Project description

**Title:** Proton translocation in the light-driven inward pump Xenorhodopsin  
**PI:** Joachim Heberle (FU)  
**In collaboration with:** Rumiana Dimova (MPIKG)

**Project description:** Ion gradients across the cell membrane drive the synthesis of ATP. In several archaea, bacteria and unicellular eukaryotes these ion gradients are generated by light-driven rhodopsins. Recently, a new class of bacterial rhodopsins, named Xenorhodopsin (XeR), has been discovered. Contrary to the extensively studied outward-pumping bacteriorhodopsin (bR), XeRs exhibit a unique inwardly directed proton-pumping activity. Electrophysiological measurements show, that XeRs might be promising candidates for novel optogenetic applications. [1]

In this project, XeR (Fig. 1) shall be investigated by time-resolved infrared difference spectroscopy [2] to elucidate the structural determinants that account for the inward proton pumping. Mutagenesis will be applied to point out the role of single amino acids involved in the pumping process. As XeRs are membrane proteins, proton translocation will be studied after reconstitution in a synthetic membrane system (GUVs; giant unilamellar vesicles) by fluorescence microscopy in cooperation with the group of Dr. Dimova.

**Required background:** Profound background in experimental biophysics or physical chemistry, especially (time-resolved) spectroscopy. Experience in protein expression and purification will be an advantage.

**Paper to read before the interview:**

**Contact:** jheberle@zedat.fu-berlin.de; dimova@mpikg.mpg.de