



## Ph.D. thesis proposal - MRI

*CRMBM-CEMEREM, Marseille France*

*Institut Fresnel, Marseille, France*



### **Magnetic Resonance Imaging at Ultra-High Fields: Definition, design and characterization of novel radiofrequency antennae using Metamaterial approaches**

***Starting date: December 2017***

Ultra-high Field Magnetic Resonance (MR) Imaging is currently on its way to the clinic providing stunning quality high-resolution images of the human brain and articular joints. Larger parts of the human body are, however, more difficult to image at static field strengths above 3 tesla partly due to the shorter wavelength of the MR radiofrequency (RF) field.

This project aims at providing new antenna concepts and prototypes dedicated to MR imaging of the thorax (cardiac MRI), the spinal cord and the brain for imaging other nuclei than the proton generally used for MRI. It is funded by a European Union H2020 grant and brings together physicists, MR physicists, engineers and industrial partners from several countries (M-Cube: <http://www.fresnel.fr/spip/spip.php?article2010>).

During this Ph.D. project, the successful candidate will develop and use MRI-based characterization procedures to elaborate specifications for novel RF antennae designed in collaboration with peers from Institut Fresnel. In particular, B1 mapping, MR thermometry and RF-shimming MR sequences and associated processing tools for these coil prototypes dedicated to body, spine and X-nuclei brain applications will be developed on a 7 tesla UHF MRI system at CRMBM-CEMEREM Marseille. In interaction with the other partners of the project, the Ph.D. candidate will provide feedback to improve the antenna design during the development process. Procedures for optimal use of the antennae in vivo in humans will be developed including tailored radiofrequency pulses and sequences. The thesis project is a unique opportunity to interact with researchers and industrial partners within the framework of a European Project.

We look for candidates with skills in signal processing, radiofrequency physics and scientific communication. Skills in MR physics, sequence and pulse design and programming are an advantage but can be acquired during the first period of the project. We offer an experienced team of researchers and engineers in MR physics and EMF simulation as well as state-of-the-art equipment. Two post-doctoral researchers will support the Ph.D. project from both sides Magnetic Resonance and antenna design. CRMBM-CEMEREM is located in the city center of Marseille, France.

Please send CV and motivation letter:

#### **Contact**

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