Ph.D. Opportunity

Uncovering the interplay of structure, function, and dynamics of brain connectivity using MRI

A **Ph.D. position** is available at the Centre Hospitalier Universitaire Vaudoise (CHUV, Lausanne, Switzerland) funded through the Swiss National Science Foundation (SNSF) as part of the Ambizione program, and available with an effective start date **as soon as possible, but no later than December 1, 2020**. Join CHUV's *Axon Lab* to work with Dr. Oscar Esteban, Dr. Meritxell Bach-Cuadra, and Prof. Patric Hagmann. The *Axon Lab* is a new research group at the Dept. of Radiology of CHUV. By joining the department, you'll have access to four MRI scanners for your research, as well as high-performance computing and GPU resources, while located in the very center of the vibrant Lausanne. Your training will take place at the Lemanic Neuroscience Doctoral School (University of Lausanne). The project continues collaborations with Stanford University, and the University of Sydney, and has budgeted resources for research visits during the program conducive to obtaining an international degree. Applications will be considered following diversity criteria. Salary is in compliance with SNFS guidelines and the contract is for up-to-four years, renewable yearly.

Have you ever heard of the reproducibility crisis? Are you concerned about the computational reliability of neuroimaging research? How the brain structure and function are linked?

In this project, **we will address the reliability of the neuroimaging workflow**. We will investigate whether minimizing the confounding effects on preprocessing of functional and structural MRI may open avenues for an integrated modeling approach that is fundamental to the understanding of the human brain. Using a dense sampling approach on a single healthy participant (an approach that has been dubbed "**precision neuroimaging**"), optimal acquisition and processing for each MRI modality will be determined across four scanner models. The project will continue developing a framework (www.nipreps.org), which includes tools such as fMRIPrep or www.templateflow.org, and comprehensively evaluate the multiplicity of processing alternatives to select those that achieve the highest sensitivity and specificity. The generalization of such improvements in the sensitivity and the specificity of functional and structural networks across our four scanners and ten new, densely-sampled subjects will allow the univocal identification (or "fingerprinting") of networks. Your Ph.D. program will conclude with a clinical application on *disconnectivity* disorders.

Qualifications:
✓ An MSc. degree in medical physics, electrical engineering, biomedical engineering, signal processing, or related field.
✓ The successful candidate will be a motivated researcher, open-science advocate, with self-initiative, curiosity, and appeal for novelty.
✓ Experience with MRI acquisition/analysis and/or machine learning will be particularly considered.
✓ Proficiency in programming (Python preferred) is necessary, and experience with Numpy, Scipy, Scikit-learn, NiBabel, NiPype, Nilearn, etc. will be highly desirable.
✓ Knowledge of container technologies (Docker, Singularity, etc.) is relevant.
✓ Participation in the neuroimaging community (e.g., Brainhack, hackathons, neurostars.org) and knowledge of neuroimaging data formats (NIfTI, GIFTI, CIFTI2) and standards (BIDS) will be valued.

Please let us know your interest (theaxonlab@gmail.com), and feel invited to request mentoring references for Dr. Esteban. We'll be happy to connect you to some of his former students — at *The Axon Lab*, your training and your career development are set first ahead of the lab's research program.