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Biomedical Engineering
Wallace H. Coulter Foundation
Seminar Series

Multimodal Functional Neuroimaging: Integration of fMRI and EEG/MEG data

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LECTURE: 9:00 AM - 10:00 AM

ENGINEERING CENTER
ROOM EC 2300
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Abstract: The electroencaphalogram (EEG) and the functional magnetic resonance imaging (fMRI) constitute the prevailing tools to study the brain functioning in both healthy individuals and patients with a variety of neurological disorders. For about two decades, physicists and biomedical engineers have struggled to determine the biophysical mechanisms underlying these two neuroimaging modalities. Recent efforts by different groups have been on: **a)** developing forward-generative models as well as strategies for their statistical inference, **b)** performing EEG-fMRI concurrent recording and data fusion, and **c)** establishing suitable animal models for specific brain dysfunctions. Here, I first review preliminary studies in humans where interesting problems related to these emergent research/technological lines are presented. Then, I discuss recent achievements by members of my group in Tohoku University, Sendai Japan, using animal models to examine how neuronal activity is translated into EEG and fMRI signals, and in which situations we must expect alterations in these signals, e.g. in the case of Alzheimer disease.

Biography: In 1988, I obtained a BS in Physics at the University of Havana. Selected as "Junior Associate" of the International Centre for Theoretical Physics, Trieste (Italy) from 1995 - 1998, where I completed the required credits for a master degree in biophysics. In 1999, I received a PhD in Physics from the University of Havana also completing part of my PhD thesis at the Pitie-Salpetriere Hospital in Paris. My first postdoc term was in the RIKEN Brain Science Institute (Japan) on the development of mathematical methods to study deep brain sources from MEG single trials. My second postdoc term was in Tohoku University (Japan) on the physiological foundations of fMRI and fNIRS data. In 2004, I was appointed as an associate professor at Tohoku University and have been leading the Neuronal Mass Dynamic's group and a chronic facility for rodents since 2006.

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