Synaptic plasticity and homeostasis

May 28, 2015

Abstract

This workshop will gather leading experimentalists and theoreticians to discuss latest results and models on synaptic plasticity and homeostasis in sensory cortices. Whether synaptic changes strongly depend on the exact timing of spikes, or on average firing rates is still a matter of debate and may vary from area to area. However, it is robustly observed, *in vitro* and *in vivo*, that homeostatic mechanisms are important to regulate the global activity. The workshop will therefore be a unique opportunity to address various questions:

- How is homeostatic regulation expressed both in vitro and *in vivo*?
- How can it be combined with Hebbian forms of learning? Are those two mechanisms competing at a single synapse?
- What are the functional implications of those plasticity mechanisms?
- From a modeler's point of view, what are the different possible implementations of homeostasis, and what are the links with meta-plasticity?

Program

9-9:45 **Pierre Yger** (Institut de la Vision, France)

– *Synaptic plasticity and Homeostasis: a review of concepts*

9.45-10:30 **Christian Tetzlaff** (BCCN Göttingen, Germany)

– *The interaction of synaptic plasticity and scaling and their role in memory formation*

10:30-11:00 ——— COFFEE BREAK ———

11:00-11:45 **Alanna Watt** (Mc Gill University, Canada)

– *Adaptive regulation of Purkinje cell spiking in spinocerebellar ataxia type 6*

11:45-12:30 **Taro Toyoizumi** (RIKEN BSI, Japan)

– *Modeling the dynamic interaction of Hebbian and homeostatic plasticity*

12:30-13:30 ——— LUNCH BREAK ———

13:30-14:15 **Sami El Boustani** (MIT, USA)

– *Investigation of single-cell plasticity in mouse V1*

14:15-15:00 **Claudia Clopath** (Imperial College, UK)

- *Emergence of functional connections in neural networks with synaptic plasticity*

15:00-15:30 ———— COFFEE BREAK ————

15:30-16:15 **Per Jesper Sjöstrom** (Mc Gill University, Canada)
- *Neocortical optogenetic kindling: Emergent seizures after repeated hyperactivity*

16:15-17:00 **Friedemann Zenke** (EPFL, Switzerland)
- *Hebbian and non-Hebbian plasticity orchestrated to form and retrieve memories in spiking neural networks*

17:00-17:45 **Carlos Stein** (EPFL, Switzerland)
- *Theory of cortical plasticity as stable higher-order feature learning*