Master de Sciences et Technologies
Mention Biologie Intégrative et Physiologie
Parcours : Neurosciences
Responsable : Professeur Régis Lambert

# Internship Proposal
# Academic Year 2019-2020

## 1. Host team :

Research Unit (e.g. Department or Institute) : Institut de la Vision
Research Unit Director : SAHEL José-Alain
Research Team Director : PICAUD Serge
Team name : Retinal information processing, pharmacology and pathology

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## 2. Internship project title:

***Uncovering the role of inhibitory cells in the retinal circuit***

## 3. Internship Description :

Over the last decade, many studies have made clear that the retina, this thin piece of tissue in the back of the eye, is much more than a camera. The light is transduced into electrical activity by the photoreceptors. The signal is then propagated through an intermediate layer of excitatory cells, the bipolar cells, which transfer their signals to the ganglion cells, the output of the retina. In parallel, interneurons called horizontal cells and amacrine cells propagate the neural signal laterally across the retinal circuit.

Amacrine cells can be divided in many different types, and for most of them, it is unclear how they contribute to the computations performed by ganglion cells. This is mostly because many of them are in the intermediate layers of the retina, which are difficult to access with standard electrophysiological techniques. Recently we have designed a novel tool to stimulate individual cells with optogenetics and 2 photon stimulation (a technique called holographic stimulation), while recording the impact large population of ganglion cells using large multi-electrode arrays (MEAs).

The purpose of the project is to use this tool to stimulate a specific type of amacrine cell, located in a deep layer of the retina, and uncovers its role in modulating the activity of ganglion cells. The student will learn how to combine 2 photon stimulation and MEA techniques in a single experiment, will perform experiments where single amacrine cells will activated or inhibited with our tool, and will measure the impact of this stimulation on ganglion cells. This work could have an impact beyond the retina, as understanding the role of inhibitory cells in sensory processing is a central problem in neuroscience.