High heat load test facility

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The constant push for higher beam currents and x-ray flux is somewhat futile if the cooling of our optical components cannot match the increases. Much effort has been put into the development of a facility to promote the testing of both CHESS and outside user's optics. As third generation sources are coming on line, there is a pressing need for a test facility equipped to develop crystal optics before they are required for operation. The wiggler sources at CHESS can provide high power densities as well as large total power for the testing of heat loaded optics. A toroidal, doubly-focused mirror being built in collaboration with APS has been delayed due to supplier difficulties, but when installed on the A2 beamline the mirror will provide focused beams that rival the intensities available at 3rd generation sources.

A recently acquired infrared video imaging system is available for collaborative development efforts (see Fig. 2 in previous article). The FSI IQ812 system has been used extensively for in-house diagnostics and was recently used successfully by the APS Optics Group led by Dr. Dennis Mills to image their pin-post monochromator tested on F2. The system can provide video rate infrared images of surfaces from room temperature to 500ºC and store the images to video tape or to a computer file for later analysis. The detector used is optimized for operation in the 8-12 μm wavelength range, good for imaging silicon. Infrared imaging provides another tool for understanding the response of heat loaded optics and allows direct comparisons to finite element computer models of the components. In addition chilled, demineralized water and liquid nitrogen for use as a cooling medium are readily available.

CHESS has frequently supported high heat load (HHL) testing in the past. With higher machine currents, better equipment, and greater demands in the synchrotron radiation community and optics manufacture industry, CHESS will continue to serve the wide range of HHL users for many years to come. For further information please contact Karl Smolenski (255-0915) or Qun Shen (255-0923).