

### **Descriptive Title of Proposed Experiment**

*Title should be suitable for public disclosure if awarded beam time*

*No need to repeat author list, since that information is captured elsewhere*

*Use the following main sections and include additional numbered subsections as needed to enhance the readability of the proposal.*

*The content should be written in Times New Roman 11, single-spaced, and aligned in mode "justify". Please make sure to set the following margins: top, bottom, right: 1.0" (2.5 cm); left: 1.0" (2.5 cm).*

*The detailed proposal text (including abstract) is limited to 6 pages in PDF format, not including the additional one page for the standard configuration table, or a one page progress report of previous beam time which can be uploaded separately.*

*Orient the proposal to the target audience (PRP members) who are very knowledgeable scientists with a broad perspective of the field, and deep expertise in specific areas, but may not be experts in the particular topic of the proposal.*

*In preparing proposals, please keep in mind the evaluation criteria:*

**Scientific Impact:** *Does the proposal address a question that, if successfully answered by the proposed experiment, will have a strong impact either on the scientific field or technological area addressed by the research?*

**Originality/New Scientific Field:** *If successful, will the proposal open a new field, or demonstrate a new approach in an existing field?*

**Need for LCLS:** *To what extent is LCLS critical for the success of this proposal? Can other techniques or facilities provide similar information about the scientific question?*

**Scientific Risk:** *Evaluate the probability that the proposed research will yield significant new results. We seek a balance of risk in the experimental portfolio, ranging from more speculative high risk / high return investigations to lower risk measurements of important systems.*

**Prior Results:** *Evaluate success or progress of prior experiments, including precursor work on other facilities that motivate the need for LCLS.*

**Feasibility:** *LCLS scientists conduct a preliminary technical feasibility review of submitted proposals. Your engagement with LCLS staff in preparing the proposal will help alleviate problems in this area.*

**Compatibility:** *Can the experiment be performed simultaneously with another experiment (i.e. can it be performed with monochromatic, hard X-ray beam)? Does the experiment require significant modifications to a LCLS instrument setup? We specifically encourage proposals that use the declared "standard configurations" and those that can use monochromatic, hard X-ray beam to allow multiplexing between multiple experiments.*

## Abstract

Provide an abstract that concisely (less than 1,950 characters) summarizes the proposed experiment. Emphasize the hypothesis to be tested, expected scientific results and impact. Indicate the observables to be measured (or the relevant experimental approach), samples to be studied etc.

## Introduction

This should briefly introduce the topic and provide essential background and context.

Consider the following questions to guide your writing:

- *What is the importance of this topic?*
- *What is the current state of knowledge, and where are the significant knowledge gaps (and why)?*

## Scientific Case and Impact of Proposed LCLS Experiments

This is the heart of the proposal. Focus as sharply as possible on the scientific (or technical) objectives of the proposed experiments, and avoid unnecessarily broad or general discussions that are likely familiar to a knowledgeable scientist. Does the proposal address a question that, if successfully answered by the proposed experiment, will have a strong impact either on the scientific field or technological area addressed by the research?

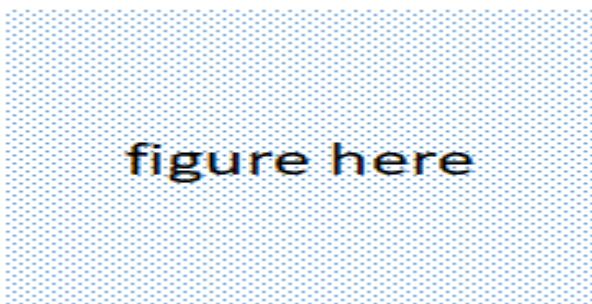
Consider splitting the Science Case into subsections as appropriate for readability and clarity (e.g. itemizing specific aims, objectives, and science questions to be addressed).

### *Sub-section (as needed)*

Consider the following questions to guide your writing:

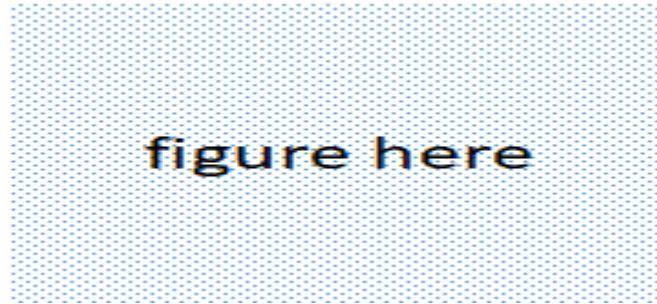
- *What is the hypothesis to be tested, or what essential question is to be addressed in these experiments?*
- *What will be the scientific impact if successful (i.e. why will the scientific community care...)?*
- *How do you propose to address the hypothesis or answer the essential question?*
- *What are the experimental observables, and how will these observables address the main scientific (or technical) objectives of the proposal? Modeling and/or prior results that can quantify the expected observables should be presented wherever possible – see “feasibility” section below.*

In addition to the above, include an overview of how the data will be interpreted to answer the essential question/objective of these experiments - including the role of theory or novel analysis methods etc. This is particularly important for approaches or methods that are not well established.



**Figure 1.** Example figure and caption

More text here..



**Figure 2.** Example figure and caption

### ***Need for LCLS***

- *Why is LCLS essential for these experiments? Be specific about the most important (unique) capabilities, instrumentation, expertise etc. that will enable the proposed experiment.*

Consider distinguishing between the need for XFEL capabilities (i.e. experiments that could be done at other XFEL facilities), and specific needs for LCLS (e.g. unique capabilities, instrumentation, expertise etc.)

In general, if a reasonable subset of the information can be obtained at non-XFEL sources, then the proposal is unlikely to be approved.

### **Experimental Details**

Proposals must contain sufficient information for LCLS scientists to review the proposal for technical feasibility and/or suitability at LCLS. 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.

Note that further experimental details will be requested (for proposals with a strong potential of being awarded beamtime) through the LCLS experiment questionnaire process. Thus, very fine details of the experiment do not need to be captured within the main proposal. However, proposals that include a clear outline of the expected shift-by-shift schedule (scope, main objectives) within each 12-hour shift have a better chance of fitting into a tightly constrained Run schedule.

### ***Instrument (or key equipment)***

Briefly describe the experiment setup or geometry.

Consider the following questions to guide your writing:

- *What are the key elements of the proposed instrument (or equipment) required for the experiment?*
- *What additional key equipment is needed, including laser, detector, sample delivery/environment, temperature, pressure, etc?*
- *How do you plan to provide/organize any additional equipment (particularly for non-standard equipment not provided by LCLS)?*

### ***X-ray and Laser Parameters (or other key parameters)***

Describe the key required parameters (e.g. X-ray wavelength, pulse energy, bandwidth, beam size, repetition rate, pulse duration).

If a laser is required, describe laser wavelength, pulse energy, bandwidth, beam size, repetition rate, pulse duration, timing, geometry.

**Other...**

Describe any additional key requirements e.g. access to local facilities, labs, advanced testing, unique sample preparation, delivery storage requirement etc.

**Feasibility assessment**

Provide a summary of your assessment of the feasibility of this experiment - including the basis of your assessment, conclusions, and justification. This assessment may be based on fundamental calculation of the expected signal rates, background noise etc. This may also be an extrapolation (or adaptation) of empirically known data acquisition rates and feasibility (e.g. from synchrotron or other XFEL studies) to the particular conditions of the proposed experiments.

**Experimental protocol**

Provide a justification for the beamtime requested, and a brief outline of the schedule (scope, main objectives) within each requested 12-hour shift. Typically between 1 and 5 shifts can be requested.

**References**

[1] A.N. Author, *Journal*. **volume**, page (year); doi.

[2] A.N. Author, *Journal*. **volume**, page (year); doi.

*Note that the experimental team list (below) and the parameter table (below) will not count against the six-page limit of the proposal.*

*The 'Spokesperson' is the primary point of contact for the proposed experiment*

*The 'Lead PI' and Co-PIs (where relevant) are the senior intellectual leaders of the proposed experiment.*

**Experimental team**

Name	email	Project Role	Experience	Position
Prof. I.M. Good <sup>1</sup>		Lead PI, Experiment, Analysis	A,B,C,D	Professor
B. Great <sup>2</sup>		Spokesperson, Sample prep. Experiment, Analysis	A,B,C,D	Postdoc
Dr. R. Best <sup>3</sup>		Co-PI, Theory	A	Senior Scientist
<i>add rows as needed</i>				

(1) Department of Chemistry, University of Washington, Seattle, WA 98195, USA

(2) LCLS and Stanford PULSE Institute, SLAC, Menlo Park, CA 94110, USA

(3) Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory, Richland, WA 99352, USA

[A] Prior LCLS publications, [B] Prior LCLS experience, [C] Other FEL experience, [D] Synchrotron experience

Example Parameter Table, see also parameter tables for standard configurations for particular Run

Parameter Table		
Sample	Sample name, delivery etc.	Comments
Desired measurement	Photon Spectrum	X-ray VLS spectrometer to measure forward scattered stimulated X-ray Raman spectrum
X-ray Energy (eV)	525 eV	Modest tuning +/- 5 eV desirable
X-ray pulse duration (fs)	< 0.5 fs	XLEAP mode
X-ray focal spot size (h x w) ( $\mu\text{m}$ )	$\sim 10 \mu\text{m}^2$	Optimum focus of the KB mirrors.
X-ray beam time (# of shifts)	5 shifts	Chem RIXS

another example...

Parameter Table for the XPP Standard Configuration		
Sample	Sample(S) description	
	Temperature range [C]	
X-ray Parameters	X-ray Energy	Fixed to 9.5keV
	X-ray Pulse Duration	Fixed to ~50fs
	X-ray Focal spot size within 10 to 200 $\mu\text{m}$	
Detector	Detector positioning range, List of Bragg reflections and typical scattering angles.	
Optical beam parameters	Wavelength [nm]	
	Pulse duration [fs]	
	Maximum Pulse Energy [ $\mu\text{J}$ ]	

Spokesperson: {name}

	Focal size (FWHM) [ $\mu\text{m}$ ]	
	Polarization requirements?	
	Minimum fluence on sample [ $\text{mJ}/\text{cm}^2$ ]	
	Geometry	Collinear
X-ray Beam Time	Number of shifts [1 shift = 12 hr]	
Any additional comments		

*Spokesperson: {name}*