

IEM SEMINAR SERIES

TUESDAY
APRIL 19th, 2016

Engaging Cortical Oscillations: Rational Design of Non-Invasive Brain Stimulation



Institute for
Engineering in Medicine
UNIVERSITY OF MINNESOTA
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DR. FLAVIO FROHLICH

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Departments of Psychiatry, Cell Biology and Physiology,
Biomedical Engineering, and Neurology
Neuroscience Center
School of Medicine
University of North Carolina at Chapel Hill



FREE event, no registration
required.

Pizza and drinks will be
provided from 12:00pm.

12:15PM - 1:15PM
Nils Hasselmo Hall
Room 2-101

For additional information on
Dr. Frohlich's presentation,
please contact:
scot0353@umn.edu

The Institute for Engineering in Medicine (IEM) is pleased to announce the IEM Seminar by Dr. Flavio Frohlich, "Engaging Cortical Oscillations: Rational Design of Non-Invasive Brain Stimulation."

Non-invasive brain stimulation has become a widely adopted tool to modulate brain activity. Nevertheless, surprisingly little is known about how stimulation interacts with endogenous brain dynamics. Without a mechanistic understanding of how stimulation engages neuronal circuits, little progress can be made towards the rational design of individualized, adaptive stimulation treatments. My laboratory focuses on using periodic stimulation waveforms, such as transcranial alternating current stimulation (tACS), to target cortical oscillations. The aim is to elucidate the mechanisms of target engagement for the effective modulation of cortical oscillations. This will enable us to (1) study the causal role of cortical oscillations in cognition and (2) develop new treatments for disorders such as schizophrenia, autism, and depression, which are associated with dysregulation of cortical oscillations. In this talk, I will provide an update on our work that vertically integrates computer simulations, in vitro and in vivo animal electrophysiology, and human studies. I will highlight our most recent findings that include feedback stimulation of transient sleep oscillations, demonstration of state-dependent stimulation effects in electrocorticography data, and computational modeling of the thalamo-cortical system for the modulation of alpha oscillations.

Flavio Frohlich studied electrical engineering at the Swiss Federal Institute of Technology in Zurich (ETH Zurich) and Imperial College (London, UK) before moving to the United States for his PhD studies in the laboratory of Dr. Terrence Sejnowski at the Salk Institute. Flavio, a Swartz Foundation postdoctoral fellow, worked with Dr. David McCormick at Yale University. Flavio has been recognized for his work on rational design of brain stimulation with the NIMH 2013 BRAINS award. Flavio is the author of the interdisciplinary textbook *Network Neuroscience* to be published in 2016.

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