

## LCLS Proposal Preparation and Review Process Guidelines

### Proposal Preparation

The technical capabilities of the LCLS are developing rapidly. LCLS operations will continue to evolve over the next few years, and we appreciate the flexibility of the user community as we work to accommodate developments, infrastructure improvements, and construction into our operations plan. LCLS provides updated information about instruments and operating parameters in calls for proposals and on the LCLS web site for the benefit of those preparing experiment proposals. Until we can reach a steady-state of operations, we will only be able to post the call for proposals and operating schedules 6-12 months in advance.

A call for proposals is generally made twice each year approximately 9 months before the run is scheduled to begin. In the call for proposals, we recommend that scientists describe well-posed experiments that can be accomplished in ~24-60 hours of beam time. Proposals must include brief discussions of the expected scientific or technological impact and anticipated feasibility and probability of success of experiments.

Proposals are written for a single run, but they may involve a much larger scope. These broader program type proposals may address important problems and may be resubmitted each cycle. However, in the absence of sufficient information to evaluate progress (data disseminated from previous beam time, publications, etc), the PRP may recommend or LCLS may decide that some proposal(s) be postponed for consideration until a future review cycle.

LCLS proposals are submitted through the user portal, <https://www-ssrl.slac.stanford.edu/URAWI/>, Provide a descriptive title of your proposed experiment that you would be willing to be made public if awarded beam time. Provide an abstract that concisely (less than 2,000 characters) summarizes the proposed experiment, quantities to be measured, samples to be studied, expected scientific results and impact. The more detailed proposal text is generally limited to 6 pages in PDF format and should include the following information (include the spokesperson's name in the upper right hand corner of each page):

1. **Experimental Team:** In a table, list the names, institution, email address, and roles of each person who would participate in the proposed experiment (e.g., sample prep, theory, data collection, data analysis). This section could also briefly mention directly-relevant previous work done by the team members.
2. **Scientific Case:** Briefly explain the background and significance of your experiment. In particular, why is LCLS required for this experiment? Itemize the specific aims and particular questions you want to answer. Focus on the specific experiment and avoid broad discussions in general terms.
3. **Experimental Procedure:** Provide specific information so that the technical feasibility of this experiment at the requested LCLS instrument can be evaluated. Tell us if you plan or have carried out supporting experiments at other facilities. Have simulations of the experiment been performed? What are the anticipated data rates? Provide a beam time plan, indicating what could be accomplished in less than 1 week (approximately 60 hours of beam time). Describe any additional equipment you plan to bring to LCLS for the experiment. We strongly recommend that you contact LCLS instrument scientist(s) before proposal submission to discuss capabilities, to identify possible problems in integrating external equipment with the LCLS facility and to

determine possible solutions. (See policy on endstations. [http://www-ssrl.slac.stanford.edu/lcls/users/policies\\_guidelines.html#use](http://www-ssrl.slac.stanford.edu/lcls/users/policies_guidelines.html#use))

4. **Technical Feasibility:** Proposals must contain sufficient information for the LCLS to review the proposal for technical feasibility. This information should include:
  - Equipment
    - Which elements of the proposed instrument do you require for the proposal?
    - What additional equipment is needed, including laser, detector, sample delivery/environment, temperature, pressure, etc?
    - How do you plan to provide/organize the additional equipment?
  - Parameters
    - Describe X-ray wavelength, pulse energy, bandwidth, beam size, repetition rate, pulse duration.
    - If laser is required, describe laser wavelength, pulse energy, bandwidth, beam size, repetition rate, pulse duration, timing, geometry.
  - Experimental protocol
    - Describe the experimental geometry.
    - Calculate the expected signal rate/background
    - Describe samples and concentrations, sample preparation and storage.
    - Describe local facilities that may be required.
5. **Previous Beam Time Summary:** If your proposal team previously received beam time at LCLS, briefly describe your prior experiment(s). Include proposal number(s), date(s) of experiment, instrument(s) used, plus 1-2 sentences summarizing if experiment was successful and how results were disseminated (list talks presented, papers in press or published, awards or special recognition, etc.). **Note:** Proposal teams must inform and acknowledge LCLS and the DOE Office of Science in presentations and publications. User reports and publications are extremely important in demonstrating the scientific impact of LCLS and are considered by the PRP in reviewing new proposals.
6. **Additional Supporting Information:** Although not encouraged, up to 2 pages of additional information may be included to show important graphs, images, key data, technical drawings, descriptions of instrumentation to be brought to LCLS, or a few references to related work by the team members to show how well a system has been characterized by more conventional methods.
7. **Addenda:** In extraordinary cases, the proposal team may submit addenda to their proposal (limited to one-half page) which briefly describes new information that becomes available after the proposal was submitted. The addenda must be consistent with the original scope of the proposal. The addenda must be sent to the Proposal Administrator at least three weeks before the scheduled Proposal Review Panel (PRP) meeting, and LCLS management will determine if the supplemental information meets the criteria to forward such material to the PRP.

\* Safety related documents must be submitted during the safety management portion (Step 2) of the LCLS proposal submission process. List and describe any safety concerns that may arise with samples you will examine, equipment you will use, or techniques you will perform (including any physical, chemical or biological hazards) and how these issues will be addressed in the experiment design.

## Proposal Review Process

LCLS management worked very closely with the LCLS Scientific Advisory Committee (SAC), Proposal Review Panel (PRP) and the Users' Executive Committee (UEC) to develop a fair and transparent external peer review process. LCLS proposal review and ranking is carried out by the Proposal Review Panel (PRP), which includes over 50 international experts divided into several subpanels: Atomic, Molecular, Optical and Cluster Physics (AMO); Biology and Life Sciences (BIO); Chemistry (CHEM); Materials-Soft Condensed Matter; Materials-Hard Condense Matter; High Energy Density Science/Matter in Extreme Conditions (MEC); and Methods and Instrumentation.

The work of the PRP begins as soon as each call for proposals is closed, with an on-site meeting at SLAC approximately two months after the proposal deadline.

Concurrently with the PRP review, LCLS scientists conduct a course, preliminary technical feasibility review of submitted proposals. LCLS scientists are also asked to comment about proposals which have previously received LCLS beam time, specifically, which instrument was used, was the beam time used efficiently, was the experiment successful. LCLS scientists forward their assessments to the LCLS Proposal Administrator ([nbrown@slac.stanford.edu](mailto:nbrown@slac.stanford.edu)) to be uploaded and attached to relevant proposal(s) for review by the PRP. LCLS management can help to facilitate the review process, but is not involved in the review process itself. A description of the proposal review process follows:

Users indicate the appropriate PRP panel(s) to review their proposals when submitting proposals through the user portal. Proposals are briefly reviewed by LCLS and the PRP Panel Chairs to confirm that the distribution of proposals is appropriate for the expertise of the PRP panels or to reassign like proposals to more appropriate panels in order to facilitate consistency in the review and ranking process. Once the panel assignments are confirmed, the PRP panel chairs assign 2-3 reviewers for each proposal assigned to their panel. Additional reviews may be requested from other panels if the area of science extends beyond the primary panel. If the PRP lacks the necessary expertise to review any proposal, panel chairs may request ad hoc external peer reviewers to supplement the PRP review. Each reviewer is asked to evaluate their assigned proposals using the following criteria:

- Does the proposal address a question that, if successfully answered by the proposed experiment, will have an important impact either on the scientific field or technological area addressed by the research? If the proposal addresses the development of an x-ray related question or technique and assuming the proposal is successful, will it provide fundamental knowledge that is important for the scientific community in using x-rays for scientific discovery?
- Does the proposal suggest a viable path of obtaining the desired information by use of LCLS? Taking into considerations factors such as the expertise of the proposing team (assuming optimal support by the LCLS staff), the preparatory steps for the experiment, the available instrumentation, the known performance of LCLS (including lasers and synchronization), how do you judge the probability of success?
- Have reports of previous LCLS experiments been provided to LCLS? Have results of previous experiments been publicly disseminated through scientific presentations and papers that acknowledge the LCLS and the DOE? (This information is required for every team that has already carried out a previous LCLS user experiment.) **Note:** In the absence of sufficient information to

evaluate progress, the PRP may recommend that proposals be ranked lower or removed from consideration during the current review cycle .

Approximately three weeks before the PRP meeting, assigned reviewers provide a written review summary for each proposal as well as a preliminary numeric rating from 1 to 5 (include fractional numbers up to one decimal point) according to the following distinctions for each assigned proposal. The panels use the following criteria for their initial review (preliminary ratings are averaged across all reviewers as a starting point for the panel's deliberations and ranking, but this preliminary rating is not used or relevant after the PRP panel evaluates their proposals and determines their top ~30% proposals.)

1. **Excellent:** A well-chosen and forefront research problem which clearly requires LCLS. The research has a good chance of making a major contribution to advances in a scientific field or contributes to important technological developments. Should be given highest priority for beam time.
2. **Very Good:** A very good problem or research which can be expected to lead to substantial advances in fundamental knowledge or technology. Should receive beam time if at all possible.
3. **Good:** A good problem, but not at the cutting edge. It will further our understanding and knowledge. Beam time should be considered only after the above two categories have received time.
4. **Fair:** The proposal is deficient. It proposes a problem that is either not presented well, may not require LCLS, or completion of the research is doubtful. Should probably not receive time.
5. **Poor:** The proposal is poorly written or does not adequately articulate scientific issues. It should not receive beam time.

At least two weeks before the PRP meeting, when the reviews are complete and it is clear which members will be present at the next PRP meeting, panel chairs will assign a 'Lead Reviewer' for each proposal whose role will be to read the reviews, prepare a brief summary, and present this during their panel's deliberations. At the conclusion of the PRP meeting, the Lead Reviewer will also compile summary comments for each proposal assigned to them and provide these to the LCLS Proposal Administrator to share with the proposal teams; final proposal review comments should be concise, but with sufficient detail to assist the proposal teams to address any deficiencies and improve their proposals for a subsequent review cycle.

The PRP meetings will generally follow this outline:

Day 1: The PRP will meet for a brief plenary session with updates related to the latest machine or instrument parameters, policy changes, and a 'charge' to the committee outlining the review process. LCLS management and scientific staff will be available "on call" to answer questions from the PRP related to capabilities, technical feasibility or safety.

The PRP will break into subpanels. During the subpanel session, the lead reviewer appointed by the panel chair will briefly present and lead a discussion of the scientific merit of the proposal(s) assigned to them. Interaction among the panels is encouraged if there are proposals that relate to more than one area. The panels will consider all proposals assigned to them and develop a ranked list of their top 30% of proposals. Before the end of Day 1 or as soon as the panel has completed their list, the subpanel chair will circulate their top 30% list to the other subpanels and to LCLS management so they can review these and prepare for Day 2.

Day 2: In the first session, the subpanels reconvene to review the top 30% proposals from each of the other panels, suggesting rank order and providing a 2-3 line summary of why LCLS is required, why is it important, or how it opens new areas of LCLS science. This information prepares the subpanel chairs and vice chairs to discuss/defend their subpanels' review during the next session when the subpanel chairs and vice chairs convene separately to review and rank the top proposals. At this time, the rest of the PRP may leave or remain to work in another room on the final review comments to the proposal spokesperson (on proposals which they were assigned Lead Reviewer). A representative from the LCLS SAC and from the LCLS UEC may be invited to attend the panel chair ranking session as 'observers'.

Round 1: Each of the panel chairs put forth their top 'must do' proposal, briefly (in 1-2 minutes) summarize the experiment, why LCLS is important and required for that experiment. If anyone objects, they speak up at this point or these top proposals stay in the #1 rank.

Subsequent Rounds: On a pro rata basis, each of the panels puts forth their remaining top 30% of proposals, with each panel chair briefly (in 1-2 minutes) summarizing why LCLS is important and required for each experiment. If a panel feels strongly that there is a 'tie' in their top ranked proposal list, they may put forth no more than 2 proposals at the same time for consideration (their panel's pro rata allocations would be adjusted accordingly). See pro rata plan summarized in the table below.

The majority of the discussions will focus on the subsequent rounds, comparing each proposal against the others until ranking in multiple levels. The end result will be proposals of essentially equal merit in tiers where the PRP or management have flexibility to consider giving more weight to some proposals to increase diversity, equalize access to new instruments, or open emerging areas of LCLS science.

### Example of Pro-Rata Ranking Plan of LCLS Proposals by Panel

Pro-Rata Ranking by Panel										
136	HCM			BIO		MEC	AMO	CHEM/SCM	M&I	
# Proposals	37.			31.		21.	18.	17.	12.	136
30%	11			9		6	5	5	4	40
Round 1	1.			2.		3.	4.	5.	6.	6
Top 6	1.			1.		1.	1.	1.	1.	6
Must-Do Proposals										
Round 2	7. 9. 12.			8.		11.	10.			6
5-10%	5.4% 8.1% 10.8%			6.5%		9.7%	9.5%			12
	2. 3. 4.			2.		3.	2.			
Round 3	16.			15.		18.	17.	13.	14.	6
11-16%	13.5%			12.9%		16.1%	14.3%	11.1%	11.8%	18
	5.			4.		5.	3.	2.	2.	
Round 4	19. 23.					24.	20.	22	21	6
16-19%	16.2% 18.9%					19.0%	16.7%	17.6%	16.7%	24
	6. 7.					4.	3.	3.	2.	
Round 5	26.			25.		28.	30.	27.	29.	6
19-23%	21.6%			19.4%		22.6%	23.8%	22.2%	23.5%	30
	8.			6.		7.	5.	4.	4.	
Round 6	31. 34. 39.			33.		37.	36.	35.	38.	9
23-28%	24.3% 27.0% 29.7%			25.8%		29.0%	28.6%	27.8%	29.4%	39
	9. 10. 11.			8.		9.	6.	5.	5.	3.

The panel chairs will summarize the final review deliberations and provide comments for the top 30% proposals to the LCLS Proposal Administrator who will forward the comments to the proposal spokesperson.

Day 2 ends with a closeout session and reception for the PRP panel chairs and LCLS management.

Proposal preparation and review guidelines are posted on the LCLS user portal and website:  
<<http://www-ssrl.slac.stanford.edu/lcls/users/proposals.html>>.