USC Viterbi School of Engineering
Ming Hsieh Department of Electrical and Computer Engineering

Seminar

New adventures in brain electromagnetism: From EEG source reconstruction to exploring neural dynamics of meditation with MEG

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EEB 132*
https://usc.zoom.us/j/91439298406?pwd=bUEvSjlqN1lTZ3lUSVFMbElEV0NVUT09
Meeting ID: 914 3929 8406| **Passcode:** 619505

Abstract: Electrical source imaging (ESI) is a key component in many EEG analysis pipelines, in both research and clinical settings. Different ESI methods mainly differ by the quality and quantity of a priori information used in the solution of the inverse problem. In this talk I'll present the main result of a recent study in which we compare in-vivo ten different ESI methods from the MNE-python package: wMNE, dSPM, sLORETA, eLORETA, LCMV, dipole fitting, RAP-MUSIC, MxNE, gamma map and Sesame. Exploiting a recently published HD scalp EEG dataset recorded at Niguarda Hospital (Milan, Italy) from Stereo-EEG implanted patients during Single Pulse Electrical Stimulation, the different inverse methods were compared under multiple choices of input parameters to assess the accuracy of the best reconstruction, as well as the impact of the parameters on the localization performance. In the second part of the talk, I'll present some preliminary results on an MEG dataset recorded in a group of expert Buddist monks during resting state (RS) and two different meditation practices: Samatha, a form of focused-attention meditation (FAM) and Vipassana that refers to open-monitoring meditation (OMM). Despite a flourishing body of research investigating the neural correlates of meditation, the underlying neural mechanisms that mediate the distinct processes associated with different forms of meditation are still poorly understood. Exploiting the high temporal resolution of MEG, the key questions we address focus on the characterization of changes in brain dynamics induced by different meditative states as evidenced by criticality and complexity measures.

Bio: Dr. Annalisa Pascarella is a senior researcher at Institute of Applied Mathematics M. Picone, National Council of Research since October 2011. Her main research interests are centered on the formulation, implementation, and validation of computational methods for the solution of the MEG/EEG inverse problems with a focus on Bayesian methods to track neural activity. In the last years she has been involved in the development of Neuropycon, an open-source brain data analysis kit which provides reproducible Python-based pipelines for advanced multi-thread processing of fMRI, MEG and EEG data, with a focus on connectivity and graph analyses. Some of her recent projects include the classification of mental states from MEG measurements during various meditation techniques.

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