



LABORATORY OF COMPUTATIONAL
NEUROSCIENCE (LCN)



ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

COMPUTATIONAL NEUROSCIENCE SEMINAR

Thursday, April 30th, 2015
13h30, Room AAC 132

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Synaptic plasticity shapes the structure of recurrent neuronal networks

Cortical networks feature an over-representation of certain patterns of connectivity compared to simple random-network models. We study the spike timing-dependent plasticity (STDP) of network structure in recurrent networks of integrate-and-fire neurons during spontaneous and stimulus-driven activity. Combining theories for fast-timescale spike train covariability in recurrent networks and slow plasticity of individual synapses, we present a self-consistent framework describing the coevolution of spiking activity and individual synaptic weights. Through a finite-size expansion of the spiking statistics, we then obtain low-dimensional sets of equations governing the dynamics of two-synapse motifs and of highly connected clusters. For additive, Hebbian STDP the network is governed by instabilities that impose thresholds for the promotion or suppression of these different forms of structure.

Host: Prof. Wulfram Gerstner