**Modeling and Analysis of extracellular potentials *in vitro* (MEA - cortical slices) and *in vivo* (ECoG, SEEG - human epilepsy patients)**

Abstract:

In this talk, I will elaborate on the biophysical forward modeling formalism based on the finite element method (FEM) to establish quantitatively accurate links between neural activity in the slice and potentials recorded in a Microelectrode Array (MEA) set-up. This is tested in the context of cortical slices, while considering the inhomogeneous electrical properties of the tissue and the saline medium [1].

I will also cover a similar approach in the context of source localization in human epilepsy patients with intractable seizures[2], for recordings from Electrocorticography (ECoG) and Stereoelectroencephalography (SEEG). I shall present preliminary results from kernel Electrical Source Imaging (kESI) method, which is based on the kernel Current Source Density (kCSD) method [3]. I will present a strategy to extend this to a patient specific source imaging technique viable for pre-surgical evaluation.

Articles:

1) Ness et.al (2015) 'Modelling and Analysis of Electrical Potentials Recorded in Microelectrode Arrays'. *Neuroinformatics*.
http://link.springer.com/article/10.1007%2Fs12021-015-9265-6

2) Kaiboriboon et.al (2012) 'EEG source imaging in epilepsy—practicalities and pitfalls'. *Nature Reviews*.
http://www.nature.com/nrneurol/journal/v8/n9/full/nrneurol.2012.150.html

3) Potworowski et.al (2012) 'Kernel current source density method.', *Neural Computation*.
http://www.ncbi.nlm.nih.gov/pubmed/22091662