*Grenoble Institut des Neurosciences, U1216 Inserm – UGA*
*Equipe « Stimulation Cérébrale et Neurosciences des Systèmes », Dir: O. David*

# Proposition de Stage M2 S4 NEUROSCIENCES
# Année Universitaire 2016 - 2017

## Equipe d'Accueil de Master :

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## Titre du sujet: Non-invasive manipulation of brain synchrony to boost brain function

## Description du sujet:

Abnormal oscillatory activity has been found to underlie cognitive impairments resulting from brain damage. Yet to date, no consistent attempt has been made to better understand the causal basis of brain oscillatory activity and inter-regional synchrony in these pathologies. However, this is the key factor to enable the elaboration of new rehabilitation programs aiming at treating faulty visual cognition by manipulating pathological brain rhythms.

In this project, the goal of the student will be to manipulate visuospatial orienting and visual performance in healthy volunteers using conditioning long trains of repetitive TMS (rTMS). He will explore the ability of these rTMS protocols to induce changes in visual performance and investigate whether these offline improvements are mirrored with changes in EEG phase synchrony in healthy participants. To do so, combined rTMS-EEG recordings will be used to study the dynamics of rapid plastic effects and to model their lasting impact on brain oscillatory activity and interregional synchrony. If the causal link between EEG synchrony and visuospatial performance is verified in healthy volunteers, then the next step will be to test the potential of a novel therapeutic approach based on the manipulation of neural synchrony in brain damage patients suffering visuospatial neglect, a neurological disability following focal damage to right fronto-parietal systems.

This project is motivated by prior MEG evidence suggesting a correlation between episodes of visual unawareness and frontal beta synchrony (Rastelli et al. Cortex 2013). The technical feasibility is guarantied by the ability of our team to induce and record with electroencephalography (EEG) offline TMS frequency-specific effects on brain activity (Woźniak et al. Neuroimage 2013 & J Affct Dis 2015).

The student will be involved in the design of the visuospatial task, the acquisition of the rTMS-EEG data in healthy volunteers, their analysis as well as in their interpretation. The internship also includes a consequent bibliographical research and the writing of a final thesis. The student will be able to acquire the skills necessary to conduct in quasi autonomy brain stimulation studies and EEG recordings, potentially transferable for a future doctoral project.