

IEM SEMINAR SERIES

TUESDAY
October 18th, 2016

Biophysical Foundations of Transcranial Electric Stimulation



Institute for
Engineering in Medicine

UNIVERSITY OF MINNESOTA

Driven to DiscoverSM

Dr. Alexander Opitz
Research Scientist
Nathan Kline Institute for Psychiatric
Research
New York



FREE event, no registration required.

Pizza and Beverages will be
provided from 11:45 am

12:00PM - 1:00PM
Mayo Memorial
Building
Room 3-100

For additional information on
Dr. Opitz's presentation,
please contact:
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The Institute for Engineering in Medicine (IEM) is pleased to announce a seminar by Dr. Alexander Opitz, "Biophysical Foundations of Transcranial Electric Stimulation."

Transcranial electric stimulation (TES) approaches have come to the fore in the brain stimulation community. In particular, the scientific literature for transcranial alternating current stimulation (tACS) and transcranial direct current stimulation (tDCS) has been growing exponentially, with the latter nearly overtaking transcranial magnetic stimulation (TMS) in the past year (per PubMed), reflecting the growing number of potential clinical applications of tDCS and tACS for treating a range of conditions. Despite mounting enthusiasm, the rapid adoption of neuroscientific, clinical, or recreational TES raises concerns. Specifically, TES effectiveness in delivering intended currents into the brain is being questioned. In this talk, I will present intracranial measurements of electric fields induced by TES in humans and non-human primates investigating their spatial distribution and temporal characteristics. I will also make a case for the need for in-vivo models compared to ex-vivo or phantom measurements. Further, I will demonstrate in how far realistic finite element method models are able to predict the measurement data and highlight key factors needed for accurate modeling results. In addition, I will present preliminary data from laminar recordings in non-human primates investigating cortical layer-specific effects of TES-induced electric fields. Based on the presented results, I will discuss novel stimulation approaches that can help to overcome limitations in existing electrical stimulation technologies.

Dr. Alexander Opitz is a research scientist at the Nathan Kline Institute for Psychiatric Research. Dr. Opitz obtained a MSc in Physics from the University of Tübingen where he worked at the Max Planck Institute for Biological Cybernetics developing an open source software to estimate electric fields induced by TMS in realistic head models. He went on to get his PhD in Computational Neuroscience from the University of Göttingen where he developed and experimentally validated new methods for high precision prediction of stimulation areas for noninvasive brain stimulation applications both in healthy and diseased individuals.

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