INVITATION

Le laboratoire ATMS de l'ENIS, en coordination avec le Sce Neurologie de Sfax et Université Concordia CANADA ont le plaisir de vous inviter à une conférence avec débat et table ronde animée par le Professeur Christophe Grova

Christophe Grova

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Multimodal investigation of connector hubs in brain networks: applications to epilepsy

Abstract:

Within brain networks, connector hubs are brain regions participating in inter-network connectivity promoting long-range communications. Hubs are often identified using the hubness metrics in graph theory, such as degree centrality, counting the number of all pairwise significant correlations between voxels up to several thousands. To address the inherent problem of multicollinearity, we developed a "SParsity-based Analysis of Reliable K-hubness (SPARK)" (Lee et al Neuroimage 2016) to study connector hubs using resting state functional MRI (fMRI). SPARK proposes a new measure of hubness by counting a sparse number (k) of networks involved in each voxel (k-hubness), featuring the unique ability to identify which networks are actually involved in each hub. We are proposing SPARK as a new method to investigate the reorganization of patient specific hubs, in the context of the presurgical investigation of patients with drug-resistive epilepsy, introducing the notions of hub disruption and hub emergence indices. After presenting the application of SPARK on a series of patients with Temporal Lobe Epilepsy, we will illustrate the clinical relevance of SPARK with fMRI within a multimodal framework characterizing resting state epileptic networks using Magneto-EncephaloGraphy (MEG) source imaging to assess the dynamic of those networks.

Biography:

After completing in 2002 a PhD in biomedical engineering from University of Rennes 1 (France, 1998-2002), validating multimodal image registration techniques, Dr Grova did a postdoctoral fellowship at the Montreal Neurological Institute (McGill University, Montreal, Canada) under the supervision of Dr. J. Gotman, studying simultaneous Electro-EncephaloGraphy (EEG) / functional Magnetic Resonance Imaging (fMRI) investigations of epileptic activity and developing expertise in EEG and Magneto-EncephaloGraphy source imaging. Recruited as assistant Professor in Biomedical Engineering and Neurology and Neurosurgery departments at McGill University in July 2008, he created the Multimodal Functional Imaging Lab, aiming at characterizing normal and pathological brain activity, especially epilepsy, combining bioelectrical neuronal activity using electrophysiology. In July 2014, he joined Concordia University as "tenure track" assistant Professor in the department of Physics of Concordia University, in the context of a strategic recruitment with PERFORM centre. PERFORM is new multimodal imaging center developed at Concordia University, dedicated to the promotion of research projects involving prevention in health and lifestyle experiences (sleep, physical exercise, nutrition). Promoted associate Professor with tenure since July 2017, his research involves combining different neuroimaging modalities to characterize brain activity, from a bio-electrical point of view (Electro-and Magneto-Encephalography) as well as from an hemodynamic perspective (functional Magnetic Resonance Imaging, Near Infra-red Spectroscopy), to study neurovascular coupling processes and ongoing resting state activity

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