Brain Stimulation: Past, Present and Future

Organizer:
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Every few years a new technology comes along that energizes the human brain mapping community: MEG, PET, and fMRI are some examples. The number of published studies using brain stimulation has increased dramatically, and this is likely to become a mainstay of cognitive neuroscience. Similar in many respects to the early days of fMRI and other technologies, this excitement and explosion in the use of stimulation will likely lead to many exciting new findings, but also to the potential for mistakes, misstatements, and ultimately to poor science, which will inevitably lead to a loss of trust in a potentially very useful set of technologies. Education is key, both for training scientists in the proper use of these technologies, but also for keeping them grounded in terms of knowing and respecting the limitations of these methods. Many OHBM members are interested in brain stimulation but have not yet tried it due to lack of knowledge, or have tried it but would like to learn more regarding what technologies are available, how to set up a laboratory to perform stimulation studies, and so on. Presenting this as a full day educational course will help to remedy some of these issues, by describing the technologies, their proper use, and examples of how to apply them to questions important to the OHBM community.

Lectures will begin with an overall introduction (Clark), overviews of basic technologies (Nitsche-tDCS/TES, Luber-TMS, Fried-DBS), modelling and imaging of the brain effects of stimulation (Parra-Modelling, Strafella-TMS/PET, Antal-tDCS/fMRI, Stagg-tDCS/MRS/DTI) and examples of brain stimulation and imaging applied to controls and specific patient groups (Priori, Flöel).

Learning Objectives:

1. Understand what technologies are available for brain stimulation and the basic physics and physiology of brain stimulation action on the nervous system;

2. Know the basic equipment required to do brain stimulation and the proper use of these technologies for clinical, research and neuroenhancement applications;

3. Be aware of the ways in which brain stimulation can be used as a mapping modality, including physiological probe and facilitator, inhibitor, and blocker of regional activity;

Target Audience:

The target audience will be those interested in learning about the technology, methods and applications of brain stimulation, and could range from novice students to experienced researchers.
Course Schedule:
8:00-8:10
Introduction to Brain Stimulation: Past, Present and Future
Vince Clark, University of New Mexico, Albuquerque, NM

8:10-9:05
Overviews of basic technologies
TDCS/TES - Michael Nitsche, Clinical Neurophysiology, Goettingen, Germany
TMS – Bruce Luber, Duke, Durham, NC, USA
DBS - Itzhak Fried, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

9:05- 10:00
Modelling and imaging of the brain effects of stimulation
Modelling – Lucas Parra, City College of New York, CUNY, New York, NY
TMS / PET - Antonio Strafella, University of Toronto, Toronto, Canada
TDCS / fMRI – Andrea Antal, Georg-August Universität, Göttingen, Germany
TDCS / MRS / DTI - Charlotte Stagg, University of Oxford, Oxford, United Kingdom

10:00-10:30
Break

10:30-11:30
Examples of brain stimulation and imaging applied to controls and specific patient groups
Alberto Priori, University of Milan, Milan, Italy
Agnes Flöel, Charite Universitätsmedizin Berlin, Berlin, Germany

11:30-12:00
Questions and Discussion