# Master thesis

Integration of Electrophysiological Mapping onto a Dynamic Heart Model for Enhanced Stereotactic Radioablation Target planning

Motivation

The treatment of ventricular tachycardia and other cardiac arrhythmias has significantly advanced with the use of electrophysiological (EP) mapping and cardiac radioablation. However, the challenge of accurately registering EP maps onto dynamic anatomical heart models and correspondent CT images remains a critical limitation in current visualization systems. This thesis aims to develop a robust framework for registering and integrating EP mapping data with patient-specific dynamic heart models to enhance spatial correlation and precision in radioablation treatment planning.
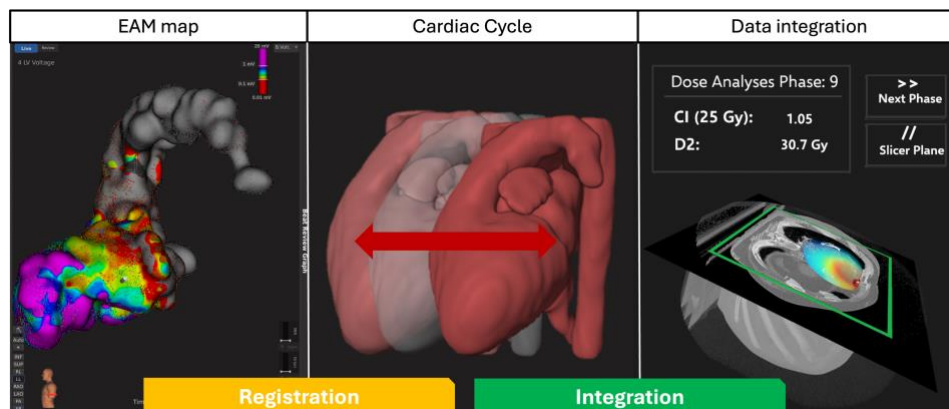
Task

The primary goal of this thesis is to create a simulation environment that focuses on the accurate registration and fusion of:

- **Electrophysiological maps (EAM)** for identifying arrhythmogenic substrates.
- **Dynamic anatomical models of the heart**, simulating its motion and deformation over the cardiac cycle.
- **CT imaging slices**, providing structural context for patient-specific anatomy.
- **Radiotherapy dose planning maps**, illustrating the targeted treatment areas and radiation exposure.

Requirements

- Python coding

Good to have

- Experience with 3DSlicer
- Radiotherapy basics

References:
1) *https://pmc.ncbi.nlm.nih.gov/articles/PMC10320498/pdf/main.pdf*

Field of research:
Image processing and modelling

Title of research project
Multimodal planning for radioablation targeting

Program
3DSlicer - python programming language

Course of study
Electrical engineering
Computer Science
Mechanical Engineering
Mechatronics
Physics

Starting date
Possible at any time

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