# Rules and Information for Peer Review of Cycle 22 Chandra Proposals

## Introduction

This document explains the process and rules for the review of Chandra proposals. Proposals are solicited annually through the Call for Proposals (CfP) and submitted to the Chandra X-ray Center (CXC). Chandra Observing Policy is contained in Chapter 3 of the Chandra CfP. Proposals are assigned to panels based on science category and to individual panelists as primary and secondary reviewer, avoiding conflicts of interest. Reviewers are given access to proposals and ancillary data (technical reviews, conflict of interest etc.) via the Panel Access Site (PAS). Each panel chair and pundit will have access to all the V/LP proposals at the review. In addition, chairs receive a list of titles for all proposals in related science areas, some of which (the V/LPs) are also being considered by other panels.

## Target Conflicts and Technical Reviews

Proposals that request targets with high count rates are reviewed by CXC instrument teams. In addition, Joint proposals are sent to the appropriate partner observatory for their review. The results of these reviews are uploaded to the PAS. On request, the CXC will provide further (e.g., Mission Planning) technical reviews of specific proposals available during the reading period before the peer review. The CXC will ensure that a group of technical reviewers is present or on-call during the peer review to provide expert advice as needed. This includes providing experts to support the evaluation of Joint Proposals. Proposals recommended by the peer review are accepted subject to a successful feasibility review by the Mission Planning Team.

Targets are also checked for duplication against all other Chandra targets (previously observed, now planned, or proposed by others in this cycle) within 6 arcmin of the proposed target (plus grid radius for grid observations). A hard such conflict involves the same instrument as that proposed, and a soft conflict involves any instrument. Target conflict rules are intended to prevent inefficient use of Chandra time on duplicate observations. Proposals asking for the same target are assessed by the same panel at the review as far as possible.

## Proposal Types and Classifications

General Observing (GO) Proposals: The majority of proposals are GO type, requesting <400ks of observing time.

Targets of Opportunity (TOO): TOOs are difficult to schedule and place a burden on Chandra's operations. The planning system can typically accommodate about one rapid-response TOO per month. The actual number that can be accomplished will depend on several factors, including how easily the TOO can be accommodated into the pre-planned schedule. Thus a limit to the number of rapid response TOOs is imposed. There are 4 levels of rapidity recognized, each with a quota (as listed in the CfP). Proposals for TOOs are treated as any other proposal. However, for purposes of time allocation at the peer review, the panel will be charged for the requested exposure time weighted by the probability that the TOO will be triggered during the Chandra cycle (e.g. 90%, 21%, 1%, as indicated by the PI and/or updated by the panel).

Large and Very Large Projects: new Chandra observations requiring 400-1000 ksec (LP) or > 1 Msec (VLP) of observing time and designated as LP/VLP by the PI.

Each V/LP is read by a pundit before the review, and then considered by two topical panels. The topical panels will have access to the pundit's comments. The panels should grade, rank-order, and note targets (if any) which may be potentially recommended for award to other, non-V/LP proposals. The panels may also make recommendations about the observing time to the Big Project Panel (BPP),

consisting of topical panel chairs and pundits, which convenes after the topical panels have met. Highly ranked V/LPs are considered by the BPP who make the final recommendations. Only the BPP can decide to change the requested observing time.

Guaranteed Time Observation (GTO) Proposals: GTO observers are guaranteed time but cannot reserve targets in advance of the review. Targets in potential GTO programs that are within 6 arcmin of those in GO proposals are judged to be target duplication conflicts. The GTO observers choose either to withdraw these targets or to submit proposals to the peer review, to be evaluated and graded in the usual way. The peer review may declare a non-conflict (e.g., if the observing parameters are sufficiently different), in which case the GTO targets are automatically approved.

Archive and Theory Proposals: Proposals to perform archival research with Chandra data, or for theoretical work pertinent to Chandra science, will be distributed to the topical panels along with a proposer-provided initial estimate (accurate to 21%) of the budget required to perform the research. Each panel will be allocated indicative funding guidelines for theory and archival proposals separately. Due to the small number statistics involved in these proposals, a topical panel's budget may be insufficient to fund even the highest ranked proposal. In this case, the panel should rank the proposals based primarily on their science and using the same scale as the observing proposals. They will be funded across panels as total funds allow.

Multi-Cycle Observing Proposals: Multi-cycle observations may be proposed when time constraints require an observing period longer than a single cycle. The amount of time available from Cycles 23 and 24 is limited to 10% (~2 Ms) and 5% (~1 Ms) of the total time respectively. Quotas for future cycle time will be applied at the review if that time is over-subscribed. Joint time (see below) constrained to lie in future cycles may also be requested. If approved, joint time for future cycles will be reserved by the CXC and forwarded as requests to our joint facilities for the appropriate future cycle(s).

**Joint Proposals:** Joint proposals are those that request HST, XMM-Newton, NuStar, SWIFT, NRAO, and/or NOAO observing time in conjunction with the proposed Chandra Observation(s) as specified in Chapter 5 of the CfP. Each panel will be given an allocation of time for those joint facilities that are over-subscribed at the review. This is a guide, rather than a hard quota, since not all panels will allocate their quota of time. Should the panel decide not to award any/all of the joint time requested in a given proposal, this should be noted in the peer review report along with reasons for this decision.

**Resource Costs, Constrained Observations and high Ecliptic Latitude Time:** There are several changes in Cycle 22 relating to how targets are evaluated, including constrained observations. The following list briefly summarizes the main changes. Full details are in the Call for Proposals (Section 1.5 and Chapter 4).

1. Observing preferences are no longer allowed. This includes coordination with ground-based observatories, which must now be entered as a constraint.
2. A new metric, the "Resource Cost" (RC), will be calculated for each non-TOO target. The RC quantifies the difficulty of scheduling each non-TOO observation. The RC replaces "constraint categories" used in previous Cycles, and also folds the ecliptic latitude into the calculation. Targets without any formal science constraints will have ........?
3. A maximum of 2.5 Ms of observing time on targets situated above 55 deg or below -55 deg ecliptic latitude will be available at the Cycle 22 peer review.

Proposers must specify all constraints on the CPS forms, and all constrained observations must be explicitly approved by the peer review. Requests to add constraints when the target is scheduled will not be honored, even if the constraints are described in the science justification. Please be diligent in notifying us at the CXC if you find any constraints buried in the text of a proposal or any that you believe are misclassified or incorrectly specified in the CPS forms. In such a case, your discussion at the review MUST be on the basis of the proposed observation and your report should explicitly state whether or not the panel believes that, to the best of its knowledge, the constraints specified (1) are required to achieve the science goals (2) have been correctly and completely specified.

Proposals including Conflicts with Targets already in the Program: Target conflict rules are intended to prevent inefficient use of Chandra time on duplicate observations. Target conflicts will not be approved. A proposed observation conflicts with another observation of the same target if the proposed investigation can be carried out using the data from the other observation. The peer review will seriously consider any and all proposals that purport to perform a scientific investigation not feasible with past and/or already approved observations or calibrations. An observer may have proposed the same target, but with a different instrument, or with the same instrument but for a much longer observation, or for the purpose of studying time variability on a long time scale, or, in any case, for a scientific investigation that is not feasible with the prior observation. In this case (e.g. different instrument, different data mode, exposure time, etc, is needed.) there is no conflict in having two observations of the same target.

## Panels

Topical Panels: The peer review will be conducted by a number of panels covering subgroups by science topic - galactic and extragalactic. These subgroups will be further divided by subject (clusters of galaxies, normal stars, etc.) in order to create panels that are scientifically focused, and that each review a moderate number of proposals. To avoid conflicts of interest, we create two or more panels dealing with the same specialized subject matter. Each panel is allocated observing time and

other quotas (e.g. Joint time, TOO triggers, RC) in proportion to the request for that panel.

Big Project Panel (BPP): The purpose of the BPP is to create rank-ordered lists of V/LPs and  to recommend the highest-ranked on each list for approval. Similarly to the topical panels, this panel will be allocated quotas for TOOs, joint time, RC etc. In the unlikely event that there is time remaining after V/LP allocation in the BPP, it will be transferred to the highest-ranked proposals in the topical panels that were previously rejected because of quota limits. This time will be divided approximately equally among the topical panels.

The BPP will include all topical-panel chairs and pundits. Proposals will generally be presented to the BPP by the chairs of those panels which discussed them. Pundits contribute a broad overview to the V/LP discussion and will be full voting members of the panel. Copies of all V/LP proposals will be provided to pundits and panel chairs before the review. The BPP chair will be one of the pundits.

In considering the recommendations of the topical panels concerning target lists and observing time for V/LPs, the panel should be aware that they may include targets that are in conflict with those in a shorter, highly recommended proposal. Such target conflicts will have been noted by the topical panel. The BPP may remove such conflicted targets from the V/LP list.

## Procedure for Large Projects

V/LPs will be discussed and graded by two panels as far as is possible given the conflict-of-interest rules. In addition, each V/LP is assigned to a pundit. The pundit report will be made available to the topical panels at the time of the review. Each panel will produce a Peer Review Report following their discussion and decision process. The panel reports will be combined into a single report and made available for the Big Projects Panel (BPP) session on Thursday.

Following the deliberations of the Big Project Panel (BPP), chairs and pundits will update reports as needed. The BPP reports will be available for update by BPP panel members via the PAS for up to about 2 weeks following the review. All chairs of panels with the same science categories will have write access to all V/LPs in those categories at the review.

# Tasks and Responsibilities

## Pundit Tasks:

- Read all V/LPs. Preliminary grades are not required.
- Write comments on assigned V/LPs. Note that pundits may be assigned V/LPs outside of their main area of expertise.
- Participate in the BPP.

## Panel Chair Tasks:

- Read all proposals assigned to the panel and submit preliminary grades.
- Act as reviewer for assigned proposals.
- Ensure that panel members are aware of the rules specified in this document and the proposal selection criteria listed in the CfP.
- Conduct a fair and impartial review that grades proposals purely on the basis of the selection criteria listed in the CfP.
- Ensure that the conflict-of-interest rules are followed.
- Serve as a member of the Big Project Panel.

## Deputy Panel Chair Tasks:

- Complete all tasks as a panel member
- Read, update and approve all written evaluations of each proposal ensuring that they are constructive, understandable, justify the assigned grade and reflect the consensus of the panel
- Step in for the panel chair as required, for example if the chair leaves the room due to a conflict of interest
- Record reviewer conflicts of interest and their mitigation on the form provided on the website

## Panel Member Tasks Prior to Review:

- Read all proposals allocated to their panel, except those for which they have a conflict of interest.
- Submit preliminary grades for all panel proposals, except those for which they have a conflict of interest

- Prepare preliminary reports for proposals to which they are assigned as primary or secondary reviewer, listing both strengths and weaknesses, on the report form for each proposal

Panel Member Tasks at the Review:
- Lead the discussion, grade and generate the peer review report for each proposal to which they are assigned as primary reviewer
- Take part in the discussion and grade all other proposals, except those for which they have a conflict of interest.
- Assist in drafting the peer review report for proposals for which they are secondary reviewer. Comments and drafted text can be sent to the primary reviewer via the PAS.

# Peer Review Reports

The PAS will be switched to the "Peer Review" version at 8am on Monday morning of the review week. This version provides access to the pre-review reports so that the content can be cut/pasted into the review reports as appropriate. Written pundit reports will be made available to the panels at this time.

The primary reviewers modify the Peer Review Reports to include the intellectual content of the pre-review reports, to incorporate the panel's consensus, any additional comments (unapproved target decisions, joint time, observing mode recommendations etc.), to set the flag indicating the complexity of the analysis, and to justify the grade assigned to the proposal. Secondary reviewers may send reports/comments to the primary reviewer via a form field in the reports. This must be accomplished while the reviewer is present at the review. The Deputy Chair reviews all panel reports and signs off on them when they are complete.

BPP Reports: These reports are initially generated from the combined panel reports and will be available to the BPP panelists on the reports website by Thursday morning. They should be updated by one of each proposal's primary reviewers (to be assigned at the BPP review) to incorporate the BPP discussion and

final decisions. They will be available online for as much as about 2 weeks following the review to allow completion of this task.

- Prioritized list of proposals
    - Pass/fail line at Chandra time allocation (once finalized, the software will set to grade 3.5)
    - Specific reasoning for proposals above the pass/fail line but that are not approved (for example, ran out VF TOOs)
    - Prioritized order extending below pass/fail line (grey area)
    - Line below which panel does not recommend approval
    - Specific recommendations for time, RC, joint time etc. for approved proposals
    - Decision tree to describe changes to recommendations should more RC, observing time or TOO triggers become available to the panel
- Report for each proposal
    - Updated and finalized by primary reviewer
    - Reviewed and approved by Deputy Chair
- List of Reviewer Conflicts and mitigation (updated by deputy chair)

# Panel Procedures

The proposals to be discussed by each panel are loaded into a database (one database for each panel). The GUI interface to this database will be run by a Panel Facilitator and allows most/all tasks the panel will need to do, such as find out about proposal target details, record grades, make sorted lists, check allocations, make recommendations/comments to the CXC, etc. Preliminary grades will be loaded into the database and an initial grade-ordered list will be provided on Monday morning.

Triage: Proposals for each panel will be ranked by average preliminary grade. The lowest 25% will be considered "triaged out" and will not be discussed further,

allowing the panel more time for proposals with a good chance of being recommended. However, before considering other proposals, the panel will consider the body of triaged proposals and decide if any should be resurrected (e.g. one with both very high and very low preliminary grades or at the specific request of a reviewer). Any resurrected proposals are to be discussed and graded at the end of the discussion period (because then the panel knows the quality of proposals which will be recommended for acceptance). It is also possible to triage additional proposals if the panel should so desire. Triaged proposal review grades will be re-normalized to lie at or below those for proposals discussed at the review. We request that the panel discuss and vote on ALL V/LP proposals at the review, including those with a low grade.

Proposal Evaluation: Each proposal surviving triage will be presented orally by both a primary and a secondary reviewer, and then discussed by the panel until the Chair is satisfied that all arguments have been fairly presented. Panelists with a conflict of interest should leave the room for discussion and voting of that proposal. The Deputy Chair will record any conflicts of interest and their mitigation.

In general, the review panel should not make cuts in a proposal. In some circumstances (e.g. for a proposal near the pass/fail line) it is necessary to do so. Targets may be switched off in the panel database with explanation given in the peer review report. When the peer review panel recommends the deletion of targets, the proposers' target priorities should be honored. Observing times should not be reduced. Changes in instruments or parameters may be recommended in the peer review report, and these recommendations may be implemented by the CXC if the proposal is approved and the proposer concurs.

Grading: Grades are on a scale from 0 to 5, with 5 indicating an outstanding proposal. The following definitions of the numerical grades should be used consistently throughout the review:

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| 4.5-5.0 | Outstanding | This investigation is among the highest priority investigations for Chandra and must be carried out. |
| 3.5-4.5 | Very Good | This investigation should be carried out if at all possible. |
| 3.0-3.5 | Good | This investigation will be of some value to science and may be carried out if resources allow. |
| 2.5-3.0 | Acceptable | This investigation is less competitive scientifically |
| 2.0-2.5 | Fair | It is not clear whether this investigation will yield valuable science results. |
| 0.1-2.0 | Poor | This investigation should not be carried out for reasons given in the evaluation |
| 0 | | This proposal was deemed non-feasible or non-responsive and was not reviewed (discuss with CXC representative first) |

Grading is by secret ballot, with each reviewer receiving a google sheet.

Review of Final Recommended List: After all proposals have been discussed and graded, the panel will review the grade-ordered list. Re-grading of proposals is not permitted at this point, however, the list may be re-ordered. If the committee wishes to consider any re-ordering, the conflict of interest rules still apply. Panel members with any conflicts of interest must leave the room and not participate in the discussions or voting concerning the reordering.

Panels will be allocated a specific observing-time budget. Panels may have other allocations such as RC or TOO triggers. If a panel does not have a specific TOO allocation, they can approve all such requests in the panel. The panel will use the rank-ordered list to determine which proposals they recommend be awarded time, keeping their numbers below the appropriate allocations. Please carefully rank-order proposals falling just above/below the acceptance line based on observing time allocation.

The CXC will normalize the grades from each panel so that proposals above the acceptance line and recommended for award have grades of 3.5 or above, and rejected proposals have grades below 3.5. The highest and lowest ranked proposals will retain their original grades and the normalization formula shall be linear.

If a proposal is ranked highly by the panel but loses the competition for a target to a more highly-ranked proposal, the panel should retain the initial grade rather than lower it to below the pass-fail line grade. Similarly, a highly-ranked, constrained or TOO proposal may have a high grade but not be approved due to lack of RC or TOO observations to allocate. In either case, the targets in question should be set to "N" in the panel database. The proposer will thus receive a grade above the normalized 3.5, indicating that the proposal was well received but not approved due to other reasons, as should be indicated in the report.

## Panel Allocations

Observing Time: After allowing for observing efficiency, about 10 Msecs of GO observing time will be distributed among the topical panels for possible award. The amount of time allotted to a specific panel depends on the number and median observing time request of those GO (i.e. not including V/LPs) proposals to be reviewed by that panel. Approximately 9 Msec is allocated to the BPP with a minimum of 1Ms to VLPs.

Slew Tax: The time allocation of each panel will be increased by a fixed percentage in order to include a slew tax of 1.5 ksec per proposed target in the review. The exposure time charged to each target at the review will be increased by 1.5 ksecs. Grid observations will be charged a lower slew tax as described in the CfP.

Other Allocations:
- RC
- TOO triggers for each (over-subscribed) response type
- time on each joint facility (when over-subscribed)

- time in future cycles (when over-subscribed)
- archive and theory funding

# Confidentiality and Conflict of Interest Rules

**Confidentiality:** Information in proposals and discussions as part of the review must be treated as confidential and not discussed with anyone outside of the review process, nor anyone in another review panel, before, during, or after the review. Following NASA's guidelines, a log will be kept of all conflicts of interest and their mitigation. The deputy chair is responsible for the conflict log.

**General Conflict of Interest Rules:** Reviewers may not be PIs of any proposal considered by their panel. Reviewers may not serve as primary or secondary reviewers on any proposals for which they are Co-Is, for which the PIs or (preferably) any of the Co-Is are from their institution, or for which the panel members are close professional/personal associates or relatives of the PI or any Co-Is on the proposal. Panel members must leave the room for the discussion and grading of proposals for which they are Co-Is, for which the PI/Co-Is are from their institutions,[1] or for which the panel members are close professional/personal associates or relatives of the PI or any Co-Is. Panel members may not serve as primary or secondary reviewers on any proposals which are in direct competition with one on which they are PI or Co-I. Furthermore, they must leave the room when such proposals are under discussion.

For the purpose of determining conflicts of interest, a close personal associate is an individual with whom a person has a close relationship that others may feel prevents them from being objective. Examples are a spouse, domestic partner, family member or close friend/collaborator.

**Pundits and Panel Chairs:** In addition to the general rules, pundits and topical panel chairs may not be PIs on any V/LP. Pundits and panel chairs must leave the Big Project Panel during any discussion of proposals for which they are Co-Is,

close professional/personal associates or relatives of Co-Is, or for which the PI/Co-Is are from the reviewers institution.[1]

Technical Reviewers: Technical Reviewers may not be PIs, or Co-Is, close professional/personal associates or relatives of PIs or Co-Is, of any proposal they review.

CXC staff and representatives: CXC staff and representatives will withdraw from the room during discussions/decisions involving the evaluation of proposals with which they have a conflict of interest.

## Miscellaneous

Members of the NASA Project Science team at MSFC, members of the CXC, and scientists at NASA HQ do not receive any guaranteed time for their participation in Chandra and must compete in the peer review. GTOs may propose for observing time in the peer review.

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[1] For large institutions with multiple divisions/departments, there may be no conflict of interest.