LABORATORY OF COMPUTATIONAL NEUROSCIENCE (LCN)

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Thursday, October 3rd, 2013
13h30, Room SG 0213

Computational Neuroscience Seminar

Michael OKUN,
Systems and Computational Neuroscience,
University College London

Structure of spontaneous activity in rodent sensory cortex

On different trials identical sensory stimuli elicit distinct neuronal responses. Furthermore, even in the absence of sensory stimuli the cortex produces unpredictable but structured spontaneous activity that in many ways resembles sensory responses. According to a fascinating recent hypothesis, these are hallmarks of sampling-based representation used by the cortex to perform sensory inference computations (Berkes et al., Science 2011). In the first part of the talk I will present a different interpretation of the currently existing evidence of sampling-based representation. The central concept in our alternative explanation is population rate dynamics, i.e., the propensity of nearby cortical neurons to change their firing rate in a coordinated manner. In the second part I will describe how the spiking of individual neurons correlates with the population rate signal. We find that in the spontaneous activity the magnitude of this correlation is highly heterogeneous even across neighboring neurons.
Simulations of random networks of spiking integrate-and-fire neurons suggest several possible mechanisms for the heterogeneity observed in the electrophysiological recordings.