsci.edu 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: TBD; ext: xxxx; email: tbd@stsci.edu

Observation and Data Management Division:

Observation Planning Branch Chief: Denise Taylor; ext: 4824; email: <u>dctaylor@stsci.edu</u>

Instruments Division:

ACS and WFPC2 Group Lead: Roeland van der Marel; ext 4931; email: marel@stsci.edu

NICMOS Acting 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.

A.4 National Astronomical Observatory of Japan

Internet:

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

Address:

NAOJ, 2-21-1, Osawa, Mitaka-City, Tokyo, 181-8588, Japan

Telephone:

[1] 422-34-3600

Email:

data center@dbc.nao.ac.jp

Comments:

The NAOJ provides assistance to HST users in Japan.

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

ABSORPTION LINES	IMAGING
ASTROMETRY	MULTIWAVELENGTH STUDY
CALIBRATION	RADIATIVE TRANSFER
CHEMICAL ABUNDANCES	SPECTROSCOPY
DYNAMICS	SURVEY
DUST	THEORY
EMISSION LINES	VARIABILITY
EVOLUTION	
Table B.2:Solar System Keywords	
ASTEROIDS	PLANETARY PLASMAS
COMETS	PLANETARY SATELLITES
EXOSPHERIC ATMOSPHERES	RINGS AROUND PLANETS
GIANT PLANETS	SUPPORT OF NASA PLANETARY MISSIONS
KUIPER BELT OBJECTS	SURFACES OF PLANETS/MOONS/OTHER
PLANETARY ATMOSPHERES	SURFACES OF PLANETS/MOONS/OTHER TERRESTRIAL PLANETS

Table B.3:Galactic Keywords

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

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
BL LAC OBJECTS AND BLAZARS	INTRACLUSTER MEDIUM
CLUSTERS OF GALAXIES	IR-LUMINOUS GALAXIES
COOLING FLOWS	IRREGULAR GALAXIES
COSMOLOGICAL PARAMETERS AND DISTANCE SCALE	LARGE SCALE STRUCTURE AND PECU- LIAR VELOCITIES
DAMPED LYMAN-ALPHA ABSORPTION SYSTEMS	LINERS
DWARF GALAXIES	LOCAL GROUP GALAXIES
ELLIPTICAL GALAXIES	MAGELLANIC CLOUDS
GALAXY BULGES	LOW SURFACE BRIGHTNESS GALAXIES
GALAXY CENTERS	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 REDSHIFT GALAXIES	SUPERNOVAE
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 Tools

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** **OSS** Office of Space Science

PAEC Planned and Archived Exposures Catalog

PC Planetary Camera or Program Coordinator

PDF Portable Document Format

PΙ Principal Investigator

Pure Parallel Observation **PPAR**

RA Right Ascension

SAA South Atlantic Anomaly

SBC Solar Blind Channel

SHD Shadow Time

SM Servicing Mission

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/pure_parallels.h
tml/

Canadian Astronomy Data Centre

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

Chandra Proposer Information

http://asc.harvard.edu/prop.html

Chandra User Documents

http://asc.harvard.edu/udocs/docs/docs.html

Chandra X-ray Observatory

http://chandra.harvard.edu/

Chandra X-ray Center (CXC)

http://asc.harvard.edu/

CVZ Tables

http://www.stsci.edu/hst/proposing/docs/cvz-information/

Cycle 13 Approved Programs

http://www.stsci.edu/hst/proposing/exp_abstract-catalogs/cy cle13-approved

Cycle 14 Announcement Web Page

http://www.stsci.edu/hst/proposing/docs/cycle14announce

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

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/De fault.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/ftp/stsci/grants/

Grants Management System

http://qms.stsci.edu/

Great Observatories Origins Deep Survey (GOODS)

http://heritage.stsci.edu/

HST Cycle 14 E/PO Program

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

HST Primer

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

HST Program Information

http://www.stsci.edu/hst/scheduling/program information

HST Proposal Catalogs

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

HST TAC review

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

HST Treasury/Large/Legacy 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/

Large and Treasury Programs

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

Multi-mission Archive at STScI (MAST)

http://archive.stsci.edu/

NASA Office of Space Science (OSS)

http://www.hq.nasa.gov/office/oss/

NASA/OSS E/PO Support Network

http://spacescience.nasa.gov/education/resources/ecosystem/
index.htm

NASA Strategic Planning and Policy

http://spacescience.nasa.gov/admin/pubs/index.htm

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/

The OSS/EPO Strategy

http://spacescience.nasa.gov/education/resources/strategy/i ndex.htm

Parallel Observations User Information Report

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

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 Science Center (SSC)

http://ssc.spitzer.caltech.edu

Spitzer GO1 Approved Programs

http://ssc.spitzer.caltech.edu/approvdprog/go1-list.txt

Spitzer Legacy, First Look Survey & GTO Programs

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

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-mem bers

Two-Gyro Science Mode Web Page

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

Visual Observation Layout Tool (VOLT)

http://pioneer.gsfc.nasa.gov/public/volt/home.html

US National Virtual Observatory

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

International Virtual Observatory Alliance

http://www.ivoa.net/