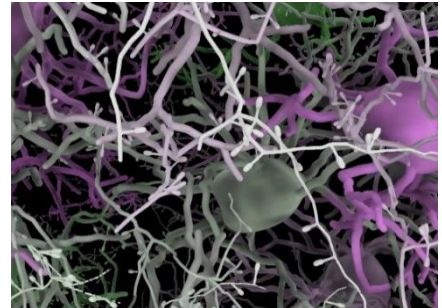# PhD position in diffusion functional MRI simulations

BACKGROUND: The functional integrity of white matter withholds tremendous diagnostic and prognostic value for neurodegenerative diseases, psychiatric diseases and stroke. Non invasive mapping of activity within white matter fibers is currently out of reach, including for functional MRI (fMRI) techniques whose contrast relies on the hemodynamic response to neural activity. Diffusion fMRI (dfMRI) relies instead on activity-dependent dynamic fluctuations in neuron and astrocyte microstructure. Our recent work supports the detectability of genuine dfMRI contrast in the human gray matter. We propose FIREPATH, a dfMRI-based method that can fill the gap of detecting activity also in the brain white matter and enable a first-of-its-kind comprehensive mapping of brain function across gray and white matter on clinical MRI scanners.

PROJECT DESCRIPTION: This doctoral position involves the development of a comprehensive simulation framework for FIREPATH. Your mission will include the development of increasingly complex substrates for brain white and gray matter and applying them to bridge experimental dfMRI measurements with underlying brain activity.

START DATE: Sept – Dec 2022. The position is open until filled. Candidates are encouraged to apply early.

SALARY: The project was approved as an ERC Starting Grant and is funded by the SEFRI (Swiss relay to Horizon Europe), following Swiss National Science Foundation salary guidelines. Funding is available for four years.

REQUIREMENTS:
- M.Sc. in physics, electrical engineering, biomedical engineering, computer science or related field.
- The successful candidate will be a motivated student with initiative, curiosity, rigor and a strong scientific background.
- Proficiency in programming is mandatory.
- Master-level experience with MRI is a plus.
- Excellent written and oral communication skills in English.
- Adherence to the principles of open research.

ENVIRONMENT: You will be part of the Microstructure Mapping Lab, a research group of engineers, physicists and neuroscientists within the Department of Radiology at the Lausanne University Hospital (CHUV) and the University of Lausanne (UNIL), led by Dr. Ileana Jelescu. The group has access to state-of-the-art clinical MRI scanners (CHUV), preclinical MRI scanners (EPFL) and ample GPU computing. You will actively collaborate with Dr. Marco Palombo (Cardiff University, UK) as well as with clinicians and biologists. The CHUV and UNIL are founding partners of the CIBM Center for Biomedical Imaging, along with the EPFL, UniGE and HUG, with over 50 affiliate members – including our group – in a variety of disciplines ranging from MRI to signal processing, EEG and PET.

INTERESTED? Visit our website https://wp.unil.ch/mic-map/ or email ileana.jelescu@chuv.ch. To apply, please go through the CHUV job portal and upload your CV, a brief statement of research interests and contact information of two references.