ESRF	**Experiment title:** Picosecond time-resolved investigation of photoinduced structural changes in photoactive yellow protein.	**Experiment number:** LS 1280
Beamline: ID9	**Date of experiment:** from: 30 June 1999 to: 2 July 1999	**Date of report:** 30 August 1999
Shifts:	**Local contact(s):** Michael Wulff	*Received at ESRF:*

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Report:

In the July 1999 experiment LS1280 we attempted to collect picosecond time-resolved crystallographic Laue data on the photocycle of photoactive yellow protein. A similar experiment was performed in July of 1998 (LS948). The laser output was maximized to produce 80μJ laser pulses, which was better than the ~50μJ used in the unsuccessful LS948 experiment. The present experiment used the W70 wiggler and the U46 undulator in series with single bunch filling mode. We collected five data sets with delays of 130ps, 430ps, 800ps, 1ns, and 12ns after laser excitation. The 12ns delay data set served as a positive control since data has been successfully processed at this time delay in a nanosecond laser experiment. A single Laue image was composed of 25 to 50 exposures collected on the detector prior to CCD readout. We excited the sample with 407nm light from a femtosecond Ti sapphire laser; a 5 second delay was given between exposures to allow for sample recovery. Dark images were collected in between the photoexcited images to give a reference data set on the same crystal. Images were collected every 2° over 60°. Two data sets at the 130ps and 12ns time delays have been processed. Both data sets contain excellent crystallographic data that is complete to 1.7Å. The $|F_{laser}| - |F_{dark}|$ difference Fourier maps contain no signal, photoactivation did not occur to a sufficient extent in the crystals. We felt that the LS948 experiment last year was unsuccessful because of problems aligning the laser beam at the crystal, and the use of crystals without sufficient diffraction volume. For the LS1280 experiment, the alignment problems were solved and crystals were of the size that was sufficient to produce interpretable $|F_{laser}| - |F_{dark}|$ difference Fourier maps in our past nanosecond laser experiments. The main problem faced with the present experiment was the number of photons produced by the femtosecond laser. We have come to the conclusion that at this time the femtosecond laser pulses do not contain enough photons to sufficiently photoactivate a PYP crystal of the dimensions necessary to produce an interpretable data set.