

## **PhD Position in MRI of Peripheral Nerves**

### Development of next-generation magnetic resonance neurography

We are looking for a highly motivated PhD candidate who is interested in working at the intersection of engineering, physics, and medicine to advance the MRI of peripheral nerves.

**Start date:** Spring 2025; **application deadline:** 31.12.2024

**Project background and aims:** MRI of peripheral nerves, MR neurography, is a complementary and non-invasive diagnostic tool for evaluating peripheral nerve diseases. It enables morphological investigation of proximal and deeply situated nerve segments but is limited by the MRN sequence characteristics, such as being 2-D with limited anatomical coverage due to long acquisition times (e.g. ~1 hour for an entire lower extremity), and sensitivity to motion artifacts. These challenges limit their extended use despite their potential of shedding new insights into nerve pathology. This project aims to develop an entirely new MRN sequence for motion-insensitive, 3-D high-resolution imaging (down to 200-250 micrometres, in plane) that can cover a whole extremity from the nerve roots to the most distal parts within a clinically feasible scan time of around 30 minutes. The work of the PhD student involves implementing a 3-D turbo spin echo sequence, empirical optimisation of image contrast, employing non-Cartesian acquisition schemes combined with parallel imaging, and testing AI reconstruction. The developed methodology will be validated in a clinical study involving healthy volunteers and patients. Alongside this PhD position, another PhD student focused on image analysis of peripheral nerves will be hired, complementing a strong team to deliver next generation MR neurography.

**Research environment:** The candidate will join an international research project lead by the Department of Neurology at the Inselspital Bern, Switzerland in close collaboration with the NMR Laboratory, Institute of Myology in Paris, France. Both institutes host Siemens 3T scanners and additionally a 7T in Bern. The first part of the PhD thesis, developing the methodology, will be conducted in Paris while the second part, validating the methodology, will be conducted in Bern. Relocation is necessary. The position is funded by the Swiss National Science Foundation and available for 3.5 years. The prospective PhD student will enrol in the Graduate School of Biomedical Engineering at the University of Bern, and will be supervised by a senior researcher on each site.

#### **Your qualifications:**

- You have a MSc degree in electrical or biomedical engineering, computational sciences, physics, mathematics, or related field. Familiarity with MRI physics is a plus.
- You are at ease with optimization mathematics and signal processing.
- Prior experience with programming and image processing is an advantage.
- Strong team spirit and ability to work autonomously with a willingness to learn.
- Excellent oral and written skills in English. German and French are a plus.

**How to apply:** Send us a cover letter describing why do you want to work with us and what excites you about the project and MRI, your CV, the contact details of two references, and your MSc thesis (if available) by email to [olivier.scheidegger@insel.ch](mailto:olivier.scheidegger@insel.ch) and [e.caldas@institut-myologie.org](mailto:e.caldas@institut-myologie.org) with the subject mentioning "MRI PhD position". Questions regarding the position can be directed to PD Dr. med. Olivier Scheidegger.

