MEETING REPORT	Report No. TR-391-003-11	
MEETING DESCRIPTION: XCS Instrument Team Leader Meeting		
WBS: 1.4 X-ray Correlation Spectroscopy		
Organized By:	Aymeric Robert	
Report Prepared By:	A Robert	**Date:** 1 December 2008
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Attachments:	☐ Slides ☐ Other ☐ Calculations ☐ Other	

Report on proposed new monochromatization scheme for the XCS Instrument
XCS Team Leaders meeting
October 19, 2008

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1. Move the large-offset and split/delay from about 200m upstream of experiment to about 40m upstream of experiment

A more detailed evaluation of the optical requirements supports this move. A position closer to the experiment will reduce the required angular stability. For example, at the larger distance, the required angular stability of the output beam was < 1 urad due to the accuracy of pointing needed to illuminate the entrance slit at the experiment. At the smaller distance, the angular stability requirement is only due to required angular resolution of the experiment (< 5 urad).

The new location also increases stability by locating the large-offset mono and pulse spit/delay on the same concrete floor slab as the experiment, and improves access to the equipment from the experimental station.

The new location maintains the needed distance of at least twice the length of the detector arm to allow the option of wavefront-division optical schemes in the pulse split/delay.

The new location will reduce cost significantly by reducing the required length of the second beam pipe downstream of the large offset mono.

We discussed the fact that the new location will move the pick-off point for the XCS experiment downstream of that for the HEDS experiment. This was not viewed as a significant problem, since we understand that the HEDS experiment will typically require beam only intermittently, with a small duty cycle, and its mirror will be designed to quickly move in and out.

We therefore endorse moving the large-offset monochromator to the new location.

2. Adding post-monochromator to scope

Many experiments will need to control the longitudinal coherence length by using higher-order reflections in the mono

It is more advantageous to have a post-monochromator for flexible installation of multiple crystals, rather than changing crystals in the large-offset mono.

Such a double-crystal monochromator is commercially available, and could be procured immediately for initial use in providing monochromatic beam to all of the early hard x-ray experiments. This will be extremely important for the scientific program. In particular, this will allow the early commissioning of the XCS experiments with the required monochromatic beam prior to the availability of the large-offset monochromator. All of the other XCS beamline components are compatible with operation in the in-line configuration without the large-offset monochromator.

We therefore endorse the concept of adding to the scope a double-crystal, small-vertical-offset monochromator with either multiple or easily changeable crystals.

3. Summary

The cost of the post monochromator (2) should be significantly less than the cost savings associated with moving the location of the large offset monochromator downstream (1). Thus the net result of these changes will be to improve performance, improve capability, and making monochromatic x-ray beam available earlier to experiments, while decreasing cost.

Report on large offset mono specifications (Supplement)
XCS Team Leaders meeting
October 19, 2008

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Large offset mono specifications

It is desirable to design the large offset monochromator to reach 6-25 keV with Si 111 crystals, to provide wide bandwidth over the full energy range for the fraction of the experiments that can use it.

The engineers should consider the potential cost savings or other benefits of reducing the large offset mono length by instead working with Si 220 crystals, without compromising the 25 keV upper end of the energy range. This would reduce the intensity available to those experiments that can use the full Si 111 bandwidth, which would need to be balanced against the potential benefits.