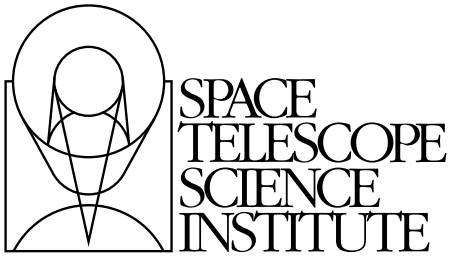
Call For Proposals
December 2012

Hubble Space Telescope Call for Proposals for Cycle 21

Policies, Procedures & Phase I Proposal Instructions



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

Call for Proposals

We invite scientists to participate in Cycle 21 of the Hubble Space Telescope (HST). The telescope and its instruments were built under the auspices of the National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA). Management of HST's scientific program is carried out by the Space Telescope Science Institute (STScI). We anticipate allocating up to 3200 orbits in this cycle, including 1800 orbits for Small Programs, 400 orbits for Medium Programs, and 1000 orbits for Large and Treasury Programs. An additional 1000 Snapshot observations may be allocated. Abstracts of previously accepted programs can be found on the HST proposal catalogs webpage.

- Phase I proposal deadline: **Friday, March 1, 2013, 8:00 pm EST**
- Phase II proposal/budget deadline: **Thursday, June 27, 2013**
- E/PO proposal deadline: **Wednesday, August 21, 2013, 5:00 pm EDT**

Where to Get Help

- Read this Call for Proposals and the HST Primer.
- Visit the STScI Phase I Proposal Roadmap.
- Visit the Cycle 21 Announcement Webpage.
- Visit STScI's website at http://www.stsci.edu/
- Contact the STScI Help Desk. Either send an e-mail to help@stsci.edu, call 1-800-544-8125, or call +1-410-338-1082 from outside the U.S. and Canada.

Who's Responsible

The Science Policies Group (SPG), part of the STScI Science Mission Office (SMO), is responsible for the HST science program selection process. The SPG staff includes astronomers Claus Leitherer (Head of SPG), Neill Reid (Head of SMO), Bob Williams, Andrew Fox, Andy Fruchter, and Technical Manager Brett Blacker.

The Cycle 21 Call for Proposals was edited by

Andrew Fox and **Jim Younger**,

based in part on versions from previous cycles, and with text and assistance from many different individuals at STScI, in particular Ron Downes, Paula Sessa, Bill Workman, Bonnie Eisenhamer, Svea Hernandez, Ken Sembach, Neill Reid, Claus Leitherer, Brett Blacker, Andy Fruchter, Susan Rose, and Charles Proffitt.

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HST Call for Proposals
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CHAPTER 1:

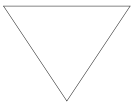
General Information

In this chapter . . .

1.1 About this Document

Two documents are of primary relevance for HST proposers: this *Call for Proposals* and the *HST Primer*. 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.

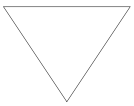
The Call for Proposals is available electronically only in HTML and PDF formats. The HTML version is optimized for on-line browsing, and contains many links to related or more detailed information, both within the document itself and in other STScI documents. You are therefore encouraged to use the HTML 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 21

Cycle 20 observations will end on September 30, 2013, and Cycle 21 will extend from October 1, 2013 to September 30, 2014. We will accept proposals for the following instruments: ACS/WFC, ACS/SBC, COS, FGS, STIS, and WFC3.



Proposers to Cycle 21 should be aware that the instrument complement offered is subject to change. Please consult the Cycle 21 Announcement Webpage for up-to-date information on the status of HST instrumentation.

What's New for Cycle 21

- A new category of GO proposal - the Medium Program - is being introduced in this Cycle (see Section 3.2.2). GO proposals will now be classified as Small (1-34 orbits), Medium (35-74 orbits), or Large (75 or more orbits) Programs based on the orbit request. Medium Programs will be reviewed by the panels and ranked together with the Small Programs. Those making the cut will proceed to the TAC, where a separate orbit pool will be available for allocation to them. This system replaces the orbit subsidy used in recent cycles, and is designed to ensure that the proposal acceptance rate is approximately independent of proposal size.
- An Ultraviolet (UV) Initiative is being introduced to ensure the unique UV capabilities of Hubble are fully utilized while they still exist. This Initiative will use orbit allocation targets to increase the share of primary GO observing time dedicated to UV observations (wavelengths < 3200 Angstroms). Small (Section 3.2.1), Medium (Section 3.2.2), Large (Section 3.2.3), and Treasury (Section 3.2.6) GO proposals are all eligible. The available UV instrument modes include ACS/SBC imaging, COS spectroscopy, STIS/MAMA imaging and spectroscopy, STIS/CCD imaging (UV gratings only) and WFC3/UVIS imaging (UV filters only). More details are given in Section 6.3.

- The UV Initiative also extends to archival proposals, in the Regular AR (Section 3.4.1), Legacy AR (Section 3.4.2), and Theory (Section 3.4.4) categories. STScI will ask the review panels and the TAC to give particular consideration to UV-specific AR proposals in the review process, provided that they lead to UV high-level data products and tools for the Hubble archive, and enable broader use of those datasets by the community. More details are given in Section 6.3.
- For Cycle 21, the focus values for the COS G130M 1055 and 1096 settings have been adjusted and now allow resolution $R=\lambda/\Delta\lambda$ of between 8000 and 12000 for wavelengths between 900 and 1080 Angstroms, with an effective area comparable to that of the Far-Ultraviolet Spectroscopic Explorer. See the HST Primer and the COS Instrument Handbook for additional details.
- The STScI Director has decided to devote a significant fraction of his discretionary time to a New Frontiers program developed in response to the Hubble Deep Field Initiative. This program will involve deep imaging observations of moderate redshift galaxy clusters and offset blank fields using ACS and WFC3 operating in parallel. Further details are given at the New Frontiers website. Data taken for the New Frontiers program will have no proprietary period, and the community is encouraged to submit archival proposals for the scientific exploitation of these data. In addition, observations to supplement the discretionary time data can be proposed, as can theory programs that support the analysis of these data.
- The right ascension (RA) restrictions that were in place for Cycle 20 no longer apply. In Cycle 21 the entire sky is accessible to HST and observations may be proposed for any sky location, subject to the standard visibility constraints of the observatory.
- Joint HST-Spitzer proposals are now available again (see Section 3.6). Up to 60 hours of time on the Spitzer Space Telescope will be awarded for joint HST-Spitzer programs in this cycle. Proposed projects must be of a fundamentally multi-wavelength nature, and both HST and Spitzer observations must be required to meet the science goals. Proposers may request up to 20 hours of Spitzer Cycle 10 time in any one HST proposal.
- Proposers are reminded that STScI and NASA can provide considerable resources to support the creation and distribution of press releases. The STScI Public Outreach news officers should be made aware of potentially newsworthy science results before the acceptance of HST publications. For more information see Section 10.12.
- Disruptive ToOs are now defined as those with turn-around times of less than 3 weeks. The number of activations of disruptive ToOs is limited to 8 in Cycle 21. There is no limit to the number of activations of non-disruptive ToOs. See Section 4.1.2 for details

Important Features Carried Over From the Previous Cycle

- Large GO Programs requesting 75 orbits or more in Cycle 21 must use the shorter target visibility values from Table 6.1 of the HST Primer, which will be enforced for any of these programs approved for Phase II.
- During Cycle 19, HST resurrected the capability of performing a single, linear spatial scan of the telescope relative to the target, to enable observations of very bright targets and higher S/N on other targets. This observing mode is formally offered in Cycle 21 for WFC3 only. See Section 5.5 of the HST Primer for more information on this capability.
- Users submitting Calibration Proposals **must** contact the appropriate instrument group to discuss their program prior to submission (see Section 3.2.4).
- Data taken for all Large and Treasury Programs will have no proprietary period by default. Proposers may request a proprietary period, and that request should be justified in the "Special Requirements" section of the proposal (see Section 9.3). Such a request will be subject to review by the TAC.
- Proposers may apply for Long-Term status (up to two cycles) for Target-of-Opportunity (ToO) programs that target objects with a low probability of occurrence during one cycle (see Section 4.1.2).
- Proposers submitting Theory, Regular AR, or Legacy AR proposals (Section 3.4) are no longer required to provide a precise numerical estimate of the required budget in their Phase I proposals. For planning purposes only, the proposals should be identified as SMALL if the expected budget is less than $60,000; MEDIUM if the expected budget is between $60,000 and $120,000; and Legacy if the expected budget exceeds $120,000. As in past cycles, Legacy programs will be assessed by the TAC. The final budget for accepted programs will be assessed by the Financial Review Committee.
- We wish to remind users that HST data can be searched and obtained both through the standard HST Search Form and through the Hubble Legacy Archive (HLA). Proprietary data can only be retrieved by authorized users via the standard search form, though the outline of these observations can be displayed via Footprints in the HLA. For public data, the HLA offers a graphical search interface, image and spectral preview capabilities, mosaic combinations, enhanced data products, as well as source lists for ACS, WFPC2, and - as of this Cycle - WFC3 observations. In addition, a new Data Discovery Portal to facilitate cross-mission searches (including Virtual Astronomical Observatory access) is in development, and will become operational in early 2013.
- Investigator address information is necessary for completing an APT Phase I proposal. A web-based application, ProPer, is available for updating address information and for requesting a new user to be added to the STScI address database. ProPer has replaced use of the addr-chg@stsci.edu email address for submitting investigator address changes.

- In addition to the standard proposal categories that have existed for many cycles, STScI continues to solicit proposals in the newer categories of Treasury Programs (Section 3.2.6), Theory Proposals (Section 3.4.4) and Legacy AR Proposals (Section 3.4.2). It is also possible to request observing time on Chandra (Section 3.5), Spitzer (Section 3.6), XMM-Newton (Section 3.7), and NOAO telescopes (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.*
  The new classification system for GO proposals (Small: 1-34 orbits; Medium: 35-74 orbits; Large: 75 orbits or above) is designed to ensure that the proposal acceptance rate is approximately independent of proposal size, so observing requests of all sizes are encouraged.
- *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 21 Announcement Webpage

The Cycle 21 Announcement Webpage provides links to information and documentation that will be useful to you while preparing your proposals. This page will also provide any late-breaking updates on the Phase I process, and answers to frequently asked questions.

1.4.2 Phase I "Roadmap"

The Phase I Proposal Roadmap is a high level step-by-step guide to writing a Phase I Proposal. Links to the appropriate sections of various documents (Call for Proposals, Primer, etc.) are given for each step.

1.4.3 HST Primer

The HST Primer provides a basic introduction to the technical aspects of HST and its instruments, and explains how to request the appropriate number of orbits in a Phase I proposal.

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 Documents Webpage. 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 Tool (APT)

The Astronomer's Proposal Tool (APT) is the interface for all Phase I and Phase II proposal submissions for HST. The current version of APT, along with minor bug fixes and enhancements, is essentially the same system as was used in the last cycle. See the "What's New" button in APT for details on the changes. The APT Webpage contains information on the installation and use of APT.

The Aladin Sky Atlas is available via APT. This interface can be used to display HST apertures on images of the sky. This tool brings a variety of benefits to users including

access to a wide variety of images and catalogs. The GALEX catalog is available in Aladin to assist in checking for potentially dangerous objects for the UV detectors. Training documentation and videos can be found on the APT Training Materials page.

1.4.6 Exposure Time Calculators (ETCs)

STScI provides Exposure Time Calculators (ETCs) for each of the HST instruments. Please use those electronic tools to estimate how long you need to integrate to achieve the signal-to-noise ratio required for your project. The ETCs will also issue warnings about target count rates that exceed linearity and safety limits. The ETCs can be accessed from the HST ETC Webpage.

1.4.7 HST Data Archive

The HST Data Archive is part of the Barbara A. Mikulski Archive for Space Telescopes (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 Large and Treasury Programs generally carry no proprietary period.

The MAST webpage 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). The Canadian Astronomy Data Centre (CADC; see Appendix A.2) maintains a copy of HST science data, and is the preferred source for Canadian astronomers.

The Hubble Legacy Archive (HLA) is a project to offer enhanced HST archive products. The HLA is a joint project of the Space Telescope Science Institute, the European Coordinating Facility, and the Canadian Astronomy Data Centre. It offers access to high level HST products including composite images and interactive tools for previewing data products. Section 7.3 of the HST Primer contains more detailed information about the HLA.

1.4.8 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 by:

- Sending an e-mail to help@stsci.edu.
- Calling 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

STScI manages the review of HST proposals in two phases.

In Phase I, proposers submit a scientific justification and observation summary for peer review. The review panels and the Time 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.

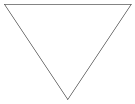
In addition to this, Phase II investigators may do the following:

- 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 21 has the following deadlines:

- Phase I proposals: **Friday, March 1, 2013, 8:00 pm EST**.
- Phase II proposals: **Thursday, June 27 2013.**
- Budgets for grant funding: **Thursday, June 27 2013.**
- Education/Public Outreach proposals: **Wednesday, August 21, 2013, 5:00 pm EDT**.



Late proposals will not be considered.

2.3 Who May Submit

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

2.3.1 Principal Investigator and Co-Investigators

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

Proposals by non-U.S. PIs that have one or more U.S. CoIs *must* designate one of the U.S. CoIs as the 'Admin 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 have the option of designating a Contact Co-I, who will serve as the contact person for that proposal. The PI remains responsible for oversight of the proposal.

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

2.3.2 ESA Scientists

An agreement between NASA and ESA states that a minimum of 15% of HST observing time (on average over the lifetime of the HST project) will be allocated to scientists from ESA member states. It is anticipated that this requirement will continue to be satisfied via the normal selection process, as it has been in previous cycles. ESA scientists will be identified automatically by APT based on the institution selected; the ESA flag will only be visible in the PDF output.

2.3.3 Student PIs

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

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

This letter from the advisor should be e-mailed before the proposal 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 21 programs. Budgets are not due in Phase I, but are required in Phase II from successful proposers. Details of the STScI Funding Policies are outlined in Chapter 12.

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.

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

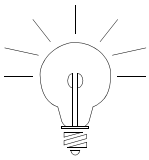
In this chapter. . .

3.1 Overview of Proposal Categories

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 Small (see Section 3.2.1), Medium (see Section 3.2.2), Large (see Section 3.2.3), Calibration (see Section 3.2.4), Long-term (see Section 3.2.5), or Treasury (see Section 3.2.6). Funding for projects that do not require new HST observations can be requested with an Archival Research (AR; see Section 3.4) or a Theory (see Section 3.4.4) Proposal. An AR Program can be either a Regular AR (see Section 3.4.1) or a Legacy AR (see Section 3.4.2) Program. Proposals can also request observing time on Chandra (see Section 3.5), Spitzer (see Section 3.6) XMM-Newton (see Section 3.7), or NOAO facilities (see Section 3.8). At any time scientists can request Director's Discretionary (DD) time for unanticipated and scientifically compelling astronomical observations (see Section 3.9). 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. A new system of Small, Medium, and Large Program categories is being introduced this Cycle. Small Programs are those requesting up to 34 orbits (Section 3.2.1). Medium Programs are those requesting between 35 and 74 orbits (Section 3.2.2). Large Programs are those requesting 75 orbits or more (Section 3.2.3). Programs in each of these categories can request observing time in future cycles when this is scientifically justified (Section 3.2.5). The additional category of Treasury Programs (Section 3.2.6) is designed to stimulate certain types of ambitious and innovative proposals that may not naturally fit in the Small, Medium, or Large Program categories.



Proposers are strongly encouraged to develop competitive Medium, Large, and Treasury Programs.

Proposers of Medium, Large, and Treasury 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 programs with scheduling constraints may require execution over an extended period.

In general, proposals are either accepted or rejected in their entirety. Accordingly, you are urged to request the actual number of orbits required to achieve your science goals.

3.2.1 Small GO Programs

Small GO Programs are those that request between 1 and 34 orbits.

It is anticipated that 1800 orbits will be available to the review panels for allocation to Small Programs in Cycle 21.

3.2.2 Medium GO Programs

Medium GO Programs are those that request between 35 and 74 orbits.

The Medium Program category is a new feature of this Cycle. It has been introduced to ensure that compelling science programs that demand a medium-size orbit request

have a similar chance of success as both smaller and larger observing programs. Medium proposals will be reviewed by the panels and ranked together scientifically with the Small proposals, but the panels will not be charged any orbits for them. Those lying above the scientific cutoff line will proceed to the TAC, where their scientific impact will be assessed alongside the Large Programs. The TAC will then decide which Medium Programs are recommended for approval. This system replaces the orbit subsidy that has been in use for medium-sized proposals in recent cycles. It is anticipated that 400 orbits will be available to the TAC for allocation to Medium Programs in Cycle 21.

3.2.3 Large GO Programs

Large GO Programs are those that request 75 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 should consult the Large Program Scheduling User Information Report linked from the HST Documents page and the HST Orbital Viewing and Schedulability page. These documents contain necessary information for developing a Large Program that is feasible with respect to HST orbit scheduling. Investigators proposing Large Programs must select the Large Program flag on the cover page, use a visibility that enhances schedulability, and include additional technical detail in the "Description of Observations" section to provide information on the scheduling aspects of their program. The shorter visibility period will be enforced in Phase II for each approved GO program that is awarded 75 orbits or more in a single cycle.

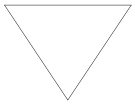
Following the recommendations of the Space Telescope Users Committee, data taken for all Large Programs will have no proprietary period as a default. Proposers may request a proprietary period, and that request should be justified in the "Special Requirements" section of the proposal (see Section 9.3). Such a request will be subject to review by the TAC.

In Cycle 21, 1000 orbits are available to new Large and Treasury Programs, and we anticipate the selection of four to eight Large Programs. For comparison, in Cycle 20 seven Large Programs were accepted for a total of 736 primary orbits; in Cycle 19 five were accepted for a total of 676 primary orbits. Descriptions of these programs are available on the Treasury, Archival Legacy and Large (TALL) Programs Webpage. Most Large Programs accepted in previous cycles were allocated between 110 and

150 orbits; that range may change in this Cycle given the newly introduced minimum size of 75 orbits for the Large Program category.

3.2.4 Calibration GO Programs

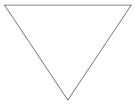
HST is a complex observatory, with many possible combinations of observing modes and spectral elements on each instrument. Calibrations and calibration software are maintained by STScI for the most important and most used configurations. However, STScI does not have the resources to calibrate fully all 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 Programs*, 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.

Users submitting Calibration Proposals **must** contact the appropriate instrument group to discuss their program prior to submission.

Successful proposers will be required to deliver documentation, data products and/or software to STScI to support future observing programs or archival research. Funding is available to support Calibration Proposals in the same manner as for normal science programs, with the following exception:



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

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

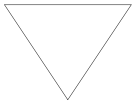
A specific science program that has special calibration requirements is not a Calibration Proposal; such a proposal should be submitted as a normal GO proposal and the necessary calibration observations should be added to the science program as described in Section 4.3.

Investigators interested in the submission of a Calibration Proposal are encouraged to study the Instrument Handbooks to determine the level at which STScI provides calibration and characterization. Examples of the kinds of topics that have been addressed by calibration outsourcing programs of the type discussed here are

- Calibration of faint photometric standards for ACS and WFC3
- ACS photometric zero point verification
- Calibration of the ACS emission line filters

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

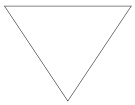
The data obtained for a GO Calibration Proposal will nominally be non-proprietary, as is the case for regular calibration observations. Proposers may request a proprietary period (which should be explained in the 'Special Requirements' section of the proposal; see Section 9.3), but such a request will be subject to panel- and TAC review and will be granted only in exceptional circumstances if exceedingly well justified. Calibration Proposals can also be submitted as Snapshot Programs (see Section 3.3.2) or Archive Programs (see Section 3.4.3). Archival Research proposals are appropriate in cases where the necessary data have already been taken, or for programs that do not require specific data but aim to develop specialized software for certain HST calibration and data reduction tasks.



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

3.2.5 Long-Term GO Programs

Small, Medium, Large, and Treasury GO Programs may request HST observing time in more than one cycle if a clear scientific case is made.



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 up to three observing cycles (21, 22, and 23). Long-Term Proposals should describe the entire requested program and provide a cycle-by-cycle breakdown of the number of orbits requested. The Cycle 21 review panels and TAC will only be able to award a limited amount of time in future cycles, so a scientific justification for allocating time beyond Cycle 21 must be presented in detail. Scheduling concerns are not a sufficient justification. The sum of all orbits requested in Cycles 21, 22, and 23 determines whether a Long-Term Program is Small, Medium, or Large. Target of Opportunity Programs are eligible to be Long-Term Programs if certain conditions are met (see Section 4.1.2).

GOs with approved Long-Term Programs need not submit continuation proposals in the subsequent cycles (and hence, GOs who had Cycle 21 time approved in Cycles 19 or 20 do not have to submit a Phase I continuation proposal, although a new Phase II and budget submission will be required for each new cycle).

3.2.6 Treasury GO Programs

Hubble Treasury Programs are those designed to create datasets of lasting value to the HST project 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.

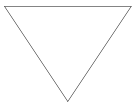
- Inclusion of an Education/Public Outreach component. A Phase I Treasury proposal only needs to summarize the planned E/PO component briefly; typically, one paragraph at the end of the Scientific Justification section. A detailed E/PO proposal should be submitted later as discussed in Chapter 11.

The emphasis in Cycle 21 remains on observations whose value is maximal if taken soon. However, Treasury Programs may request observing time to be distributed in future cycles if scientifically required (similar to the situation for Small, Medium, and Large Long-Term GO Programs; see Section 3.2.5). In this cycle approximately 1000 orbits of HST time will be available for new Large and Treasury Programs. For reference, one Treasury Program was accepted in Cycle 20 and one was accepted in Cycle 19. Descriptions of all Treasury Programs are also available on the HST Treasury, Archival Legacy and Large Programs Webpage.

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.

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.

Investigators proposing Treasury Programs must select the Treasury Program flag on the cover page, use a visibility that enhances schedulability, and include additional technical details in the "Description of the Observations" section to provide information on the scheduling aspects of their program. Note that a program can be both Large and Treasury, in which case both flags should be set. Proposers submitting Treasury Programs which are also Large Programs should consult the Large Program User Information Report, which can be found on the HST Documents webpage (linked from the Cycle 21 Announcement Page). This document contains a discussion of the issues surrounding Large Program scheduling.



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

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

3.3 Snapshot (SNAP) Proposals

Snapshot (SNAP) Programs consist of separate, relatively short observations with typical durations of 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 of objects selected from a large list of available candidates.

3.3.1 Characteristics of SNAPs

Accepted SNAP programs are allocated a specific number of Snapshot targets. However, there is no guarantee that any individual target will be observed, because 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 allocated targets will be observed.

There is no commitment on the part of STScI to obtain any specific completion factor for Snapshot Programs.

The Cycle 19 primary GO scheduling rate was nearly identical to the rate from Cycle 18, providing a similar number of Snapshot scheduling opportunities. However, as of the end of the nominal cycle, the completion rate for Cycle 19 Snapshot Programs was ~36% compared to ~46% for Cycle 18 Snapshot Programs at the end of that cycle. SNAP Programs are scheduled at high priority during their allocated cycle and, unlike GO Programs (see Section 3.2.5), SNAP Programs cannot request observing time in future cycles. However, they are kept active for one additional cycle at decreased priority to supplement the SNAP pool.

Given the two-stage scheduling priorities for SNAPs, the results of the past two cycles highlight the effect of visit duration and target distribution on completion rates. For example, there were 2.4 times as many Cycle 18 Snapshot visits with durations of 21-30 minutes executed as compared to Cycle 19 SNAPs of that duration. The

numbers of scheduling opportunities did not change significantly between these two cycles. However, the candidate pool in this size category was 41% of the total candidates for Cycle 18 compared to just 23% for Cycle 19. So even though the total SNAP candidate pools for both cycles were about the same, Cycle 18 had a much larger selection of small-duration visits to choose from to fill the available SNAP scheduling opportunities of this size.

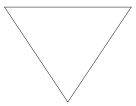
Likewise, a review of the target lists showed that Cycle 18 had a better target distribution on the sky compared to the Cycle 19 distribution. Of the 422 total Snapshot observations scheduled during the nominal 52 weeks of Cycle 19 GO science observing, 361 were from Cycle 19 programs. The remainder were from Cycle 18 programs. For comparison, there were 459 Snapshot visits scheduled during the nominal 52 weeks of Cycle 18, very few of which were from the prior cycle allocation.

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, and other useful information.

3.3.2 Calibration SNAP Programs

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

Users submitting Calibration Proposals are required to contact the appropriate instrument group to discuss their program prior to submission.



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

3.3.3 Guidelines for SNAP Programs

Please consider the following when developing your SNAP Proposal:

- Your willingness to waive part or all of the proprietary data-rights period is included in the selection criteria (see Section 6.1).

- You need not give a complete list of all targets and their coordinates in your Phase I proposal. However, you *must* specify the number of targets, and unambiguously identify the targets (e.g., reference to target lists in papers, or give a detailed description of the target characteristics). SNAP exposures may not be used for targets of opportunity (see also Section 4.1.2).
- In the 'Observation Summary' section of the proposal (see Section 8.16) you should provide a typical example of a Snapshot exposure.
- SNAP Programs cannot request observation times longer than 45 minutes, including guide star acquisition and target acquisition. In general, shorter duration Snapshot observations have more scheduling opportunities than longer ones.
- SNAP observations should not be proposed with any special scheduling constraints (e.g., CVZ 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.
- SNAP Programs 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., monitoring or follow-up observations). 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 of at least one month duration. Solar system targets interior to the orbit of Jupiter are not permitted. Timing constraints will reduce the chance of a target being scheduled. Due to the amount of effort required in implementing moving target SNAP programs, these observations ordinarily cannot be revised during the observing cycle, once the initial processing has been completed.
- SNAP Programs with the ACS/SBC are not allowed.
- Spectroscopic COS and STIS/MAMA SNAPs (other than those using the NUV-PRISM) are allowed, but the total number of targets accepted from all SNAP programs for COS and STIS/MAMA will be limited to 150. Imaging and moving target SNAPs with COS or STIS/MAMA modes are not allowed, due to the target and field bright-object checking requirements. Variable STIS/MAMA and COS 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

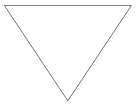
expected completion rate since they are not restricted to SAA-free orbits. Thus, use of the CCD NUV configurations should be considered instead of the MAMA NUV.

- STIS/CCD SNAPs are allowed for both imaging and spectroscopic modes.
- 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).
- 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).
- Because SNAP targets are added to the observing schedule at a late stage of the schedule building process, moving-target SNAP programs may not use any detector that requires bright object screening (e.g. STIS/MAMA or COS). It is simply not practical to screen the field for any background objects that might violate bright object screening limits.

3.4 Archival Research (AR) Proposals

Observations that are no longer proprietary (see Section 1.4.7) are available for analysis by interested scientists through direct retrieval from the HST Data Archive or from the Hubble Legacy Archive (HLA). The retrieval is free and does not involve financial support. The HST Archival Research (AR) Program can provide financial support for the analysis of such data sets. AR Phase I proposals must provide a guide to the anticipated level of funding (see Section 8.6.3) and must outline a management plan for analyzing the data (see Section 9.7). Detailed budgets 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 (see Section 12.2).

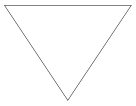
HST has produced an extraordinary quantity of high-quality observations over its twenty-two years in orbit. The category of Regular AR Proposals (see Section 3.4.1) has existed for many cycles. To encourage the use of available data and to realize the full potential of the Data Archive, the opportunities for large-scale archival research were expanded in Cycle 11 with the introduction of the category of Legacy AR Proposals (Section 3.4.2). This cycle, we particularly encourage archival proposals aimed at exploiting the data obtained as part of the New Frontiers Program developed in response to the Hubble Deep Fields Initiative. We also encourage the submission of proposals that combine HST archival data with data from other astronomical missions, such as the datasets maintained at the Barbara A. Mikulski Archive for Space Telescopes (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 planning purposes only, proposers should identify their proposals as SMALL if the expected budget is less than $60,000, and MEDIUM if the expected budget lies between $60,000 and $120,000. Proposals that require higher funding levels should be

submitted as Legacy AR proposals. For reference, 24 Regular AR Proposals were approved in Cycle 20, and 28 were approved in Cycle 19.



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

3.4.2 Legacy AR Proposals

A Legacy AR project is defined by the following characteristics:

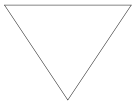
- The project should perform a homogeneous analysis of a well-defined subset of data in the HST Archive.
- The main goal should be to provide a homogeneous set of calibrated data and/or ancillary data products (catalogs, software tools, Web interfaces etc.) to the scientific community.
- The results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

The main difference between a Regular and a Legacy AR project is that the former aims at performing a specific scientific investigation, while the latter will also create data products and/or tools for the benefit of the community. While Legacy AR Proposals will be judged primarily on the basis of scientific merit, the importance and broad applicability of the products produced by the Legacy Program will be key features in judging the overall scientific merit of the proposal.

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

It is anticipated that Legacy AR Proposals will be larger in scope and requested funds than most Regular AR Proposals. While there is no lower limit on the requested amount of funding, it is expected that most Legacy AR 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 3.2.3 and Section 3.2.6).

For reference, four AR Legacy Proposals were approved in Cycle 20 and four were approved in Cycle 19. Descriptions of these programs are available on the HST Treasury, Archival Legacy and Large Programs Webpage.



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

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

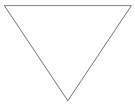
3.4.3 Calibration AR Programs

Calibration Proposals (see Section 3.2.4) may also be submitted as an Archival Research Program. Archival proposals are appropriate in cases where the necessary data have already been taken, or for programs that do not require specific data but aim to develop specialized software for certain HST calibration and data reduction tasks. Examples of topics that have been addressed by calibration outsourcing programs of the type discussed here are:

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

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

Users submitting Calibration Proposals must contact the appropriate instrument group (accessible via the STScI Helpdesk; see ***Section 1.5***) to discuss their program prior to submission.



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

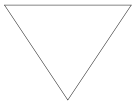
3.4.4 Theory Proposals

The opportunity exists 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. We particularly encourage submission of theory proposals that aim to support analysis of data taken as part of the New Frontiers Program. In recent cycles, of order 5% of the total HST proposal funding has been used to support Theory Proposals.

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

For planning purposes only, Theory Phase I proposals should identify their proposals as SMALL if the expected budget is less than $60,000, and MEDIUM if the expected budget lies between $60,000 and $120,000. Proposals that require higher funding levels should be submitted as Legacy Theory proposals. Detailed budgets are due in Phase II only (as in the case of GO and SNAP proposals, see Chapter 12). 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 (see Section 12.2).

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 in recent cycles have been under $100,000, with a median around $50,000. For reference, thirteen Theory Proposals were approved in Cycle 20 and nine were approved in Cycle 19.

STScI also allows the submission of more ambitious proposals for which larger amounts of funding may be justified.

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

The 'Scientific Justification' section of the proposal (see Section 9.1) should describe the proposed theoretical investigation and also its impact on observational investigations with HST. Review panels will consist of observational and theoretical astronomers with a broad range of scientific expertise (see Section 6.1). They will not necessarily have specialists in all areas of astrophysics, particularly theory, so the proposals must be written for general audiences of scientists. The 'Analysis Plan' section of the proposal (see Section 9.6) should discuss the types of HST data that will benefit from the proposed investigation, and references to specific data sets in the HST Data Archive should be given where possible. This section should also describe how the results of the theoretical investigation will be made available to the astronomical community, and on what time-scale the results are expected.

3.4.5 Guidelines for AR Programs

Please consider the following when developing your AR proposal:

- In general, 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 21 (October 1, 2013). Data taken for the Multi-Cycle Treasury Programs and for the New Frontiers Program are available for AR proposals in this cycle.
- System resources required for On-the-Fly Reprocessing (OTFR) may significantly delay the availability of data to programs that require large data volumes. Requests larger than 2000 datasets (where a dataset consists of a set of associated exposures) may experience delays to allow for sufficient resources. We recommend breaking large OTFR requests into smaller requests of around 500 datasets each for maximum efficiency. Optimal non-OTFR requests should be for 5000 datasets or less. More information is available on the Large Searches and Requests Webpage.
- 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 Barbara A. Mikulski Archive for Space Telescopes (MAST). STScI is an active partner of the Virtual Astronomical Observatory (VAO), and MAST is implementing VAO technology to make its data holdings available. The HLA is compatible with VAO interfaces. Any (pilot) programs that tie in with the VAO effort are particularly encouraged; see the VAO website and the International Virtual Observatory Alliance websites for information. However, HST data must form the major focus of any AR proposal; requests for support of AR programs using data primarily from other missions should follow the guidelines in the appropriate NASA Research Announcements.
- The Archive is developing a new Data Discovery Portal to facilitate cross-mission searches. The portal builds on concepts developed by the HLA team and utilizes existing HLA and archive features. By providing filters to the data after the search, the ability to add and subtract fields after the search, and to display footprints of the observations, the interface becomes a powerful search tool. Users can also utilize the portal to discover resources from around the world, including Spitzer, Chandra, SDSS, VizieR, and more. Users can use the HLA interactive display to view images, the new MAST spectral plotter to view spectra, and a charting tool to load in catalogs and filter the catalog to identify objects of interest. The version currently implemented is a beta version, with access to a limited data set. Future features include the ability to search for multiple targets, to perform temporal searches, and a bibliography search. Please see the help documentation linked from the entry page, and feel free to send suggestions and questions to archive@stsci.edu.

3.4.6 Suggestions for AR Proposals

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

- The data to be obtained for the New Frontiers Program.
- The data obtained by the HST Pure Parallel Program (see Section 4.2.2).
- The data obtained for the Hubble Deep Field (HDF), the Hubble Deep Field-South (HDF-S) and the Hubble Ultra Deep Field (UDF).
- The data obtained by the HST Treasury Programs. Descriptions of these programs are available on the HST Treasury, Archival Legacy and Large Programs Webpage. Community contributed high level science products from

imaging and spectroscopic surveys (including GOODS, GRAPES and GEMS) are available from the High Level Science Product Webpage at MAST.

3.5 Joint HST-Chandra Observing Proposals

If your science project requires observations from both HST and the Chandra X-ray Observatory, you can submit a single proposal to request time on both observatories to either the HST Cycle 21 or the Chandra Cycle 15 review. This avoids the "double jeopardy" of having to submit proposals to two separate reviews.

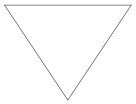
By agreement with the Chandra X-ray Center (CXC), STScI will be able to award up to 400 kiloseconds of Chandra observing time. Similarly the CXC will be able to award up to 100 orbits of HST time to highly rated proposals awarded Chandra time in its TAC process. The only criterion above and beyond the usual review criteria is that the project must be 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 new HST observations (and should not be proposed for in conjunction with an Archival Research or Theory Proposal).

Of the 400 kiloseconds of Chandra observing time that can be awarded in the HST review, only approximately 15% of the observations may be time-constrained. In addition, only one rapid ToO can be awarded (less than 20 days turn-around time). A Chandra ToO is defined as an interruption of a command load, which may include several predictable observations within that one-week load. HST Cycle 21 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). *The Chandra Cycle 15 deadline is 14 March 2013 at 6 pm EDT.* 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.

Establishing the technical feasibility of the Chandra observations is the responsibility of the PI, who should review the Chandra documentation or consult with the CXC. A description of the technical information that should be included in the proposal is given in Section 9.4.1. For proposals that are approved, the CXC will perform detailed feasibility checks in Chandra Cycle 15. The CXC reserves the right to reject any previously approved observation that proves infeasible, impossible to schedule, and/or dangerous to the Chandra instruments. Any Chandra observations that prove infeasible or impossible could jeopardize the overall science program and may cause

revocation of the corresponding HST observations. Duplicate Chandra observations may also be rejected by the CXC.



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

3.6 Joint HST-Spitzer Observing Proposals

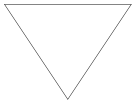
If your science project requires observations from both HST and Spitzer, then you can submit a single proposal to request time on both observatories to either the HST Cycle 21 review or the Spitzer Cycle 10 review. This avoids the "double jeopardy" of having to submit proposals to two separate reviews. Technical information about Spitzer instrumentation and observations is available from the Spitzer Science Center (SSC) Website and specific questions can be addressed to the SSC Helpdesk (help@spitzer.caltech.edu).

By agreement with the SSC, STScI will be able to award up to 60 hours of Spitzer observing time. Similarly, the SSC will be able to award up to 60 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 must be 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 or Theory Proposal). Proposers may request up to 20 hours of Spitzer time in any one HST Cycle 21 proposal. Any program requiring more than 20 hours of Spitzer time should be submitted as a Spitzer Cycle 10 proposal. Spitzer observations of approved joint HST-Spitzer Cycle 21 proposals will be scheduled from October 2013 through September 2014.

Highly constrained Spitzer programs are discouraged as joint HST-Spitzer proposals. Proposers may not request target-of-opportunity Spitzer observations that require execution sooner than eight weeks after the Astronomical Observation Requests (AORs) are defined. Please direct any questions you have about Spitzer ToO or constrained observations to the SSC Helpdesk at help@spitzer.caltech.edu.

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

Establishing the technical feasibility of the Spitzer observations is the responsibility of the PI, who should review the Spitzer documentation or consult with the SSC. A description of the technical information that should be included in the proposal is given in Section 9.4.2. For proposals that are approved, the SSC will perform detailed feasibility checks. The SSC reserves the right to reject any previously approved observation that proves to be non-feasible or impossible to schedule. Any Spitzer observations that prove infeasible or impossible could jeopardize the overall science program and may cause revocation of the corresponding HST observations. Duplicate Spitzer observations may also be rejected by the SSC.



Joint HST-Spitzer Proposals must be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10). Also, you must include technical information about the Spitzer observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.2).

3.7 Joint HST/XMM-Newton Observing Proposals

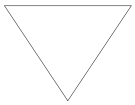
If your science project requires observations from both HST and the XMM-Newton Observatory, you can submit a single proposal to request time on both observatories to either the HST Cycle 21 or the XMM-Newton Cycle AO-12 review.

By agreement with the XMM-Newton Observatory, the HST TACs will be able to award up to 150 kiloseconds of XMM-Newton observing time. Similarly the XMM-Newton TACs will be able to award up to 30 orbits of HST time. The only criterion above and beyond the usual review criteria is that the project must be fundamentally of a multi-wavelength nature, and that both sets of data are required to meet the science goals. XMM-Newton time will only be awarded in conjunction with new HST observations (and should not be proposed for in conjunction with an Archival Research or Theory Proposal). Proposers should take special care in justifying both the scientific and technical reasons for requesting time on both missions.

It is not essential that the project requires simultaneous XMM-Newton and HST observations. No observations with a reaction time of less than 5 working days from the trigger date will be considered. Target of Opportunity (ToO) proposals must state explicitly whether the HST observations require a disruptive ToO. No more than one disruptive ToO will be allocated per proposal. It is the responsibility of the PI to inform both observatories immediately if the trigger criterion is fulfilled.

Joint HST/XMM-Newton Proposals should be submitted to the observatory that represents the prime science facility (not to both observatories). Since the XMM-Newton AO-12 submission deadline has passed (5 October 2012), only joint proposals where HST is the prime science facility should be submitted in response to this call.

Establishing the technical feasibility of the XMM-Newton observations is the responsibility of the PI, who should review the XMM-Newton Instrument Handbooks. A description of the technical information that should be included in the proposal is given in Section 9.4.3. All standard observing restrictions for both observatories apply to joint proposals. For proposals that are approved, both projects will perform detailed feasibility checks. Both projects reserve the right to reject any approved observation that is in conflict with safety or schedule constraints, or is otherwise deemed to be non-feasible.



Joint HST/XMM-Newton 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 XMM-Newton observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.3).

3.8 Joint HST-NOAO Observing Proposals

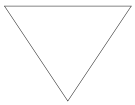
By agreement with the National Optical Astronomy Observatory (NOAO), STScI will be able to award time on NOAO facilities to highly ranked proposals that request time on both HST and NOAO telescopes. The award of time on NOAO facilities will be subject to approval by the NOAO Director, after nominal review 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 new 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 2014 NOAO observing semesters (2014A for February to July 2014 observations, and 2014B for August 2014 to January 2015 observations). Time cannot be requested for the preceding semester, 2013B. Time may be requested only for those facilities listed on

the NOAO/NASA Collaboration Webpage. Under this agreement approximately 15-20 nights per telescope per year will be available on most telescopes, with the exceptions of those telescopes on which NOAO gives out fewer nights. Only a fraction of the time is available on some facilities - the WIYN and 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.

Establishing the technical feasibility of the proposed ground-based observations is the responsibility of the PI, who should review the NOAO documentation or consult with NOAO directly. A description of the technical information that should be included in the proposal is given in Section 9.4.4. The proposal should include an explanation of how the requested observing allocation was calculated. If approved for NOAO time, the PI must submit, by September 26, 2013, an NOAO Phase II form giving detailed observing information appropriate to the particular NOAO telescope and instrument. In addition, for NOAO time on Gemini (only), successful PIs will be required to submit a complete NOAO proposal to NOAO by September 26, 2013 on the standard NOAO proposal form. This will be reviewed by the regular NOAO Time Allocation Committee in order to determine into which Gemini queue the observations will be placed.

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



Joint HST-NOAO Proposals must be identified in the 'Special Proposal Types' section of the proposal (see Section 8.10). Also, you must include technical information about the NOAO observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.4).

3.9 Director's Discretionary (DD) Time Proposals

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

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

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

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

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

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

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

CHAPTER 4:

Observation Types and Special Requirements

In this chapter. . .

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.

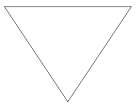
4.1.1 Continuous Viewing Zone (CVZ) Observations

Most targets are occulted by the Earth during a portion of the HST orbit. However, this is not true for targets that lie close to the orbital poles. This gives rise to so-called Continuous Viewing Zones (CVZ) in two declination bands near +/– 61.5 degrees. Targets in those bands may be viewed without occultations at some time during the 56-day precessional cycle of the HST orbit. The number and duration of CVZ passages depend on the telescope orbit and target position, and may differ significantly from previous cycles. Please refer to the HST Orbital Viewing and Schedulability webpage for information on determining the number of CVZ opportunities in Cycle 21 and their approximate duration for a given target location. Passages of HST through the South Atlantic Anomaly generally restrict the length of

uninterrupted observations to 5 to 6 orbits. See Section 2.2.1 of the HST Primer for technical details about the CVZ.

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

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



Continuous Viewing Zone observations must be marked in the 'Observation Summary' section of the proposal (see Section 8.16).

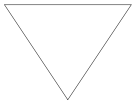
Restrictions on Using the CVZ

Observations that require special timing requirements (including telescope orientation constraints; see Section 4.1.6) should *not* be proposed for execution in the CVZ, and orbit estimates in the Phase I proposal should be based on standard orbit visibility (see Table 6.1 of the HST Primer). Because of the extra scattered earthshine that enters the telescope on the day side of the orbit, sky-background limited observations through broadband optical or infrared filters do not gain significant observing efficiency from CVZ observations. If it is determined during the Phase II proposal implementation that an observation is unschedulable because of conflicts between the CVZ requirement and any other Special Requirements (e.g., SHD, LOW, timing, etc.), then the observing time may be revoked. Proposers who are in doubt about whether or not to request CVZ observations should contact the STScI Help Desk (see Section 1.5).

4.1.2 Target-of-Opportunity (ToO) Observations

A target for HST observations is called a 'Target-of-Opportunity' (ToO) if the observations are linked to 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 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 8.16). In the 'Special Requirements' section of the proposal (see Section 9.3) you must provide an estimate of the probability of occurrence of the ToO during the observing cycle, and describe the required turn-around time.

Turn-Around Time and ToO Limits in Cycle 21

The turn-around time for a ToO observation is defined as the time between STScI receiving a ToO activation and the execution of the observations. The HST observing schedule is updated weekly, and construction of each weekly calendar starts approximately eleven days in advance of the first observations on that calendar. Thus, in the normal course of events, almost 3 weeks can elapse between Phase II submission of a ToO and execution of the observations. 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. ToOs are therefore classified into two categories: disruptive ToOs that require observations on a rapid timescale and therefore revisions of HST observing schedules that are either active or in preparation; and non-disruptive ToOs that can be incorporated within the standard scheduling process. Disruptive ToOs are defined as those having turn-around times of less than 3 weeks, and non-disruptive ToOs have turn-around times longer than 3 weeks.

Disruptive ToOs: The minimum turn-around time for ToO activation 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. Any required bright object screening (COS, STIS/MAMA, or ACS/SBC) must be completed before a ToO can be placed on the schedule. The ability to perform any bright object check will depend on the quality of the flux information provided by the observer, the complexity of the field, and the availability of suitable expertise at STScI to evaluate that information on a short time scale. Under exceptional circumstances, it may be possible to achieve shorter turn-around times, but only at the expense of significant loss of observing efficiency. Ultra-rapid (< 2 day turn-around) ToOs therefore require an extremely strong scientific justification, and may only be requested for instruments that do not require bright object checking (ACS/WFC, WFC3, STIS/CCD, FGS). Because of the significant effect disruptive ToO observations have on the HST schedule, the number of activations will be limited to 8 in Cycle 21; this allocation will include no more than one ultra-rapid ToO.

Non-disruptive ToOs: Observations of transient phenomena that require turn-around times longer than 3 weeks can be accommodated in the normal HST scheduling

process. Non-disruptive ToOs will be incorporated in the HST observing schedule at the earliest opportunity consistent with normal scheduling process. Consequently, there is no limit on non-disruptive ToOs in Cycle 21. However, programs that have been allocated a specific number of non-disruptive ToOs may not subsequently request activation on shorter timescales.

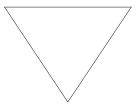
Proposers are encouraged to check the ToO Webpage for further information and examples on defining and activating ToO observations.

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. Disruptive ToOs require 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.

Long-Term ToOs

Proposers may apply for Long-Term status for ToO programs that target objects with a low probability of occurrence during one cycle. The request must be justified in the "Special Requirements" section of the proposal (see Section 9.3) and will be subject to review by the TAC. Long-Term ToO proposals will be extended into Cycle 22.



If the triggering event for a standard ToO Program does not occur during Cycle 21, the program will be deactivated at the end of the cycle. Unused ToO time carries over to the following cycle only for Long-Term ToO Programs.

ToO Programs with COS, STIS/MAMA or ACS/SBC

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

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 2.2.2 of the HST Primer).

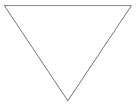
4.1.3 Special restrictions on observations with COS, STIS/MAMA and ACS/SBC

The COS, STIS/MAMA, and ACS/SBC instruments employ photon counting detectors and are vulnerable to damage through exposure to bright sources. Consequently, there are a number of restrictions on the use of these configurations. All targets and field objects within the appropriate field of view must pass bright-object safety reviews (see Section 5.1 of the Primer). All Phase I proposals must include a discussion of the safety of the proposed targets and fields in the Description of the Observations (see Section 9.2), based on the relevant Instrument Handbook sections and calculations with the appropriate APT and ETC tools.

Observations of variable sources

Proposals to observe variable objects with the COS, STIS/MAMA, or ACS/SBC detectors must pass bright object checking before they can be scheduled (see Section 5.1 of the Primer). Proposers should assume the maximum flux values for targets unless there are specific reasons for adopting other values (for example, time constrained observations of periodic variables at flux minima); the justification for adopting alternative flux values should be given in the 'Special Requirements' section of the proposal (see Section 9.3).

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



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

The observing strategy might include additional observations, obtained over a timescale appropriate to the particular type of variable object, with either HST or ground-based telescopes. Proposers should be aware that this type of observation requires extra resources. STScI reserves the right to limit the number of visits requiring quiescence verification observations within 20 days or less of an HST observation to no more than 12 such visits per Cycle. If you are planning such

observations, please contact the Help Desk at help@stsci.edu for more information on the options and requirements for confirming quiescence.

Additional restrictions

- 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 2.2.2 of the HST Primer).
- Pure Parallel observations with COS, STIS/MAMA, or the ACS/SBC detectors are not permitted.
- SNAP programs using the ACS/SBC are not permitted.
- SNAP programs using STIS/MAMA imaging modes or the STIS/NUV-MAMA PRISM modes are not allowed. SNAP programs are allowed to use all other STIS/MAMA spectroscopic modes and all STIS/CCD modes.
- The total number of targets accepted from all SNAP programs for COS and STIS/MAMA will be limited to 150.
- In order to preserve SAA-free orbits for MAMA observations, STIS programs that contain both CCD and MAMA science observations (excluding target acquisitions) must normally be split into separate CCD and MAMA visits. Exceptions are allowed if at least one of the following conditions apply:
  A) There is less than 30 minutes of science observing time (including overheads) using the CCD;
  B) The target is observed for only one orbit;
  C) There is a well-justified scientific need for interspersed MAMA and CCD observations.
- By default, STIS spectroscopic exposures are accompanied by separate AUTO-WAVECAL exposures. The observer can insert additional GO-WAVECAL exposures adjacent to any external exposure and, although not recommended without adding an equivalent GO-WAVECAL exposure, can turn off the AUTO-WAVECAL exposures. For additional information see Section 4.5 of the Primer.
- To optimize the science return of COS the following is recommended: the use of TIME-TAG mode, the use of the default wavelength calibration procedures, and for FUV modes the use of all four FP-POS positions for each CENWAVE setting selected. Observers who wish to employ non-optimal observing techniques must strongly justify their observing strategy in the Description of the Observations section of the PDF attachment. Non-optimal observing techniques should not normally be adopted solely for the purpose of producing a modest reduction of the observational overheads; in such cases

the observer should normally just request adequate time to use the recommended optimal strategy. For more details, please see Section 4.4 of the Primer.

4.1.4 Solar System Targets

HST can observe most targets within our Solar System, although there are a few exceptions. Mercury is always well within the 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. 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. Observations of comets can be made while they are farther 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. However, lunar observations are possible under gyro control in three-gyro mode. GO proposals to observe the Moon can be submitted for consideration by the Cycle 21 TAC. These proposals must use observing strategies that have been used in previous HST lunar observing programs. The execution of lunar observations will be subject to the availability of resources to carry out the extra work required. Investigators interested in proposing for lunar observations are encouraged to consult the Lunar Observations User Information Report, which contains details on how such observations will be scheduled, the rules pertaining to them, and other useful information.

Pointing constraints are discussed further in Section 2.3 of the HST Primer.

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

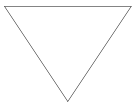
There are a variety of plausible scenarios in which investigators may wish to propose for HST observations of targets that have not yet been discovered or identified (i.e., targets with unknown coordinates, such as the next supernova in our own Galaxy, or the next gamma-ray burst in the southern hemisphere).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

time-criticality, observations will generally not be approved for targets that have not yet been discovered or identified.

4.1.6 Time-Critical Observations

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

- astrometric observations,
- observing specific phases of variable stars,
- monitoring programs,
- imaging surface features on solar-system bodies,
- observations requiring a particular telescope orientation (since the orientation is fixed by the date of the observations; see Section 2.4 of the HST Primer),
- observations coordinated with observations by another observatory.



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

Time-critical observations impose constraints on the HST scheduling system 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 2.2.3 of the HST Primer). Proposals to observe such events can therefore be accepted only conditionally.

4.1.7 Dithering strategies with ACS and WFC3

Experience has shown that ACS and WFC3 imaging observations are best taken as dithered exposures (see Section 5.4 of the HST Primer). Proposers who do not intend to use dithering for primary observations must provide a justification for their choice of strategy in the Description of Observations section of the pdf attachment (Section 9.2). In general, undithered observations with ACS or WFC3 detectors will not be approved without strong justification that such an approach is required for the

scientific objectives. Otherwise, hot pixels and other detector artifacts may compromise the archival value of the data.

4.2 Parallel Observations

Since 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 Figure 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.

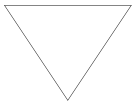
Depending on whether a parallel observation is related to any specific primary observation, it is defined either as a *coordinated parallel* or *pure parallel*. Coordinated Parallel Observations are observations related to a particular primary observation in the same proposal. Pure Parallel Observations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

Parallel observations are rarely permitted to interfere significantly with primary observations; this restriction applies both to concurrent and subsequent observations. Specifically,

- A parallel observation cannot dictate how the primary observation will be structured (e.g. it cannot cause the adjustment of primary exposures). This is particularly directed toward pure parallels where the definition of the observations is independent of and subordinate to a primary observation.
- Parallel observations will not be made if the stored command capacity or data volume limits would be exceeded.
- Pure Parallel Observations may not explicitly constrain the scheduling of the primary observations, that is, they may not specify orientation or timing constraints.
- Coordinated Parallel Observations may include orientation or timing constraints as requested and justified in the accepted HST Phase I proposal.

- Pure Parallel Observations are subject to the availability of parallel observing opportunities as identified by STScI (see Section 4.2.2).

4.2.1 Coordinated Parallel Observations



Coordinated Parallel Observations must be marked in the 'Observation Summary' section of the proposal (see Section 8.16).

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 generally not allowed to add Coordinated Parallel Observations in Phase II that were not explicitly included and approved in Phase I. Any such requests will be adjudicated by the Telescope Time Review Board (TTRB). Coordinated Parallel Observations will ordinarily be given the same proprietary period as their associated primary observations.

4.2.2 Pure Parallel Observations

The Pure Parallel Observing process is designed to take advantage of the full complement of instruments installed in SM4. Similar to primary science planning, the parallels process provides a reliable estimate, in advance of observations, of the number of orbits that will be executed on accepted parallel programs during the cycle. The Parallel Observing User Information Report provides a complete description of this observing mode and is required reading if you are considering submitting a Pure Parallel observing program.

Restrictions

Pure Parallel observations are currently restricted to orbits where COS and STIS are the primary instruments. Consequently, parallel opportunities will be limited by the actual number of orbits allocated to these instruments and to the corresponding

regions of sky being observed. Past experience shows that the final allocation of Pure Parallel orbits also depends on the science goals of the parallel programs (e.g. desired targets may not be available and multiple Pure Parallel programs can compete for the same primary opportunities.) STScI continues to investigate ways to expand the number of Pure Parallel observing opportunities.

For the purpose of Pure Parallel orbit allocation, an orbit is defined as having target visibility of at least 2500 seconds. The number and types of parallel observing opportunities will vary depending on the mix of primary GO programs each cycle. Additionally, the total number of Pure Parallel orbits actually executed could be less than planned due to changes to the primary programs or on-board execution failures. For Cycle 20, opportunities totaling 244 orbits were found to satisfy the 260-orbit TAC allocation to one Pure Parallel program; another request for 150 orbits could not be awarded because no suitable opportunities were available in the Cycle 20 GO pool. Time not requested but potentially also available included 42 one-orbit, 72 two-orbit, and 123 three-orbit pure parallel opportunities.

Pure Parallel programs will be restricted to using ACS/WFC, WFC3/UVIS or WFC3/IR. Multiple parallel science instrument observing may be carried out using ACS and WFC3 simultaneously on the same primary observation (see the Parallel Observing User Information Report for details on the use of multiple parallel science instruments in a Pure Parallel Program). Primary science programs with Coordinated Parallels that use ACS or WFC3 are not eligible for Pure Parallel programs.

Matching with Primary Programs in Phase II

PIs with accepted Pure Parallel programs will be given a list of parallel science opportunities that STScI has identified as being suitable for their program. The PI then selects and submits a final list of opportunity matches to STScI in the Phase II Pure Parallel program submission.

The process of matching Pure Parallel observations to primary programs will occur during the planning and implementation phase (Phase II) so that it can be known in advance when and how the parallel observations can be executed. Proposals for Pure Parallel observations may specify either particular or generic targets, although the latter are more common and provide more flexibility for matching parallel observations to actual opportunities.

Review and Execution

The review panels and TAC will select the programs based on the proposed science. The TAC will consider all accepted programs and produce a ranked list as an aid for resolving potential conflicts. The proprietary period for a GO Pure Parallel Program will depend on the number of orbits requested, as is the case for Primary GO Programs: Small (0-34 orbits) and Medium (35-74 orbits) Pure Parallel Programs will have a default proprietary period of 12 months; Large (75 orbits or more) Pure Parallel Programs will have no proprietary period by default. Pure Parallel observations are assigned to specific primary observations, and the parallel observations will be carried over to subsequent cycles if the primary observations are not executed in Cycle 21.

4.2.3 Restrictions and Limitations on Parallel Observations

Parallel Observations with ACS

The ACS/SBC may not be used for either Pure or Coordinated Parallel Observations in any mode.

The ACS/WFC detector may be used for Coordinated Parallel Observations with any other instrument as primary.

The ACS/WFC may be used for Pure Parallel Observations with the COS and STIS instruments as primary (see Section 4.2.2).

Parallel Observations with COS

The COS/FUV MCP detector may be used for Coordinated Parallel Observations with any other instrument as primary, provided that the telescope orientation is specified exactly and the parallel field passes bright object checking.

The COS/NUV MAMA detector may be used for Coordinated Parallel Observations with any other instrument as primary, provided that the telescope orientation is specified exactly and the parallel field passes bright object checking.

COS may not be used for Pure Parallel Observations in any detector mode.

Parallel Observations with FGS

The FGS cannot be used for either Pure or Coordinated Parallel Observations.

Parallel Observations with STIS

The STIS/CCD detector may be used for Coordinated Parallel Observations with any other instrument as primary.

Neither the STIS/NUV-MAMA PRISM mode nor any STIS/MAMA imaging mode can be used for Coordinated Parallel Observations.

STIS/MAMA spectroscopic modes (other than the NUV/PRISM) may be used for coordinated parallel observations, but only if an exact ORIENT is specified.

STIS may not be used for Pure Parallel Observations in any detector mode.

When STIS is the primary instrument and another instrument is used for a Coordinated Parallel, STIS auto-wavecals will never be done during an occultation; instead these calibration exposures have to be scheduled when the external target is visible, leading to a slight reduction in the observing efficiency.

Parallel Observations with WFC3

WFC3 may be used for Coordinated Parallel Observations with any other instrument as primary. WFC3 may only be used for Pure Parallel Observations with COS or STIS as primary (see Section 4.2.2).

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. During the Phase II process, proposals to calibrate Available-but-Unsupported modes must be pre-approved by the appropriate instrument team. For details please consult the relevant Instrument Handbook.

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.

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

Depending on the proposal category, observers may have exclusive access to their science data during a proprietary period. For Small and Medium GO proposals, this period is normally 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, the data become available for analysis by any interested scientist through the HST Archive.

Proposers of Small and Medium GO Programs 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 "Special Requirements" section of the proposal (see Section 9.3). 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 for Snapshot Programs; see Section 6.2).

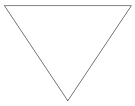
Data taken under the Treasury (see Section 3.2.6), Calibration (see Section 3.2.4), and Large (see Section 3.2.3) Program categories will by default have no proprietary period. Any request for non-zero proprietary periods for programs in these categories must be justified in the "Special Requirements" section of the proposal (see Section 9.3) and will be subject to review by the TAC.

5.2 Policies and Procedures Regarding Duplications

Special policies apply to cases in which a proposed HST observation would duplicate another observation either already obtained or scheduled to be obtained.

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 8.16), and justified strongly in the 'Justify Duplications' section of the proposal (see Section 9.5) as meeting significantly different and compelling scientific objectives.

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

ACS and WFC3 Duplications of WFPC2, NICMOS or STIS imaging

ACS and WFC3 have imaging capabilities superior to WFPC2, NICMOS and STIS for many purposes (see Section 4.7 of the HST Primer). Nonetheless, proposers should note any duplications of previously approved or executed WFPC2, NICMOS, or STIS imaging exposures that lie in their fields, and justify why the new observations are required to achieve the scientific goals of the project. Proposers for WFC3 observations should note and justify any duplications of previous ACS observations.

Snapshot Targets

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

- Snapshot targets may not duplicate approved GO programs in the same cycle.

- Snapshot observations may be proposed that duplicate approved but unexecuted Cycle 20 Snapshot observations by the same Principal Investigator. If the Cycle 21 program is accepted, the Cycle 20 program will not be carried forward into Cycle 21.

5.2.2 How to Check for Duplications

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

- The HST Duplication Checking Web Form.
- The Planned and Archived Exposures Catalog (PAEC), which is available from the HST Catalogs Webpage at MAST. This catalog contains summary information about exposures in ASCII format and can be browsed with any text editor. It is normally updated monthly, but will be kept fixed between the release of this Call for Proposals and the Phase I deadline.

Please make sure that you are either searching in the HST duplication table (automatic if you use the Duplication Checking Web Form) or the 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 Conducts the Proposal Review

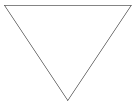
HST Programs are selected through competitive peer review. A broad range of scientists from the international astronomical community evaluates and ranks all submitted proposals, using a well-defined set of criteria (see Section 6.2) and paying special attention to any potential conflicts of interest. The review panels 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

The review panels will consider Small GO (up to 34 orbits; Section 3.2.1), Medium GO (35-74 orbits; Section 3.2.2), Calibration GO (Section 3.2.4), Snapshot (Section 3.3), Regular AR (Section 3.4.1), Calibration AR (Section 3.4.3) and Theory (Section 3.4.4) proposals. Each review panel has an allocation of a specific number of orbits; the panel can recommend Small GO Proposals up to its orbit allocation. Medium GO proposals will be ranked side-by-side with the Small proposals, but the panels will not be charged for them; instead, the Medium proposals above the scientific cutoff line in each panel (as defined by the Small proposals) will proceed to the TAC, where they will be evaluated alongside highly ranked Medium proposals from the other panels.

The panel recommendations generally do not require further approval of the TAC (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 (75 orbits or more; see Section 3.2.3), Treasury GO Programs (Section 3.2.6) or AR Legacy Proposals (Section 3.4.2), but they will send comments on those proposals to the TAC for their consideration.

Panelists are chosen based on their expertise in one or more of the areas under review by the panel. Each panel spans several scientific categories (as defined in Section 8.8). In Cycle 21, we anticipate having two panels dealing with *Planets* (including the Solar System, exoplanets, planet formation, and debris disks); three panels dealing with *Stars* (of any temperature, in any evolutionary state, and including nearby star formation and Galactic ISM); two panels dealing with *Stellar Populations*; three panels dealing with *Galaxies* (including unresolved stellar populations, ISM in external galaxies, galaxy morphology, and galaxy evolution); two panels dealing with *AGN and IGM* (including quasar absorption lines); and two panels dealing with *Cosmology* (including large-scale structure, gravitational lensing, and galaxy groups and clusters). 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)

The TAC will include the TAC chair, the fourteen panel chairs, and three at-large members to ensure broad expertise across the full range of scientific categories. The primary responsibility of the TAC is to review Large GO Programs (75 orbits or more; see Section 3.2.3), Treasury GO Programs (Section 3.2.6), AR Legacy Proposals (Section 3.4.2), and any other particularly large requests of resources (GO Calibration programs, SNAP, AR, Theory, or Pure Parallel). The TAC will also consider the panel recommendations concerning the Medium Programs (35-74 orbits, see Section 3.2.2), will rank accepted Pure Parallel programs, and will be the arbiter of any extraordinary or cross-panel issues.

6.2 Selection Criteria

Evaluations of HST proposals are based on the following criteria.

Criteria for all Proposals

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

Additional Criteria for all GO and SNAP Proposals

- What is the rationale for selecting the type and number of targets? Reviewers will be instructed to recommend or reject proposals as they are and to refrain from orbit- or object trimming. Therefore, it is very important to justify strongly both the selection and the number of targets in your proposal, as well as the number of orbits requested.
- Why are the unique capabilities of HST required to achieve the science goals of the program? Evidence should be provided that the project *cannot* be accomplished with a reasonable use of ground-based telescopes (irrespective of their accessibility to the proposer).
- Is there evidence that the project has already been pursued to the limits of ground-based and/or other space-based techniques?
- What are the demands made on HST and STScI resources, including the requested number of orbits or targets, and the efficiency with which telescope time will be used?
- Is the project technically feasible and what is the likelihood of success? Quantitative estimates of the expected results and the needed accuracy of the data must be provided.

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

- Is there a plan to assemble a coherent database that will be adequate for addressing all of the purposes of the program?
- Will the work of the proposers be coordinated effectively, even though a large team may be required for 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, feasibility of data requests, archiving and dissemination of products)?
- Is there a well-developed analysis plan describing how the scientific objectives will be realized?
- Does the proposal provide a justification for the requested funds?

Additional Criteria for Treasury GO and Legacy AR Proposals

- What scientific investigations will be enabled by the data products, and what is their importance?
- What plans are there for timely dissemination of the data products to the community? High-level science products should be made available through the HST data archive or related channels.

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?

6.3 Ultraviolet Initiative

Ultraviolet GO Proposals

In recognition of the unique UV capabilities of Hubble coupled with the finite lifetime of the mission, a UV Initiative is being introduced in Cycle 21. This initiative will use orbit allocations to increase the share of primary GO observing time dedicated to UV observations. Both the review panels and the TAC will have UV orbit allocations. The allocations will be advisory, not quotas, and UV proposals recommended for acceptance must meet the usual requirement of high scientific quality set for all successful Hubble proposals (see Section 6.2). Small (Section 3.2.1), Medium (Section 3.2.2), Large (Section 3.2.3), and Treasury (Section 3.2.6) GO Programs can benefit from the UV Initiative. SNAP programs are not eligible to benefit. Two conditions must be met for a GO proposal to be eligible.

- *The proposal must use the UV capabilities of Hubble*. The eligible instrument modes (with central wavelength <3200 Angstroms) are ACS/SBC imaging (all filters), COS spectroscopy (all modes), STIS/MAMA spectroscopy and imaging (all gratings and filters), STIS/CCD spectroscopy (UV gratings only), and WFC3/UVIS imaging (UV filters F200LP, F300X, F218W, F225W, F275W, F336W, FQ232N, FQ243N, and F280N), and WFC3/UVIS G280 grism spectroscopy.
- *The UV observations must be essential to the proposed science investigation*. This condition will automatically be met for UV-only proposals (those that request UV observations only). For proposals requesting both UV and optical/IR observations, the scientific necessity for the UV observations must be carefully justified in the Special Requirements section of the proposal.

Proposers must check the UV Initiative box in APT to identify whether their proposal qualifies for the benefit based on the above criteria. Depending on the response in Cycle 21, the UV Initiative may be extended to future cycles.

Ultraviolet Archival Proposals

The UV Initiative also extends to archival proposals, in the Regular AR (Section 3.4.1), Legacy AR (Section 3.4.2) and Theory (Section 3.4.4) categories. STScI will ask the review panels and the TAC to give particular consideration to UV-specific archival proposals in the review process, provided they lead to UV high level data products and tools for the Hubble archive, and enable broader use of those datasets by the community, or (in the case of Theory proposals) provide new models or theories to aid in the interpretation of UV HST data.

For archival programs that propose the joint analysis of UV and optical/IR datasets, the UV datasets must be essential to the scientific investigation for the UV Initiative benefit to apply. In this case, the proposers should carefully justify the importance of

the UV component of their program in the Special Requirements section of the proposal.

AR proposers should check the UV Initiative box in APT to identify their proposal as eligible for the benefit.

CHAPTER 7:

Guidelines and Checklist for Phase I Proposal Preparation

In this chapter . . .

This 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, March 1, 2013, 8:00 pm EST.

Please submit well before the deadline whenever 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 APT. However, APT will not be made available/released for Cycle 21 Phase I use until mid-January 2013. If you need a version prior to the formal release, please send your request to the STScI Help Desk, help@stsci.edu.

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

7.1.2 Phase I Proposal Format

Cycle 21 proposals must be submitted electronically. A Java-based software tool, APT (the Astronomer's Proposal Tool; see Section 1.4.5) is the interface for all Phase I and Phase II proposal submissions for HST.

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. 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. We recommend doing so well before the submission deadline, to give the STScI Help Desk (see Section 1.5) ample time to answer any questions you may have.

7.1.3 Page Limits for PDF Attachment

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

Table 7.1: PDF Attachment Page Limits

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

1. For Calibration GO (Section 3.2.4), Joint HST-Chandra (Section 3.5), Joint HST-Spitzer (Section 3.6), Joint XMM-Newton (Section 3.7) and Joint HST-NOAO (Section 3.8) Programs, determine whether your proposal is Small, Medium, or Large based on the HST orbit request, and use the appropriate page limits.
2. Regular AR proposals include Calibration AR programs (Section 3.4.3).

In relation to these page limits, note the following:

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

7.2 Proposal Preparation Checklist

Table 7.2: Proposal Preparation Checklist

Step	Procedure
1) Review the Phase I Roadmap	The roadmap (http://apst.stsci.edu/apt/external/help/roadmap1.html) is a high level step-by-step guide to writing a Phase I Proposal. It includes links to various documents and training videos.
2) Install APT	Go to the APT Webpage. Follow the instructions there to download and install the latest version of APT onto your machine. You can also ask your system administrator to do an institution-wide installation.
3) Fill out the APT Phase I form	Use APT to fill out the Phase I form. Information on the use of APT, including movie tutorials, is available on the APT Webpage. A description of which items are requested as well as guidelines for answers are presented in Chapter 8. Proposers can save work in progress, so APT submission can be completed over several sessions.
4) Download a template file for the creation of your PDF attachment	Go to the Cycle 21 Announcement Webpage. Download one of the templates to create 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 applications, including LaTeX and Microsoft Word.
5) Edit the template	Edit the template using your favorite word-processing application. A description of which issues need to be discussed, and guidelines for how to discuss them, are presented in Chapter 9.
6) 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 21 Announcement Webpage 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 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.
7) 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).
8) Review your proposal	In APT, click on 'PDF Preview' to get a preview of all the final information in your proposal. What you see is exactly what the reviewers who judge your proposal will see. If you are not satisfied, make any necessary changes.
9) 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.
10) Submit your proposal	In APT, use the Submission tool to submit your proposal to STScI. All parts are sent together (i.e., both the APT Form information and the PDF attachment).

Table 7.2: Proposal Preparation Checklist (Continued)

Step	Procedure
11) Receive an STScI acknowledgment of your submission	Verification of a successful submission will appear in the Submission Log on the Submission Screen in APT within about a minute. Also, the PI and all CoIs will receive an automatic email acknowledgment that the merged PDF submission was received successfully. After the Phase I deadline has passed, and all submissions are in their final form, you will receive final notification that your submission has been successfully processed; this email will mark the completion of the submission. **If you do not receive the final notification email within 48 hours of the deadline, please contact the STScI Help Desk and provide the submission ID from the APT Submission Log window.** If there are any problems associated with your PDF attachment, you will be contacted by email.

CHAPTER 8:

Filling Out the APT Proposal Form

In this chapter . . .

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 context-sensitive help in APT. 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 two printed lines. Please use mixed case instead of all upper case.

8.2 Abstract

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 85 characters of text. This limit is enforced by APT.

8.3 Proposal Phase

No action is required by the proposer at this time. For Cycle 21 the Phase will automatically be set to '**`PHASE I`**'. See Section 2.1 for a description of the different phases in the HST proposal process.

8.4 Category

Select one of the following categories:

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

Proposals for Director's Discretionary Time (see Section 3.9) submitted outside of the normal review cycles should select:

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

8.5 Cycle

For a Cycle 21 proposal, enter '**`21`**' (this will be the default).

8.6 Requested Resources

8.6.1 Primary and Parallel Orbits

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

Enter the total number of orbits requested for Primary observations and the total number of orbits requested for Coordinated Parallel observations OR enter the total number of orbits requested for Pure Parallel observations. Only whole orbits can be requested, and only whole orbits will be allocated. In general, only the boxes for 'This Cycle' need to be filled out. However, long-term proposals (see Section 3.2.5) should provide a year-by-year breakdown of the orbits requested by also filling out the boxes for 'Next Cycle' (Cycle 22) and 'After Next' (Cycle 23).

8.6.2 Total Targets

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

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

8.6.3 Budget

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

Please indicate the scale of the budget request for this program. For planning purposes only, proposers should identify their proposals as SMALL if the expected budget is less than $60,000, and MEDIUM if the expected budget lies between $60,000 and $120,000. Proposals that require higher funding levels should be submitted as Legacy AR proposals. See Chapter 12 for details on Grant Policies and allowable costs. Do not provide a specific figure for your expected budget. This entry will be used by the TAC and the review panels as a guide to the likely required resources. Successful programs will be required to submit a detailed budget for review by the Financial Review Committee.

It is advised that investigators work with the appropriate office at their institution for budget preparation to ensure that all components of the budget are properly accounted for within their estimate. This should be the same office the investigators work with when submitting the final budget.

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. The default proprietary period is 0 for Large, Treasury, and Calibration GO Programs, and 12 for Regular GO, Medium GO, and Snapshot Programs. See Section 5.1 on Data Rights for more information. The benefits of or need for a non-default proprietary period must be discussed in the 'Special Requirements' section of the proposal (see Section 9.3).

8.8 Scientific Category

Specify *one* Scientific Category from the list below. Please adhere to our definitions of these categories. If you find that your proposal fits into several categories, then 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 and Mercury), such as planets, comets, minor planets, asteroids, planetary satellites, and Kuiper-belt objects.
- **EXTRA-SOLAR PLANETS:** This includes direct and indirect observations of all objects belonging to known extrasolar planetary systems, and observations of their host stars.
- **DEBRIS DISKS:** This includes all studies of circumstellar and proto-planetary disks.
- **RESOLVED STAR FORMATION:** This includes studies of forming and newly-formed stars, early stellar evolution, pre-main sequence stars, T-Tauri stars, Herbig-Haro objects and FU Orionis stars.
- **UNRESOLVED STAR FORMATION:** This includes studies of star formation in distant galaxies (beyond the Local Group).
- **COOL STARS**: This applies to stars with effective temperatures less than 10,000 K, including halo subdwarfs, subgiants, giants, supergiants, AGB stars, pulsating/variable stars, brown dwarfs, stellar activity, atmospheres, chromospheres, mass loss and abundance studies.

- **HOT STARS:** This applies to stars that spend a significant fraction of their observable lives at an effective temperature higher than 10,000 K. It includes OB stars, neutron stars, white dwarfs, Wolf-Rayet stars, blue stragglers, central stars of PN, luminous blue variables, hot subdwarfs, supernovae, pulsars, X-ray binaries, and CVs.
- **ISM AND CIRCUMSTELLAR MATTER:** This applies to the general properties of the diffuse medium within the Milky Way and nearby galaxies, including planetary nebulae, supernova remnants, winds and outflows, HII regions, giant molecular clouds, diffuse and translucent clouds, ionized gas in the halo, diffuse gas observed in emission or absorption, dust, dust extinction properties, dark clouds and deuterium abundance studies. This does not include observations of circumstellar disks and proto-planetary systems in young stellar objects, which are in the Debris Disks category.
- **RESOLVED STELLAR POPULATIONS**: This includes resolved stellar populations in globular clusters, open clusters or associations, and the general field of the Milky Way and other nearby galaxies. Studies of color-magnitude diagrams, luminosity functions, initial-mass functions, internal dynamics and proper motions are in this category.
- **UNRESOLVED STELLAR POPULATIONS AND GALAXY STRUCTURE**: This includes studies of the initial mass function, stellar content and globular clusters in distant galaxies, galaxy morphology and the Hubble sequence, and low surface-brightness galaxies. Starbursts, IR-bright galaxies, dwarf galaxies, galaxy mergers and interactions may fall under this heading.
- **ISM IN EXTERNAL GALAXIES:** This category includes studies of gas distribution and dynamics in distant galaxies. Starbursts, IR-bright galaxies, dwarf galaxies, galaxy mergers, and interactions may also fall under this heading if the emphasis is on the ISM.
- **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 other observations of the diffuse IGM. It includes spectroscopy and imaging of damped Ly-alpha systems.
- **COSMOLOGY**: This includes studies of the structure and properties of clusters and groups of galaxies, strong and weak gravitational lensing, galaxy evolution through observations of galaxies at intermediate and high redshifts (including for example, the Hubble Deep Fields), cosmology in general, the structure of the universe as a whole, cosmological parameters and the extra-galactic distance scale.

Proposals in the Scientific Categories **Solar System, Extra-solar Planets** and **Debris Disks** will be reviewed by the Planets panels; proposals in categories **Cool Stars**, **Hot Stars, Resolved Star Formation**, and **ISM and Circumstellar Matter** will be reviewed by the Stars panels; proposals in categories **Resolved Stellar Populations** will be reviewed by the Stellar Populations panels; proposals in categories **Unresolved Stellar Populations and Galaxy Structure, ISM in External Galaxies,** and **Unresolved Star Formation** will be reviewed by the Galaxies panels; proposals in categories **AGN/Quasars** and **Quasar Absorption Lines and IGM** will be reviewed by the AGN and IGM panels; proposals in category **Cosmology** will be reviewed by the Cosmology panels.

8.9 Keywords

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

8.10 Special Proposal Types

8.10.1 Chandra ksec

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

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

8.10.2 Spitzer hours

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

If you are asking for both HST and Spitzer observing time (see Section 3.6) then list the requested number of Spitzer observing hours. You should then also provide detailed information on the Spitzer observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.2). If you are not requesting any new Spitzer

observations (or if you have Spitzer time that has already been awarded), then enter **'0'**.

8.10.3 XMM-Newton ksec

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

If you are asking for both HST and XMM-Newton observing time (see Section 3.7) then list the requested number of XMM-Newton kiloseconds. You should then also provide detailed information on the XMM-Newton observations in the 'Coordinated Observations' section of the proposal (see Section 9.4.3). If you are not requesting any new XMM-Newton observations (or if you have XMM-Newton time that has already been awarded), then enter **'0'**.

8.10.4 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 9.4.4). If you are not requesting any new NOAO observations (or if you have NOAO time that has already been awarded), then enter **'0'**.

8.10.5 Theory

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

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

8.10.6 Legacy

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

Mark this keyword if you are submitting an AR Legacy Proposal (see Section 3.4.2).

8.10.7 Calibration

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

8.10.8 Treasury

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

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

8.10.9 UV Initiative

Mark this keyword if your proposal is eligible for the UV Initiative (see Section 6.3). This keyword can be set for both GO and AR proposals.

8.11 Proposal PDF Attachment

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

8.12 Principal Investigator

Enter the first and/or last name 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 supply APT with the address information. 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 not in the database, click on "New Entry". If you are in the database, but the address information is incorrect, click on "Update This Address." Both clicks will take you to the ProPer tool so you can be added to, or update information in, the database. Once you have entered your information into ProPer, you will be able to immediately redo the database search and supply APT with the information.

Contact

For Large and Treasury Programs, we will contact the proposer within 1-2 weeks of the submission deadline if we need to verify our understanding of the appropriate scheduling constraints. If a Co-Investigator is to serve as the contact for this verification, then the Phase I Contact 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, enter the name and select the correct person from the list of database matches. As for PIs, new investigators or address updates should be submitted via ProPer. 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.

If a proposal has a non-U.S. PI and one or more U.S. CoIs, then you must select one of the U.S. CoIs to be the 'Admin PI'. 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 Datasets

(This item appears in the APT form only for AR proposals. It does not need to be completed for Theory proposals.)

Please fill in the keywords in the table in the APT form, specifying the approximate number of datasets (where a dataset is a set of associated exposures) requested for each instrument, the retrieval method (ftp, CD, DVD, or disk), and the planned schedule for data retrieval (e.g. over one weekend, 100 datasets per week). Information on large data requests and guidelines for delivering High-Level Science Products to MAST are available online.

8.15 Targets

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

GO proposals must include a list of all targets. *Snapshot proposals need only include a representative subset of targets in the Phase I submission* (see Section 3.3.3). For proposals with a large number of fixed targets, there is a capability to ingest a

comma-separated text file with the appropriate target information. See the APT Phase I Roadmap ("Fill in the Target Information") for details.

8.15.1 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.

8.15.2 Target Name

The target naming conventions for HST are defined in detail in Section 3.2 of the HST Phase II Proposal Instructions. Please adhere to these naming conventions throughout your proposal. For generic targets use a short text description either of the target location (e.g., **`RANDOM-FIELD`**) or of the target itself (e.g., **`NEXT-SUPERNOVA`**).

8.15.3 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.

8.15.4 V-Magnitude

A magnitude or flux should be specified for every target. Supply the V-magnitude for the entire target (galaxy, planet, etc.), if known. In the case of observations with ACS/SBC, STIS/MAMA, or COS, specify the V-magnitude of the brightest object in the field of view (this may not be the primary target). For variable targets, give the brightest V-magnitude expected during the observations. The configurations mentioned above have detectors with bright object safety limits, and observations that violate those limits are infeasible. See Section 5.1 of the HST Primer, or the respective Instrument Handbooks (see Section 1.4.4) for details. With the exception of the safety checks, this information is used only for scientific review, not for exposure-time calculations. It is not required to specify the V-magnitude or flux for generic targets.

8.15.5 Other Fluxes

For each target you should specify either a V-magnitude 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, 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.

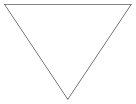
8.16 Observation Summary (OS)

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

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

- For SNAP proposals the OS should describe a typical observation for one or a few of the targets. A complete and unique description of the target list should be provided in the 'Scientific Justification' section of the proposal (see Section 9.1).
- For Long-Term Programs, the OS should include information for *all* the proposed observations, not just those requested in Cycle 21.
- Parallel observations must be included in the OS, and marked as such using the relevant special requirement flags (see Section 8.16.11 and Table 8.1).
- Target acquisition observations (see Section 5.2 of the HST Primer) need not be included in the OS, unless they are themselves used for scientific analysis.
- Normal calibration observations that are often or routinely taken (e.g, fringe flats) need not be included in the OS. However, the OS should include any special calibration exposures of internal sources or external targets (see Section 4.3). Special internal calibrations should be listed separately from external calibration exposures. When these special calibrations require additional orbits, that should be specified and the orbits included in the total allocation. The need for these calibrations should be justified in the 'Description of the Observations' (see Section 9.2).

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



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

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

8.16.1 Target

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

8.16.2 Instrument

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

8.16.3 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).

8.16.4 Config

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

8.16.5 Science Mode

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

8.16.6 Coronagraphy

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

8.16.7 Polarizer

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

8.16.8 Spectral Element

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

Central Wavelength

If a COS or STIS grating is used, then first select the grating and subsequently give the central wavelengths in Angstroms for the exposures.

8.16.9 Orbits

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

8.16.10 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.

8.16.11 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. For Snapshot observations, only the 'duplication' checkbox is allowed.

Table 8.1: Special Requirement Flags for the Observation Summary

Flag	Use this flag for
Coordinated Parallel	All of the exposures specified in this observation block are to be done in Coordinated Parallel mode (see Section 4.2.1).
CVZ	Continuous Viewing Zone observations (see Section 4.1.1).
Duplication	Observations which duplicate or might be perceived to duplicate previous or upcoming exposures (see Section 5.2.1).
Disruptive Target of Opportunity	Target-of-Opportunity observations with turn-around time shorter than 3 weeks (see Section 4.1.2).
Non-disruptive Target of Opportunity	Target-of-Opportunity observations with turn-around time longer than 3 weeks (see Section 4.1.2).

8.16.12 Scheduling Requirements

For all proposals, we request that you provide additional scheduling information for your observations; this request does not apply to observations of solar system or generic targets. The additional information will help STScI understand and assess the scheduling implications of your program. Be sure 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:

NO SCHEDULING CONSTRAINTS

Setting this requirement means 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*. 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 Optical Telescope Assembly (OTA). To minimize the zodiacal light, the scheduling algorithm places seasonal restrictions on the observations; to reduce the earthshine, the amount of time data is taken within an orbit is reduced by approximately 15%. The former complicates scheduling, while the latter reduces the observing efficiency of HST. Therefore, using the *LOW SKY* restriction must have adequate scientific justification included in the Phase I proposal. With this restriction, the zodiacal background light for low-ecliptic latitude targets can be reduced by as much as a factor of 4. Avoiding the earthshine at the standard earth-limb avoidance angle (see Section 2.3 of the HST Primer) can make a similar difference. *LOW SKY* is generally incompatible with *CVZ*.

SAME ORIENT

Setting this requirement means that all exposures defined in the Observation Block MUST be observed at the exact same *ORIENT*. This requirement is only meaningful if the observations are to occur in multiple visits (e.g. Number of Iterations is greater than 1, or if the Total Orbits is greater than 5).

ORIENT

Enter the *ORIENT* range that all the exposures defined in the Observation Block *must* be observed within. If multiple *ORIENT* ranges are acceptable, then enter all values.

BETWEEN

Enter the range of dates that all exposures defined in the Observation Block *must* be observed within. If multiple *BETWEEN*s are acceptable, then enter all values.

AFTER OBSERVATION BY

Enter any timing requirements between Observation Blocks. Timing requirements between observations WITHIN an Observation Block do not need to be specified. This is intended to capture repeated visits with spacings of multiple days or greater, not timing requirements of less than 1-2 days.

For Large and Treasury programs, we will contact the proposer within 1-2 weeks of the submission deadline if we need 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.

8.16.13 Verifying Schedule Constraints

If you have specified any scheduling constraints, you are encouraged to use the APT Visit planner to verify that your observations are indeed schedulable. While it cannot check that the total number of orbits you have requested are available, the Visit Planner will at least confirm whether or not there are days during the cycle when your target(s) can be observed with your imposed scheduling constraints. In general, the more days that are available, the more feasible your program. This is particularly important for Large Programs. Detailed instructions for performing this verification can be found in the APT Help menu.

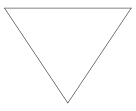
If you find that any observation is not schedulable, and it is not scientifically possible to adjust any special scheduling constraints (e.g. a BETWEEN), then you can increase the scheduling opportunities by selecting the Increase Scheduling Flexibility flag in APT. Note that using this option may require you to ask for a larger orbit allocation, since setting the flag will reduce the orbital visibility for the observation; this reduced orbital visibility is automatically used for Large Programs. Detailed instructions for performing this verification can be found in the APT Help menu.

CHAPTER 9:

Preparation of the PDF Attachment

In this chapter . . .

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. You must use Adobe Acrobat (or equivalent software) to properly view and print the PDF attachment in APT.



Your PDF Attachment should obey the page limits discussed in Section 7.1.3. 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 it addresses. The members of the review panels will span a range of scientific expertise (see Section 6.1), so you should write this section for a general audience of scientists.

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

- GO Treasury, AR Legacy and Pure Parallel proposals should address the use to the astronomical community of the data products that will be generated by the program.
- Proposals using ACS/WFC, WFC3/UVIS, or WFC3/IR for undithered imaging must explain why this strategy is needed for the scientific objectives; dithering is required to eliminate hot pixels and other detector artifacts that may compromise the archival value of the data.
- ACS/SBC, COS, and STIS/MAMA proposers must address the safety of their targets and fields with respect to the appropriate count rate limits of the photon-counting detectors (see Chapter 5 of the Primer and the COS, STIS, or ACS Instrument Handbook).
- Snapshot proposals should provide a complete and unique description of the target sample.
- AR Proposals should describe how the project improves upon or adds to the previous use of the data.
- Theory Proposals should include a description of the scientific investigations that will be enabled by the successful completion of the program, and their relevance to HST.
- Calibration Proposals should describe what science will be enabled by the successful completion of the program, and how the currently supported core capabilities, their calibrations, and the existing pipeline or data reduction software are insufficient to meet the requirements of this type of science.

9.2 Description of the Observations

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

This section of the PDF file should be used to provide a short description of the proposed observations. It should explain the amount of exposure time and number of orbits requested (e.g., number of objects, examples of exposure-time calculations and orbit estimates for some typical observations). You should summarize your target acquisition strategies and durations where relevant. For CVZ targets, state the number of CVZ opportunities available in the cycle (use the Visit Planner to determine this number).

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 8.16).

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 or Treasury Programs should discuss how they have designed their program with regard to schedulability.
  - 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.
- Calibration Proposals should present a detailed justification of how they will achieve the goals of the program, and if applicable, a description of the conditions under which these goals will be achieved.
- Calibration Proposals should discuss what documentation, and data products and/or software will be made available to STScI to support future observing programs.

9.3 Special Requirements

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

List and justify any special scheduling requirements, including:

- For Target of Opportunity (ToO) observations (see Section 4.1.2), estimate the probability of occurrence during Cycle 21, specify whether long-term status is requested, identify whether the ToOs are disruptive or non-disruptive, and state clearly how soon HST must begin observing after the formal activation.
- CVZ observations (see Section 4.1.1).
- Time-critical observations (see Section 4.1.6).
- Early acquisition observations (see Section 5.2.1 of the HST Primer).
- Coordinated Parallel (CPAR) observations (see Section 4.2.1).
- Target acquisitions that use the 'Re-use target offset' function (see Section 5.2.2 of the HST Primer).
- Scheduling of STIS/MAMA and STIS/CCD observations (other than target acquisitions) in the same visit (see Section 6.2.2 of the HST Primer).
- Requests for expedited data access (see Section 7.2 of the HST Primer).
- Other special scheduling requirements (e.g., requests for non-SAA impacted observations).

If applicable, discuss the need for a non-default proprietary period request (see Section 5.1 and Section 8.7).

If your proposal (either GO or AR) uses a mixture of UV and optical/IR observations and you wish to claim the benefit of the UV Initiative (see Section 6.3), justify why the UV component of your proposal is essential to the science investigation.

9.4 Coordinated Observations

(This item is required only for GO proposals)

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

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

9.4.1 Joint HST-Chandra Observations

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

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

Proposers should note the current restrictions on observing time as a function of pitch angle of the satellite. Refer to Section 3.3.3 of the Chandra Proposers' Observatory Guide for detailed information. Proposers should check the pitch angles of their targets and be sure that any constraints they request do not render the proposed observation infeasible. The Chandra Proposal Documentation and observation planning software will be updated for their Cycle 15 in mid-December 2012.

Technical documentation about Chandra is available from the Chandra X-ray Center (CXC) Webpage, which also provides access to the Chandra Help Desk. The primary document is the Proposer's Observatory Guide, available from the Chandra Proposal Information Webpage. Full specification of approved observations will be requested during the Chandra Cycle 15 period when detailed feasibility checks will be made.

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

9.4.2 Joint HST-Spitzer Observations

Proposers requesting joint HST-Spitzer observations (see Section 3.6) *must* provide a full and comprehensive technical justification for the Spitzer portion of their program. All observations must use the IRAC Post-Cryo Mapping observing mode only. This justification must include:

- the requested observing time, justification for the requested time, target fluxes, required sensitivity and assumptions made in its derivation,
- an indication on whether the observations must be coordinated in a way that affects scheduling of either HST or Spitzer observations. Highly constrained Spitzer observations are discouraged for joint HST-Spitzer proposals.

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

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

9.4.3 Joint HST/XMM-Newton Observations

Proposers requesting joint HST/XMM-Newton observations (see Section 3.7) must provide a full and comprehensive technical justification for the XMM-Newton portion of their program, including

- the choice of prime instrument,
- the requested exposure time, justification for the exposure time, target count rates, and assumptions made in their determination,
- information on whether the observations are time-critical.

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

Technical documentation about XMM-Newton is available from the XMM-Newton Webpage.

9.4.4 Joint HST-NOAO Observations

Proposers requesting joint HST-NOAO observations (see Section 3.8) must provide a full and comprehensive scientific and technical justification for the NOAO portion of their program. The technical 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 September 26, 2013 NOAO deadline for the Spring 2014 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 Webpage. Questions may be directed to the NOAO Proposal Help Desk by e-mail 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.

9.5 Justify Duplications

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

Justify, on a target-by-target basis, any potential duplication with previously accepted observing programs. Use the 'Duplication' checkbox in the OS (see Section 8.16) to identify the duplicating observations. See Section 5.2.1 for policies on duplications.

9.6 Analysis Plan

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

All AR proposals should provide a detailed data analysis plan and describe the datasets that will be analyzed. Proposers should complete the information required in the APT dataset table (see Section 8.14): the number of datasets (not pointings) per instrument needed to carry out the research and the type of data retrieval (ftp, CD, DVD or disk: see the HST Archive Data Retrieval Options for a description of the available options). Proposers must provide a schedule indicating the timescale for the data request(s), for example all datasets at once, or 1/12th of the datasets per month. Inclusion of a complete target list is not required.

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

Theory Proposals should discuss the types of HST data that will benefit from the proposed investigation, and references to specific data sets in the HST Data Archive should be given where possible. They should also describe how the results of the theoretical investigation will be made available to the astronomical community, and on what timescale 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 programs complement ongoing calibration efforts by the instrument groups. They should contact the relevant groups to ensure that efforts are not duplicated.

9.7 Management Plan

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

Provide a concise, but complete, management plan. This plan will be used by the review panels to assess the likely scale of the proposed research program. Proposers should include a schedule of the work required to achieve the scientific goals of the program, a description of the roles of the PI, CoIs, postdocs, and students who will perform the analysis, and a plan to disseminate the results to the community.

9.8 Past HST Usage

List here the program numbers and data status for all accepted GO/AR/SNAP programs of the **PI** in at least the **last four** HST Cycles. Include a list of refereed publications resulting from these programs.

The description of past HST usage does not count against the page limits of the proposal.

CHAPTER 10:

Proposal Implementation and Execution

In this chapter . . .

10.1 Notification

The review panels and the TAC will meet in mid-May 2013. Electronic notification of the outcome of the Phase I selection process will be sent to all proposers in late May.

10.2 Phase II Submission

Successful GO/SNAP proposers must submit a Phase II program providing complete details of the proposed observations. Detailed instructions on the preparation of Phase II programs are provided in the STScI Phase II documentation. Complete observational details must be provided by the Phase II submission deadline (June 27, 2013). Accurate target coordinates must also be supplied at this time, except for certain Targets of Opportunity or in other exceptional circumstances, provided that those circumstances were described clearly in the Phase I proposal).

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

Proposers are not allowed to make changes to the list of investigators (PI and CoIs) after acceptance of the Phase I proposal, unless permission for this is granted by the Head of the Science Policies Division. Requests for this should be well-justified, and 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 or require bright-object checking) will also be assigned a Contact Scientist (CS). The role of the CS is to provide advice on observing strategies, and to answer specific questions about instrument performance. Observers who are not automatically assigned a CS may request one. The CS is generally an Instrument Scientist involved in the calibration and characterization of the primary instrument used in the observer's program. The role of the CS ceases at program execution. Please contact the STScI Help Desk (help@stsci.edu) for post-execution assistance.

10.4 Duplication Checking

Some computer-aided duplication checks are carried out in Phase II, in part by STScI and also by observers who wish to check whether any of their own observations are being duplicated. Any duplications found that were not justified explicitly in the Phase I proposal *and* recommended by the review panels or the 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. 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 ToO Programs). All technically challenging or infeasible observations are flagged. It is the responsibility of the PI to ensure that none of the observations violate bright-objects constraints (see Section 5.1 of the HST Primer).

10.6 Proposal Scheduling

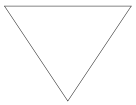
After Technical Review, observations determined to be feasible are scheduled for execution. The scheduling process attempts to optimize the overall HST efficiency. STScI will not contemplate requests to advance or postpone the scheduling of individual programs based on other considerations, with the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

10.6.1 Unschedulable or Infeasible Programs

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

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

- 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 data will actually be obtained.

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 the TAC.

10.7 Access to Data Products

Data products are available from the HST Data Archive (see Section 7.2 of the HST Primer). Enhanced products for non-proprietary observations may also be available from the Hubble Legacy Archive (HLA, see Section 7.3 of the 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 through the MAST website. 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 website available from the HST mission pages at MAST. PIs should register before their observations are made. PIs wishing to allow others to access their proprietary data should send that request to archive@stsci.edu. HST data normally become non-proprietary one year after they are taken, though this depends on the proposal type (see Section 8.7).

The HST Data Handbook describes the data produced by the instruments. The Space Telescope Science Data Analysis Software (STSDAS) Webpage 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 issues. 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 resolve issues that are not clear from the available documentation. However, observers who are new to HST may find it useful to visit STScI for 2-3 days to learn how to deal with their data. Also, in cases of particularly complex or difficult programs, observers may consider visiting STScI before the Phase II deadline.

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

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

10.10 Failed Observations

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

A smaller fraction of failures do not have a clear cause, and may not be evident from our internal reviews of data quality. If you believe your observation has failed or is seriously degraded, then you may request a repeat for your program using the Hubble Observation Problem Report (HOPR) Web Form available from the HST Program Information Page. 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). 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 exposure fails during execution it will *not* be repeated, regardless of the cause of the failure.
- If a Pure Parallel exposure fails during execution it may be repeated with suitable justification and if a suitable parallel scheduling opportunity is available.
- 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.
- Observations that have partially or completely missing data due to a failure to successfully retrieve the data from the spacecraft may be repeated with suitable justification. PIs must describe how their data have been affected.

10.11 Publication of HST Results

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

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

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

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

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

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

- Chief Institute Librarian, Space Telescope Science Institute, 3700 San Martin Dr., Baltimore, MD 21218, USA (library@stsci.edu)
- Office of Public Outreach, STScI, 3700 San Martin Drive, Baltimore, MD 21218, USA (villard@stsci.edu).

This requirement includes both refereed and non-refereed publications, but *not* abstracts or poster papers. As soon as links are received, they are entered into the publicly available HST bibliography.

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 (see Appendix A for contact information). Proposers can find guidelines and examples of these activities on the OPO webpage that discusses the Release of Scientific Findings to the Public.

Investigators are reminded that NASA has the "first right of refusal" for all Hubble news releases. NASA's policy is to distribute all news fairly and equitably, with wide access to, and broad impact of, scientific findings. Both STScI and NASA can provide considerable resources to support the creation and distribution of press releases, and investigators are strongly encouraged to make use of those resources. The STScI Public Outreach news officers should be made aware of potentially newsworthy science results by principal investigators before the acceptance of HST publications, with sufficient time for consideration of a news release.

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.

CHAPTER 11:

Education & Public Outreach Proposals

In this chapter . . .

11.1 NASA SMD E/PO Policies

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

- The NASA Education Strategic Coordination Framework: A Portfolio Approach,
- Explanatory Guide to the NASA Science Mission Directorate Education & Public Outreach Evaluation Factors (Version 3.1, November 2010),
- NASA SMD E/PO Program Strategy.

More information can be found at the STScI E/PO webpage, and at the NASA Science E/PO Webpage.

11.2 HST E/PO Proposals

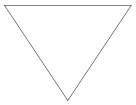
In accordance with NASA SMD E/PO policies, a portion of the HST Cycle 21 budget has been allocated for E/PO funding. STScI is announcing the opportunity for *accepted* U.S. HST Cycle 21 General Observer, Archival, Theory, and Snapshot researchers and current Hubble Fellows to submit proposals for an E/PO supplement to the parent research program to develop an education program related to their research.

The spirit of the HST Cycle 21 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 21 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 21 E/PO funding categories:

- Individual - an HST Cycle 21 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 21 GO/AR/SNAP programs and current Hubble Fellows to give serious consideration to this opportunity.



The deadline for submitting an HST Cycle 21 E/PO proposal is Wednesday, August 21, 2013 at 5:00 p.m. EDT. The HST Cycle 21 E/PO Grant Program's Call for Proposals will be available on the E/PO website at the end of June 2013. For more information, or if you have questions about the HST E/PO Grant program, please send an email to cyclehstepo@stsci.edu.

11.2.1 Assistance for the Preparation of E/PO Proposals

For general SMD E/PO questions and information about the program, please contact HQ-SMD-EPO@mail.nasa.gov.

CHAPTER 12:

Grant Funding and Budget Submissions

In this chapter . . .

12.1 Overview

Funding
Subject to availability of funds from NASA, STScI will provide financial support to eligible investigators of approved Cycle 21 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 'GGP'. The most recent version of this document is available at the STScI Grants Administration Office Webpage.

Budgets
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. Budgets must be submitted by all investigators who request funding and approved by the Program PI. Investigators who are not eligible will not submit a budget. Detailed instructions for budget preparation and submission using the Grants Management System will be sent to successful proposers after the Phase I review has been completed.

Joint Mission Proposals

Successful HST-Chandra Programs will be funded separately by both STScI and the CXC, following their respective policies. Details of the CXC funding policies are given in the Chandra Cycle 15 Call for Proposals and at the Chandra Proposal Information Webpage.

Successful HST-Spitzer Programs will be funded separately by both STScI and the Spitzer Science Center, following their respective policies. Spitzer programs of less than 100 hours are eligible for a maximum of $5000 in data analysis funding.

For successful HST/XMM-Newton Programs, funding to support the analysis of the HST observations will be provided by STScI following its policies. Funding to support the analysis of the XMM-Newton observations can be requested by eligible U.S. PIs by submitting a separate proposal to the NASA ADAP Program.

Below is 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.

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, nonprofit research institutions, private for-profit organizations, and Federal employees. Only U.S. PIs and CoIs are eligible to request funding.

Non-U.S. scientists are eligible to apply for HST time but are not eligible for funding from STScI. "Non-U.S." refers to a scientist who has a contractual affiliation (e.g. employment, grant, contract, research funding, etc.) with a non-U.S. institution regardless of where he or she resides. STScI grant funding may not flow through a U.S. Investigator to Investigators at foreign institutions.

Proposers who have questions about their eligibility for funding should contact the STScI Grants Administration Office (see Appendix A.1).

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’ of the program (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, no funding may flow through the U.S. investigator to the non-U.S. investigators.

Unaffiliated Scientists
U.S. scientists not affiliated with the types of institutions listed above are required to contact the STScI Grants Administration Office (see Appendix A.1) to determine if they are eligible for STScI funding. It is the responsibility of STScI to ensure that grants are awarded to organizations with financial management systems that meet the standards described in Sections III-VI of the STScI General Grants Provisions (General Grant Provisions of the Space Telescope Science Institute).

12.3 Foreign Agreement Letters

STScI is required by NASA to send Foreign Agreement letters to non-U.S. institutions that have investigators listed on HST GO and AR programs. NASA requires acceptance of the agreement of the Financial Arrangements, Data Rights, and Liability for activity connected with the use of the Hubble Space Telescope (HST).

Foreign PIs and Co-Is of successful proposals will receive an electronic copy of the letter to be signed by the Authorizing Official of their institution. No action is required by U.S. PIs.

Transfers to new institutions:
If a foreign PI or Co-I transfers to a new institution, a notification must be sent to the STScI Grants Administration Office at gms_mail@stsci.edu. The e-mail will include the name and e-mail contact of the PI or Co-I, the name and address of the former and new institution, and the name, address, and e-mail contact of the official (e.g. Chancellor, Vice-Chancellor, Dean, etc.) who is authorized to sign the Agreement Letter.

More information regarding Foreign Agreement Letters can be found at http://www.stsci.edu/institute/brc/ga

12.4 Allowable Costs

Support may be requested for the acquisition, calibration, analysis, and publication of HST data, and related costs. Budget proposals are reviewed based on what is reasonable and allowable to complete the scientific goals of the program. Costs of the following types may be acceptable, if they conform to the GGP (see Section 12.1):

- 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 (if directly related to the specific project for which it is budgeted)
- Computer services
- Equipment
- Materials and supplies
- Overhead costs
- Indirect costs
- Funds to support ground-based observations

For-profit organizations should note that profit and cost of money are not allowable costs.

Preparatory funding may be requested if necessary to prepare for the receipt of HST data. Proposers may request that up to 25% of the total approved amount for their programs be awarded prior to the start of the Cycle 21 observing schedule. However, such funding is not available prior to the Directorate approval of funding for Cycle 21 programs. Preparatory funds are part of the overall funding allocated for the program, and are not additional funds. Pre-award expenditures may be incurred, but at the risk of the investigator. All funding (including preparatory funds) is subject to the availability of funds from NASA.

12.5 Grant Period

It is anticipated that the period of time required to analyze HST data will normally be one or two years, depending on the type and complexity of the project.

GO programs with observations approved for more than one cycle (continuation programs) will submit a detailed budget in Phase II of each subsequent cycle. The budget submission for the first year will only include costs for the first year of the project, and the budget narrative will include an overall management plan and estimated costs for all approved cycles. The Institute may request confirmation from PIs that the originally proposed allocation of funds among Co-I institutions remains appropriate after the first year of the multi-year program.

12.6 Award of Funds

All budget proposals are reviewed by the Financial Review Committee (FRC), and the Committee recommendations are submitted to the STScI Director for final approval. Near the start of Cycle 21, each PI or Administrative PI of approved programs that have requested funding will receive electronic notification from the STScI Director with the approved funding amount. Approved preparatory funding is generally awarded soon thereafter. With the exception of preparatory funding, GO funding will become incrementally available after the first observations from the program occur. Funding for AR and Theory proposals will become incrementally available after funding approval. All funding is subject to the availability of funds from NASA.

APPENDIX A:

Contact Information

In this appendix . . .

A.1 Space Telescope Science Institute

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

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

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

Fax:
ext. 4767

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

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

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

HST Mission Office:

Head: Ken Sembach; ext. 5051; email: sembach@stsci.edu

ESA HST Project Scientist & Mission Manager:

Antonella Nota; ext. 4520; email: nota@stsci.edu

Science Mission Office:

Head: I. Neill Reid; ext. 4971; email: inr@stsci.edu

Science Policies Group:

Head: Claus Leitherer; ext. 4425; email: leitherer@stsci.edu
Technical Manager: Brett Blacker; ext. 1281;
email: blacker@stsci.edu

Grants Administration Office:

Manager: Paula Sessa; ext. 4816; email: sessa@stsci.edu

Office of Public Outreach:

Head: Hussein Jirdeh; ext. 4381; email: jirdeh@stsci.edu

Observation and Engineering Division:

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

Instruments Division:

ACS/WFPC2 Team Lead: Linda Smith; ext. 4926; email:
lsmith@stsci.edu
COS/STIS Team Lead: Alessandra Aloisi; ext. 4519; email:
aloisi@stsci.edu
WFC3/NICMOS Team Lead: John W. MacKenty; ext. 4559; email:
mackenty@stsci.edu

A.2 Canadian Astronomy Data Centre

Internet:

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

Address:

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

Telephone:

[1] 604-363-0025

Email:

cadc@dao.nrc.ca

Comments:

The CADC provides assistance to HST users in Canada.

APPENDIX B:
Scientific Keywords

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

Table B.1:Generic Keywords

ASTROMETRY	DYNAMICS
CHEMICAL ABUNDANCES	EVOLUTION
DYNAMICS	RADIATIVE TRANSFER
DUST	VARIABILITY

Table B.2:Planetary System Keywords

ASTEROIDS	PLANETARY SATELLITES
COMETS	PROTO-PLANETARY DISKS
EXTRA-SOLAR PLANETS	SUPPORT OF NASA PLANETARY OR EXOPLANETARY MISSIONS
GIANT PLANETS	SURFACES OF PLANETS/MOONS/OTHER
KUIPER BELT OBJECTS	TERRESTRIAL PLANETS
PLANETARY ATMOSPHERES	

Table B.3:Galactic Keywords

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

Table B.4:Galactic or Extra-Galactic Keywords

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

Table B.5:Extra-Galactic Keywords

AGN PHYSICS	HUBBLE DEEP FIELDS
BAL QUASARS	INTERACTING AND MERGING GALAXIES

Table B.5:Extra-Galactic Keywords

CLUSTERS OF GALAXIES	INTRACLUSTER MEDIUM
COOLING FLOWS	IR-LUMINOUS GALAXIES
COSMOLOGICAL PARAMETERS AND DISTANCE SCALE	IRREGULAR GALAXIES
DAMPED LYMAN-ALPHA ABSORPTION SYSTEMS	LARGE SCALE STRUCTURE AND PECULIAR VELOCITIES
DWARF GALAXIES	LOCAL GROUP GALAXIES
ELLIPTICAL GALAXIES	MAGELLANIC CLOUDS
GALAXY BULGES	LOW SURFACE BRIGHTNESS GALAXIES
GALAXY CENTER	LYMAN-ALPHA FOREST CLOUDS
GALAXY DISKS	METAL ABSORPTION SYSTEMS
GALAXY FORMATION AND EVOLUTION	RADIO GALAXIES
GALAXY HALOS	RADIO-LOUD QUASARS
GALAXY MORPHOLOGY AND STRUCTURE	RADIO-QUIET QUASARS
GAMMA-RAY BURSTS	SEYFERT GALAXIES
GLOBULAR CLUSTER SYSTEMS	SPIRAL GALAXIES
GRAVITATIONAL LENSING	STARBURST GALAXIES
GROUPS OF GALAXIES	STELLAR POPULATIONS IN EXTERNAL GALAXIES
HIGH 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 Tool
AR	Archival Research
ATP	Astrophysics Theory Program
AURA	Association of Universities for Research in Astronomy, Inc.
CADC	Canadian Astronomy Data Centre
CCD	Charge-Coupled Device
CoI	Co-Investigator
COS	Cosmic Origins Spectrograph
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
ERS	Early Release Science
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
HLA	Hubble Legacy Archive
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	Barbara A. Mikulski Archive for Space Telescopes
MCP	Micro-Channel Plate
NASA	National Aeronautics and Space Administration
NICMOS	Near Infrared Camera and Multi-Object Spectrometer
NOAO	National Optical Astronomy Observatory
NUV	Near Ultraviolet
NVO	National Virtual Observatory
OS	Observation Summary
PAEC	Planned and Archived Exposures Catalog
PC	Planetary Camera or Program Coordinator
PDF	Portable Document Format
PI	Principal Investigator
PPAR	Pure Parallel Observation
RA	Right Ascension
SAA	South Atlantic Anomaly
SBC	Solar Blind Channel
SHD	Shadow Time
SM	Servicing Mission

SMD	Science Mission Directorate
SNAP	Snapshot
SSC	Spitzer Science Center
STAC	Space Telescope Advisory Committee
ST-ECF	Space Telescope - European Coordinating Facility
STIS	Space Telescope Imaging Spectrograph
STScI	Space Telescope Science Institute
STSDAS	Space Telescope Science Data Analysis Software
TAC	Telescope Allocation Committee
TOO	Target of Opportunity
U.S.	United States
UTC	Coordinated Universal Time
UV	Ultraviolet
WFC	Wide Field Channel (on ACS)
WFC3	Wide Field Camera 3
WF/PC	Wide Field and Planetary Camera 1
WFPC2	Wide Field and Planetary Camera 2
XDL	Cross Delay Line

APPENDIX D:
Internet Links

APT (Astronomer's Proposal Tools):
http://www.stsci.edu/hst/proposing/apt

Archival Pure Parallel Program:
http://www.stsci.edu/hst/HST_overview/documents/uir/UIR_Parallels.pdf

Barbara A. Mikulski Archive for Space Telescopes (MAST, formerly the Multi-mission Archive at STScI):
http://archive.stsci.edu/

Canadian Astronomy Data Centre:
http://cadcwww.hia.nrc.ca/

Chandra Proposer Information:
http://cxc.harvard.edu/proposer/

Chandra X-ray Observatory:
http://cxc.harvard.edu/

Chandra X-ray Center (CXC):
http://cxc.harvard.edu/

Cycle 20 Approved Programs:
http://www.stsci.edu/hst/proposing/exp_abstract-catalogs/Cycle20-Approved-Programs.pdf

Cycle 21 Announcement Webpage: Update to Cycle 21
http://www.stsci.edu/hst/proposing/docs/cycle21announce

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

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

Guide to the NASA Office of Space Science Education & Public Outreach Evaluation Criteria:
http://science.hq.nasa.gov/research/ecosystem.htm

General Grant Provisions of the STScI:
http://www.stsci.edu/ftp/stsci/grants/ggp302.pdf

Grants Administration Office:
http://www.stsci.edu/institute/brc/ga

Grants Management System:
http://gms.stsci.edu/

Great Observatories Origins Deep Survey (GOODS):
http://www.stsci.edu/science/goods/

HST Archive Data Retrieval Options:
http://archive.stsci.edu/hst/help/retrieval_help.html

HST E/PO Program:
http://cycle-epo.stsci.edu/

HST Instruments Webpage:
http://www.stsci.edu/hst/HST_overview/instruments

HST Primer:
http://www.stsci.edu/hst/proposing/documents/primer/primer_cover.html

HST Program Information:
http://www.stsci.edu/hst/scheduling/program_information

HST Proposal Catalogs:
http://archive.stsci.edu/hst/catalogs.html

HST Proposal Support Webpage:
http://archive.stsci.edu/hst/prop_support.html

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

HST Treasury, Archival Legacy and Large Programs:
http://archive.stsci.edu/hst/tall.html

Hubble Deep Field (HDF):
http://www.stsci.edu/ftp/science/hdf/hdf.html

Hubble Deep Field-South (HDF-S):
http://www.stsci.edu/ftp/science/hdfsouth/hdfs.html

Hubble Heritage Project:
http://heritage.stsci.edu/

Hubble Legacy Archive:
http://hla.stsci.edu

Hubble Observation Problem Report (HOPR):
http://www.stsci.edu/hst/programs/major_changes

Hubble Second Decade Committee Treasury Program Report:
http://sco.stsci.edu/second_decade/recommendations/index.html

Hubble Ultradeep Field (UDF):
http://www.stsci.edu/hst/udf

IDEAS (Initiative to Develop Education through Astronomy and Space Science):
http://ideas.stsci.edu/

International Virtual Observatory Alliance:
http://www.ivoa.net/

Large and Treasury Programs:
http://www.stsci.edu/hst/proposing/LargePrograms/

Large Searches and Requests Webpage:
http://archive.stsci.edu/hst/bigsearch_request.html/

NASA Education Strategic Coordination Framework: A Portfolio Approach
http://www.nasa.gov/pdf/189101main_Education_Framework.pdf

NASA Explanatory Guide to the Science Mission Directorate Education & Public Outreach Evaluation Factors
http://science.nasa.gov/media/medialibrary/2010/12/01/SMD_MissionGuideV3_1_508.pdf

NASA SMD E/PO Program Strategy
http://science.nasa.gov/researchers/education-public-outreach/strategy/

NASA Science Mission Directorate (SMD) (formerly OSS)
http://science.hq.nasa.gov/

NASA SMD EPO Support Network:
http://science.hq.nasa.gov/research/ecosystem.htm

NASA Strategic Planning and Policy:
http://science.hq.nasa.gov/

NASA Strategic Plan 2003:
http://science.nasa.gov/about-us/science-strategy/past-strategy-documents/space-science-enterprise-plans/

National Astronomical Observatory of Japan:
http://dbc.nao.ac.jp/

National Optical Astronomy Observatory (NOAO):
http://www.noao.edu/

NOAO/NASA Collaboration Webpage:
http://www.noao.edu/gateway/nasa/

Origins Forum:
http://origins.stsci.edu/

NASA SMD EPO Strategy:
http://science.hq.nasa.gov/research/epo.htm#strategy

Parallel Observations User Information Report:
http://www.stsci.edu/hst/HST_overview/documents/

Phase I Proposal Roadmap:
http://apst.stsci.edu/apt/external/help/roadmap1.html

Phase II Proposal Instructions:
http://www.stsci.edu/hst/programs/hst/proposing/docs/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_TTRB.pdf

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

SNAP User Information Report:
http://www.stsci.edu/hst/HST_overview/documents/

Space Science Enterprise Strategic Plan:
http://science.nasa.gov

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/

Treasury Program Advisory Committee:
http://www.stsci.edu/institute/org/spd/spd-reports/tpac-members

XMM-Newton Observatory:
http://heasarc.nasa.gov/docs/xmm

US National Virtual Observatory:
http://www.us-vo.org/