PHOTON SCIENCE at STANFORD LINEAR ACCELERATOR CENTER

LUSI LCLS Ultrafast Science Instruments

DESIGN REVIEW REPORT	Report No. TR-391-003-21-0

The Design Review Report Shall include at a minimum:

- The title of the item or system;
- A description of the item;
- Design Review Report Number;
- The type of design review;
- The date of the review;
- The names of the presenters
- The names, institutions and department of the reviewers
- The names of all the attendees (attach sign-in sheet)
- Completed Design Checklist.
- Findings/List of Action Items – these are items that require formal action and closure in writing for the review to be approved. See SLAC Document AP-391-000-59 for LUSI Design Review Guidelines.
- Concerns – these are comments that require action by the design/engineering team, but a response is not required to approve the review
- Observations – these are general comments and require no response

TYPE OF REVIEW: Preliminary Design Review

WBS: 1.5 Diagnostics Common Optics

Title of the Review	Profile Monitor and Wavefront Monitor, Optics Preliminary Design Review	
Presented By:	Yiping Feng,	
Report Prepared By:	Sebastien Boutet	**Date:**02-10-09
Reviewers/Lab :	Bill White – SLAC Sebastien Boutet – SLAC	
Distribution:		
Attachments:	☐Review Slides ☐Design Checklist ☐Calculations ☐Other	

Purpose/Goal of the Review:
Assess the validity of the optical components to be used in the LUSI diagnostics devices

Introduction and outcome summary of the review:
The optical components of the LUSI diagnostics were presented with calculations validating the technical choices. All the options chosen by the LUSI group seemed valid and the committee recommends continuing to the final design.

Findings/Action Items:
The LUSI group should communicate with the in-vacuum mirror vendor to determine if the proposed mirror is vacuum compatible and can be delivered clean and ready for vacuum.

The LUSI group should determine whether a high quality vacuum window is truly necessary. It is unclear if one truly needs such a window for which design work and fabrication would be required to mount the window in a flange. The LUSI group should investigate the use of standard pre-mounted window flanges available commercially.

The LUSI group should communicate with the vacuum window vendor to determine if they can be provided with coating,

Concerns:

The vacuum window will bow under vacuum forces. It should be determined whether such bowing will cause image distortions that will prevent the specifications from being met.

Observations:
Except for the profile monitor, the 120 Hz readout rate of the CCD camera is not necessary. However, using a common camera for every device is a valid option to simplify the controls requirements.

The cable length on Cameralink devices is limited. It should be verified that is can be long enough for the LUSI needs without the need to use a fiber.

Placing a resolution test pattern on the YAG screen is a good idea and can be achieved using a FIB. Alternatively, one could mount a standard military test pattern next to the YAG. However,

this brings some depth of field issues and the YAG screen and test patterns would have to be well-aligned.

The concept presented, a YAG screen at normal incidence with a 45 degree mirror is valid and the committee recommends using this design. However, it may be possible to improve the resolution with a thinner scintillator, possibly coating a surface placed at 45 degrees in the beam. The committee recommends pursing this option in parallel for possible future improvements of the system.

Response to Findings/Action Items:

The LUSI group should communicate with the in-vacuum mirror vendor to determine if the proposed mirror is vacuum compatible and can be delivered clean and ready for vacuum.
Response: DCO will confirm with the mirror vendor for vacuum compatibility issues.

The LUSI group should determine whether a high quality vacuum window is truly necessary. It is unclear if one truly needs such a window for which design work and fabrication would be required to mount the window in a flange. The LUSI group should investigate the use of standard pre-mounted window flanges available commercially.
Response: DCO will confirm the requirements by simulation. XTOD group responsible for the LCLS FEE also specified similar windows for their direct imager based on their simulations. We'll compare our findings with them.

The LUSI group should communicate with the vacuum window vendor to determine if they can be provided with coating.
Response: DCO will communicate with the window vendor to address any coating issues. Antireflective coatings are available in the ADC and VG Scienta viewport product line.