

Internship Proposal Academic Year 2018-2019

1. Host team:

Research Unit (e.g. Department or Institute): Institut de Biologie de l'Ecole Normale Supérieure, Paris

Research Unit Director : Antoine Triller

Research Team Director : Clément Léna/Daniela Popa

Team name : Neurophysiology of Brain Circuits

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2. Internship project title: Physiology and pathophysiology of motor circuits

3. Internship Description :

The cerebellum contains more than half of the neurons in the brain and it is one of the largest cerebral structures. The cerebellum has been compared to an adaptive filter, able to finely tune the actions of the body to the environment. The operations performed in its circuit have been analyzed for elementary reflexes (eyeblink conditioning, vestibulo-ocular reflex, etc...). However, the largest part of the cerebellum is engaged in a dialogue with the major anterior brain structures (thalamus, cortex, basal ganglia). Moreover, there is clinical evidence that this dialog is disrupted in a large number of neurological diseases. However, it is currently unclear how our knowledge of cerebellar function can be extended to the cerebello-cortical dialog.

Our goal is to understand the nature and the function of the communication between the cerebellum and the forebrain. Our work focuses on cellular physiology and integrated network activity, particularly in the cerebello-cortical motor circuits. We are particularly interested in deciphering the interactions between the different structures that link the cerebellum to the cortex in normal and pathological conditions. To address this question, we use a variety of techniques including chemogenetics, optogenetics, *in vivo* electrophysiology in behaving animals, anatomical tracing, etc ... We also make use of advanced signal processing and analysis of network activity.

We wish to host an M2 student in the team for the 2018-2019 academic year. This internship will focus on the physiology and/or physiopathology of the cerebello-forebrain loops that we recently identified and described. The student will analyze the physiological and behavioral impact of targeted optogenetic stimulations in these loops. He/she will receive training in the experimental procedures and perform surgeries, recordings, behavioral experiments and data analysis.