Title (tentative): Dynamics of neuronal excitability investigated by Optogenetics

Thesis advisor(s): Massobrio Paolo, Michele Giugliano

E-mail: Paolo.Massobrio@unige.it

Address: Via All'Opera Pia, 13 - 16145 Genova

Phone: (+39) 010 33 52761

### Description

**Motivation and application domain**

In 2010, a new protocol to study neuronal excitability over long time scales was proposed. It was shown that long-term neuronal excitability dynamics is unstable and dominated by critical fluctuations, scale-invariant rate statistics.

**General objectives and main activities**

The main goal of this thesis is to replace the electrical stimulation with wide-field Optogenetic stimulation in order to 1) increase the experimental throughput of excitability investigations, and 2) explore whether simultaneous whole-cell stimulation results in the similar phenomenology. The hypothesis to be rejected - by carrying out in vitro experimental recording and photo-stimulation - is that focused electrical stimulation and wide-field distributed photo activation might result in distinct interactions with neuronal excitability.

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

Within this thesis, the master student will make experiments with optogenetics set-up. In addition, the student will process and analyze the acquired data by developing ex novo and using computational algorithms.

**Place(s) where the thesis work will be carried out:** University of Antwerp (Belgium)

### Additional information

**Pre-requisite abilities/skills:** Computational Neuroscience, Neuroengineering

**Curriculum:** Bioengineering

**Maximum number of students:** 1

**Financial support/scholarship:** Possibile supporto da parte di Erasmus+