

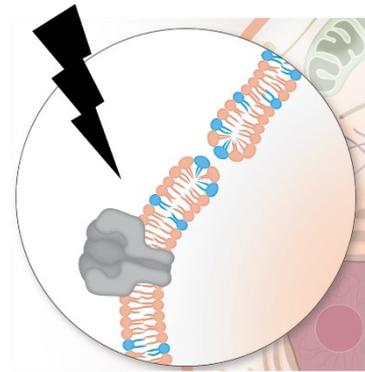
Two PhD positions on developing electroporation-based technologies and treatments at the University of Ljubljana in Slovenia

[University of Ljubljana](#) (UL) was founded in 1919 and is today the central and largest educational and research institution in Slovenia. UL implements and promotes basic, applied and developmental research and encourages interdisciplinary and multidisciplinary study, promotes critical thinking and educates top scientists to lead sustainable development.

This mission of the University is strongly reflected in our group [Laboratory of Biocybernetics](#). Major direction pursued in the research group is [cell membrane electroporation](#); namely, the group's research is focused on theoretical and experimental investigations of the basic biophysical mechanisms of electroporation, its applications in biology, biotechnology, and medicine, and development of electrodes and pulse delivery systems required to perform in vitro, in vivo, and clinical studies. The group is truly interdisciplinary and is composed of engineers, biologists, microbiologists and pharmacists working together and developing common language and understanding. The group is known for developing instruments and devices, conducting experiments on different levels of biological complexity (lipid bilayers, vesicles, cells, ex vivo tissues) and using modelling approaches to test fundamental understanding of the observed and studied phenomena.

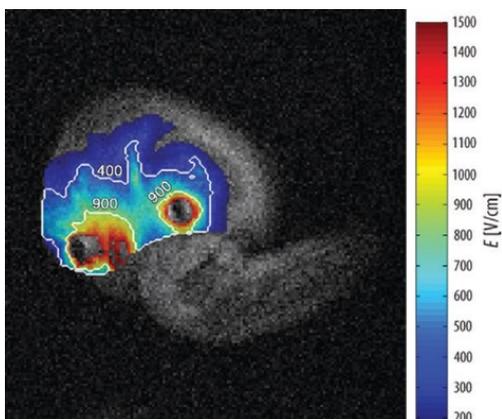
PhD Project 1: Mechanisms of electroporation

Electroporation is becoming widely used, but we are still lacking the knowledge on what happens during electroporation and how electroporation differs between cells, especially when we are considering excitable cells such as neurons or muscle cells. The project will be oriented towards gaining better understanding of the fundamental mechanisms of electroporation at the membrane and cellular level. The project will include one or more of the following research methods: molecular dynamics simulations of lipid bilayers and membrane proteins, numerical modeling of single-cell electroporation and associated molecular transport, in vitro experiments with cells or model lipid systems using various imaging techniques.



Supervisor: assistant professor dr. Lea Rems

PhD Project 2: Monitoring of electroporation



One of the most important conditions for successful electroporation is the exposure of cells or tissues to sufficiently high electric field, which is determined mainly by its electrical properties. However, due to limited availability of electrical properties of tissues, applicability of numerical predictions for electric field distribution are not always reliable. Therefore, new techniques for determining electric field distribution and electrical conductivity distribution of tissues are needed. The project will be focused on implementing magnetic resonance techniques for determining electric field and electrical conductivity of tissues. The project will include

one or more of the following research methods: MR imaging, post-processing of MR raw data, numerical modelling of tissue electroporation, preparation of various phantoms.

Supervisor: assistant professor dr. Matej Kranjc

Requirements

The four-year doctoral study will begin in the Academic Year 2021/22. Selected candidate will receive funding through the [Young Researchers](#) call, which will be issued by Slovenian research organizations in July 2021.

The doctoral candidate should preferably have a background in natural sciences or engineering. The candidate has to show an average grade for all examinations and coursework at bachelor's and master's degree (together with the assessment of diploma and master thesis) of at least 8,00 (out of 10). The age of the candidate should not exceed 28 years, unless the student has already concluded one or two years of postgraduate study without financial support. The raise of the age limit also applies in case of parental leave.

Application

Interested candidates should send their motivation letter and CV to dr. Lea Rems (lea.rems@fe.uni-lj.si) or to dr. Matej Kranjc (matej.kranjc@fe.uni-lj.si). Please contact us also for any further questions.