

Chandra Legacy Program Call for Proposals

Letters of Intent Due: **6PM EDT on 28 March 2024**

Proposals Due: **6PM EDT on 15 April 2024**

In November 2023 the CXC issued the Chandra Legacy Program (CLP) call for white papers to identify science challenges for which the capabilities of Chandra are absolutely required. These science programs were to be designed to address fundamental questions about our current understanding of the components and evolution of the Universe. A committee of seven (non-CXC) members of the astrophysics community reviewed the twenty-two white papers that were submitted. After the CLP Review Committee completed its evaluation of the white papers, recommendations for major science initiatives were presented to the CXC Director. These recommendations have been used to form the themes of this Call for Legacy Proposals.

Chandra Legacy Program Major Initiatives

The CLP major initiatives identified through the white paper call are:

Initiative 1: Probing the Physics of Baryon Cycles and Feedback using Deep Observations of Nearby Galaxies

Deep X-ray observations of nearby galaxies offer unique opportunities to detect and characterize the spatial distribution of elusive hot X-ray-emitting gas in and around galaxies. Chandra's superb angular resolution is essential for resolving X-ray binary populations and mapping the internal structures of the X-ray emitting circumgalactic medium (CGM) in and around galaxies. We seek an ambitious and compelling science proposal that can be uniquely enabled by high-resolution X-ray maps of a well-chosen sample of relatively nearby galaxies coupled with high resolution multi-wavelength coverage, within a CLP exposure time of ~3 Ms. Previous Chandra exposures should be considered when constructing a proposed observing program. A successful proposal must articulate the legacy values of the Chandra observations, its complementarity and synergy with multiwavelength observations, and why the proposed science is not possible as part of the General Observer (GO) program.

Probing the cycling of baryons in galaxies is critical to building a complete picture of galaxy assembly and growth. However, even at low redshift, key unknowns persist that Chandra can address via observations of the hot gas phase. Examples might include:

- (1) providing an X-ray view of stellar population evolution;
- (2) measuring how stellar evolution and AGN feedback circulate energy and metals;

- (3) determining the structure of the multiphase ISM/CGM;
- (4) establishing the influence of mergers of galaxies and of their super massive black holes (SMBHs).

The proposed Chandra legacy observations and resulting data products should leverage existing and/or proposed high spatial-resolution multi-wavelength coverage of nearby galaxies to provide a fundamental and enduring anchor point for understanding the evolution of the baryon cycle over cosmic time.

Initiative II: Deep Observation of a Galaxy Cluster to Understand Key Physical Processes

Deep X-ray observations of galaxy clusters offer a unique opportunity to study the physics of galaxy formation, plasma physics, and cosmology. Chandra's superb angular resolution is essential for providing detailed physical insights into the roles of AGN feedback in clusters, the microphysics of astrophysical plasma and the nature of dark matter using merging clusters, and the cosmological growth of structures in cluster outskirts. We seek an ambitious and compelling science proposal that can be uniquely enabled by a deep (~3 Msec) Chandra observation of an appropriately selected galaxy cluster. A successful proposal must articulate how the proposed observations and data products will open up new discovery space or significantly advance the state-of-the-art astrophysical constraints.

Potential science objectives for this theme include understanding the heating mechanisms of AGN feedback and cooling-heating balance in cluster cores, which might be achieved by:

- (1) determining the equation-of-state of the intra-cluster medium (ICM);
- (2) distinguishing among physical mechanisms for heating of the ICM;
- (3) measuring the electron mean free path;
- (4) testing the precipitation model in a multiphase cool core.

Detailed Policy Information for this Call for CLP Proposals

Proposing policies given in the Chandra [Cycle 26 CfP](#) apply to this Call, unless otherwise specified below.

If there are any policy clarifications or changes between the issuance of this CfP and the deadline, that information will be posted prominently on <https://cxc.harvard.edu/CLP/>.

Policies that Apply Specifically to CLP Proposals

- ALL CLP proposals will be allotted **6 pages** for **the scientific justification** and an additional **1 page** for a **list of references**, regardless of joint observatory requests.
 - **Formatting guidelines:** Each page must have at least 1-inch margins on all sides of a standard 8.5 x 11 inches (US-letter size) sheet. Proposers are strongly encouraged to write proposals using an easily-read font family with no more than

15 characters per inch (horizontally) and 6 lines per inch (vertically). In most cases this is achieved with 11 or 12 point font in single-spaced paragraphs.

- Science justifications should also describe observations and/or data products that a successful proposing team will provide to the overall astronomy community.
- The proposed observations will have **no proprietary period**; individual observation segments will be placed into the public Chandra archive immediately following standard processing.
- Target of Opportunity (TOO) proposals **will not be accepted** for the CLP CfP.
- There is a limit on amount of requested exposure time at high ecliptic latitudes ($|b| > 55$ degrees) of 1.2 Ms for the CLP CfP.
- There is a limit on the maximum amount of requested exposure time with the HRC instrument of 500 ks for the CLP CfP.
- The nominal **Resource Cost (RC)** available to the CLP CfP is approximately 1.6 RC units per kilosecond. Proposers should use the [RC Calculator](#) to estimate, provide, and discuss the RC of their specific observing program in the scientific justification.
- **Funding for selected CLP proposals will be commensurate with Large and Very Large Proposals of similar exposure time.** Funding is subject to availability and all the eligibility and conditions in the [Cycle 26 CfP](#) will apply to proposers to this CLP CfP.
- Future opportunities may be available for the community at large to propose for other science objectives to be carried out using CLP datasets, subject to processes in place and availability of funding.
- In addition to the evaluation criteria described in the [Cycle 26 CfP](#) (section 9.2), proposals submitted to the CLP CfP **will be evaluated for their alignment with the CLP major initiatives.**
- Proposals submitted to this call will be reviewed in the **CLP review panel(s)** composed of general and subject matter experts from the astrophysical community.
- The proposed observations will occur over the Cycle 26 and Cycle 27 periods, which nominally spans 1 January 2025 to 31 December 2026, however, some observations may occur earlier and some may occur later.
- The proposals will be submitted as **non-transient** DDT proposals via the [DDT Chandra Proposal Software portal](#), by **6PM EDT on 15 April 2024.**
 - When completing the DDT proposal, please specify “*This is a CLP proposal.*” in the field “Why can’t the observation wait for the next Chandra CfP:”.

Existing Policies of Note

- Joint Proposals using joint partner observatories listed in the [Cycle 26 CfP](#) are allowed and the observing details must be included in the Scientific Justification. As indicated in the Cycle 26 CfP, additional observing details may be requested by our joint partner observatories in order to perform a technical review.

Allocations of joint partner observatories for the CLP CfP are:

| JPO | Allocation |
|------------|-------------------|
| HST | 42 orbits |
| JWST | 42 hrs |
| XMM | 280 ks |
| NuSTAR | 280 ks |
| Swift | 140 ks |
| NOIRLab | 1.4% (nights) |
| AUI | 0.84% (nights) |

- Time constrained observations are allowed and must be specified on the target forms and justified in the Scientific Justification. All constraints must be provided to the [Resource Cost Calculator](#) to estimate the RC of a given program. All constraints are subject to technical review. Constraints are discussed in detail in Chapter # of the Cycle 26 CfP.
- The dual anonymous peer review process described in the Cycle 26 CfP applies to these proposals, please review section 7.2 of the [Cycle 26 CfP](#) to assure your proposal is correctly anonymized.

Submission Instructions

A preliminary Letter of Intent is required and should be submitted to clp@cfa.harvard.edu by **6pm EDT 28 March 2024**. The Letter of Intent is a PDF document that contains the following:

- Title,
- Primary Investigator,
- A full list of Co-Investigators.

CLP proposals are to be submitted using the [DDT version of CPS](#). This software is linked at the top of the page: https://cxc.harvard.edu/proposer/Chandra_RfO.html

At least one member of the proposing team will need to have a CPS account in order to submit a proposal.

The proposal must be submitted as a **non-transient** DDT.

Proposers are required to specify “This is a CLP proposal.” in the field “Why can’t the observation wait for the next Chandra CfP:”

How to Get Help or Ask Questions about this Call

Email cxchelp@cfa.harvard.edu, or visit <https://cxc.cfa.harvard.edu/help/> to submit a question to the CXC HelpDesk. This system is normally monitored during regular business hours (ET), but additional coverage is likely as the CLP deadline approaches.