DESIGN REVIEW REPORT	Report No. TR-391-003-29

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: 1.4 X-ray Correlation Spectroscopy

Title of the Review	XCS Large Angle Detector Mover Upper Assemblies (WBS 1.4.4.3)	
Presented By:	Michael Kosovsky / SLAC Eric Bong / SLAC	
Report Prepared By:	Richard F Boyce / SLAC	**Date:** 14 May 2009
Reviewers/Lab :	Richard F Boyce / SLAC RFB Michael Holmes / SLAC MRH	
Attending:	Scott Debarger / SLAC - Left early	
Distribution:		
Attachments:	☒ Review Slides ☐ Design Checklist ☐ Calculations ☐ Other	

Purpose/Goal of the Review:

1) Assess the completion of requirements and specification documents that pertain to the Large Angle Mover upper assemblies (those assemblies which mount on top of the mover carriage)

2) Determine if preliminary design is complete:
   A. The method of solution has been determined.
   B. The described method of solution is likely to satisfy mechanical requirements.
   C. Vendor components have been identified.
   D. Vacuum performance is understood.

3) Verify cost estimate is up to date.

4) Assess whether schedule is reasonable.

Introduction and outcome summary of the review:

The XCS Large Angle Detector Mover positions a pixilated detector at a distance of 8 m , through an arc of -1 deg to 55 deg. On top of the main mover carriage is an evacuated transport, a beam-core stopper module and a detector fine-position stage. The assemblies include vacuum, mechanical mounting and position, precision alignment stages, in-vacuum precision motion feed-throughs and in-air precision translation stages. The design also incorporates provision to reconfigure the arrangement of components. The Physics requirement Document and Engineering Specifications have been released and are on SODA: SP-391-001-33 and SP-391-001-31.

In summary, the review committee recommends that the XCS team addresses the concerns contained in this report and continues work towards an FDR of this system with a focus on safety, and table motion. There were no long lead items identified.

Findings/Action Items:

None

Concerns:

Window safety will probably need to be reviewed by HEEC.

Need Machine Protection System to protect the Detector from the hot spot.

The nose may hit parts close to the sample holder or defractometer.

The table may interfere with the adjacent CXI beamline during movement.

Alignment detector needs to be able to move to both the 4 meter and 8 meter configurations.

Turbo pump may cause vibration.

P3 design finish date looks too early.

Observations:

Windows
- Small window - diamond, large window - kapton.
- Thickness unknown at review.
- Other window materials may be possibilities.
- What is failure result if punctured - slow leak or complete rupture?
- Could the pipe be filled with HE to reduce pressure across the windows?
  - (Would have to confirm only He in pipe.)
- May have to vent the pipe while working around it.

Detector protection
- Beam stopper and stalk need more work, as noted in the presentation.
- Stoppers have not been reviewed,
  - Detector protection should be a large focus of that PDR.
- Is it possible to use a detector with a hole in the center.
  - (Like the CXI detector instead of using adjustable stoppers?)

Nose piece
- A circuit contact sensor to the sample holder may be needed.
- This also may be needed for the defractometer as well?

Table motion
- Table will nominally have 2 "focus points."
  - One on CXI beamline, one on XCS beamline.
- Will need software control of the table motion to prevent a collision.

Alignment detector
- Maybe mount the alignment detector (photodiode) on the Detector stage.
- Maybe rotate the Detector stage if it makes more room.

Turbo pump
- A gate valve may need to be added and the pump turned off.
  - (May need to determine controls logic for regular operations.)
- Might add an ion pump.
  - (Not if the chamber is vented whenever hutch doors are open.)
- Do you vent whenever the hutch doors are open?
  - May need to add automated vent valve to air.

P3 schedule
- Adjust the schedule to present design schedule.
- Installation goal has moved up by a year from May 2012, to May 2011.
- Concentrate on the mover procurement which is not part of this review.

Pressure safety should not need a review.
Keep the pressure between vacuum to +15 psi.
Burst disc might be replaced with a 1-2 psi pressure relief valve.
It is anticipated that the chamber will be vented with atmospheric air.
(e.g. no pressure sources like bottled nitrogen.)
(It is still recommended that HEEC analyzes failures of the windows as a safety concern.)

The structure may need to be reviewed by the SLAC Earthquake Committee.

Budget seems OK.

Representative(s) from controls group should attend future PDRs and FDRs.

Gap from detector to large window may need to be checked.
(Need to minimize air gap for best possible signal?)

Experimenters may need to monitor the pipe vacuum readout.

Chamber 12 inch vacuum flange may be stressed when made up.
Procedure to adjust the 6 struts, add compliance, and bellows.

Rigging points on the removable pipe need to be closer to the middle.
Two lift points are probably enough.

Need lock nuts on the pipe location adjustment screws.
Loosen one side only so locked position screws hold their setting.

Defractometer purchase req has already been submitted.

Detector will be from BNL.

Main table has not yet had a PDR.

It is anticipated the main top frame will be a vendor-supplied item.

FDR of this PDR is anticipated to be in ~2 months.