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

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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)

Pre-requisite abilities/skills: Computational Neuroscience, Neuroengineering

Curriculum: Bioengineering

Maximum number of students: 1

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