



Tenure job opportunity

Job title: Research Scientist – Deep learning for solving inverse problems in MRI (data acquisition and image reconstruction)

Location: NeuroSpin, CEA Saclay, Gif-Sur-Yvette, France.

Job type: Tenure position.

Start date: Summer 2022, application due before February 28th, 2022.

Salary: Based on education and experience. Healthcare/childcare benefits included.

Contact: Please send application to Dr. Philippe Ciuciu (philippe.ciuciu@cea.fr) and Dr. Alexandre Gramfort (alexandre.gramfort@inria.fr) with CV, research statement and two letters of recommendation.

Context: NeuroSpin is one of the largest Magnetic Resonance Imaging centers and platforms in the world. Its overarching scientific objective is understanding human brain structure and function at the mesoscopic scale (i.e. 100 μ m isotropic). This platform is equipped with 3T, 7T and 11.7T MRI scanners (world premiere) for human brain imaging. In combination with other techniques, these ultra-high magnetic field MRI scanners provide new information on the structure and functioning of the normal and pathological brain. To reach these goals, learning-based computational imaging methods must be further elaborated to shorten scan times without compromising image quality, in continuation with the in-house *Compressed Sensing* solutions (SPARKLING technology).

Within NeuroSpin, the new joint Inria-CEA MIND (*Models and Inference for Neuroimaging Data*, formerly [PARIETAL](#)) laboratory brings together [Inria](#) and [CEA](#) researchers in charge of methodological developments in the area of machine/deep learning for solving inverse problems in neuroimaging (e.g. in MRI/fMRI and MEG/EEG) as well as for decoding human brain activity from multimodal functional neuroimaging data. MIND researchers develop new concepts, algorithms and technologies that can be transferred to clinical scanners and applied in research on patients and/or healthy volunteers with the goal of responding to fundamental questions in neuroscience (e.g. optimal brain age assessment). **The proposed tenure position will be assigned to the MIND laboratory, and in particular to the *Compressed Sensing in MRI* research group** led by Dr. Philippe Ciuciu.

Job description: The successful candidate is expected to **contribute to deep learning solutions and the underlying technology that are currently under development for accelerating MR data acquisition and boosting the quality of image reconstruction**. This contribution will additionally strengthen NeuroSpin's competitiveness as a world-class imaging center in the "AI for MRI" field. Through their creative input, the successful candidate will equally contribute with the rest of the *Compressed Sensing in MRI* team to NeuroSpin's overarching scientific objective by impacting all MR imaging modalities (morphological, functional and structural, i.e. diffusion-weighted imaging), at the mesoscopic scale, especially on the 11.7T scanner, as well as heteronuclear MRI (Sodium and Phosphorus imaging) at lower spatial resolution. The first images of the 11.7T scanner were acquired in October 2021 (see the press release [here](#)).

The MIND team is responsible for transferring these methodological and technological developments to NeuroSpin's clinical platform as well as to collaborators in hospitals with whom we are developing new imaging protocols for certain brain pathologies or neurological disorders.

Main selection criteria:

The ideal candidate must:

1. have demonstrated scientific excellence in machine/deep learning
2. actively participate in the strengthening of clinical research at NeuroSpin, with a particular focus on the 11.7T scanner
3. integrate into one of NeuroSpin's transverse projects: Functional MRI at 500 μ m or Brain Development and Aging



4. initiate and obtain external funding (national funding, European funding such as Horizon Europe).

It will also be imperative that the recruited person participates to the ongoing national projects of the team and in the supervision of students (master, PhD).

Platform activity:

All research and software developments will be integrated either into Siemens scanners (PrismaFit 3T, Magnetom 7T and 11.7T) within the NeuroSpin platform or within the in-house current MR image reconstruction tools (e.g. PySAP software).

Desired profile: Candidates must have a doctorate either in electrical/biomedical engineering or in machine learning (or related fields) with application to solving inverse problems in imaging. A preliminary experience in neuroimaging is necessary as well as a post-doctoral experience in one of the reference laboratories in the field.

Expected qualifications: Training in signal/image processing, in optimization and machine/deep learning. Proficiency in Python and in the use of a deep learning framework such as TensorFlow/Keras or Pytorch. The successful candidate's field of expertise should cover both the design of neural networks, their implementation and their training/validation/test on large image databases.

Knowledge of MRI physics and pedagogical skills, promotion and sharing of methodological developments are strongly recommended. A strong ability to work in a **team environment** and excellent English language skills are necessary.

The successful candidate will have the opportunity to work with a **world-class team in machine learning applicable to neuroimaging**. As part of the MIND team, the opportunity to develop strong European and international collaborations is assured.