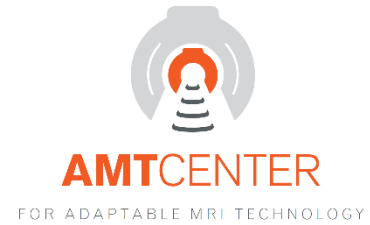


Master Thesis

Fabrication and exploration of RF detectors for Magnetic Resonance Imaging at low field



Topic

Radio frequency coils are a key component for signal detection in an MRI system. At low magnetic fields, the inherent low sensitivity in ^1H NMR requires these detectors to be further optimized to boost quality and speed of the acquired images. Your goal is to investigate the optimal features of various RF coil geometries with a strong practical approach. You will combine theoretical aspects and simulations with hands-on work to build and use your own RF coils.

Your activities

Main tasks:

- build RF detectors with different geometries, materials, and electrical properties. You will solder copper based materials and capacitors to resonate your coil at a frequency of interest (4.2 MHz), properly interface and integrate it in the acquisition chain of an MRI system;
- CAD design and 3D printing of coil structures and accessory parts;
- characterize the built RF detectors (i.e in terms of noise, efficiency, homogeneity) on the bench and via NMR & MRI experiments at 0.1 T;
- assess and compare performance, explore iterative optimization solutions.

Optional tasks:

- simulations of the coil's magnetic field using COMSOL Multiphysics;
- acquisition and analysis of the coil's magnetic field using MRI sequences on phantoms;
- in-vivo MRI using the coil built by yourself!

Your profile

- Master student with a background in Biomedical/Electrical Engineering, Physics, or similar
- interest and basic knowledge in MRI physics and hardware, electromagnetic principles
- minimum ability in manual, hands-on work
- previous soldering experience not necessary, although welcome
- autonomous, team-working, precise, organized, motivated learner with critical thinking.

Contact

Prof. Salameh: najat.salameh@unibas.ch

Prof. Sarracanie: mathieu.sarracanie@unibas.ch

amt.dbe.unibas.ch