



## ***Postdoctoral position for a neurologist/epileptologist available in the Multimodal Functional Imaging Lab (PERFORM / Montreal Neurological Institute, Montreal)***

The candidate will join a multidisciplinary team composed of neurologists and methodologists within the [Multimodal Functional Imaging Laboratory](#), directed by Pr. Christophe Grova. The laboratory of Pr. Grova is based on two sites: (i) Physics Dpt at Concordia University and [PERFORM center](#), (ii) Biomedical Engineering Dpt and epilepsy group of the Montreal Neurological Institute, McGill University. Both environments offer unique platforms with access to several modalities (simultaneous high-density EEG/fMRI, MEG, simultaneous EEG/NIRS, TMS). The candidate will notably have access to the brand new multimodal imaging platform of PERFORM center, dedicated to neuroscience studies over large cohort of subjects (effect of age, exercising, ...), whereas clinical applications during the presurgical investigation of patients with epilepsy will be primarily based at the Montreal Neurological Institute. The main expertise of the team is the development and the validation of source localization methods dedicated for EEG, MEG and NIRS as well as multimodal characterization of resting state brain activity.

### **Supervisor: Christophe Grova Ph.D.**

Assistant Professor, Physics Dpt and PERFORM, Concordia Univ.

Chair of PERFORM Applied Bio-Imaging Committee

Adjunct Professor, Biomedical Engineering and Neurology & Neurosurgery dpts, McGill Univ.

Member Epilepsy Group, Montreal Neurological Institute

Director of the [Multimodal Functional Imaging Laboratory](#)

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### ***Multimodal investigation of epileptic activity using simultaneous EEG/MEG and EEG/NIRS acquisitions.***

The proposed project aims at localizing and characterizing the generators of epileptic activity using simultaneous acquisitions of ElectroEncephaloGraphy (EEG) with Magneto-EncephaloGraphy (MEG), as well as simultaneous acquisitions of EEG with Near Infra-Red Spectroscopy (NIRS).

EEG and MEG are respectively measuring on the scalp electric and magnetic fields generated by neuronal activity at a millisecond scale, providing a detailed description of brain bioelectrical activity. Combined with EEG measuring brain electric activity on the scalp, NIRS allows studying hemodynamic processes at the time of spontaneous epileptic activity. The specificity of NIRS data is its ability to measure local changes oxy-hemoglobin (HbO) and deoxy-hemoglobin (HbR), exploiting absorption properties of infrared light within brain tissue using optic fibers placed on the surface of the head (temporal resolution: 10 ms, 16 sources x 32 detectors, penetration: 2-3 cm from the surface of the head).

While methodological developments in the lab will consist in 3D reconstruction of the generators of EEG, MEG and NIRS signals and assessing multimodal concordances between bioelectrical neuronal signals and hemodynamic processes, the purpose of this Postdoctoral project will be to assess the **integrity of neurovascular coupling processes at the time of epileptic discharges**, using a unique multimodal environment involving EEG/MEG ([Pellegrino et al HBM 2016](#)), EEG/NIRS ([Pellegrino et al Frontiers in Neurosc. 2016](#)) and also EEG/fMRI recordings ([Heers et al HBM 2014](#)). Close collaborations with the epilepsy group of the Montreal Neurological Institute, involving notably Dr E. Kobayashi MD-PhD, Dr F. Dubeau MD-PhD and Dr. J. Gotman PhD, will provide access to patient populations and additional clinical expertise for this project.

**Requirements:** The candidate should be an MD (neurologist) with previous training in epileptology and neurophysiology (EEG). Expertise in analyzing MEG or NIRS signals and/or computational skills including neuroimaging softwares are appreciated additional qualification. The candidate should be fluent in English (and if possible French) due to the patient population studied.

Please send your CV and motivation letter **before Dec 15<sup>th</sup>** to [christophe.grova@concordia.ca](mailto:christophe.grova@concordia.ca)