



PhD Fellowship: Ion Channel Engineering and Optogenetics

Engineering of light-controlled membrane proteins for optogenetics and synthetic biology

With the advent of Optogenetics in the last decade, the control of living tissues by light is becoming a real alternative to pharmaceutical or electrical methods. Optogenetics relied initially on light-driven channels and transporters from lower organisms, but is now expanding toward more relevant human proteins. Following this movement, our project aims at modifying natural ion channels and G-protein coupled receptors to render them light-sensitive. The strategy will consist in attaching photosensitive molecules to the proteins in order to change their conformation upon illumination. Attachment points will be identified by molecular dynamics simulation. Experimental tests will be conducted on engineered proteins expressed in model cells and characterized by biophysical techniques.

The target proteins, already studied in the team, will be the ATP-sensitive potassium channel Kir6.2, the G-protein activated potassium channel Kir3, and the opioid receptor DOR.

The project will provide useful tools for basic and applied research in optogenetics and synthetic biology, and serve to establish a framework for designing light-sensitive membrane proteins.

Location. The thesis will take place in the Channels group within the Institute for Structural Biology (<http://www.ibs.fr/groups/channels-group>). The Channels group focuses on the structure and function of ion channels and receptors.

IBS is a renowned institute in the field of structural and molecular biology. It is part of the Grenoble scientific polygon with numerous research institutes and colleges as well as several large instruments such as the European Synchrotron. The site offers a stimulating scientific environment in the natural surroundings of the French Alps.

Candidate. Strong academic credentials and communication skills. Experience or interest in neuroscience or electrophysiology. The granting agency (CEA) will only consider candidates under 25 years old (*Exemptions possible to account for specific university curricula*) with top-tier academic records. There are no other restrictive conditions and foreigners can, and should, apply. The working language in the lab is English.

Position. The position is funded by CEA. Starting date will be October 2018 with some flexibility. Salary is competitive for a French PhD (>1500 €/month + benefits).

Application. Send a short CV, including grades and rankings when available, and the email addresses of two references to Dr Michel Vivaudou (e-mail: vivaudou@ibs.fr).