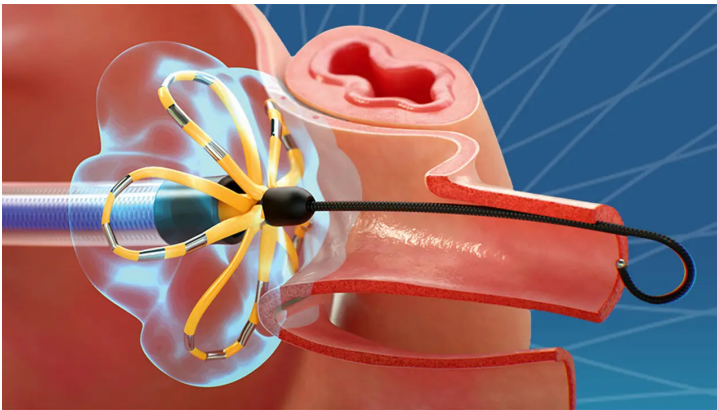


Master Thesis

Optimizing Pulsed Field Ablation for Atrial Fibrillation: Computational Modeling of Electroporation Dynamics

Motivation

We are seeking a motivated and talented student to join a cutting-edge research project focused on computer modeling of pulsed field ablation (PFA) techniques. PFA is a novel and rapidly evolving technology used for the treatment of atrial fibrillation (AF), a common cardiac arrhythmia. Unlike traditional thermal ablation methods, PFA selectively targets cardiac tissue by creating transient pores in cell membranes using high-intensity electric fields—a process known as electroporation. This approach has shown great promise due to its precision, safety, and effectiveness in clinical applications. By contributing to this project, the student will play a crucial role in advancing the understanding and optimization of PFA, with the potential to impact future therapeutic strategies for AF.



Taken from <https://www.medpagetoday.com/cardiology/arrhythmias/107585>

Student Project

The selected student will be responsible for developing and implementing computational models to simulate the electroporation process specifically in the context of pulsed field ablation (PFA). This will involve using and adapting existing software tools to model the interactions between electric fields and cardiac tissue, focusing on parameters critical to the success of PFA in treating atrial fibrillation. The student will analyze simulation results to optimize the parameters of the PFA process, ensuring maximal ablation efficacy while minimizing damage to surrounding tissues. Additionally, the student will document their work, and present their partial findings during regular team meetings every two weeks. A good foundation in computational methods, bioelectric phenomena, and proficiency in programming languages such as Python or MATLAB is desired for this role. Familiarity with biomedical applications and an interest in cardiovascular therapies will be highly advantageous.

Skills needed

- Written and spoken English
- Experience in Python is desirable

Research area

Computational modelling
in Biomedical Engineering

Project

Cardiac modelling

Orientation

Computational modelling,
software programming,
cardiac simulation

Course of studies

Electrical engineering,
computer science, physics

Starting date

From October/November



Contact person

M.Sc. Cristian Barrios
Raum 411
Geb. 30.33,
Fritz-Haber-Weg 1

76131 Karlsruhe

eMail:

cristian.espinosa@kit.edu

Telefon:

+49 721 608-42652