



**National Aeronautics
and Space Administration**

**OCTOBER 31, 1997
NRA 97-OSS-14**

RESEARCH ANNOUNCEMENT

ADVANCED X-RAY ASTROPHYSICS FACILITY (AXAF) GENERAL OBSERVER PROGRAM

CYCLE 1

Proposals Due:

FEBRUARY 2, 1998

ADVANCED X-RAY ASTROPHYSICS FACILITY
(AXAF)
GENERAL OBSERVER PROGRAM

Cycle 1

NASA Research Announcement
Soliciting Proposals for Basic Research

NRA 97-OSS-14

Release Date: October 31, 1997
Proposal Due Date: February 2, 1998

Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546-0001

**ADVANCED X-RAY ASTROPHYSICS FACILITY
GENERAL OBSERVER PROGRAM
Cycle 1**

This NASA Research Announcement (NRA) solicits basic research proposals for participation in the National Aeronautics and Space Administration (NASA) program for the conduct of space science observations and subsequent analysis of the resultant scientific data from the Advanced X-ray Astrophysics Facility (AXAF). The primary goal of the AXAF mission is the investigation of the nature and physics of astrophysical objects as revealed through their high energy emission.

This NRA is the first announcement for the AXAF General Observer (GO) Program and solicits proposals for Cycle 1 of the mission. The AXAF launch is currently scheduled for August 27, 1998, aboard the Space Shuttle Columbia. A Performance Verification and Calibration (PVC) phase lasting approximately 2 months will follow launch, and a Guaranteed Time Observations (GTO) phase lasting approximately 2 months will follow the PVC phase. Observations implemented as a result of this NRA will occur during the GO period of Cycle 1, which will begin about 4 months after launch and last approximately 9 months. Seventy percent (70%) of the observing time during the GO period of Cycle 1 is available to GO's. It is anticipated that further opportunities for participation in the AXAF GO program will be announced approximately annually.

Participation is open to all categories of organizations, both domestic and foreign, including educational institutions, NASA Centers, profit and not-for-profit organizations, and other Government agencies. Proposals may be submitted at any time before the proposal due date. Proposals received after that date will be held for the next review cycle. Notices of Intent to propose are not required. Proposals will be evaluated by a scientific peer-review panel with a goal of announcing the selections approximately five months after the proposal due date. A detailed schedule specifying proposal deadlines and important mission milestones is provided in Appendix C to this NRA.

Funds for awards under this NRA are expected to be available subject to the annual NASA budget cycle. The Government's obligation to make awards is contingent upon the availability of appropriated funds from which payment for award purposes can be made and the receipt of proposals which the Government determines are acceptable for award under this NRA. The total amount of funding available for the support of GO's for the present observing opportunity is anticipated to be approximately \$10 million. It is anticipated that approximately 200 investigations will be recommended for selection. It is expected that, in most cases, investigations selected for award under this NRA will be funded through the use of grants.

The proposal review will be conducted in two stages. During the first stage, the scientific and technical merits of the proposed investigation will be evaluated, as well as consideration of the appropriateness of using AXAF to achieve the scientific objectives. Based upon the results of this Stage 1 review, the AXAF Program Scientist at NASA

Headquarters will recommend a set of proposals to be considered for award of observing time and funding during Cycle 1. For the second stage, investigators whose proposals are recommended for further consideration will be asked to submit a proposed budget to support their investigation. A subset of the original review panel will be convened approximately 6-8 weeks after the initial review to evaluate the proposed budgets. Based upon overall consideration of both scientific and cost factors, the AXAF Program Scientist will recommend a set of proposals for consideration by the Selecting Official for final selection and award.

Proposers whose investigations are selected will have proprietary use of their data for 12 months after receipt of the data in usable form, after which time the data will be placed in a public data archive that is accessible to other interested investigators.

Further details relevant to the AXAF General Observer Program are included in the Appendices that are listed on page 5 and described below. This NRA, its Appendices, and relevant reference documents may be downloaded directly via the World Wide Web, or via anonymous file transfer protocol (ftp), at the addresses given below. Individuals not having access to the Internet may request paper copies of this Announcement and reference documents at the addresses given below. Requests for copies should be made at the earliest opportunity to ensure receipt early in the proposal preparation period.

Appendix A gives an overview of the mission and describes the observing opportunity. Appendix B gives the general instructions for responding to NASA Research Announcements. Appendix C, which supersedes and augments Appendix B, provides additional, NRA-specific information on proposal submission and subsequent evaluation, selection, and implementation. The information in Appendix C applies to this NRA only. Appendix D contains copies of the electronic forms and instructions needed to prepare and submit electronic forms required in response to this NRA. Appendix E lists the PVC and GTO targets for Cycle 1.

Education and the enhancement of public understanding of space science are considered to be vital and integral parts of all NASA space science missions and research programs. NASA OSS encourages every proposer to this NRA to include an Education/Public Outreach (E/PO) component with their research proposal. The OSS E/PO program and instructions for submitting an E/PO proposal are described in Appendix F.

Technical and reference documents are available interactively from the AXAF Science Center over the World Wide Web, for download via the World Wide Web or anonymous ftp, and in hard copy by request at the address given below. *The AXAF Proposer's Guide* contains an overview of the detector capabilities, as well as information on proposing for AXAF observing time (e.g., instructions for assessing feasibility, instrument summaries, constraint summaries, etc.). *The AXAF Observatory Guide* contains detailed descriptions of the instruments.

IDENTIFIER: NRA 97-OSS-14

PROPOSAL DUE DATE: February 2, 1998

NUMBER REQUIRED: 20 hard copies, including signed original
Electronic submission of proposal forms required

SELECTING OFFICIAL: Director
Research Program Management Division
Office of Space Science

SUBMIT PROPOSALS TO: AXAF Science Center
Smithsonian Astrophysical Observatory
Ref: NRA 97-OSS-14
60 Garden Street
Cambridge, MA 02138
USA

OBTAIN ADDITIONAL PROGRAMMATIC INFORMATION FROM Dr. Alan Bunner
Science Program Director
Office of Space Science
Code S
National Aeronautics and Space Administration
Washington, DC 20546-0001
USA
TEL: 202-358-0364, FAX 202-358-3096
E-mail: alan.bunner@hq.nasa.gov

DIRECT TECHNICAL QUESTIONS TO: Dr. Fred Seward
AXAF Science Center
Mail Stop 4
Smithsonian Astrophysical Observatory
60 Garden Street
Cambridge, MA 02138
USA
TEL: 617-495-7282, FAX: 617-495-7356
E-mail: usupport@cfa.harvard.edu

REQUEST PRINTED
APPENDICES AND
REFERENCE DOCUMENTS
FROM:

Dr. Fred Seward
AXAF Science Center
Mail Stop 4
Smithsonian Astrophysical Observatory
60 Garden Street
Cambridge, MA 02138
USA
TEL: 617-495-7282, FAX: 617-495-7356
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RETRIEVE NRA and APPENDICES ELECTRONICALLY FROM:

World Wide Web: <http://www.hq.nasa.gov/office/oss/>, select "Research Opportunities"

or: <http://asc.harvard.edu/>

Anonymous ftp: [asc.harvard.edu](ftp://asc.harvard.edu) in directory [/pub/doc](ftp://asc.harvard.edu/pub/doc)

NASA appreciates your interest and cooperation in participating in the Advanced X-ray Astrophysics Facility General Observer Program.

Alan N. Bunner
Science Program Director
Structure and Evolution of the Universe
Office of Space Science

Appendices:

- A. AXAF Mission Description
- B. Instructions for Responding to NASA Research Announcements for Solicited Basic Research Proposals
- C. Additional Information Regarding Proposal Preparation, Submission, Evaluation, Selection, and Implementation
- D. Instructions for AXAF Electronic Proposal Forms
- E. AXAF Performance Verification and Calibration (PVC) and Cycle 1 Guaranteed Time Observer (GTO) Targets
- F. Office of Space Science Policy for Education and Public Outreach

AXAF Mission Description

A.1 Mission Overview

The Advanced X-ray Astrophysics Facility (AXAF) is scheduled to be launched on the Space Shuttle Columbia on August 27, 1998. After launch, there will be an approximately 2 month Performance Verification and Calibration (PVC) phase during which the instruments will be turned on, tested, and calibrated. Two months of dedicated Guaranteed Time Observer (GTO) observations will follow the PVC phase. Nine months of mixed General Observer (GO) and GTO science observations will commence at the end of the PVC and dedicated GTO phases (approximately January 1999 for an August 27, 1998, launch). GO observing time on AXAF will be available to the international user community through peer-reviewed proposals. During the 9 months of mixed GO and GTO observations which comprise Cycle 1, GO's will be allocated 70% of the observing time and GTO's will be allocated 30% of the observing time.

The scientific instruments have been developed by science and engineering teams at the Smithsonian Astrophysical Observatory (SAO), Pennsylvania State University (PSU), Massachusetts Institute of Technology (MIT), Scientific Research Organization of the Netherlands (SRON), and Max-Planck-Institut für extraterrestrische Physik (MPE). The project is managed by NASA's Marshall Space Flight Center (MSFC) where Project Science is located and which is responsible for the scientific integrity of the mission. The project is sponsored by NASA's Office of Space Science (OSS).

AXAF has as its primary mission the study of the nature of astrophysical sources of high energy radiation. The scientific objectives will address questions concerning the fundamental physics and astrophysics of such systems, including, but not limited to:

- accurate measurement of the discrete X-ray source contribution to the X-ray background;
- galaxy and galaxy cluster structure and evolution, and properties of X-ray sources in other galaxies;
- characteristics of active galactic nuclei, starburst galaxies, and quasars; in particular, emission mechanisms, time variability, jets, and lobes;
- supernova remnant abundances, structure, and central neutron stars or pulsars;
- interstellar hot plasma abundances, temperatures, and X-ray ionization states;
- phase-resolved spectroscopy of compact objects to understand the emission mechanisms; and
- the properties and structure of stellar coronae.

A.2 Science Payload

AXAF is comprised of three major components: the spacecraft, the X-ray telescope, and the Science Instrument Module (SIM) containing the focal plane instruments. The spacecraft provides the power, attitude control, communications, and support for the telescope and instruments. The X-ray telescope consists of the optical bench, the High Resolution Mirror Assembly (HRMA), and two objective transmission gratings: the High Energy Transmission Grating (HETG) and the Low Energy Transmission Grating (LETG). The HRMA is a Wolter Type I, 1.2 m diameter, 10 m focal length, iridium-coated mirror. At 1.5 keV, and including aspect solution errors, ~60% of the imaged X-rays are contained in a circle of diameter ~1.0 arcsecond.

AXAF carries two scientific instruments in the focal plane: the AXAF CCD Imaging Spectrometer (ACIS) and the High Resolution Camera (HRC). The focal plane instruments are mounted in the SIM. The SIM provides three functions: launch lock, translation (to interchange the two focal plane instruments), and focus. Only one of the two focal plane instruments can be placed in the telescope's focus at a time; proposals which request simultaneous observations with both instruments cannot be carried out.

The ACIS has two arrays of CCD's, one optimized for imaging wide fields, the other optimized for grating spectroscopy and for imaging smaller fields. Each array is shaped to follow, in an approximate manner, the relevant focal surface. In conjunction with the HRMA, the ACIS imaging array (ACIS-I) will provide simultaneous time-resolved imaging and spectroscopy in the energy range 0.5–10.0 keV. The ACIS-I field-of-view is 16' × 16' in size. The bare CCD arrays themselves have an intrinsic spectral resolving power $E/\Delta E$ of ~10 at 0.5 keV, ~25 at 1.5 keV, and ~50 at 8.0 keV. The ACIS spectroscopic array (ACIS-S) may be used in conjunction with the High Energy Transmission Grating (HETG) (see below). The CCD pixels are 0.5" in size. The nominal readout time for each CCD is ~3.3 s. Subarrays of each chip may be specified to obtain higher time resolution. Also available is a continuous readout option which acquires one dimensional streaked images providing a time resolution of ~3 ms. The effective area, applicable to photons collected in a 10" (1") detection cell, is ~110 (70) cm² at 0.5 keV, ~630 (380) cm² at 1.5 keV, and ~60 (25) cm² at 8 keV. Proposers are urged to study carefully the chapters describing ACIS in the *AXAF Proposer's Guide* and the *AXAF Observatory Guide* because the instrument has many different modes with which data may be obtained. The *Proposer's Guide* and *Observatory Guide* are available from the AXAF Science Center (<<http://asc.harvard.edu/>>) and at the addresses given in the Solicitation Announcement.

The HRC provides the highest spatial resolution imaging capability on AXAF with a point spread function FWHM of 0.5" with 0.13" pixels (electronic readout). The HRC consists of two microchannel plate arrays which are used as the primary detection devices. One array (HRC-I) is optimized for direct imaging, the other array (HRC-S) is optimized for imaging the dispersed flux from the Low Energy Transmission Grating (LETG) (see below). The field-of-view of the HRC-I imaging array is 31' × 31' while the

HRC-S spectroscopic array has a field-of-view of $7' \times 97'$. The effective area of the HRC-I imaging array, applicable to photons collected in a $10''$ ($1''$) detection cell, is ~ 5 (3) cm^2 at 0.1 keV and ~ 200 (120) cm^2 at 1 keV. The temporal resolution is $16 \mu\text{s}$ with a deadtime of $50 \mu\text{s}$. The internal background is less than 10^{-6} counts s^{-1} arcsec^{-2} .

The HETG is optimized for high-resolution spectroscopy over 0.4 – 10 keV. Two types of gratings are mounted in the HETG: medium-energy gratings (MEG's) covering the 0.4 – 5 keV band and high-energy gratings (HEG's) covering the 0.9 – 10 keV band. The MEG's are mounted behind the annular aperture of the outer two mirror pairs while the HEG's are mounted behind the apertures of the inner two mirror pairs. The two sets of gratings operate simultaneously; the dispersed axes of the spectra cross at a shallow angle in the focal plane. The ACIS spectroscopic array will normally be used to read out the HETG spectra. When used in conjunction with the HETG, the ACIS-S spectroscopic array will acquire spectra with a spectral resolving power $E/\Delta E$ of ~ 600 at 1.5 keV and ~ 140 at 6 keV. The effective area of the HETG/ACIS-S combination is ~ 100 cm^2 at 1.5 keV and ~ 20 cm^2 at 6 keV (first order, $1''$ detection cell).

The LETG is optimized for high-resolution spectroscopy over the 0.08 – 4 keV band. The LETG will provide the highest spectral resolving power available on AXAF ($E/\Delta E > 1000$ below 0.15 keV). The HRC-S spectroscopic array will normally be used to read out the LETG spectra. In conjunction with the HRC-S, the effective area of the LETG is ~ 12 cm^2 (first order, $1''$ detection cell) in the 0.1 – 3 keV range.

Detailed descriptions of all of the instruments are contained in the *Observatory Guide*, which is available from the AXAF Science Center (<http://asc.harvard.edu/>) and at the addresses given in the Solicitation Announcement. Proposers should refer to that document for additional details.

A.3 Operations

AXAF is scheduled to be launched into orbit by the Space Shuttle Columbia on August 27, 1998, following which two Inertial Upper Stage solid rocket motor burns, plus the internal spacecraft propulsion system, will insert AXAF into its final elliptical orbit.

The planned elliptical orbit will have a perigee altitude of $10,000$ km, an apogee altitude of $140,000$ km, an inclination of 28 degrees, and an orbital period of 64.2 hours. The baseline mission lifetime is 5 years with expendables sized for more than 10 years of operations. The high orbit means that the spacecraft will be above the high radiation environment (the upper boundary of which is currently placed at $60,000$ km altitude for planning purposes, but subject to adjustment based on operational experience) approximately 82% of the time, and that 80% to 85% of the sky will be accessible for observation at any given time. Uninterrupted observations as long as ~ 190 ks will be possible. The solar panels can be rotated about one axis, so that at any time of the year AXAF can be pointed to any region of the sky except for the avoidance regions around the Sun (45° from the limb), the Moon (6° from the limb), and the Earth (20° from the

bright limb). The Earth and Moon constraints may be violated at the expense of a reduction in the quality of aspect determination.

Taken together, the high elliptical orbit and the prevention of observations at low altitudes in the Earth's radiation belts imply that the preponderance of AXAF observing will be done near apogee when the Earth, as seen from AXAF, appears to move only slowly through the sky. As a result, the Earth and its surrounding avoidance region constitute a portion of the sky that will be partially blocked from view throughout the AXAF NRA cycle. Long, continuous observations in this region (>30 ks at the center, but longer at the edges) will be difficult, but short observations are possible.

The portion, roughly 10% of the sky, that will be partially blocked during Cycle 1 lies in the region given approximately as (4 hr < R.A. < 11 hr, -10° < Dec. < -50°). Although the elements of the AXAF orbit evolve substantially over time, the partially blocked region is expected to move by only about 9° in the first year of the mission, and it is only later in the mission that this region becomes entirely unblocked and a new region becomes partially blocked. The ObsVis proposal preparation tool, available over the World Wide Web at <<http://asc.harvard.edu/>>, provides some information on target visibility.

Communications with the spacecraft will occur through the Deep Space Network and the NASCOM telecommunications link. Telemetry will be sent to the Operations Control Center (OCC) in Cambridge, Massachusetts, for processing. After processing, the science data and related housekeeping telemetry will be sent to the AXAF Science Center (ASC) in Cambridge.

A.4 Summary of Proposal Policies

After the Performance Verification and Calibration (PVC) phase (2 months) and following the dedicated Guaranteed Time Observations (GTO) phase (2 months), observing time on AXAF will be opened to competitive proposals from the international community. Seventy percent (70%) of the observing time will be available to the general scientific community during the first cycle of proposals. Investigations to be carried out with AXAF will be evaluated by a competitive peer review process administered by NASA Headquarters.

GTO time continues during future proposal cycles as well. For months 5-22 of the AXAF mission, General Observers (GO's) will be allocated 70% of the observing time and GTO's will be allocated 30% of the observing time. For months 23 and later, these percentages become 85% and 15%, respectively. GTO's are permitted to reserve targets for only one proposal cycle. This approach will permit GO's to propose for a wide variety of targets. During the first two cycles, no GO competition for GTO-reserved targets will be permitted. Appendix E contains a list of the targets reserved for PVC and Cycle 1 GTO observations. Starting with Cycle 3, GTO's will compete directly with GO's for targets using peer-reviewed proposals.

The AXAF mission will accommodate Targets of Opportunity (TOO's). TOO's that are proposed in response to an NRA are reserved for a single proposal cycle. If the TOO occurs during that cycle, the GO retains the same data rights as a non-TOO observer. TOO's that do not occur during the proposal cycle must be repropoed. Unanticipated or unpropoed TOO's may be brought to the attention of the Director of the AXAF Science Center, who may reschedule AXAF to obtain the observations in the best interest of the scientific community. Data from nonpeer-reviewed TOO's are nonproprietary. GTO's may not reserve TOO's.

This NRA covers months 5–13 of the AXAF mission, which are the first 9 months of AXAF operations after the PVC and dedicated GTO phases.

For more details about the science payload and operations plan, please see the *Proposer's Guide* and the *Observatory Guide*. These guides are available from the ASC at <<http://asc.harvard.edu/>> or at the addresses given in the Solicitation Announcement.

A.5 The AXAF Science Center

The AXAF Science Center (ASC) in Cambridge, Massachusetts, is responsible for planning and conducting AXAF observations. The ASC is responsible for generating the science time-line that will incorporate user-imposed constraints, as well as instrument- or satellite-imposed constraints. All raw telemetry, containing both instrument and spacecraft data, will be sent to the OCC. The ASC Data Systems Division will receive and process the data, generate standard data products for validation, and distribute the data to the Principal Investigator of a specific observation. The ASC will also provide and support data analysis software and a permanent public archive of the AXAF data. The AXAF public data archive will contain data that is nonproprietary (PVC data, other calibration data, data from unpropoed TOO's), as well as data for which the 12 month proprietary period has elapsed or been waived. The User Support Group (USG) will support observers with their analysis of these data. The USG will provide additional technical information, as needed, for the preparation of proposals via the World Wide Web (<<http://asc.harvard.edu/>>) and E-mail (usupport@cfa.harvard.edu).

The AXAF Program Scientist at NASA Headquarters has overall responsibility for the process of evaluating and selecting proposals submitted in response to this NRA. Logistical and organizational support for the processing and evaluation of AXAF proposals will be provided by the ASC. ASC scientific and technical staff, who may be participating in AXAF proposals, will necessarily provide support for the proposal review, including the organization of peer review panels and performing technical reviews. ASC staff will not serve on science peer review panels.

**INSTRUCTIONS FOR RESPONDING TO
NASA RESEARCH ANNOUNCEMENTS**

Part 1852.235-72

NASA Federal Acquisition Regulations (FAR) Supplement (NFS)
Version 89.90, Effective March 11, 1997.

Accessible at URL
<<http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm>>,
open Part 1852.228 to 1852.241 from menu.

(JANUARY 1997)

A. General.

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a preaward synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRA's contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRA's.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument. Contracts resulting from NRA's are subject to the Federal Acquisition Regulation (FAR) and the NASA FAR Supplement (NFS). Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRA's; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

B. NRA-Specific Items. Several proposal submission items appear in the NRA itself: the unique NRA identifier, when to submit proposals, where to send proposals, number of copies required, and sources for more information. Items included in these instructions may be supplemented by the NRA.

C. Proposal Content. The following information is needed to permit consideration in an objective manner. NRA's will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) *Transmittal Letter or Prefatory Material.*

- (i) The legal name and address of the organization and specific division or campus identification, if part of a larger organization;
- (ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;
- (iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;
- (iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;
- (v) Identification of other organizations that are currently evaluating a proposal for the same efforts;
- (vi) Identification of the NRA, by number and title, to which the proposal is responding;
- (vii) Dollar amount requested, desired starting date, and duration of project;
- (viii) Date of submission; and
- (ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

(2) *Restriction on Use and Disclosure of Proposal Information.* Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following Notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the Notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the Notice.

<p><u>Notice</u></p> <p>Restriction on Use and Disclosure of Proposal Information</p> <p>The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal, the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.</p>
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(3) *Abstract.* Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) *Project Description.*

- (i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance, relation to the present state of knowledge, and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures.

The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) *Management Approach.* For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) *Personnel.* The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications, and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) *Facilities and Equipment.*

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non research purposes should be explained.

(8) *Proposed Costs.*

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages, fringe benefits, equipment, expendable materials and supplies, services, domestic and foreign travel, ADP expenses, publication or page charges, consultants, subcontracts, other miscellaneous identifiable direct costs, and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired, purpose and estimated number and lengths of trips planned, basis for indirect cost computation (including date of most recent negotiation and cognizant agency), and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(9) *Security.* Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

(10) *Current Support.* For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) *Special Matters.*

(i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(ii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

D. Renewal Proposals

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

E. Length. Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

F. Joint Proposals.

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

G. Late Proposals. A proposal or modification received after the date or dates specified in an NRA may be considered if doing so is in the best interests of the Government.

H. Withdrawal. Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

I. Evaluation Factors

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

- (i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.
- (ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.
- (iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.
- (iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

J. Evaluation Techniques. Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases, proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

K. Selection for Award.

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

L. Cancellation of NRA. NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

(End of provision)

Additional Information Regarding Proposal Preparation, Submission, Evaluation, Selection, and Implementation

The information contained in Appendix C augments and supersedes Appendix B and applies only to this NRA.

C.1 Proposal Preparation and Submission

C.1.1 General Observing Parameters

The General Observer (GO) observations to be carried out with AXAF during Cycle 1 will be selected from proposals submitted in response to this NRA. Under normal operating conditions, the spacecraft permits observations of targets for which the angles between the target and the solar limb are $>45^\circ$, the target and the lunar limb are $>6^\circ$, and the target and the bright Earth limb are $>20^\circ$. In addition there are constraints on the roll angle that derive from thermal and power considerations. Proposers may specify additional constraints on their observation. No more than 20% of AXAF observing time will be awarded to constrained observations.

AXAF observing time will be block-scheduled so little or no real-time observing capabilities will exist (see below). Whenever possible, maneuvers will be scheduled to occur during passage of the spacecraft through the perigee of its orbit or during passage through the radiation belts. Approximately 1–3 maneuvers per day are anticipated. These estimates may change with in-orbit experience.

There are no restrictions regarding the amount of observing time or the number of targets that may be requested in observer proposals. Proposals may be submitted for single targets with a relatively short observation time, or for larger programs involving multiple targets or significant amounts of observing time. All proposals will be reviewed in the same peer review, and a mix of large and small programs is expected. There will be no specified key projects for AXAF. Proposers may not request observations distributed over multiple proposal cycles.

Proposals to observe Targets of Opportunity (TOO's) are allowed (see the *Proposer's Guide*). The lack of real-time observing will constrain the speed with which a TOO observation can be implemented (the planned response time is ~24 hours). One advantage of this mission in comparison to previous missions (with the exception of RXTE) is the liberal solar angle constraint, which makes available approximately 80% of the sky at any given time. The large sky accessibility affords an opportunity for coordinated ground-based and AXAF observing, as a given target often can be scheduled for observations during nighttime hours at ground-based telescopes. If a TOO proposal is selected, time will be awarded but will remain unscheduled until the approved opportunity occurs.

Note that it will be the proposer's responsibility to notify the ASC that any approved opportunity has occurred. Also, note that a proposal must not contain a mix of TOO targets and non-TOO targets.

It is the intent of NASA that all approved non-TOO observing programs be carried out. Therefore, scheduling constraints and TOO observations may require rescheduling some observations. Proposers need not repropose if an accepted non-TOO observing program is not carried out during the current NRA period. Any such programs will be given priority for accomplishment in the next observing cycle. However, proposers of TOO observations will be required to repropose their observing programs if the TOO is not carried out during the applicable observing cycle.

C.1.2 Who May Propose

Proposals may be accepted from any institution within or outside the U.S. AXAF proposals must identify a single Principal Investigator (PI) who assumes full responsibility for the budget and the conduct of the science investigation.

Following selection, the ASC will communicate formally only with the PI. In the event that the PI is unavailable, the ASC will communicate with the person identified in the proposal as the Observing Investigator. It will be the PI's responsibility to respond to any questions concerning observational constraints or configurations.

C.1.3 Who May Propose -- Foreign Participation

NASA welcomes proposals from outside the U.S. However, investigators working outside the U.S. are not eligible for funding from NASA. Proposals from non-U.S. entities should not include a cost plan. Proposals from outside the U.S. and U.S. proposals that include non-U.S. participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the non-U.S. participant is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA and, if the proposal is selected, that sufficient funds will be made available to undertake the activity as proposed.

In addition to sending 20 copies of the proposal to the address given in the Solicitation Announcement, one copy of the proposal, along with the Letter of Endorsement from the sponsoring non-U.S. agency must be forwarded to:

Ms. Bettye Jones
Ref: NRA 97-OSS-14
Space Science and Aeronautics Division
Code IS
NASA Headquarters
Washington, DC 20546-0001
USA

All proposals must be typewritten in English. All non-U.S. proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date; those received after the closing date will be held for the next proposal cycle. Sponsoring non-U.S. agencies may, in exceptional situations, forward a proposal without endorsement to the submission address if endorsement is not possible before the announced closing date.

In such cases, however, NASA's International Space Science and Aeronautics Division should be advised when a decision on endorsement can be expected.

Successful and unsuccessful proposers will be contacted directly by the NASA Research Program Management Division. Copies of the letters of notification will be sent to the sponsoring government agency. Should a non-U.S. proposal or a U.S. proposal with non-U.S. participation be selected, NASA's International Space Science and Aeronautics Division will arrange with the non-U.S. sponsoring agency for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency will each bear the cost of discharging their respective responsibilities. Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

- i a letter of notification by NASA; and
- ii an exchange of letters between NASA and the sponsoring governmental agency, or
- iii a formal Agency-to-Agency Memorandum of Understanding (MOU).

C.2 Proposal Format and Content

C.2.1 Overview

The proposal review procedure will be conducted in two stages to minimize the burden of proposal preparation. During the first part, the scientific and technical merits of the proposed investigation will be reviewed, including the appropriateness of using AXAF to address the scientific objectives and its relevance to furthering our understanding of high energy astrophysical processes. Based upon the criteria listed in Section C.3 of this NRA, a panel of science peers will evaluate the scientific and technical merits of proposals received in response to this NRA. Based upon the results of this Stage 1 review (scientific and technical review), the AXAF Program Scientist at NASA Headquarters will recommend a set of proposals to be considered for award of observing time during Cycle 1. The PI's of these proposals will then be asked to submit a cost proposal for the Stage 2 review (cost review). A subset of the Stage 1 panel will then evaluate the cost proposals. Based upon overall consideration of both scientific and cost factors, the AXAF Program Scientist will recommend a set of proposals for consideration by the Selecting Official for final selection and award. The second review will take place approximately 6-8 weeks after the end of the Stage 1 review. Following the second review, those proposers selected for award will be notified of the recommended funding level for their investigation.

C.2.2 Stage 1 Scientific and Technical Proposal Details

Proposal Content The Stage 1 proposal must include a standard Cover Page, a General Form, the scientific and technical justification (as described below), a Target Summary Form (which includes either two ACIS Parameter pages or a HRC Parameter page depending on detector requested), and, optionally, a Target Constraints form and a Target Remarks form. The forms must be submitted electronically, as well as included in the Stage 1 proposal (see Appendix D for electronic proposal submission instructions). The information in the forms will be entered into a data base that will be used in cataloging and evaluating proposals, as well as in scheduling observations that are selected for implementation. The forms must be completed in the format presented. Cost sections should not be submitted for the Stage 1 scientific and technical review; cost information will not be considered at any time during the Stage 1 review.

Although a signature block is included on the General Form, institutional endorsements are optional for the Stage 1 science and technical proposal. A signature block is included in case signatures are required by the proposing institution. However, institutional endorsements are required for a Stage 2 cost proposal.

The abstract on the Cover Page must be limited to 800 characters, including spaces between words. If the abstract exceeds this length, it will be truncated automatically at 800 characters when entered into the data base. The abstracts and target lists for approved observations will be made available to the scientific community.

The pointing positions given in the target form will be used to point the spacecraft; care must be exercised in stating these positions, since even slight pointing errors can seriously degrade the data from an observation. Positions must be stated in equinox/epoch J2000.

A Target Number should be assigned to each proposed pointing to designate the priority of that particular pointing within an investigation requiring multiple pointings. If it is necessary for the peer-review committee to recommend a reduction in observing times, an attempt will be made to preserve the highest priority observations.

The discussion of the scientific investigation should provide the following information:

- (1) Scientific Justification. State clearly the scientific problem to be addressed, with relevant background and references to previous work. Show how the proposed AXAF observations and data analysis techniques will advance knowledge in the research area. Justify the use of AXAF for the proposed investigation by showing how the observations use the strengths and capabilities of AXAF. Any constraint on the observations must be stated and justified. Discuss the data analysis program required to attain the science goals including the scope of the effort.
- (2) Technical Feasibility. Show how the requested observations (choice of instruments and/or gratings, exposure time, detector parameters, etc.) make possible the achievement of the scientific objectives. State how targets or pointing locations were selected. List assumptions about source intensity, surface brightness, and spectrum.

Estimates of both count rates and total counts needed for the investigation must be provided. Note that it is in the proposer's best interest to provide enough detail to allow a reviewer to understand the proposer's target brightness assumptions, to reproduce the count estimates, and to appreciate the proposer's understanding of how to best use the AXAF instruments. The proposer should also demonstrate that the estimated counts are sufficient to extract the desired science results from the observation. Proposal preparation and simulation tools are available on the World Wide Web at <<http://asc.harvard.edu/>> to enable estimates to be obtained (some require code to be downloaded to the user's site). The proposer is urged to make use of these tools and to learn to use them well before the deadline for proposal submission. The ACIS and the HRC both have maximum count rate limits. For observations of relatively bright sources using ACIS, pulse pileup can be a severe problem. Details may be found in the *Proposer's Guide* and the *Observatory Guide*. Proposers are urged to become familiar with these instrumental artifacts prior to submitting their proposal.

- (3) Constrained Observations. The proposer may desire to place constraints (monitoring, coordinated with observations at other wavelengths, uninterrupted, roll angle, etc.) on the proposed observations. Constrained observations limit the flexibility of scheduling an observation and, therefore, reduce the overall observing efficiency. Proposers should consider carefully the impact of a request for a constrained observation and provide scientific justification for it. Proposers should also discuss the potential impact on time-constrained observations of a delay in the launch of AXAF or potential interruption by a TOO. No more than 20% of AXAF observing time will be allocated to constrained observations.

A one page biography/bibliography of the Principal Investigator may be included.

Page Restrictions and Quantity As a result of the large number of proposals anticipated in response to this NRA, there will be strict page limits (see Table 1). The scientific justification and technical feasibility must consist of not more than four pages. These four pages and the target form(s) comprise the scientific and technical proposal and should provide the peer panel members with the essence of the scientific proposal.

Table 1: Page Restrictions

Section	Page Limit	Comments
Cover Page form	1	no other cover needed
General Form	1	
Scientific Justification and Technical Feasibility	4	includes text, figures, charts, tables, references
Target Summary form including ACIS Parameter or HRC Parameter pages	2-3 each	as needed
Target Constraints form	1 each (optional)	as needed
Target Remarks form	1 each (optional)	as needed
Biography/bibliography of PI	1 (optional)	

Reviewers will consider only those pages in each proposal section that do not exceed the page limits specified in Table 1. Each side of a paper sheet containing text or illustration counts as one page. All text should be typewritten in English, either single or double spaced, using an easily read font having no more than 15 characters per inch. Text is limited to not more than 55 lines per page. Margins should be a minimum of 1 inch on all sides. Proposals printed double sided are encouraged. The scientific and technical sections and all relevant forms that comprise the proposal should be stapled together in one document without cardboard covers, plastic bindings, or other features. Twenty copies of the proposal, including the signed original, should be sent to the address listed in the Solicitation Announcement.

Proposal forms are also to be submitted electronically (see Appendix D). The Scientific Justification and Technical Feasibility section is not to be submitted electronically.

Technical Information Resource Technical questions concerning the AXAF mission and requests for assistance in proposal submission may be addressed to Dr. Fred Seward, AXAF User Support Manager, at:

Dr. Fred Seward
AXAF Science Center
Mail Stop 4
Smithsonian Astrophysical Observatory
60 Garden Street
Cambridge, MA 02138
USA
Telephone: (617) 495-7282; FAX: (617) 495-7356
E-mail: usupport@cfa.harvard.edu

Electronic Forms Submission All proposers are required to submit their Cover Page form, General Form, and Target Summary forms (including ACIS or HRC Parameter pages, with Target Constraints and Target Remarks forms, if necessary) electronically. Proposers who do not have access to electronic communications should contact Dr. Seward at the above address at least two weeks before the proposal due date. Electronic submission facilitates efficient proposal processing and reduces the likelihood of the introduction of transcription errors into the proposal and observation databases. For electronic forms submission, the AXAF Science Center is making available Remote Proposal Software (RPS) (see Appendix D), which will be the easiest method for a proposer to comply with the electronic submission requirement. Additional information is available on the World Wide Web at <http://asc.harvard.edu/>, and questions may be e-mailed to usupport@cfa.harvard.edu.

C.2.3 Stage 2 Cost Proposal Details

A cost proposal will be requested for all proposed investigations that receive sufficiently high evaluations during the Stage 1 review and that require financial support from NASA.

Cost proposals will be due approximately 5 weeks after the Stage 1 review. A cost proposal consists of:

- The Cover Page form and General Form with institutional signatures. Institutional endorsement is required for a Stage 2 cost proposal.
- A one page (or less) summary of the budget justification. The budget justification summary should include a breakdown of the work assignments for all funded investigators taking part in the investigation, justification of any major purchases including workstations, justification of foreign or excessive travel, and any cost sharing applied to this project. Funding will be provided within a single year; multi-year programs are not allowed.
- A budget using the enclosed Budget Summary form (page C-12). In addition, a budget may be included which is prepared according to the guidelines of the proposing institution and which includes the cost information listed below. Include a detailed budget for each funded Co-I. The PI's Budget Summary form should include the totals of the Co-I's budgets as line items.
- A list of current or currently proposed research support from all sources for the PI and any funded Co-I's. For current support (in any period that will overlap with this award) and pending support (including continuations of multiple year awards) include the name of investigator, project title, sponsoring agency or institution, period of performance and amount of award, and commitment by investigator in terms of full-time equivalent (FTE) work year.
- Any required Certifications. U.S. code currently requires that a signed copy of each of the following three certifications (found at the end of this NRA) must be submitted with the original signed copy of a Stage 2 proposal from any type of organization except for those of the U.S. Government:
 - (a) Certification regarding Debarment, Suspension, and Other Responsibility Matters;
 - (b) Certification regarding Drug Free Workplace; and
 - (c) Certification Regarding Lobbying (required only for proposals requesting a cumulative total of \$100,000 or more).

As part of the proposal and corresponding budget for an AXAF GO investigation, proposers may request support for correlative observations at other wavelengths. Funding for such correlative studies will be considered only insofar as they directly support a specific AXAF investigation.

The Budget Summary should contain estimated costs for the following potential expenditures:

- Cost estimates for direct labor, including individual person-months, salaries, wages, and fringe benefits for the personnel involved.
- Travel costs – itemize trips, including travel to data analysis centers.
- Estimated costs for workstations, other equipment, supplies, and computer services. Itemize items over \$500. See below for additional information on workstation requests.
- Publication costs.

- Subgrants or subcontracts – itemize expenditures at a level similar to the parent grant.
- Other costs, with explanation, including any Education/Public Outreach proposal.
- Overhead or indirect rates and costs.
- Contributions from any cost-sharing plan.
- Total cost of support being requested from NASA.

To assure compatibility with NASA’s data systems, requested workstation systems must be capable of supporting existing portable data analysis environments such as the FTOOLS analysis software. FTOOLS is supported on a range of platforms and operating systems including Unix and Linux. In addition, requested computer systems should contain at least 64 MB of RAM and a 4 GB or larger hard drive (for further technical specifications, contact the ASC).

Portable analysis software will be available for the following UNIX platforms:

- Sun Solaris 2.5.1 (5.5.1)
- DEC Risc, Digital Unix V4.0B
- HP HPUX 10.01
- IBM Risc AIX 4.2
- PC/Linux Redhat or Slackware
- SGI IRIX 6.3

Requests for workstations must be justified in the text of both the science and the technical portions of the proposal and in the budget explanation. Such justification should briefly describe the computing capabilities that exist, or are expected to exist, at the proposer’s institution during the period in which the proposed research would be performed and then explain the scientific impact to the proposed work if the request for the additional workstation is declined. The budget request for workstations must be clearly stated in the Budget Summary form as a line item.

C.3 Proposal Evaluation and Selection

The evaluation criteria listed in C.3.1 and C.3.2 supersede the criteria listed in Appendix B.

C.3.1 Stage 1 Proposals

Evaluation Criteria The criteria used in the Stage 1 evaluation are listed below in descending order of priority.

- The overall scientific merit of the investigation.
- The suitability of using the AXAF observatory and data products for the proposed investigation, the feasibility of accomplishing the objectives of the investigation within the proposed time, telemetry, and scheduling constraints, and the feasibility of the analysis techniques. For programs incurring a large expenditure of observatory time relative to exposure time (e.g., multiple short exposures or raster scans), the total observatory time required will be considered.
- The relevance of the proposed research to NASA’s space science program.

- The competence and relevant experience of the principal investigator and any collaborators as an indication of their ability to carry the investigation to a successful conclusion. Past performance in scientific research, as evidenced by the timely publication of refereed scientific papers, will be considered.

Stage 1 Determination Experience with solicitations for prior NASA GO programs indicates that a substantial oversubscription of AXAF observing time is likely. All proposals evaluated in response to this NRA will first be reviewed for technical feasibility by AXAF Science Center staff. This consists of an evaluation of technical feasibility within spacecraft constraints, instrument capability, and observational constraints, a determination of target coincidence with reserved PVC or GTO targets, and an estimation of required spacecraft resources including total time to complete all proposed observations.

AXAF observation proposals will be evaluated for scientific and technical merit by a scientific peer review panel convened by NASA, and a numerical grade will be assigned to each proposal. The peer review panel will also be asked for their opinion of observing programs for implementation that are sized to the observing time available for GO programs. NASA will consider awarding observing time to large (with total observing time 200 ks or more) as well as short programs. The peer review panel will judge whether a proposed observational program essentially duplicates one or more observations to be performed during the PVC period or reserved by GTO's.

To aid in the Stage 2 cost review, the data analysis and interpretation effort required to complete the proposed science goals will be evaluated by the Stage 1 peer review panel.

C.3.2 Stage 2 Proposal Evaluation and Selection

Proposers whose proposals receive a high evaluation will be notified and asked to submit a Stage 2 proposal. Stage 2 proposals will be due approximately 5 weeks after notification. A review team comprised of a subset of the Stage 1 peer review panel will then review the cost proposals for overall consideration of both scientific and cost factors. In addition to the overall scientific/technical rating of the proposed investigation, input to the Stage 2 review from the Stage 1 review will include an evaluation of the level of effort required to complete the data analysis and interpretation phase of the project. Based on this evaluation, the AXAF Program Scientist will recommend a set of proposals to the Selecting Official for final selection and award.

Evaluation Criteria The criteria used in the Stage 2 evaluation will be:

- The total cost of the investigation, including cost realism and reasonableness, in the context of the anticipated level of effort required to carry out the investigation successfully, and
- The total proposed cost in relation to the available funds.

A total of about \$10 million is planned for the support of GO's for proposals solicited in this NRA. It is anticipated that approximately 200 investigations will be recommended for selection. Successful proposers will be notified concerning the level of funding recommended for their investigation shortly after the Stage 2 review.

Selection After evaluation of Stage 2 proposals, selection will be made based on the following considerations, listed in descending order of priority:

- Stage 1 evaluation of scientific merit and technical feasibility,
- Stage 2 evaluation of proposed costs, and
- E/PO evaluation of any proposed Education/Public Outreach activity (used to discriminate among closely competing proposals).

C.4 Implementation

All approved targets will be placed into an observation database in which each observation is assigned a unique identifying number.

It is the responsibility of the AXAF mission planning and operations team at the ASC to produce a mission timeline from all approved observation requests. The process of mission timeline generation is split into two parts:

First, for the entire period covered by this NRA, a long-term mission timeline (LMTL) will be generated with a precision of about a week. Additional LMTL's will be generated as needed in response to TOO's and other timeline changes. Targets are scheduled in the LMTL to achieve maximum efficiency in the observing program within the operational constraints of AXAF. Constrained observations will be scheduled in accordance with their constraints. Unconstrained observations will be scheduled to produce the highest observing efficiency.

Second, about four weeks prior to the anticipated execution of the observations, a short-term mission timeline (SMTL) will be produced on the basis of the LMTL. The SMTL is used for the automatic generation of required spacecraft commands. The SMTL, including slew times, pointing direction, guide stars, roll angles, etc., will be well-defined approximately two weeks in advance of execution.

The AXAF Science Center will make its best effort to schedule all approved observations. All approved non-TOO observations that are not scheduled, or that were scheduled but not successfully executed for whatever reason, will automatically be rescheduled within the current NRA period or carried over into the observing program of the next observing cycle. However, approved TOO observations will not automatically be carried into the next NRA period, but must be repropoed.

If observations are cut short by mission timeline optimization or other constraints, the completeness criterion will determine whether a given target is scheduled for additional

observing time. The completion criterion for each requested pointing with AXAF is 80% of the approved exposure time.

Investigators whose proposals are selected will have proprietary use of their data for 12 months after receipt of the data in usable form, after which time the data will be placed in a public archive and made available to other interested investigators. The proprietary period for GTO observations is identical. A PI may waive the proprietary period as is customary for observations intended to benefit the general community.

C.5 Schedule

The current schedule for the review and selection of proposals for the first observing cycle on AXAF is listed in Table 2. Note that the dates of events planned beyond the Stage 1 Science Proposals Due Date are estimates and subject to change.

Table 2: AXAF NRA Schedule

Date	Action
October 31, 1997	Release NRA
February 2, 1998	Stage 1 Science Proposals Due
April 1998	Stage 1 Review
May 1998	Stage 2 Cost Proposals Due
June 1998	Stage 2 Review
July 1998	Final Selection of Proposals
August 27, 1998	Launch of AXAF
September/October 1998	PVC Phase
November/December 1998	Dedicated GTO Observations
January 1999	Begin Cycle 1 GO Observations

C.6 Education and Public Outreach

Education and the enhancement of public understanding of space science are considered to be vital and integral parts of all NASA space science missions and research programs. Therefore, NASA OSS strongly encourages every proposer to any of its programs to include an Education/Public Outreach (E/PO) component with their research proposal in response to the guidelines outlined in Appendix F of this NRA. Scientific excellence and programmatic relevance of proposed investigations will be the primary selection criteria, but the quality of a proposed E/PO effort will be used to discriminate between proposals of comparable merits. Therefore, prospective proposers will enhance the likelihood of selection by adding a viable E/PO activity to their research proposal. Note that E/PO tasks need not be original; the important factor is that a tenable task of merit be proposed that, if selected, will be carried out.

The OSS Education and Public Outreach program is described in Appendix F of this NRA, which also provides a discussion of the resources available to aid the space science community to become effectively involved in education and/or public outreach.

Further information may also be accessed by selecting “Education and Outreach” from the OSS homepage at <<http://www.hq.nasa.gov/office/oss/>>.

Attention is also called to the Initiative to Develop Education through Astronomy and Space Science (IDEAS) program administered by the Space Telescope Science Institute on behalf of OSS. The purpose of the IDEAS program is to provide start-up funding for innovative projects that promote science education through astronomy and space science at all levels, especially pre-college. The IDEAS program, which currently selects programs yearly, provides awards of up to \$10K (with a few up to \$40K) to collaborate with education professionals to enhance science and mathematics education. The IDEAS program is open to any scientist based in the U.S. regardless of whether or not they currently hold a research grant from NASA OSS. For more information, contact the IDEAS Program at the address given in Appendix F.

Instructions for AXAF Electronic Proposal Forms

NRA 97-OSS-14
Appendix D

Stage 1 AXAF science and technical proposals must contain hard copies of at least three AXAF forms: the Cover Page form, the General Form, and the Target Summary form. The Target Summary form includes the Target Summary page and either the two ACIS Parameters pages or the HRC Parameters page. There is also an optional Target Constraints form and an optional Target Remarks form. Electronic submission of all of these AXAF forms is required.

The Remote Proposal Submission (RPS) software, which is provided by the AXAF Science Center (ASC), provides a user friendly means of entering the data necessary for filling out the AXAF forms, performing simple checks of entered data for consistency and completeness, electronically submitting the AXAF forms, and creating LaTeX files suitable for generating hard copies of the AXAF forms. The RPS software can be accessed through either of two completely independent user interfaces: a World Wide Web (WWW) page and an automated E-mail handler. Both interfaces have complete functionality, and each has data input, data checking, forms submission, and LaTeX file creating capabilities. A more complete description of RPS and instructions on its use may be found in the *AXAF Proposer's Guide*.

The WWW version of RPS provides a form-based interface to the AXAF form processor. It can be reached from the ASC home page at <<http://asc.harvard.edu/>>. Help files for the WWW version are available as hypertext links for each form and for each parameter. The WWW version is stateless, which means nothing is done with the entries that are entered into the Browser until the user carries out an action, such as saving, verifying, submitting, or generating LaTeX code. Complete instructions may be found on the RPS Web page.

Instructions to use the automated E-mail handler may be obtained by sending a blank E-mail message to <rps@head-cfa.harvard.edu>. The response will be instructions that describe how to obtain a fill-in-the-blank data input file, how to verify the answers in a completely filled in data input file, how to obtain a LaTeX file that can be used to create hard copies of the AXAF forms, and how to electronically submit the final version of the data input file.

The hard copy of the AXAF forms must be included in the final proposal before copies are made and the proposal is mailed to the ASC. The proposal author is strongly urged to verify the consistency between the electronic contents of the RPS files and the hard copy by closely examining the hard copy prior to submitting proposals. Blank AXAF forms are enclosed, although it is assumed that completed forms will be generated via RPS rather than by filling in the blank forms.

The AXAF detectors are complex because of the numerous available data collecting modes. The proposer is urged not to rely only on the RPS instructions to understand the use of the AXAF detectors but to refer to the *AXAF Proposer's Guide* and the *AXAF Observatory Guide*. Both are available from the ASC at <<http://asc.harvard.edu/>>.

AXAF PVC and Cycle 1 GTO Targets

This appendix contains the targets to be observed during the Performance Verification and Calibration (PVC) phase and by the Guaranteed Time Observers (GTO's) during Cycle 1. The PVC phase is months 1–2 of the mission; some calibration observations are for monitoring and will be performed later in Cycle 1. All calibration data will be placed immediately into the public data archive. GTO observations during Cycle 1 will occupy 100% of months 3–4 and 30% of months 5–13. Guaranteed Time Observers have the same proprietary data rights as General Observers. More information on these targets and observations is available on the ASC web site at <<http://asc.harvard.edu/>>.

E.1 Performance Verification and Calibration Targets

RA (J2000)	Dec (J2000)	Detector / Grating	Exp (ksec)	Target Name	Principal Investigator
01:04:02.40	-72:01:55.3	ACIS-I/NONE	20.0	E0102-72.3,CHIP I1	AXAF Science Center
01:04:02.40	-72:01:55.3	ACIS-I/NONE	20.0	E0102-72.3,CHIP I1,2	AXAF Science Center
01:04:02.40	-72:01:55.3	ACIS-I/NONE	20.0	E0102-72.3,CHIP I1,3	AXAF Science Center
01:04:02.40	-72:01:55.3	ACIS-I/NONE	20.0	E0102-72.3,CHIP I1,4	AXAF Science Center
01:04:02.40	-72:01:55.3	ACIS-S/NONE	20.0	E0102-72.3,CHIP S3	AXAF Science Center
01:04:02.40	-72:01:55.3	ACIS-S/NONE	20.0	E0102-72.3,CHIP S3,2	AXAF Science Center
01:04:02.40	-72:01:55.3	ACIS-S/NONE	20.0	E0102-72.3,CHIP S3,3	AXAF Science Center
01:04:02.40	-72:01:55.3	ACIS-S/NONE	20.0	E0102-72.3,CHIP S3,4	AXAF Science Center
03:11:55.20	-76:51:51.0	HRC-I/NONE	10.0	PKS0312-770	AXAF Science Center
03:11:55.20	-76:51:51.0	HRC-S/NONE	10.0	PKS0312-770	AXAF Science Center
03:11:55.20	-76:51:51.0	ACIS-I/NONE	10.0	PKS0312-770	AXAF Science Center
03:11:55.20	-76:51:51.0	ACIS-I/NONE	10.0	PKS0312-770, 2	AXAF Science Center
03:11:55.20	-76:51:51.0	ACIS-I/NONE	10.0	PKS0312-770, 3	AXAF Science Center
03:11:55.20	-76:51:51.0	ACIS-I/NONE	10.0	PKS0312-770, 4	AXAF Science Center
03:11:55.20	-76:51:51.0	ACIS-S/NONE	10.0	PKS0312-770	AXAF Science Center
03:36:47.30	+00:35:23.9	ACIS-S/HETG	200.0	HR1099	AXAF Science Center
03:46:59.00	+24:09:15.1	HRC-I/NONE	10.0	PLEIADES	AXAF Science Center
03:46:59.00	+24:09:15.1	HRC-S/NONE	10.0	PLEIADES	AXAF Science Center
03:46:59.00	+24:09:15.1	ACIS-I/NONE	10.0	PLEIADES	AXAF Science Center
03:46:59.00	+24:09:15.1	ACIS-S/NONE	10.0	PLEIADES	AXAF Science Center
03:46:59.00	+24:09:15.1	HRC-I/NONE	10.0	PLEIADES, OFF-SET	AXAF Science Center
03:46:59.00	+24:09:15.1	HRC-S/NONE	10.0	PLEIADES, OFF-SET	AXAF Science Center
03:46:59.00	+24:09:15.1	ACIS-I/NONE	10.0	PLEIADES, OFF-SET	AXAF Science Center
03:46:59.00	+24:09:15.1	ACIS-S/NONE	10.0	PLEIADES, OFF-SET	AXAF Science Center
05:16:42.30	+45:59:52.4	HRC-S/LETG	100.0	CAPELLA	AXAF Science Center
05:16:42.30	+45:59:52.4	HRC-S/LETG	30.0	CAPELLA,2	AXAF Science Center
05:16:42.30	+45:59:52.4	HRC-S/LETG	100.0	CAPELLA HESF	AXAF Science Center
05:16:42.30	+45:59:52.4	ACIS-S/HETG	100.0	CAPELLA	AXAF Science Center
05:16:42.30	+45:59:52.4	ACIS-S/HETG	30.0	CAPELLA,2	AXAF Science Center
05:16:42.30	+45:59:52.4	ACIS-S/LETG	50.0	CAPELLA	AXAF Science Center
05:25:00.00	-69:38:24.0	ACIS-I/NONE	5.0	N132D	AXAF Science Center
05:34:32.00	+22:00:52.1	ACIS-S/HETG	10.0	CRAB PULSAR	AXAF Science Center

RA (J2000)	Dec (J2000)	Detector / Grating	Exp (ksec)	Target Name	Principal Investigator
05:34:32.00	+22:00:52.1	ACIS-S/HETG	10.0	CRAB PULSAR,2	AXAF Science Center
05:34:32.00	+22:00:52.1	ACIS-S/HETG	5.0	CRAB PULSAR-CC	AXAF Science Center
05:39:39.50	-69:44:37.0	ACIS-I/NONE	10.0	LMC X-1	AXAF Science Center
05:40:11.10	-69:19:55.2	HRC-I/NONE	20.0	PSR B0540-69	AXAF Science Center
05:40:11.10	-69:19:55.2	ACIS-I/NONE	20.0	PSR B0540-69-CC	AXAF Science Center
06:35:45.60	-75:16:12.0	HRC-I/NONE	25.0	PKS0637-752	AXAF Science Center
06:35:45.60	-75:16:12.0	HRC-S/NONE	25.0	PKS0637-752	AXAF Science Center
06:35:45.60	-75:16:12.0	ACIS-I/NONE	25.0	PKS0637-752	AXAF Science Center
06:35:45.60	-75:16:12.0	ACIS-S/NONE	25.0	PKS0637-752	AXAF Science Center
06:45:11.00	-16:42:05.0	HRC-S/LETG	20.0	SIRIUS B	AXAF Science Center
07:39:20.40	+05:14:21.0	HRC-S/LETG	150.0	PROCYON	AXAF Science Center
09:09:09.00	-09:39:39.0	ACIS-I/NONE	30.0	ABELL 754	AXAF Science Center
09:18:05.70	-12:05:45.0	ACIS-I/NONE	10.0	HYDRA A	AXAF Science Center
09:18:05.70	-12:05:45.0	ACIS-S/NONE	10.0	HYDRA A	AXAF Science Center
09:55:32.00	+69:03:55.0	HRC-I/NONE	20.0	M81	AXAF Science Center
09:55:50.70	+69:40:37.0	HRC-I/NONE	10.0	M82	AXAF Science Center
10:32:13.00	+53:29:00.0	HRC-I/NONE	80.0	REJ1032+532 OFF-AXIS	AXAF Science Center
10:36:54.00	-27:30:60.0	HRC-I/NONE	20.0	A1060	AXAF Science Center
10:36:54.00	-27:30:60.0	HRC-S/NONE	20.0	A1060	AXAF Science Center
10:36:54.00	-27:30:60.0	ACIS-I/NONE	20.0	A1060	AXAF Science Center
10:36:54.00	-27:30:60.0	ACIS-I/NONE	20.0	A1060, 2	AXAF Science Center
10:36:54.00	-27:30:60.0	ACIS-I/NONE	20.0	A1060, 3	AXAF Science Center
10:36:54.00	-27:30:60.0	ACIS-I/NONE	20.0	A1060, 4	AXAF Science Center
10:36:54.00	-27:30:60.0	ACIS-S/NONE	20.0	A1060	AXAF Science Center
10:36:54.00	-27:30:60.0	ACIS-S/NONE	20.0	A1060, 2	AXAF Science Center
10:36:54.00	-27:30:60.0	ACIS-S/NONE	20.0	A1060, 3	AXAF Science Center
10:36:54.00	-27:30:60.0	ACIS-S/NONE	20.0	A1060, 4	AXAF Science Center
10:45:03.60	-59:41:03.0	ACIS-I/NONE	20.0	ETA CARINAE	AXAF Science Center
10:45:03.60	-59:41:03.0	ACIS-I/NONE	10.0	ETA CARINAE-CC	AXAF Science Center
11:04:27.20	+38:12:31.7	HRC-S/LETG	50.0	MKN 421	AXAF Science Center
11:04:27.20	+38:12:31.7	ACIS-S/HETG	30.0	MKN 421	AXAF Science Center
11:04:27.20	+38:12:31.7	HRC-I/NONE	80.0	MKN 421 OFF-AXIS	AXAF Science Center
11:04:27.20	+38:12:31.7	ACIS-I/NONE	60.0	MKN 421 OFF-AXIS	AXAF Science Center
11:04:27.20	+38:12:31.7	ACIS-S/NONE	40.0	MKN 421 OFF-AXIS	AXAF Science Center
12:29:06.70	+02:03:08.6	HRC-S/LETG	40.0	3C 273	AXAF Science Center
12:29:06.70	+02:03:08.6	ACIS-S/HETG	40.0	3C 273	AXAF Science Center
12:29:06.70	+02:03:08.6	HRC-I/NONE	20.0	3C 273	AXAF Science Center
12:36:45.00	+47:55:30.0	HRC-I/NONE	10.0	REJ1236+47	AXAF Science Center
12:36:45.00	+47:55:30.0	HRC-I/NONE	10.0	REJ1236+47, 2	AXAF Science Center
12:36:45.00	+47:55:30.0	HRC-I/NONE	10.0	REJ1236+47, 3	AXAF Science Center
12:36:45.00	+47:55:30.0	HRC-I/NONE	10.0	REJ1236+47, 4	AXAF Science Center
12:36:45.00	+47:55:30.0	HRC-S/NONE	10.0	REJ1236+47	AXAF Science Center
12:59:48.00	+27:57:60.0	HRC-I/NONE	10.0	COMA CLUSTER	AXAF Science Center
12:59:48.00	+27:57:60.0	HRC-I/NONE	10.0	COMA CLUSTER, 2	AXAF Science Center
12:59:48.00	+27:57:60.0	HRC-I/NONE	10.0	COMA CLUSTER, 3	AXAF Science Center
12:59:48.00	+27:57:60.0	HRC-I/NONE	10.0	COMA CLUSTER, 4	AXAF Science Center
12:59:48.00	+27:57:60.0	HRC-S/NONE	10.0	COMA CLUSTER	AXAF Science Center
12:59:48.00	+27:57:60.0	HRC-S/NONE	10.0	COMA CLUSTER, 2	AXAF Science Center
12:59:48.00	+27:57:60.0	HRC-S/NONE	10.0	COMA CLUSTER, 3	AXAF Science Center
12:59:48.00	+27:57:60.0	HRC-S/NONE	10.0	COMA CLUSTER, 4	AXAF Science Center

RA (J2000)	Dec (J2000)	Detector / Grating	Exp (ksec)	Target Name	Principal Investigator
12:59:48.00	+27:57:60.0	ACIS-I/NONE	10.0	COMA CLUSTER	AXAF Science Center
12:59:48.00	+27:57:60.0	ACIS-S/NONE	10.0	COMA CLUSTER	AXAF Science Center
13:16:22.10	+29:05:56.4	HRC-S/LETG	20.0	HZ43	AXAF Science Center
13:16:22.10	+29:05:56.4	HRC-S/LETG	20.0	HZ43, 2	AXAF Science Center
13:16:22.10	+29:05:56.4	HRC-S/LETG	30.0	HZ43 HESF	AXAF Science Center
13:16:22.10	+29:05:56.4	HRC-S/LETG	30.0	HZ43 HESF, 2	AXAF Science Center
13:25:27.60	-43:01:11.0	HRC-I/NONE	10.0	CEN A	AXAF Science Center
14:11:20.10	+52:12:21.0	ACIS-I/NONE	10.0	3C295	AXAF Science Center
18:33:33.50	-10:34:06.7	HRC-I/NONE	30.0	G21.5-0.9	AXAF Science Center
18:33:33.50	-10:34:06.7	HRC-I/NONE	30.0	G21.5-0.9, 2	AXAF Science Center
18:33:33.50	-10:34:06.7	HRC-I/NONE	30.0	G21.5-0.9, 3	AXAF Science Center
18:33:33.50	-10:34:06.7	HRC-I/NONE	30.0	G21.5-0.9, 4	AXAF Science Center
18:33:33.50	-10:34:06.7	HRC-S/NONE	30.0	G21.5-0.9, ALL MCPs	AXAF Science Center
18:33:33.50	-10:34:06.7	HRC-S/NONE	30.0	G21.5-0.9,2,ALL MCPs	AXAF Science Center
18:33:33.50	-10:34:06.7	HRC-S/NONE	30.0	G21.5-0.9,3,ALL MCPs	AXAF Science Center
18:33:33.50	-10:34:06.7	HRC-S/NONE	30.0	G21.5-0.9,4,ALL MCPs	AXAF Science Center
18:33:33.50	-10:34:06.7	ACIS-I/NONE	10.0	G21.5-0.9, CHIP I0	AXAF Science Center
18:33:33.50	-10:34:06.7	ACIS-I/NONE	30.0	G21.5-0.9, CHIP I1	AXAF Science Center
18:33:33.50	-10:34:06.7	ACIS-I/NONE	10.0	G21.5-0.9, CHIP I2	AXAF Science Center
18:33:33.50	-10:34:06.7	ACIS-I/NONE	10.0	G21.5-0.9, CHIP I3	AXAF Science Center
18:33:33.50	-10:34:06.7	ACIS-S/NONE	10.0	G21.5-0.9, CHIP S0	AXAF Science Center
18:33:33.50	-10:34:06.7	ACIS-S/NONE	10.0	G21.5-0.9, CHIP S1	AXAF Science Center
18:33:33.50	-10:34:06.7	ACIS-S/NONE	30.0	G21.5-0.9, CHIP S2	AXAF Science Center
18:33:33.50	-10:34:06.7	ACIS-S/NONE	10.0	G21.5-0.9, CHIP S3	AXAF Science Center
18:33:33.50	-10:34:06.7	ACIS-S/NONE	10.0	G21.5-0.9, CHIP S4	AXAF Science Center
18:33:33.50	-10:34:06.7	ACIS-S/NONE	10.0	G21.5-0.9, CHIP S5	AXAF Science Center
18:36:55.40	+38:46:46.2	HRC-I/NONE	3.0	VEGA	AXAF Science Center
18:36:55.40	+38:46:46.2	HRC-S/NONE	3.0	VEGA, CENTRAL MCP	AXAF Science Center
18:36:55.40	+38:46:46.2	HRC-S/NONE	3.0	VEGA, -Y MCP	AXAF Science Center
18:36:55.40	+38:46:46.2	HRC-S/NONE	3.0	VEGA, +Y MCP	AXAF Science Center
18:36:55.40	+38:46:46.2	ACIS-I/NONE	3.0	VEGA	AXAF Science Center
18:36:55.40	+38:46:46.2	ACIS-S/NONE	3.0	VEGA	AXAF Science Center
20:33:14.10	+41:18:41.0	ACIS-I/NONE	7.0	STAR A, CYG OB2	AXAF Science Center
20:33:09.60	+41:14:56.0	ACIS-I/NONE	7.0	STAR B, CYG OB2	AXAF Science Center
20:32:41.00	+41:14:25.0	ACIS-I/NONE	7.0	STAR C, CYG OB2	AXAF Science Center
20:32:22.00	+41:18:23.0	ACIS-I/NONE	7.0	STAR D, CYG OB2	AXAF Science Center
21:44:41.20	+38:19:17.0	ACIS-S/HETG	3.0	CYG X2, HETG-CC	AXAF Science Center
21:44:41.20	+38:19:17.0	ACIS-S/LETG	3.0	CYG X2, LETG-CC	AXAF Science Center
21:44:41.20	+38:19:18.1	ACIS-S/HETG	30.0	CYG X-2	AXAF Science Center
23:23:25.80	+58:48:53.4	HRC-I/NONE	5.0	CAS A	AXAF Science Center
23:23:25.80	+58:48:53.4	HRC-S/NONE	5.0	CAS A, CENTRAL MCP	AXAF Science Center
23:23:25.80	+58:48:53.4	HRC-S/NONE	2.0	CAS A, -Y MCP	AXAF Science Center
23:23:25.80	+58:48:53.4	HRC-S/NONE	2.0	CAS A, +Y MCP	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-I/NONE	1.0	CAS A, CHIP I0	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-I/NONE	11.0	CAS A, CHIP I1	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-I/NONE	1.0	CAS A, CHIP I2	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-I/NONE	1.0	CAS A, CHIP I3	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-I/NONE	14.0	CAS A, ALL CHIPS, 2	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-I/NONE	14.0	CAS A, ALL CHIPS, 3	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-I/NONE	14.0	CAS A, ALL CHIPS, 4	AXAF Science Center

RA (J2000)	Dec (J2000)	Detector / Grating	Exp (ksec)	Target Name	Principal Investigator
23:23:25.80	+58:48:53.4	ACIS-S/NONE	1.0	CAS A, CHIP S0	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-S/NONE	1.0	CAS A, CHIP S1	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-S/NONE	1.0	CAS A, CHIP S2	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-S/NONE	11.0	CAS A, CHIP S3	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-S/NONE	1.0	CAS A, CHIP S4	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-S/NONE	1.0	CAS A, CHIP S5	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-S/NONE	16.0	CAS A, ALL CHIPS, 2	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-S/NONE	16.0	CAS A, ALL CHIPS, 3	AXAF Science Center
23:23:25.80	+58:48:53.4	ACIS-S/NONE	16.0	CAS A, ALL CHIPS, 4	AXAF Science Center

E.2 Guaranteed Time Observer Targets (Cycle 1)

RA (J2000)	Dec (J2000)	Detector / Grating	Exp (ksec)	Target Name	Principal Investigator
00:00:00.00	+00:00:00.0	ACIS-S/NONE	40.0	JUPITER	Gordon Garmire
00:18:33.40	+16:26:34.8	ACIS-I/NONE	35.0	MS0015.9+1609	Leon van Speybroeck
00:19:50.00	+21:56:54.0	HRC-S/LETG	50.0	RXJ0019.8+2156	Albert Brinkman
00:19:50.00	+21:56:54.0	ACIS-S/NONE	1.0	RX J 0019.8+2156	Stephen Murray
00:24:42.00	-72:00:00.0	ACIS-S/NONE	74.0	47 TUC	Stephen Murray
00:25:17.00	+64:08:37.0	ACIS-I/NONE	50.0	TYCHO SNR	Stephen Holt
00:30:33.10	+26:18:18.0	ACIS-I/NONE	50.0	V 0030+2618	Leon van Speybroeck
00:37:19.80	-72:14:13.0	ACIS-S/NONE	5.7	1E 0035.4-7230	Stephen Murray
00:40:27.00	+40:40:12.0	HRC-I/NONE	12.0	M31 - BOTTOM	Stephen Murray
00:42:08.00	+40:55:17.0	HRC-I/NONE	12.0	M31 - MID BOTTOM	Stephen Murray
00:42:44.40	+41:16:08.3	HRC-I/NONE	12.0	M31 - CENTER	Stephen Murray
00:42:44.40	+41:16:08.3	ACIS-I/NONE	60.0	M31 TRANSIENT TBD	Stephen Murray
00:44:07.00	+41:43:16.0	HRC-I/NONE	12.0	M31 - MIDDLE TOP	Stephen Murray
00:45:20.00	+41:49:47.0	HRC-I/NONE	12.0	M31 - TOP	Stephen Murray
00:47:33.10	-25:17:18.0	ACIS-S/NONE	2.0	NGC 253	Gordon Garmire
00:58:37.00	-71:35:48.0	ACIS-S/NONE	13.3	1E 0056.8-7154	Stephen Murray
01:02:18.00	+31:47:20.4	ACIS-I/NONE	55.0	CL 0107+31	Leon van Speybroeck
01:03:60.00	-72:01:56.0	ACIS-S/HETG	140.0	E0102-72	Claude Canizares
01:09:26.90	+35:43:03.0	ACIS-S/NONE	2.0	NGC 404	Gordon Garmire
01:23:39.00	+33:15:24.0	ACIS-S/NONE	29.0	NGC 507	Stephen Murray
01:23:54.00	-34:03:55.0	ACIS-S/NONE	1.0	NGC 526A	Andrew Wilson
01:23:54.00	-34:03:55.0	ACIS-S/NONE	9.0	NGC 526A	Andrew Wilson
01:31:50.90	-13:36:28.8	ACIS-I/NONE	10.0	A209	Leon van Speybroeck
01:52:48.70	+01:01:08.4	ACIS-I/NONE	10.0	A267	Leon van Speybroeck
01:53:00.40	-13:44:18.0	ACIS-I/NONE	40.0	NGC 720	Gordon Garmire
02:05:38.00	+64:49:24.0	HRC-I/NONE	29.0	3C 58	Stephen Murray
02:39:53.10	-01:34:45.0	ACIS-I/NONE	90.0	ABELL 370	Gordon Garmire
02:41:04.80	-08:15:21.0	ACIS-S/NONE	2.0	NGC 1052	Gordon Garmire
02:41:43.70	+00:25:54.0	ACIS-S/NONE	2.0	NGC 1055	Gordon Garmire
02:42:40.70	-00:00:47.6	ACIS-S/NONE	1.0	NGC 1068	Andrew Wilson
02:42:40.70	-00:00:47.6	ACIS-S/NONE	80.0	NGC 1068	Andrew Wilson
02:42:40.70	-00:00:48.0	ACIS-S/HETG	50.0	NGC 1068	Claude Canizares
02:42:40.90	-00:00:47.6	ACIS-S/LETG	80.0	NGC 1068	Albert Brinkman
02:43:29.90	+37:20:27.0	ACIS-S/NONE	2.0	NGC 1058	Gordon Garmire
02:48:03.60	-03:32:09.6	ACIS-I/NONE	10.0	A383	Leon van Speybroeck

RA (J2000)	Dec (J2000)	Detector / Grating	Exp (ksec)	Target Name	Principal Investigator
02:58:54.00	+13:35:00.0	ACIS-S/NONE	30.0	A401	Stephen Murray
03:05:33.80	+17:10:04.8	ACIS-I/NONE	30.0	MS0302.7+1658	Leon van Speybroeck
03:08:10.10	+40:57:20.5	HRC-S/LETG	80.0	ALGOL	Albert Brinkman
03:19:48.10	+41:30:42.0	ACIS-S/HETG	50.0	NGC 1275	Claude Canizares
03:19:48.50	+41:30:27.0	ACIS-I/NONE	40.0	A426	Andrew Fabian
03:19:48.50	+41:30:27.0	ACIS-S/NONE	10.0	A426	Andrew Fabian
03:38:29.30	-35:27:01.0	ACIS-S/HETG	58.0	NGC 1399	Claude Canizares
03:38:41.70	-35:31:42.9	ACIS-I/NONE	10.0	NGC 1399	Richard Mushotzky
03:38:41.70	-35:31:42.9	ACIS-S/NONE	60.0	NGC 1399	Richard Mushotzky
03:46:46.00	+24:04:06.0	ACIS-I/NONE	60.0	PLEIADES	Jeffrey Linsky
04:14:37.70	+05:34:42.0	ACIS-S/NONE	15.0	MITG J0414+0534	Gordon Garmire
04:39:01.20	+07:15:36.0	ACIS-I/NONE	10.0	RXJ0439.0+0715	Leon van Speybroeck
04:39:03.84	+05:20:20.4	ACIS-I/NONE	10.0	RXJ0439+0520	Leon van Speybroeck
04:39:49.60	-68:09:02.0	ACIS-S/NONE	8.0	RX J 0439.8-6809	Stephen Murray
04:54:07.40	+02:55:12.0	ACIS-I/NONE	10.0	A520	Leon van Speybroeck
04:54:10.80	-03:01:08.4	ACIS-I/NONE	15.0	MS0451.6-0305	Leon van Speybroeck
05:07:42.00	-37:30:48.0	HRC-I/NONE	29.0	NGC 1808	Stephen Murray
05:08:59.00	-68:43:30.0	ACIS-I/NONE	40.0	SNR 509.0-68.7	Gordon Garmire
05:19:34.00	-69:02:11.0	ACIS-I/NONE	55.0	0519-69.0	Stephen Holt
05:19:49.70	-45:46:45.0	ACIS-S/NONE	1.0	PICTOR A	Andrew Wilson
05:19:49.70	-45:46:45.0	ACIS-S/NONE	9.0	PICTOR A	Andrew Wilson
05:25:02.10	-69:38:59.0	ACIS-S/HETG	100.0	N132D	Claude Canizares
05:28:44.80	-65:26:56.0	ACIS-S/HETG	60.0	AB DOR	Jeffrey Linsky
05:32:23.28	-11:32:09.6	ACIS-I/NONE	10.0	A545	Leon van Speybroeck
05:35:08.00	-06:33:47.0	ACIS-S/NONE	2.0	HD 37001	Gordon Garmire
05:35:15.00	-05:23:20.0	ACIS-I/NONE	50.0	TRAPEZIUM CLUSTER	Gordon Garmire
05:35:16.70	-05:23:24.0	HRC-I/NONE	69.0	ORION TRAPEZIUM	Stephen Murray
05:35:24.00	-05:23:00.0	ACIS-S/HETG	73.0	TRAPEZIUM	Claude Canizares
05:35:28.30	-69:16:13.0	ACIS-S/HETG	100.0	SN 1987A	Collab Garhol(50-50)
05:35:28.30	-69:16:13.0	ACIS-S/NONE	10.0	SN 1987A	Gordon Garmire
05:36:20.70	-06:45:13.0	ACIS-S/NONE	20.0	HH 1	Gordon Garmire
05:38:42.85	-69:06:03.0	ACIS-S/NONE	30.0	30 DORADUS	Gordon Garmire
05:38:56.40	-64:05:01.0	ACIS-S/HETG	20.0	LMC X-3	Gordon Garmire
05:39:38.80	-69:44:36.0	ACIS-S/HETG	20.0	LMC X-1	Gordon Garmire
05:40:11.00	-69:19:60.0	ACIS-I/NONE	30.0	0540-69.3	Stephen Holt
05:43:33.50	-68:22:23.0	HRC-S/LETG	50.0	CAL 83	Albert Brinkman
05:43:33.50	-68:22:33.0	ACIS-S/NONE	2.0	CAL 83	Stephen Murray
06:17:07.40	+09:08:12.0	HRC-S/LETG	26.0	X 0614+091	Albert Brinkman
06:22:44.50	-00:20:44.7	ACIS-S/NONE	44.0	A0620-00	Stephen Murray
06:58:37.90	-55:57:00.0	ACIS-I/NONE	28.0	1E0657-56	Collab Vanmur(23-5)
06:59:48.10	+14:14:18.6	HRC-S/LETG	40.0	PSR B0656+14	Claude Canizares
07:32:22.30	+31:38:02.4	ACIS-I/NONE	10.0	A586	Leon van Speybroeck
07:34:35.90	+31:53:18.0	HRC-S/LETG	80.0	YY GEM	Albert Brinkman
07:41:10.70	+31:12:00.4	ACIS-S/HETG	29.0	B2 0738+313	Stephen Murray
07:47:31.10	-19:17:47.0	ACIS-I/NONE	30.0	PKS0745-191	Andrew Fabian
07:47:31.30	-19:17:40.0	ACIS-S/HETG	95.0	PKS 0745-191	Claude Canizares
07:51:17.30	+14:44:23.0	HRC-S/LETG	50.0	RE0751+14	Albert Brinkman
07:58:07.10	-60:45:36.0	HRC-I/NONE	49.0	NGC 2516	Stephen Murray
08:03:35.10	-40:00:12.0	HRC-S/LETG	25.0	Z PUP	Stephen Murray
08:30:57.40	+65:51:14.4	ACIS-I/NONE	10.0	A665	Leon van Speybroeck

RA (J2000)	Dec (J2000)	Detector / Grating	Exp (ksec)	Target Name	Principal Investigator
08:35:20.60	-45:10:36.0	HRC-S/LETG	25.0	VELA PULSAR	Gordon Garmire
08:35:20.60	-45:10:36.0	ACIS-S/NONE	5.0	VELA PULSAR	Gordon Garmire
08:35:20.70	-45:10:38.4	ACIS-S/HETG	40.0	PSR B0833-43	Claude Canizares
08:39:11.90	+65:01:11.0	HRC-S/LETG	30.0	PI-1 UMA	Stephen Murray
08:41:24.30	+70:53:42.0	ACIS-S/HETG	75.0	Q0836+7104	Claude Canizares
08:42:57.80	+36:21:54.0	ACIS-I/NONE	10.0	A697	Leon van Speybroeck
08:58:41.20	+14:09:34.0	ACIS-S/NONE	20.0	3C 212	Stephen Murray
09:02:06.80	-40:33:17.0	ACIS-S/HETG	30.0	VELA X-1	Claude Canizares
09:11:27.50	+05:50:52.0	ACIS-S/NONE	15.0	RX J0911.4+0551	Gordon Garmire
09:13:45.50	+40:56:29.0	ACIS-S/NONE	10.0	IRAS09104	Andrew Fabian
09:17:54.00	+51:42:57.6	ACIS-I/NONE	10.0	A773	Leon van Speybroeck
09:19:18.90	+69:12:10.5	ACIS-S/NONE	2.0	NGC 2787	Gordon Garmire
09:20:28.80	+30:31:08.4	ACIS-I/NONE	10.0	A781	Leon van Speybroeck
09:22:02.70	+50:58:35.0	ACIS-S/NONE	2.0	NGC 2841	Gordon Garmire
09:25:46.20	-47:58:17.0	ACIS-S/NONE	1.0	RX J 0925.7-4758	Stephen Murray
09:51:00.00	+26:34:60.0	ACIS-S/NONE	15.0	0951+2635	Gordon Garmire
09:55:33.20	+69:03:55.0	ACIS-S/NONE	2.0	NGC 3031	Gordon Garmire
09:55:47.00	+69:40:58.0	ACIS-I/NONE	25.0	M 82	Stephen Murray
09:55:51.10	+69:40:45.0	ACIS-I/NONE	25.0	M 82	Gordon Garmire
09:58:21.36	-11:03:39.6	ACIS-I/NONE	10.0	A907	Leon van Speybroeck
10:01:20.73	+55:53:55.8	ACIS-S/NONE	50.0	0957+561	Gordon Garmire
10:19:38.00	+19:52:14.3	HRC-S/LETG	10.0	AD LEO	Stephen Murray
10:46:45.80	+11:49:11.0	ACIS-S/NONE	2.0	NGC 3368	Gordon Garmire
10:52:00.00	+57:21:36.0	HRC-I/NONE	350.0	LOCKMAN HOLE	Stephen Murray
10:57:00.00	-03:37:00.0	ACIS-I/NONE	90.0	EMSS 1054.5-0321	Gordon Garmire
11:00:18.10	+13:54:08.0	ACIS-S/NONE	2.0	NGC 3489	Gordon Garmire
11:00:23.90	+28:58:30.0	ACIS-S/NONE	2.0	NGC 3468	Gordon Garmire
11:01:52.00	-34:42:16.0	ACIS-S/HETG	50.0	TW HYA	Claude Canizares
11:06:33.50	-18:21:24.0	ACIS-S/NONE	49.0	HE 1104-1805	Stephen Murray
11:18:16.90	+07:46:00.0	ACIS-I/NONE	30.0	PG 1115+080	Gordon Garmire
11:20:14.90	+12:59:21.0	ACIS-S/NONE	2.0	NGC 3627	Gordon Garmire
11:20:16.20	+13:35:22.0	ACIS-S/NONE	2.0	NGC 3628	Gordon Garmire
11:21:15.20	-60:37:24.0	ACIS-I/NONE	18.0	CEN X-3	Gordon Garmire
11:21:15.20	-60:37:24.0	ACIS-S/HETG	4.0	CEN X-3	Gordon Garmire
11:24:36.00	-59:15:60.0	ACIS-I/NONE	40.0	SNR 292.0+01.8	Gordon Garmire
11:26:08.00	+43:34:58.0	ACIS-S/NONE	2.0	NGC 3675	Gordon Garmire
11:31:56.50	+04:55:49.0	ACIS-S/NONE	15.0	PMN J1131+0455	Gordon Garmire
11:39:02.00	-37:44:18.0	ACIS-S/HETG	55.0	NGC 3783	Gordon Garmire
11:40:23.30	+66:08:42.0	ACIS-I/NONE	60.0	MS1137.5+6625	Leon van Speybroeck
11:44:30.00	+19:49:60.0	ACIS-S/NONE	40.0	A1367	Stephen Murray
11:55:18.20	+23:24:28.8	ACIS-I/NONE	10.0	A1413	Leon van Speybroeck
11:57:22.10	+33:37:55.2	ACIS-I/NONE	10.0	A1423	Leon van Speybroeck
12:01:53.70	-18:52:35.5	ACIS-S/NONE	74.0	NGC4038/NGC4039	Stephen Murray
12:10:32.60	+39:24:20.0	ACIS-S/NONE	40.0	NGC 4151	Andrew Wilson
12:10:32.60	+39:24:20.4	ACIS-S/NONE	1.0	NGC 4151	Andrew Wilson
12:10:32.60	+39:24:21.0	ACIS-S/HETG	50.0	NGC 4151	Claude Canizares
12:15:05.00	+33:11:49.0	ACIS-S/NONE	2.0	NGC 4203	Gordon Garmire
12:18:57.80	+47:18:12.0	ACIS-S/NONE	1.0	NGC 4258	Andrew Wilson
12:18:57.80	+47:18:12.0	ACIS-S/NONE	14.5	NGC 4258	Andrew Wilson
12:20:06.80	+29:16:50.0	ACIS-S/NONE	2.0	NGC 4278	Gordon Garmire

RA (J2000)	Dec (J2000)	Detector / Grating	Exp (ksec)	Target Name	Principal Investigator
12:22:31.90	+29:53:43.0	ACIS-S/NONE	2.0	NGC 4314	Gordon Garmire
12:22:54.80	+15:49:20.0	ACIS-S/NONE	2.0	NGC 4321	Gordon Garmire
12:25:04.00	+12:53:14.0	ACIS-S/NONE	2.0	NGC 4374	Gordon Garmire
12:25:48.90	+33:32:51.0	ACIS-S/NONE	2.0	NGC 4395	Gordon Garmire
12:26:12.00	+12:57:00.0	ACIS-S/NONE	29.0	NGC 4406	Stephen Murray
12:26:37.60	-62:46:13.0	ACIS-S/HETG	40.0	GX 301-2	Claude Canizares
12:29:46.90	+08:00:13.0	ACIS-I/NONE	10.0	NGC 4472	Richard Mushotzky
12:29:46.90	+08:00:13.0	ACIS-S/NONE	40.0	NGC 4472	Richard Mushotzky
12:30:49.30	+12:23:28.0	ACIS-S/HETG	40.0	NGC 4486	Claude Canizares
12:30:49.40	+12:23:27.9	ACIS-S/NONE	1.0	M 87	Andrew Wilson
12:30:49.40	+12:23:28.0	ACIS-S/NONE	80.0	M87	Andrew Wilson
12:30:49.80	+12:23:32.0	ACIS-I/NONE	10.0	VIRGO CLUSTER	Andrew Fabian
12:31:24.30	+25:46:24.0	ACIS-S/NONE	2.0	NGC 4494	Gordon Garmire
12:34:17.28	+09:46:12.0	ACIS-I/NONE	10.0	Z5247	Leon van Speybroeck
12:36:20.70	+25:59:16.0	ACIS-S/NONE	2.0	NGC 4565	Gordon Garmire
12:36:49.40	+62:12:58.0	ACIS-S/NONE	237.0	HUBBLE DEEP FIELD	Gordon Garmire
12:36:50.00	+13:09:46.0	ACIS-S/NONE	2.0	NGC 4569	Gordon Garmire
12:37:43.50	+11:49:05.0	ACIS-S/NONE	2.0	NGC 4579	Gordon Garmire
12:39:58.80	-11:37:28.0	ACIS-S/NONE	2.0	NGC 4594	Gordon Garmire
12:42:47.50	+02:41:10.0	ACIS-I/NONE	5.0	NGC 4636	Richard Mushotzky
12:42:47.50	+02:41:10.0	ACIS-S/NONE	50.0	NGC 4636	Richard Mushotzky
12:42:52.35	+13:15:26.4	ACIS-S/NONE	2.0	NGC 4639	Gordon Garmire
12:48:48.70	-41:18:44.0	ACIS-I/NONE	30.0	CEN CLUSTER	Andrew Fabian
12:48:48.70	-41:18:44.0	ACIS-S/NONE	10.0	CEN CLUSTER	Andrew Fabian
12:50:26.60	+25:30:06.0	ACIS-S/NONE	2.0	NGC 4725	Gordon Garmire
12:50:53.00	+41:07:12.0	ACIS-S/NONE	2.0	NGC 4736	Gordon Garmire
12:56:44.20	+21:41:05.0	ACIS-S/NONE	2.0	NGC 4826	Gordon Garmire
13:11:29.50	-01:20:09.6	ACIS-I/NONE	10.0	A1689	Leon van Speybroeck
13:12:17.00	+42:37:45.0	ACIS-S/NONE	100.0	S-Z CLUSTER	Richard Mushotzky
13:13:27.60	+36:35:39.7	ACIS-S/NONE	2.0	NGC 5033	Gordon Garmire
13:15:49.30	+42:01:45.0	ACIS-S/NONE	2.0	NGC 5055	Gordon Garmire
13:25:20.00	-38:24:55.0	HRC-I/NONE	10.0	IRAS 13224-3809	Albert Brinkman
13:25:27.61	-43:01:08.9	ACIS-I/NONE	74.0	NGC5128	Stephen Murray
13:29:52.30	+47:11:54.0	ACIS-S/NONE	1.0	MESSIER 51	Andrew Wilson
13:29:52.30	+47:11:54.0	ACIS-S/NONE	15.0	MESSIER 51	Andrew Wilson
13:29:58.70	+47:16:04.0	ACIS-S/NONE	2.0	NGC 5195	Gordon Garmire
13:35:48.70	+17:09:54.0	ACIS-I/NONE	30.0	MS1333.3+1725	Leon van Speybroeck
13:35:53.70	-34:17:45.0	ACIS-S/HETG	125.0	MCG -6-30-15	Collab Canfab(100-25)
13:42:08.30	+35:39:15.0	ACIS-S/NONE	2.0	NGC 5273	Gordon Garmire
13:47:31.00	-11:45:11.0	ACIS-I/NONE	10.0	RXJ1347-114	Andrew Fabian
13:47:31.00	-11:45:11.0	ACIS-S/NONE	10.0	RXJ1347-114	Andrew Fabian
13:48:52.70	+26:35:27.0	ACIS-I/NONE	20.0	A1795	Andrew Fabian
13:48:52.70	+26:35:27.0	ACIS-S/NONE	20.0	A1795	Andrew Fabian
13:59:50.60	+62:31:04.0	ACIS-I/NONE	55.0	ZW CL 1358+6245	Gordon Garmire
14:01:01.90	+02:51:32.0	ACIS-S/HETG	140.0	ABELL 1835	Claude Canizares
14:01:02.00	+02:52:40.0	ACIS-I/NONE	20.0	A1835	Andrew Fabian
14:01:02.00	+02:52:40.0	ACIS-S/NONE	10.0	A1835	Andrew Fabian
14:13:09.00	-65:20:18.0	ACIS-S/HETG	80.0	CIRCINUS GALAXY	Gordon Garmire
14:13:10.20	-65:20:21.0	ACIS-S/NONE	1.0	CIRCINUS GALAXY	Andrew Wilson
14:13:10.20	-65:20:21.0	ACIS-S/NONE	19.0	CIRCINUS GALAXY	Andrew Wilson

RA (J2000)	Dec (J2000)	Detector / Grating	Exp (ksec)	Target Name	Principal Investigator
14:13:14.80	-03:12:27.0	ACIS-S/NONE	1.0	NGC 5506	Andrew Wilson
14:13:14.80	-03:12:27.0	ACIS-S/NONE	9.0	NGC 5506	Andrew Wilson
14:16:28.80	+44:46:40.8	ACIS-I/NONE	30.0	V 1416+4446	Leon van Speybroeck
14:17:59.50	+25:08:13.0	HRC-S/LETG	80.0	NGC 5548	Albert Brinkman
14:24:38.00	+22:56:01.0	ACIS-I/NONE	30.0	Q 1422+231	Gordon Garmire
14:26:02.20	+37:50:06.0	ACIS-I/NONE	10.0	A1914	Leon van Speybroeck
14:39:36.20	-60:50:07.0	HRC-S/LETG	80.0	ALPHA CEN	Albert Brinkman
14:57:14.40	+22:20:38.4	ACIS-I/NONE	10.0	MS1455.0+2232	Leon van Speybroeck
15:02:08.10	+66:12:24.0	HRC-S/LETG	25.0	H 1504+65	Stephen Murray
15:03:49.30	+47:39:14.0	HRC-S/LETG	60.0	44 BOO	Jeffrey Linsky
15:21:44.80	+52:54:49.0	ACIS-S/NONE	15.0	SBSG 1520+530	Gordon Garmire
15:39:41.80	+34:25:01.2	ACIS-I/NONE	10.0	A2111	Leon van Speybroeck
15:42:23.20	-52:23:10.0	ACIS-I/NONE	18.0	4U 1538-52	Gordon Garmire
15:42:23.20	-52:23:10.0	ACIS-S/HETG	4.0	4U 1538-52	Gordon Garmire
15:49:48.00	+21:25:48.0	ACIS-S/NONE	50.0	3C324	Richard Mushotzky
16:01:40.90	+66:48:10.0	ACIS-S/NONE	20.0	AG DRA	Stephen Murray
16:09:06.00	+65:31:60.0	ACIS-S/NONE	15.0	CLASS 1608+656	Gordon Garmire
16:10:47.80	+66:08:42.0	ACIS-I/NONE	50.0	MS1610.4+6616	Leon van Speybroeck
16:14:41.60	+33:51:35.0	ACIS-S/HETG	85.0	TZ CRB	Jeffrey Linsky
16:15:49.40	-06:09:00.0	ACIS-I/NONE	10.0	A2163	Leon van Speybroeck
16:17:39.20	-51:01:56.8	ACIS-I/NONE	40.0	RCW 103	Gordon Garmire
16:23:35.80	+26:33:50.4	ACIS-I/NONE	30.0	MS1621.5+2640	Leon van Speybroeck
16:28:38.50	+39:33:03.0	ACIS-I/NONE	20.0	A2199	Andrew Fabian
16:28:38.50	+39:33:03.0	ACIS-S/NONE	20.0	A2199	Andrew Fabian
16:32:16.70	-67:27:42.0	ACIS-S/HETG	40.0	4U 1626-67	Claude Canizares
16:32:47.00	+05:34:33.0	ACIS-I/NONE	10.0	A2204	Andrew Fabian
16:35:56.00	+66:12:00.0	ACIS-I/NONE	20.0	ABELL 2218	Collab Garvan(10-10)
16:40:55.50	-53:45:05.0	ACIS-S/HETG	30.0	4U 1636-53	Claude Canizares
16:52:59.00	+02:24:12.0	HRC-I/NONE	10.0	NGC 6240	Stephen Murray
16:54:00.10	-39:50:44.9	ACIS-S/NONE	43.0	GRO J1655-40	Collab Murgar(23-20)
16:57:49.70	+35:20:32.5	HRC-S/LETG	30.0	HER X-1	Albert Brinkman
17:01:23.00	+64:14:09.6	ACIS-I/NONE	30.0	V 1701+6414	Leon van Speybroeck
17:03:36.00	+78:43:00.0	ACIS-S/NONE	30.0	A2256	Stephen Murray
17:04:41.30	+60:44:30.4	ACIS-S/NONE	10.0	3C 351	Stephen Murray
17:16:52.30	+67:08:31.2	ACIS-I/NONE	50.0	RXJ1716.9+6708	Leon van Speybroeck
17:20:08.90	+26:38:06.0	ACIS-I/NONE	10.0	RXJ1720.1+2638	Leon van Speybroeck
17:20:41.00	-21:29:20.4	ACIS-I/NONE	50.0	KEPLER SNR	Stephen Holt
17:22:27.60	+32:07:37.2	ACIS-I/NONE	10.0	A2261	Leon van Speybroeck
17:40:41.30	-53:40:25.0	ACIS-S/NONE	49.0	NGC 6397	Stephen Murray
17:44:07.00	-29:43:36.0	ACIS-S/NONE	10.0	1E1740.7-2942	Gordon Garmire
17:45:40.00	-29:00:28.0	ACIS-I/NONE	50.0	SGR A*	Gordon Garmire
17:55:59.70	+18:20:18.3	ACIS-S/NONE	2.0	NGC 6500	Gordon Garmire
18:01:08.10	-25:04:40.0	ACIS-I/NONE	7.0	GX 5-1	Albert Brinkman
18:23:40.50	-30:21:40.0	HRC-S/LETG	10.0	NGC 6624	Stephen Murray
18:33:39.80	-21:03:40.0	ACIS-S/HETG	50.0	PKS 1830-211	Gordon Garmire
18:56:35.30	-37:54:34.4	HRC-S/LETG	50.0	RXJ1856.5-3754	Albert Brinkman
19:01:52.00	-36:58:00.0	ACIS-I/NONE	20.0	CRA CLOUD CORE	Gordon Garmire
19:11:06.60	+09:06:00.0	ACIS-I/NONE	40.0	W49B	Stephen Holt
19:11:49.50	+04:58:58.0	ACIS-S/HETG	30.0	SS 433	Claude Canizares
19:58:21.60	+35:14:06.0	ACIS-S/HETG	15.0	CYG X-1	Claude Canizares

RA (J2000)	Dec (J2000)	Detector / Grating	Exp (ksec)	Target Name	Principal Investigator
19:59:28.30	+40:44:02.0	ACIS-S/NONE	1.0	CYGNUS A	Andrew Wilson
19:59:28.30	+40:44:02.0	ACIS-S/NONE	40.0	CYGNUS A	Andrew Wilson
20:02:49.60	+25:14:11.3	ACIS-S/NONE	20.0	GS 2000+25	Stephen Murray
20:13:16.80	-56:55:32.3	ACIS-I/NONE	50.0	ABELL 3667	Stephen Murray
20:19:17.90	+11:27:13.0	ACIS-S/NONE	15.0	MITG J2019+1127	Gordon Garmire
20:24:03.80	+33:52:04.1	ACIS-S/NONE	10.0	V 404 CYG	Stephen Murray
20:32:25.50	+40:57:27.7	ACIS-S/HETG	20.0	CYG X-3	Albert Brinkman
20:45:09.30	-31:20:24.0	ACIS-S/HETG	60.0	AU MIC	Jeffrey Linsky
20:56:22.30	-04:37:44.4	ACIS-I/NONE	45.0	MS2053.7-0449	Leon van Speybroeck
21:29:12.10	-15:38:42.0	ACIS-S/NONE	25.0	PKS2126-158	Stephen Murray
21:29:37.90	+00:05:38.4	ACIS-I/NONE	10.0	RXJ2129.6+0005	Leon van Speybroeck
21:44:40.00	+38:19:14.0	HRC-S/LETG	30.0	CYG X-2	Albert Brinkman
21:51:55.50	-30:27:53.7	ACIS-S/HETG	90.0	PKS2149-306	Claude Canizares
21:53:36.50	+17:41:45.0	ACIS-I/NONE	10.0	A2390	Andrew Fabian
21:53:36.50	+17:41:45.0	ACIS-S/NONE	10.0	A2390	Andrew Fabian
21:58:51.70	-30:13:32.2	HRC-S/LETG	60.0	PKS 2155-304	Albert Brinkman
21:58:52.00	-30:13:32.0	ACIS-S/HETG	40.0	PKS 2155-304	Claude Canizares
22:08:40.80	+45:44:32.0	ACIS-S/HETG	100.0	AR LAC (HD 210334)	Claude Canizares
22:33:37.60	-60:33:29.0	ACIS-I/NONE	325.0	Hubble DF - South	Riccardo Giacconi
22:40:30.30	+03:21:31.0	ACIS-S/NONE	15.0	EINSTEIN CROSS	Gordon Garmire
23:18:23.20	-42:22:17.0	ACIS-S/NONE	20.0	NGC 7582	Stephen Murray
23:23:26.70	+58:49:03.0	ACIS-I/NONE	50.0	CAS A	Stephen Holt
23:55:04.00	+28:38:01.0	ACIS-S/HETG	50.0	II PEG (HD 224085)	Claude Canizares

Office of Space Science Policy for Education and Public Outreach

(revised 07/28/97)

The Office of Space Science (OSS) has developed a comprehensive approach for making education at all levels and the enhancement of public understanding of space science integral parts of all of its missions and programs. The two key documents that establish the basic policies and guide all OSS Education and Outreach activities are a strategic plan entitled *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* (March 1995), and an accompanying implementation plan entitled *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* (1996). Both are available on the World Wide Web by opening "Education and Outreach" from the menu on the OSS homepage at <<http://www.hq.nasa.gov/office/oss/>>, or from Dr. Jeffrey Rosendhal, Code S, NASA Headquarters, Washington, DC 20546-0001, USA.

In accord with these established OSS policies, proposers to any OSS NASA Research Announcement (NRA) are strongly encouraged to include an Education/Public Outreach (E/PO) component as part of their scientific research proposal. Note that an E/PO activity will be funded only in conjunction with a "parent" research proposal. Up to the order of 10 percent of the proposed budget for the research task may be proposed for E/PO activities, although for "parent" proposals having budgets less than about \$60K, a larger percentage will be considered based on the merits of the proposed E/PO activity. The primary selection criterion for the proposed "parent" research investigation will continue to be that described in the NRA. However, the quality of a proposed E/PO component will be used as an additional factor to discriminate between proposals having otherwise equal scientific/technical and programmatic merits.

The evaluation criteria against which a proposed E/PO activity will be judged are:

- The effectiveness and realism of the proposed education and/or public outreach program;
- The proposed establishment of effective, long-duration partnerships with institutions and/or personnel in the fields of educational and/or public outreach (note: a detailed discussion of the concept of education "partnerships" may be found in *Science Education Partnerships -- A Manual for Scientists and K-12 Teachers*, A. Sussman, ed., University of California Press (1993));
- The effective leveraging of existing and/or ancillary resources beyond those requested in the proposal (including, for example, the waiver of institutional overhead on the E/PO component by the proposing institution);
- The prospects for the proposed E/PO program to have a "multiplier effect" beyond the immediately involved personnel (e.g., the training of teachers or the broad dissemination of a planned E/PO product);

- The degree to which the proposed E/PO program benefits and promotes nationally recognized and endorsed efforts in education reform;
- The capability and commitment of the proposer to carry out the proposed E/PO program; and
- The realism and adequacy of the proposed budget (including any additional resources outside those requested from NASA).

Note that originality of the proposed effort is not a criterion; rather NASA OSS seeks assurance that an effective and appropriate E/PO activity of merit has been planned and that it will be executed. Additional guidance is contained in the OSS E/PO strategy and implementation plans referenced above.

To directly aid space science research personnel in identifying suitable education and/or outreach opportunities and to help develop partnerships between the space science and education/outreach communities, NASA OSS initiated in 1997 an “Education and Outreach Broker/Facilitator Program” (see NRA 97-OSS-07). The goal of this Broker/Facilitator program is to search out and establish high leverage opportunities, arrange alliances between educators and OSS-supported scientists, help scientists turn results from space science missions and programs into educationally appropriate products and/or services, and arrange for the results from such education and outreach activities to be disseminated regionally and/or nationally. Further information about this program and a list of the selected OSS Broker/Facilitators may also be accessed through the OSS homepage as described above

The guidelines for the preparation and submission of the E/PO component of a research proposal submitted in response to an OSS NRA are as follows:

- The proposal should be a separately bound document that uses the E/PO Cover Page format at the end of this Appendix (this form may be copied for use, downloaded from the OSS web site, or a facsimile may be generated that contains the specified information as shown).
- The body of an E/PO proposal should be restricted to five pages, not including the Cover Page or the Budget Summary form, and begin with a brief summary of the proposed program followed by a description of its objectives and plan of activity. It should discuss the intended involvement of the Principal Investigator of the “parent” research proposal as well as that of any alternative personnel who would be responsible for the E/PO effort and/or the respective institutional responsibilities if a partnership is proposed.
- The budget for the E/PO component should use the same Budget Summary form in Appendix C as augmented by appropriate material to provide an understanding of the details of its anticipated costs. The total for any E/PO effort must also be included on line G, “Education/Public Outreach,” of the Budget Summary for its “parent” research proposal. The period of performance of any proposed E/PO activity must not exceed that of its “parent” research proposal.
- To allow maximum flexibility for developing the content of both the research proposal as well as an E/PO proposal, the E/PO component may be submitted in either of two ways:

Simultaneously with its “parent” research proposal by the proposal due date specified in the NRA of interest; or

Up to 15 days after the NRA’s nominal due date for new research proposals.

- Regardless of when the E/PO component of a research proposal is submitted, the original E/PO proposal plus one copy are to be sent to the address listed in the NRA for delivery of research proposals, while six additional copies are to be sent directly to:

OSS NRA Education/Public Outreach Program
Space Science Support Office
Mail Stop 160
12 West Taylor Street
Building 1151, Room 100
NASA Langley Research Center
Hampton, VA 23681-0001

Every E/PO component of a research proposal will be evaluated by appropriate professional education and outreach personnel, and the results of these reviews will be transmitted to the cognizant NRA Program Scientist in time for use in developing the recommendation for selection. Results of these E/PO reviews will be used to discriminate between research proposals having otherwise equal science, technical, and programmatic merits. The OSS Selecting Official will specifically take into account the presence of a proposed E/PO component and its review rating when deciding on final selections and funding levels. It is the intention that as many E/PO proposals of merit as possible will be funded as allowed by the anticipated OSS E/PO budget of about \$1.5M in each Fiscal Year (i.e., the order of 150 to 200 tasks). Regardless of whether the “parent” research proposal is selected, the reviews of all E/PO proposals will be conveyed to the proposers as part of any requested debriefing.

Attention is also called to the Initiative to Develop Education through Astronomy and Space Science (IDEAS) program administered by the Space Telescope Science Institute (STScI) on behalf of OSS. This program, which currently selects proposals yearly, provides awards of up to \$10K (with a few up to \$40K) to enhance and encourage the participation of space scientists in E/PO activities. The IDEAS program is open to any scientist based in the U.S. regardless of whether they currently hold a research grant from NASA OSS or not. E-mail inquiries about IDEAS may be made directly to <IDEAS@stsci.edu>, while the current request for proposals may be found on the Internet at <<http://opposite.stsci.edu/pubinfo/edugroup/ideas.html>>. Surface mail may be addressed to

IDEAS Program
Office of Public Outreach
Space Telescope Science Institute
3700 San Martin Drive
Baltimore, MD 21218.

OSS EDUCATION/PUBLIC OUTREACH (E/PO) PROPOSAL COVER PAGE

NRA ID: 97-OSS-14	NRA Title ADVANCED X-RAY ASTROPHYSICS FACILITY (AXAF) GENERAL OBSERVER PROGRAM (Cycle 1)
Parent Research Proposal Title	

Principal Investigator (Title and Name)		
Department		
Company/Institution		
Street Address		City/Town
State	Zip/Postal	Country
Telephone	Fax	E-Mail Address
Principal Investigator's Signature		Date

E/PO Proposal Title

Co-Investigator(s) Name	Institution	E-mail

Institutional Endorsement

Name of Authorizing Official	
Title	
Institution	
Signature	Date

Budget Summary

	Year 1	Year 2	Year 3	Total Funding
Amount Requested				

**CERTIFICATION REGARDING
DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS
PRIMARY COVERED TRANSACTIONS**

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 34 CFR Part 85, Section 85.510, Participants' responsibilities. The regulations were published as Part VII of the May 28, 1988 Federal Register (pages 19160-19211). Copies of the regulations may be obtained by contacting the U.S. Department of Education, Grants and Contracts Service, 400 Maryland Avenue, S.W. (Room 3633 GSA Regional Office Building No. 3), Washington, D.C. 20202-4725, telephone (202) 732-2505.

- A. The applicant certifies that it and its principals:
- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
 - (b) Have not within a three-year period preceding this application been convicted or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or Local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or Local) with commission of any of the offenses enumerated in paragraph A.(b) of this certification;
 - (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or Local) terminated for cause or default; and
- B. Where the applicant is unable to certify to any of the statements in this certification, he or she shall attach an explanation to this application.
- C. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lowered Tier Covered Transactions (Subgrants or Subcontracts)
- (a) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principles is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department of agency.
 - (b) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name

NRA or AO Number and Title

Printed Name and Title of Authorized Representative

Signature

Date

Printed Principal Investigator Name

Proposal Title

CERTIFICATION REGARDING DRUG-FREE WORKPLACE REQUIREMENTS

This certification is required by the regulations implementing the Drug-Free Workplace Act of 1988, 34 CFR Part 85. Subpart F. The regulations, published in the January 31, 1989 Federal Register, require certification by grantees, prior to award, that they will maintain a drug-free workplace. The certification set out below is a material representation of fact upon which reliance will be placed when the agency determines to award the grant. False certification or violation of the certification shall be grounds for suspension of payments, suspension or termination of grants, or government-wide suspension or debarment (see 34 CFR Part 85, Sections 85.615 and 85.620).

I. GRANTEES OTHER THAN INDIVIDUALS

- A. The grantee certifies that it will provide a drug-free workplace by:
- (a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
 - (b) Establishing a drug-free awareness program to inform employees about --
 - (1) The dangers of drug abuse in the workplace;
 - (2) The grantees policy of maintaining a drug-free workplace;
 - (3) Any available drug counseling, rehabilitation, and employee assistance programs; and
 - (4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;
 - (c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);
 - (d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will
 - (1) Abide by the terms of the statement; and
 - (2) Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than five days after such conviction;
 - (e) Notifying the agency within ten days after receiving notice under subparagraph (d) (2) from an employee or otherwise receiving actual notice of such conviction;
 - (f) Taking one of the following actions, within 30 days of receiving notice under subparagraph (d) (2), with respect to any employee who is so convicted --
 - (1) Taking appropriate personnel action against such an employee, up to and including termination; or
 - (2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or Local health, Law enforcement, or other appropriate agency;
 - (g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a), (b), (c), (d), (e), and (f)
- B. The grantee shall insert in the space provided below the site(s) for the performance or work done in connection with the specific grant:
Place of Performance (Street address, city, county, state, zip code)

Check if there are workplaces on file that are not identified here.

II. GRANTEES WHO ARE INDIVIDUALS

The grantee certifies that, as a condition of the grant, he or she will not engage in the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance in conducting any activity with the grant.

Organization Name

NRA or AO Number and Title

Printed Name and Title of Authorized Representative

Signature

Date

Printed Principal Investigator Name

Proposal Title

CERTIFICATION REGARDING LOBBYING

As required by S 1352 Title 31 of the U.S. Code for persons entering into a grant or cooperative agreement over \$100,000, the applicant certifies that:

- (a) No Federal appropriated funds have been paid or will be paid by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, in connection with making of any Federal grant, the entering into of any cooperative, and the extension, continuation, renewal, amendment, or modification of any Federal grant or cooperative agreement;
- (b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting an officer or employee of any agency, Member of Congress, or an employee of a Member of Congress in connection with this Federal grant or cooperative agreement, the undersigned shall complete Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (c) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subgrants, contracts under grants and cooperative agreements, and subcontracts), and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by S1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Organization Name

NRA or AO Number and Title

Printed Name and Title of Authorized Representative

Signature

Date

Printed Principal Investigator Name

Proposal Title