



ESRF

Experiment title: Picosecond time-resolved investigation of photoinduced structural changes in photoactive yellow protein.

Experiment number:
LS 948

Beamline:

ID9

Date of experiment:

from: 11 July 1998

to: 19 July 1998

Date of report:

20 February 1999

Shifts:

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Report:

In the July 1998 experiment LS948 we attempted to collect high quality ps time-resolved Laue crystallographic data on the photocycle of photoactive yellow protein. For these studies we used the W70 wiggler and the U26 undulator in hybrid 2/3 filling mode. The photocycle of PYP is a reversible process and therefore allows signal averaging by repeated crystal photolysis where repeated X-ray exposures are accumulated on the CCD detector prior to read-out. We collected two data sets on crystals in the dark with shutters phase locked to the hybrid mode "super-bunch." One dark data set was a series of 4 exposures every 0.5° over 60° using the U26 undulator and the other was a series of 4 exposures every 2° over 60° using the W70 wiggler. One data set was collected with a 150ps delay after laser excitation using the W70 wiggler with shutters phase locked on the single bunch. We excited the sample with 400 nm light from a fs Ti sapphire laser at 1 Hz to allow for sample recovery between exposures. 80 exposures were collected on the detector prior to CCD readout. All three of the collected data sets were highly redundant but the undulator set lacked completeness due to limited time during the experimental run. The wiggler data sets were processed and used to calculate $|F_{\text{laser}}| - |F_{\text{dark}}|$ difference Fourier maps. These maps did not reveal clear chemically plausible signal. We believe that this is due to insufficient laser excitation due to the large dimensions of the crystal that was used.