

Doctoral Candidate 5 - Robust DL Models for Accelerated Multi-Contrast MRI Reconstruction from Nonuniform k-space Data

Host Institution	Ghent University, Belgium
PhD enrolment	Ghent University, Belgium
Primary Supervisor	Prof. dr. Aleksandra Pizurica, Group for Artificial Intelligence and Sparse Modelling
Subject area	Geometric Deep Learning models; graph neural networks, multi-contrast MRI acquisition and image formation principles

About this doctoral project and your tasks

This project aims to address the challenge of improving the **reliability of Deep Learning (DL) methods** for accelerated multi-contrast MRI reconstruction. The focus will be on model-aware DL approaches that incorporate knowledge about the underlying MRI physics into the learning framework to enhance interpretability, robustness, and generalization. Geometric deep learning, particularly **Graph Neural Networks**, will be explored to enable more efficient, non-Cartesian subsampling of the spatial frequency space (k-space) and to leverage non-local similarities during image reconstruction. Performance will be maximized through the **joint optimization of sampling trajectories and reconstruction** in an end-to-end DL framework.

Your tasks will include :

- Acquiring expertise on **MRI reconstruction** and staying updated on its advancements through scientific literature and collaboration with IQ-BRAIN project partners.
- Developing an **advanced deep learning approach** for accelerated reconstruction of multi-contrast MRI images based on graph neural networks and self-supervised learning.
- Publishing your high-quality research in top journals and conferences in the field.
- Engaging with and supporting the research and (limited) teaching activities in the research group.

Foreseen secondments

For this project, we foresee secondments to:

- Prof. Dr. Jan Sijbers and Prof. Dr. Marleen Verhoye (6 months) at **University of Antwerp** (Belgium)
- Dr. Sascha Koehler (6 months) at **Bruker Biospin**, Germany

About the host institution and research group

The research **Group for Artificial Intelligence and Sparse Modelling (GAIM)** is part of the Department Telecommunications and Information Processing of the Faculty of Engineering and Architecture at Ghent University. GAIM's research is at the intersection of machine learning, signal/image processing and information theory. We pursue the **development and integration of innovative algorithms** for representation learning, deep learning and sparse coding, pattern recognition and classification,



information recovery from partial, corrupted, and high-dimensional data as well as inference algorithms for solving generic problems described by probabilistic graphical models and reasoning under uncertainty. The application areas of our research include **biomedical processing, remote sensing and art investigation**. The current focus of the group is on model-aware deep learning models in image reconstruction and analysis.

About the offer

- The selected candidate will be employed by Ghent University for **36 months** on the MSCA-DN project.
- Doctoral candidates are offered a **competitive remuneration** based on the MSCA allowances and the regulations of the host institution. Ghent University has received the following EU-grant to recruit a Doctoral Candidate (DC): monthly Living Allowance € 3.400; monthly Mobility Allowance € 600; and monthly Family Allowance € 660 (only if applicable). Please note that the final monthly, gross salary will result from deducting (from the mentioned amounts) all compulsory national labour taxes (social security, etc.) to be borne by the employer. 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, 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.

More information

For additional information about the research project, contact:

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