# Report for the short visit Ref 1443

In September 2006, Jérémie Léonard, from IPCMS Strasbourg, visited for 5 days the group of Prof. Majed Chergui at EPFL, Lausanne from the 25th to the 29th. The aim of the visit was to help Dr Erwin Portuondo to take over new series of ultrafast spectroscopic measruments on bacteriorhodopsin (bR) proteins and mutants, after the new, unexpected results had been recorded in june by J. Leonard. The main purposes of the visit were :

1) prepare and use a thinner flow cell in order to improve the time resolution of the experiment.
2) Possibly achieve a better time resolution with the new cell.
3) Prepare fresh protein samples ready to use for the spectroscopic measurement, so that Dr E. Protuondo could continue the measurments and compare the behavior of the wild type bR with two mutants : W86F and W182F.

J. Leonard did update the flow cell so that the spectroscopy of the sample would be done on a solution film of 100-micron thickness. The resulting time response was measured by monitoring the « step-like » dynamical behaviour of Sulforhodamin (see Figure 1). Fresh samples were prepared, and characterised (by measuring their static absorption spectra). A new set of measurements was started with fresh samples in the updated flow cell.

Figure 1 displays the transient absorption spectra of wild-type bR in a 200-micron and in a 100-micron flow cell, as compared to that of sulforhodamin in a 100-micron thick flow cell. Reducing the path length of pump and probe pulses in the solution under study reduces the effect of group velocity mismatch which limits the time resolution in the experiment. Figure 1 shows that the rise time of the bR transient is limited by the temporal resolution in a 200-micron thick flow cell. It demontrates that this rise time is faster than has been claimed in the past. However, the comparison to the rise time of sulforhodamin in the same flow-cell is slightly faster, which indicates that a non-instantaneous component might be present in the rise of the bR transient as was stated earlier.

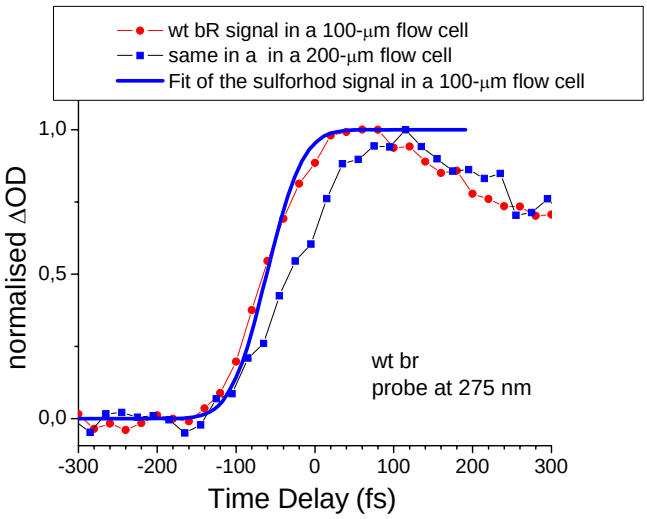


**Figure 1**

Based on these new important observations Dr. E. Purtuondo will continue the measurement while changing the probe wavelength as well as the relative orientation of pump and probe polarisation axes. Our understanding of the mechanisms responsible of these transient absorption signals is weakened by the new measurements of J. Leonard, and additional measurements should lead to a better understanding, and eventually an improved model.