

## The Wyart team “Spinal Sensory Signalling” at ICM is recruiting a Master student with a possible extension to PhD position

### **AUTOMATED DETECTION OF MANEUVERS AND POSTURE IN A GENETIC MODEL ORGANISM**

6 months internship during the school year 2018-2019 - **Paris 13<sup>ème</sup>**

*The Institut du Cerveau et de la Moelle épinière is a private foundation which objective is fundamental and clinical research of the nervous system. United in one site, 600 researchers, engineers and clinicians cover most of the disciplines in neurosciences, neurology and psychiatry with the aim to accelerate discoveries in brain functions, and developments of treatment of neurological diseases.*



### **DESCRIPTION OF THE TEAM**



**THE TEAM.** THE WYART LAB INCLUDES 18 RESEARCHERS, 3 PIS, 6 POSTDOCS, 3 GRAD STUDENTS AND 1 FREELANCE CODER DEDICATED TO THE PROJECT: OLIVIER MIRAT (MIRAT ET AL., FRONTIERS IN NEURAL CIRCUITS 2013). THE TEAM RECEIVED A PROOF OF CONCEPT GRANT FROM THE EUROPEAN RESEARCH COUNCIL (ERC) IN OCTOBER 2018 TO FUND THIS PROJECT.

PLEASE CHECK <https://wyartlab.org>

### **INTERNSHIP DESCRIPTION**

Keywords: sensory-motor integration, locomotion, postural control

**THE PROJECT.** Discovery of new drugs and functions of genes involved in pain and neurological disease relies on efficient ways to screen effects on animal behavior that are relevant for humans. Zebrafish emerged in the last decade as an essential model for drug discovery as it is a low-cost genetic model organism whose genome shares 70% homology with human genes; well-suited to fast and high throughput investigation of genes and molecules involved in human diseases; an ideal platform to study genes and pathways of relevance to disease in humans.

However, the current state of the art in commercial analysis of zebrafish behavior is limited to the analysis of gross movement parameters based on automated identification of the head position where the fast kinematics indicative of specific types of motor defects cannot be resolved. However, a fine kinematic analysis efficiently performed over large population of animals is crucial to reliably quantify defects in strength, posture or speed in mutant animals with and without with drug treatment. This accuracy is critical for concluding on the effects of drugs and genes involved in motor and postural control or pain.

Our team has designed a new software for tracking and categorization of maneuvers for single larva and groups of zebrafish larvae. For this project, we aim to implement an automated method relying on deep networks to 1) automatically recognize each fish in a group and 2) identify the different types of maneuvers.

**ORGANIZATION OF THE INTERNSHIP.** THE INTERN WILL BE WORKING ON DATA GENERATED BY 3 POSTDOCS IN THE TEAM AND WILL HELP IMPROVE ZEBRAZOOM WITH THE HELP OF OLIVIER MIRAT AND CLAIRE WYART. ONE PROJECT OF INTEREST RELIES ON USING DEEP LEARNING TO AUTOMATICALLY RECOGNIZE LARVAE AND IDENTIFY THE TYPES OF MANEUVERS THAT THEY ARE PERFORMING.

**PROFILE.** STRONG CODING SKILLS, IDEALLY IN C++, PYTHON AND/OR MATLAB. KNOWLEDGE OF COMPUTER VISION, DATA SCIENCE AND MACHINE LEARNING METHODS IS A PLUS. ABILITY TO WRITE AND MAINTAIN CLEAN CODE, BE A TEAM PLAYER AND BE MINDFUL OF PRIORITIES. DESIRE TO WORK IN A DUAL COMPUTER SCIENCE / BIOLOGY ENVIRONMENT, BE EXPOSED TO THE CREATION OF A STARTUP. GOOD ENGLISH SKILLS.

**SKILLS TO DEVELOP AND/OR LEARN DURING THE INTERNSHIP.** NOTIONS ON MOTOR CONTROL AND POSTURAL CONTROL, IMAGE ANALYSIS, AUTOMATED IDENTIFICATION OF OBJECTS, AUTOMATED IDENTIFICATION OF MANEUVERS, MACHINE LEARNING, DEEP LEARNING.

Please send a motivation letter and CV to Claire Wyart, [claire.wyart@icm-institute.org](mailto:claire.wyart@icm-institute.org)