LABORATORY OF COMPUTATIONAL NEUROSCIENCE (LCN)

Prof. Wulfram Gerstner
EPFL – IC & SV– LCN
SG –AAB119 (Bâtiment SG-AAB)
Station 15
CH - 1015 LAUSANNE, Switzerland

ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Thursday, January 9th, 2014
13h45, Room SG 0213

Computational Neuroscience Seminar

Jonathan PILLOW,
Psychology & Neurobiology,
The University of Texas at Austin

Unlocking the neural code in neurons and neural populations using advanced statistical models and methods

A major goal of computational neuroscience is to understand how neurons work together to build representations of sensory, motor, and cognitive variables necessary for behavior. A popular approach to this problem is to develop statistical models of the relationship between neural activity and relevant external variables (e.g., sensory stimuli or motor output).

In this talk, I will describe several projects aimed at unlocking the neural code in different brain areas at several different levels of biophysical detail. First, I will describe recent work on characterizing the representation of sensory-motor decisions by neural populations in the lateral intra-parietal cortex (area LIP) in primates. Second, I will describe new methods for rapidly characterizing high-dimensional response properties of single neurons in visual cortex using closed-loop "adaptive" experimental design. Third, I will present a new model-based technique for estimating intracellular excitatory and inhibitory synaptic conductances from extracellular spike trains recorded in primate retina.

I will discuss the implications of these findings for understanding neural codes and the mechanisms by which they are constructed, and the promise of such statistical approaches for gaining insights into neural datasets of increasing size and complexity.