



<b>CXI Comments</b>		
<b>Comments (except for KB mirrors):</b>		
CD2-C1.3-1	1. Very exciting science appears to be only 4 years away.	No comment needed
CD2-C1.3-2	2. The overall plan for the instrument appears sound and we do not think it should be changed.	No comment needed
CD2-C1.3-3	3. The injector will be ready for some experiments.	No comment needed
CD2-C1.3-4	4. The reference laser is in good shape.	No comment needed
CD2-C1.3-5	5. The wavefront sensor is quite important. The Diagnostics and Common-Optics committee will comment on the wavefront sensor.	No comment needed
<b>Comments on K-B mirrors:</b>		
CD2-C1.3-6	1. We agree that the KB mirror focusing is the most critical aspect. The overall plan appears sensible and adequate.	No comment needed
CD2-C1.3-7	2. A 400 mm long mirror that focuses 15 keV radiation to 75 nm has been demonstrated by the quoted vendor, J-TEC. This is comforting. However, a manipulator system for the mirrors designed for use at the LCLS was not demonstrated, and is a concern.	We agree that it is a concern and a significant amount of effort is dedicated to identifying a suitable source for this mechanical system.
CD2-C1.3-8	3. Using information obtained on mirrors in the front-end is a reasonable way for the CXI team to address possible beam-induced degradation of the mirrors. However, the involvement of LLNL in simulations appears somewhat informal.	The involvement of LLNL is indeed informal. It is questionable what a formal involvement could bring at this point. LLNL has already performed damage calculations of the materials considered and these calculations make predictions about the damage threshold which are not experimentally verified and also have large error bars. Performing these calculations again will not help. Only experimental verification can be used to make more accurate predictions and LUSI cannot have a formal involvement with any experiments. LUSI is using the same damage assumptions as LCLS and making sure to stay many orders of magnitude below the calculated damaged thresholds to be safe.
CD2-C1.3-9	4. We think it will be best if a person is defined as having overall responsibility for the KB mirror systems including the manipulator and incorporating lessons learned from front-end mirrors. The effort of this person should be a substantial fraction of their time. We estimate that it should be ~30% of their time until the entire KB systems are fully designed.	This is the job of the CXI Instrument Scientist who has been overseeing the KB mirrors and will continue to do so until the end of the project.
<b>XCS Recommendations</b>		
CD2-R1.4-1	Document the performance of the split-and-delay unit in the proof-of-concept experiment recently carried out at HASYLAB.	Not needed for CD-2. The released PhD dissertation will be soon available. Also 2 scientific publications are in draft form
CD2-R1.4-2	Consider including environmental control of the split-and-delay optical systems to ensure beam stability.	Not needed for CD-2, but will be considered by the XCS team
CD2-R1.4-3	Strengthen and broaden outreach to and input from the User Community in beamline design and in conceiving XCS experimental programs.	This will be discussed at the October, 2008 Team Leader meeting. LUSI will be developing an MOU/Charter for the team leaders to better define the Team Leaders roles and responsibilities.
CD2-R1.4-4	Recommend proceeding to CD2.	No comment needed

WBS 1.4		<b>XCS Comments</b>		
	CD2-C1.4-1	Development of local expertise in Split-Delay optics should be a high priority for LCLS	This is a high priority for LCLS. The LCLS Directorate is exploring ways to make this happen.	
	CD2-C1.4-2	The effect of pulse-to-pulse intensity fluctuations on the measured intensity autocorrelation needs more consideration, although it does not appear to be a serious issue	The pulse to pulse variation are not of concern to conduct successful XPCS experiments. All the variations will be turned into Intensity fluctuations using various optical components (which in any case are required to conduct the experiment.) This includes, slits (i.e mitigating spatial fluctuation), monochromator (i.e. mitigating wavelength fluctuations and angular fluctuations). The use of a transmissive diagnostics right before the sample allows to precisely record the incident intensity, which will be further used for proper normalization of the experimental data (and to correct the data). More consideration will be given to the pulses to pulse intensity fluctuation	
	CD2-C1.4-3	The performance of the common optical elements is absolutely critical to the success of the XCS instrument.	No comment needed	
	CD2-C1.4-4	More attention to coherence preservation is important, especially in surface specifications of all optical elements along the beam path.	The coherence preservation is important and is considered in the design and/or choice of every component of the XCS instrument. This is not reflected in the WBS 1.4 but rather in the Diagnostics and common optics section. The LUSI scientist have been developing simulations in order to properly account for these effect, thus allowing us to provide more accurate specifications for optical components to be purchased, while preserving at best the coherence properties of the x-ray beam.  More attention will be given to coherence preservation	
	CD2-C1.4-5	Comments from previous reviews should be addressed more carefully.	These comments have been addressed	
	CD2-C1.4-6	More stakeholder input beyond the team leaders is highly desirable in design decisions and in conceiving XCS experiments. This could be accomplished by increasing the number of Team Leaders, and by holding regularly scheduled Team Leader meetings to discuss beamline and experimental design details. It would valuable for the XCS beamline scientist to develop collaborations with XCS researchers and carry out experiment at other facilities.	A Team Leader meeting for XCS is scheduled for October, 2008. Go-forward plans will be discussed at this meeting. We will be looking at SNS/SING and NSLS II for ideas for implementing this recommendation.	
	CD2-C1.4-7	Additional scientific and engineering personnel would be highly desirable to develop and oversee the key common optics components.	No comment needed	
	CD2-C1.4-8	We applaud the plan to utilize common designs where possible to maximize savings.	No comment needed	
	CD2-C1.4-9	It would be valuable for the XCS beamline scientist to develop collaborations with XCS researchers and carry out experiment at other facilities.	LUSI agrees. This will depend on funding out side of the LUSI project.	
CD2-C1.4-10	The design of the XCS instrument is quite mature. The development of the instrument could be accelerated if additional funding is made available.	LUSI agrees. LUSI management will continue to explore ways to make this happen with the current funding profile.	LUSI has plans to accelerate XCS.	
WBS 1.5		<b><u>Diagnostics and Common Optics Recommendations</u></b>		
	CD2-R1.5-1	1. Deployment of the large offset monochromator is required for practical experimental operations of the CXS beamline. X-ray optics experts including reviewers from outside the laboratory should review detailed physics specifications for the Large Offset Monochromator.	Not needed for CD-2, but this will be done as part of the established LCLS/LUSI engineering control processes. In addition, an advance procurement review will be held to review the requirements prior to placing the purchase order.	Advance procurement review of the XCS Large offset monochromator is planned for April 2009
	CD2-R1.5-2	2. In addition, the angular stability requirements for the Large Offset Monochromator may not be obtainable at a reasonable cost with the current monochromator placement. Project management should consider reserving an alternative position near the far experiment hall for this component.	LUSI Project Management will reserve an alternative position for the monochromator near the Far Experimental Hall.	LUSI Project Management and LCLS will reserve an alternative position for the monochromator near the Far Experimental Hall.
	CD2-R1.5-3	3. Surface roughness and microstructure of commercial Be CRLs may adversely affect beam coherence. Within the next 12 months, preliminary R&D on the commercial lenses should be a priority for the project.	Research has been done in this area. The report "Design and Microfabrication of Novel X-ray Optics II" edited by Anatoly A Snigrev and Derrick Mancini was published in the Proceedings of SPIE, Vol. 5539. The article "Beryllium parabolic refractive x-ray lenses" (B. Lengeler, et al) in that report commented on the high quality of Be lenses manufactured in Aachen as demonstrated in the excellent preservation of the lateral coherence by the parabolic refractive lenses.	
	CD2-R1.5-4	4. Recommend that Diagnostics and Common Optics proceed to CD-2.	No comment needed	
		<b><u>Diagnostics and Common Optics Comments</u></b>		
	CD2-C1.5-1	1. For real-time performance, considerable computational resources must be devoted to wavefront monitors. These resources will be provided by future LCLS operations funding	No comment needed	
CD2-C1.5-2	2. Physics specifications are in development for the Large Offset Monochromator. Details of the engineering specifications, cost and device performance will depend critically on the choice of monochromator crystals and cut.	The monochromator is planned as a design/build contract. The physics specifications will be evaluated as a part of a focused pre-procurement technical review. The physics specifications will allow for the use of a range of crystals. The engineering design will allow for the use of different crystals. The final crystal decision will be made by the instrument scientist.		

WBS 1.6	<b>Controls and Data Acquisition Recommendations</b>			
	CD2-R1.6-1	1. We recommend regularly scheduled meetings between the beamline scientists, diagnostics physicists and control system design engineers.	LUSI agrees and the project will schedule regular meetings including the beamline scientists, diagnostics physicists and control system design engineers.	Regularly scheduled meetings are occurring for the Cornell detector and supports. Other meetings are still on an "as-needed" basis. We will start regular XPP meetings after the FIDR.
	CD2-R1.6-2	2. The LUSI control and data system is ready for CD-2.	No comment needed	
	<b>Controls and Data Acquisition Comments</b>			
	CD2-C1.6-1	1. The design is technically sound. For the CD-2, the project's scope, attendant cost and schedule are all satisfactory for this subsection.	No comment needed	
	CD2-C1.6-2	2. The committee is pleased to see the following: The LUSI control and data system design team included expertise from LCLS and SLAC PPA and SCCS group.	No comment needed	
	CD2-C1.6-3	The project team is taking advantage of established designs from existing LCLS and SLAC high energy physics project.	No comment needed	
	CD2-C1.6-4	120-Hz data feedback loop is prepared for beamline applications including feedback control for beam position stability improvement.	No comment needed	
CD2-C1.6-5	Data system concept and architecture are well developed. The test of interfaces between LUSI DAQ system and readout electronics for LUSI detectors got a good start.	No comment needed		
CD2-C1.6-6	3. Since beam diagnostics information for each experimental data set is critical on a pulse by pulse basis, it is very important to have a strong technical link between beamline scientists, diagnostics physicists and control system design engineers.	LUSI agrees. See recommendation 1.		
WBS 1.1	<b>ES&amp;H Recommendations</b>			
	CD2-R1.1-5	1. Approve CD-2 for the LUSI project.	No comment needed	
	<b>Cost and Schedule Recommendations</b>			
	CD2-R1.1-4	1. Accept proposed Cost and Schedule as the baseline.	No comment needed	
	<b>Cost and Schedule Comments</b>			
	CD2-C1.1-5	1. The LUSI project plan for staffing and procurements conforms to the program funding profile and assumes a Continuing Resolution through March 2009. The Project has not yet had the opportunity to fully evaluate how the additional funding in the first half of FY2009 could be effectively utilized.	The project has started to evaluate the effect of funding scenarios on the proposed baseline. As of Sept. 29, 2008, our CD-2 baseline plan is accurate.	This effort continues. Additional complexities have been added since CD-2 due to the receipt of earlier total funding for the LUSI project.
	CD2-C1.1-6	2. The level of detail and basis behind the cost estimate are very good for the CD-2 stage of the project.	No comment needed	
	CD2-C1.1-7	3. The material escalation rate of 2.3% is considered low. Although majority of vendor/catalog quotes are recent, the Project should continue to monitor market conditions and adjust as necessary	The LUSI project will continue to monitor market conditions and adjust escalation rates as necessary.	Due to the current economic conditions, LUSI would like to make early procurements. We are moving ahead as quickly as possible with the PEP-planned procurements and are also looking at ways to accelerate other procurements.
	CD2-C1.1-8	4. Amount of contingency (33% on ETC) considered at this stage of the project (CD-2)	No comment needed	
	CD2-C1.1-9	5. Preliminary scope contingency consisting of the 0.1 micron K-B mirror system has been identified - estimated at ~\$1M	No comment needed	
CD2-C1.1-10	6. The project has yet to require the Control Account Managers to prepare variance analysis reports. It is important that each Control Account Manager take "ownership" of their Control Accounts. Implementing variance analysis even before a performance measurement baseline is approved would assist this process.		Formal variance reporting is in process.	
<b>Project Management Recommendations</b>				
CD2-R1.1-1	1. Clarify CD-4 deliverables and coordinate structure of CD-3/CD-4 milestones with the program prior to submission of PEP	The project is clarifying CD-4 deliverables and has decided on a single CD-3 and CD-4. These changes are included in the PEP.	Action Complete	
CD2-R1.1-2	2. Enhance participation of instrument team leaders in LUSI project execution	Team leader meetings for all three instruments are scheduled for October, 2008. Go-forward plans will be discussed at these meetings. We will be looking at SNS/SING and NSLS II for ideas for implementing this recommendation. LUSI will be developing an MOU/Charter for the team leaders to better define the Team Leaders roles and responsibilities. In addition, the Team Leaders will be invited to all design reviews, FAC and Lehman reviews.	Team Leader meetings for all three instruments were conducted in October, Concurrence on the current instrument scope was received. Scope adds and subtracts were discussed. LUSI is working with the LCLS XFD Division to define the Team Leader roles as we move into operation. We are also cooperating on involving the expanded user community in future instrument decisions.	
CD2-R1.1-3	3. Approve CD-2 for LUSI project	No comment needed		
<b>Project Management Comments</b>				
CD2-C1.1-1	1. CD-4 deliverables in draft PEP are too ambiguous regarding acceptance criteria and handoff from LUSI to LCLS operations	The project has clarified CD-4 deliverables. Hand-off to LCLS operations will follow the same procedures developed for the LCLS-AMO instrument. LUSI is working with LCLS Photon Operations to develop these procedures.	This effort is continuing. LUSI/LCLS coordination meetings occur every two weeks.	
CD2-C1.1-2	2. Structure of CD-3 and CD-4 milestones may limit flexibility of project to respond to science needs	The CD-3 and CD-4 milestones have been redefined. There is now only one CD-3 and one CD-4. Appropriate Level 2 milestones for instrument early science and advance procurements are used to increase the flexibility of the project to respond to science needs.	Action Complete - although LUSI is evaluating additional L2 milestones to properly track advanced progress allowed by the ARRA funding	
CD2-C1.1-3	3. Scope contingency [up or down] should be well documented and socialized with all LUSI stakeholders	LUSI will prepare the scope contingency and it will be discussed at the Team Leader meetings in October	Scope contingency items were discussed at the October meetings. LUSI has started incorporating some of the scope adds identified as a result of these meetings.	
CD2-C1.1-4	4. Plan for design reviews is well thought out reviews are in an early state and will need follow through on recommendations should include external reviewers and a diverse mix of engineering and physics participation	Responses to the design review comments have been documented. Appropriate mixtures of engineering and physics participation will be included in future reviews.	We have conducted a number of design reviews since CD-2. There is formal documentation for these.	