

## *Student Job / Studentische Hilfskraft* Reviving NERVLAB

### Project description:

The aim of this project is to revive the numerical tool NERVLAB (by Dr. Flehr). The program is based on the coupling of Maxwell's equations in Electro-Quasistatic (EQS) approximation to the Hodgkin-Huxley equations where the Finite Integration Technique (FIT) formulation is used for the EQS equation.

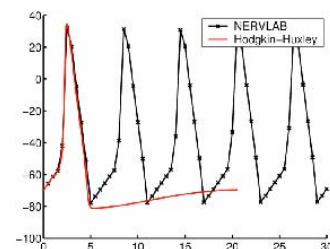
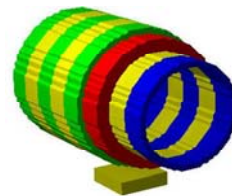
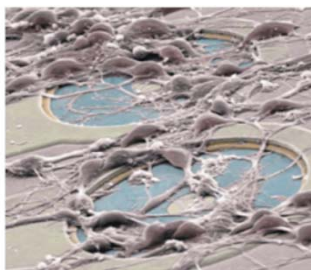


Fig. 1: (a) Neuronal network on the electrodes of Micro Electrode Array (MEA) (courtesy: Biophysics group, Uni-Rostock). (b) Simple 3D model of an axon close to an electrode (by Dr. Flehr). (c) Series of action potentials computed with code NERVLAB (developed by Dr. Flehr) compared to single action potential computed with Hodgkin-Huxley equations.

Students who are interested in working on this project should have

- interest in bio-electromagnetics
- good experience in programming with MATLAB®,
- good knowledge on electro-quasistatics, Finite Integration Technique (FIT), Finite Element Method (FEM)
- and the ability to solve problems in an autonomous manner.

### References:

1. J.Flehr, Simulation des extrazellulären elektrischen Feldes von Nervenzellen während eines Aktionspotentials, PhD Dissertation, Universität Rostock, 2006.