

Doctoral Candidate 8 - Developing a Deep learning-based qMRI method for multi-TE arterial spin labelling MRI

Host Institution	University of Antwerp, Belgium
PhD enrolment	University of Antwerp, Belgium
Primary Supervisor	Prof. dr. Jan Sijbers, imec-Vision Lab
Subject area	Image modelling, acquisition and processing, physics-informed Deep Learning

About this doctoral project and your tasks

You will develop a novel physics-informed deep learning (DL) framework for the estimation of perfusion parameter maps from **under-sampled multi echo-time arterial spin labelling (ASL)** MRI images. These maps can be used to study the permeability of the blood-brain barrier, which is a promising candidate biomarker for early prediction of age-related cognitive decline or neurological diseases. **The framework will leverage** 1) deep image priors to improve the trade-off in quality versus scan-time in quantitative ASL; 2) intra-scan motion to increase the spatial resolution of the perfusion parameter maps; 3) uncertainty quantification of perfusion parameter maps.

Your tasks will include:

- Starting from a profound literature search, staying up-to-date on the state-of-the-art on **ASL perfusion MRI** throughout the PhD trajectory.
- Developing a **forward model** that describes the dependency of the measured ASL images on the perfusion parameters and acquisition settings and accounts for intra-scan motion.
- Developing, training and testing a **physics-informed neural network** for motion-compensated perfusion mapping from under-sampled ASL images, thereby exploring recently emerging deep learning strategies.
- Quantifying the **uncertainty** of the estimated perfusion parameter maps.
- Developing a strategy for **optimal experiment design**.
- Testing the framework on **(pre)clinical MRI scanners**.

Foreseen secondments

For this project, we foresee secondments to:

- Prof. Matthan Caan (3 months) at **Amsterdam UMC** (The Netherlands)
- Prof. Patricia Figuieredo (2 months) at **Instituto Superior Técnico** (Portugal)

About the host institution and research group

The **University of Antwerp** is a dynamic, forward-thinking university in the second largest city in Belgium. We offer an innovative academic education to more than 20000 students, conduct pioneering scientific research and play an important service-providing role in society. With more than 6000 employees from 100 different countries, we are helping to build tomorrow's world every day.

Imec-Vision Lab is a research group of the Physics department at the University of Antwerp. The Vision Lab has unique expertise in **reconstruction, processing and analysis of imaging data**. The working environment is strongly interdisciplinary, combining techniques and insights from Physics, Engineering, Mathematics and Computer Science. The group has a broad range of national and international collaborations with both academic and industrial partners. More details on Vision Lab's research are available at <http://visielab.uantwerpen.be>.

About the offer

- The selected candidate will be employed by University of Antwerp for **36 months** on the MSCA-DN project. In line with university regulations and following a positive evaluation by the doctoral committee, University of Antwerp may provide additional funding for a maximum of 12 months to complete the doctoral degree.
- Doctoral candidates are offered a **competitive remuneration** based on the MSCA allowances and the regulations of the host institution. The gross monthly amount at University of Antwerp corresponds to the [amount for doctoral scholarship holders](#). Moreover, funding is available for technical and personal skills training and participation in international research events.
- **Expected start date:** between April and September 2025. We encourage last-year master students who will graduate by this time to already apply.

More information is available in the [general information document](#) for IQ-BRAIN positions.

Specific profile and requirements

- Your profile aligns with the [general requirements and eligibility criteria](#) of the IQ-BRAIN project.
- You have a master's degree in **physics, computer science, mathematics, biomedical engineering, or related field** (or will have by the time of your appointment).
- Background in **scientific computing and/or magnetic resonance imaging (MRI)** is appreciated.
- You are proficient in at least one **programming language**.

How to apply

All applications must be submitted via the **IQ-BRAIN job platform**:
<https://www.uantwerpen.be/en/projects/iq-brain/jobopenings/apply/>.

Deadline for applications: 1 December, 23:59. More information about the application procedure is available in the [general information document](#) for IQ-BRAIN positions.

More information

For additional information about the research project, please contact:

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or

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