

DRAFT 2, 1-14-08

Report from the review committee of the Preliminary Instrument Design Review of the XPP Instrument for LCLS

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Committee: John Arthur (SLAC), Aaron Lindenberg (SLAC), Robert Schoenlein (LBNL), and Michael Toney (SLAC)

The committee wishes to convey its thanks to the principal presenter for his efforts in preparing and giving the presentation. The committee found the preliminary design well thought out, and the proposed design viable. The design appears to be appropriately flexible and applicable to a wide range of ultrafast time-resolved diffraction science. *Therefore, the committee recommends that the experimental team move forward with the design leading to a Final Design Review, taking into account the comments and recommendations enumerated below. These comments and recommendations are given in no special order.*

1. The final beam-guard slits are about 2m upstream from the sample. This may allow unwanted background radiation to reach the detector. *The XPP team should carefully examine this issue.*
2. The kinematic mount envisioned for the diffractometer system could be technically difficult to engineer. *The XPP team should study the trade-offs in precision, ease of use, ease of alignment, repeatability, and cost of using such a kinematic mount versus swapping independent diffractometers into the beamline.*
3. The thin monochromator crystal scheme offers great promise but has not yet been engineered or proven. Questions remain about the reliability of this scheme (if thin Si crystals are used) and the quality of the beam delivered (if diamond crystals are used). *The XPP team needs to prove the viability of this plan with prototype tests.*
4. The large-offset monochromator requires very careful engineering to avoid stability problems. *The XPP team needs to demonstrate that their final design is stable. Ideally, this would involve full-scale prototype tests.*
5. The committee applauds the plan to incorporate an overhead crane into the beamline. This will greatly simplify the process of moving large beamline components within the hutch, and should contribute to increased productivity and safety.
6. For this versatile instrument, performing first-ever experiments, adequate support for user software development is essential. *LUSI is urged to work with LCLS and SLAC to assure that adequate support is provided for user software development. It may be appropriate to engage SCS in this.*

7. It was not clear to the committee exactly what sample environment equipment will be provided for XPP by the LUSI project. *This should be clarified for the final design review.*
8. The committee feels that it would be worthwhile to consider extending the range of operation of the XPP instrument below 6 keV (at least down to 4 keV). *The XPP team should examine the consequences of such an extension (vacuum or He flight path, loss of incident flux, monochromator stability, etc.), choose a reasonable range of operation, and be prepared to justify it at the final design review.*
9. The committee had some concern about how general users would access the instrument and how the staff would prevent problems created by general users who violate instrument policies (either intentionally or unintentionally). *This is an issue affecting all LCLS instruments, and coherent policies need to be developed by the LCLS management. The XPP team needs to develop practices for ensuring that LCLS policies in this area are followed.*