ESRF	**Experiment** title: Nanosecond time-resolved investigation of photoinduced structural changes in photoactive yellow protein.	**Experiment number:** LS 805
Beamline: ID9	**Date of experiment:** from: 24 September 1997 to: 1 October 1997	**Date of report:** 14 January 1998
Shifts: 3 sb+3 2/3fill	**Local contact(s):** Michael Wulff	*Received at ESRF:* 02 MAR. 1998

Names and affiliations of applicants (* indicates experimentalists):

Keith Moffat, Ben Perman*, Vukica Srajer, Spencer Anderson, Zhong Ren, Tsu-yi Teng*,
Claude Pradervand
University of Chicago / CARS , Chicago, IL, USA
Michael Wulff*, Dominique Bourgeois*, Friedrich Schotte
ESRF, Grenoble, France
Thomas Ursby
Lund University, Lund, Sweden
Klaas Hellingwerf*, Remco Kort
University of Amsterdam, Amsterdam, The Netherlands

Report:

In the September 1997 experiment LS805 we continued to collect high quality ns time-resolved Laue crystallographic data on the photocycle of photoactive yellow protein. We used 485 nm light from a dye laser pumped by the third harmonic of a ns Nd:YAG laser. According to experiments conducted prior to the run, this improved the fraction of photoactivated molecules in the crystal over earlier studies (LS540, November 1996) in which 495 nm light was chosen. For these studies we used wiggler W70 and undularor U46 in series in single bunch mode and wiggler W70 alone in hybrid mode. The photocycle of PYP is a reversible process and therefore, in principle, allows signal averaging by repeated crystal photolysis where the repeated X-ray exposures are accumulated on the CCD detector prior to read-out. This strategy acquired highly redundant data sets at a few individual time points. In LS805 we sought to collect data that was more complete in the time course of the reaction. To do this 76 images at different laser - X-ray delay times between 1 ns and 3 ms were recorded for 6 unique crystal orientations. The resulting data, although less complete in reciprocal space are more complete in time. The major goal of this type of experiment is to better understand the crystalline kinetics of PYP so that the occupancies of unique states are known for all times. One can then collect data at delay times for which certain intermediates are at a maximal occupancy. We have already initiated data reduction of the LS 805 data.

Several highly successful runs at beamline DO9 have generated a large backlog of data and we therefore do not request more beamtime in this reviewing cycle.