Title (tentative): Design and development of control software for optical patterned stimulation of brain micro-circuits

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Motivation and application domain
Optogenetics is progressively transforming neuroscience, allowing unprecedented possibility to activate specific cell sub-populations with precise optical stimulation patterns.

General objectives and main activities
Optogenetic techniques can be successfully applied to the study of brain micro-circuits, and in particular to how the activity of individual cells contributes to network dynamics. To do so, the Optical Approaches to Brain Function Laboratory focuses on the development of innovative optical methods to probe cortical micro-circuits’ function. In this context, we are seeking for a Bioengineering student interested in Neuroscience research to be involved in the programming of control software for Spatial Light Modulators (SLMs). SLMs are programmable devices allowing to modulate light both in space and time in order to design custom optical stimuli.

Training Objectives (technical/analytical tools, experimental methodologies)
The student will be required to program in Matlab, including the design of GUIs and the interfacing with SLM hardware and GPUs to speed up computation. He/she will also be required to interact with biologists and physicists to 1) design sw according to experimental needs and 2) test the sw during experimental sessions.

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

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

Curriculum: Bioengineering

Maximum number of students: 1

Financial support/scholarship: none