UFR de Chimie et de Biologie
UNIVERSITÉ Grenoble Alpes

**Master's degree in Biology – Chemistry-Biology Department**

# Master 2 internship project
# Year 2019-2020

**Laboratory/Institute:** IBS
**Team:** Membrane Group/Moreau
**Director:** W. Weissenhorn
**Head of the team:** C. Moreau

**Name and status of the scientist in charge of the project:** C. Moreau **HDR: yes** ☒ **no** ☐
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**Program of the Master's degree in Biology:**

☐ Immunology, Microbiology, Infectious Diseases ☒ Integrative Structural Biology
☐ Physiology, Epigenetics, Differentiation, Cancer ☐ Neurosciences and Neurobiology
☐ Planta International

**Title of the project: Development of innovative protein-based biosensors using a high-throughput functional screening method.**

## Objectives (up to 3 lines):

The objective of the internship is to develop a new approach for the easy and efficient design of innovative biosensors. These biosensors require delicate protein engineering for creating functional artificial proteins. To facilitate it, a yeast-based screening method will be developed and extended to numerous biosensors

## Abstract (up to 10 lines):

The team created innovative biosensors by attaching membrane receptors (G protein-coupled receptors) to an ion channel. These Ion Channel-Coupled Receptor (ICCR) biosensors generate an electrical signal when the fused receptor recognizes its ligands. Thanks to the electrical nature of the signal, these biosensors can be integrated in micro- or nano-electronic systems. Thus, several original applications are in development notably a project of electronic noses in collaboration with two laboratories of the Seoul National University (South Korea). To facilitate and accelerate the design of these biosensors, an original approach is under development using a yeast-based functional screening. In tandem with a post-doctoral fellow, the M2 student will participate to this project and will learn original techniques not only in high-throughput screening but also in molecular biology and electrophysiology.

## Methods (up to 3 lines):

The methods used during the internship will be in the fields of 1) Molecular Biology for the design of cDNA libraries of biosensors; 2) High-Throughput Screening (HTS) with yeast strains; and 3) Electrophysiology with a robot for automated recordings of functional biosensors.

## Up to 3 relevant publications of the team:

1) Moreau *et al.* Coupling ion channels to receptors for biomolecule sensing. *Nat Nanotechnol* **3**, 620-625
2) Principalli *et al.* Functional mapping of the N-terminal arginine cluster and C-terminal acidic residues of Kir6.2 hannel fused to a G protein-coupled receptor. *Bba-Biomembranes* **1859**, 2144-2153,
3) Moreau *et al.* Tuning the allosteric regulation of artificial muscarinic and dopaminergic ligand-gated potassium channels by protein engineering of G protein-coupled receptors. *Sci Rep-Uk* **7**, 41154

## Requested domains of expertise (up to 5 keywords):

No particular expertise is required.