**Thesis Project Form**

**Title (tentative):** Development of analytical methods for neuronal population recordings

**Thesis advisor(s):** Massobrio Paolo, Tommaso Fellin; Valentina Pasquale

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**Description**

**Motivation and application domain**

The use of light to both control and read out neural activity is allowing to get unprecedented insight into how information is encoded in neuronal populations’ activity.

**General objectives and main activities**

Optogenetics, electrophysiology and imaging techniques can be successfully combined in comprehensive approaches to the study of brain micro-circuits, in particular to how the activity of individual cells contributes to network dynamics. The Optical Approaches to Brain Function Laboratory focuses its research on the development of innovative optical methods to probe brain micro-circuits and on the application of this technology to the understanding of networks’ function and dysfunction.

We are seeking for a student interested in Neuroscience research to be involved in the development of analytical tools for electrophysiological and/or optical neuronal recordings. Experimental paradigms combine imaging (two-photon scanning microscopy) and electrophysiology (patch-clamp and multi-channel extracellular recordings), together with optogenetics (single- and two-photon patterned excitation) and transgene expression technology (transgenic Cre-lox models and various gene delivery approaches).

**Training Objectives (technical/analytical tools, experimental methodologies)**

The student will be required to program in Matlab, including the design of GUIs and the application of state-of-the-art statistical analysis. He/she will also be required to interact with biologists and physicists to 1) design algorithms to answer to specific scientific questions 2) interpret obtained results in light of the applied experimental protocols.

**Place(s) where the thesis work will be carried out:** IIT, Optical Approaches to Brain Function Lab (www.iit.it/it/linee/optical-approaches-to-brain-function) - Via Morego, 30 – 16163 Genova

**Additional information**

**Pre-requisite abilities/skills:** Neuroengineering and Computational Neuroscience; Matlab programming skills

**Curriculum:** Bioengineering

**Maximum number of students:** 1

**Financial support/scholarship:** none