## An X-ray Chopper for Time-resolved Crystallography

<u>Shamus Husheer</u><sup>a</sup>, Katharine Bowes<sup>a</sup>, Jacqueline Cole<sup>a</sup>, Trevor Rayment<sup>a</sup>, Simon Teat<sup>b</sup>, John Warren<sup>c</sup>, Graham Bushnell-Wye<sup>c</sup>, Paul Raithby<sup>d</sup>, <sup>a</sup>Department of Chemistry, University of Cambridge, UK. <sup>b</sup>DIAMOND Light Source Ltd, Oxford, UK. <sup>c</sup>CCLRC Daresbury Laboratory, Warrington, UK. <sup>d</sup>Department of Chemistry, University of Bath, UK. E-mail: slgh2@cam.ac.uk

A chopper has been developed for time-resolved (pump-probe) xray crystallography, with pulse lengths continuously adjustable from DIAMOND single bunch extraction ( $3\mu$ sec) to 45% of rotation time (45msec at 10Hz). Rotation frequency can be DC to 50Hz. This allows access to all time windows from hours to picoseconds. The chopper transmits 0.002% of flux at 25KeV (0.5Å), with improved blocking at lower energy. The chopper can be phase-locked to the synchrotron bunch clock, and includes an on-board digital delay (waveform) generator with 10ns resolution and 16 channels of output for triggering lasers, gating high-speed electronics, etc. The chopper is controlled via an RS232 interface to Windows PC software, with all high-speed electronic processing being performed by a Field Programmable Gate Array (FPGA).

The parameters for chopper design are presented, and the overall mechanical operation, along with the control electronics and logic. Results of initial testing at Daresbury station 9.8 are provided, as well as opening time jitter and accuracy measured to verify single bunch extraction at DIAMOND.

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