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

Tuesday, January 17th, 2011
14h15, Room SV 2510

Computational Neuroscience Seminar

Gaute EINVOLL,
Computational Neuroscience Group
Norwegian University of Life Sciences

How local is the local field potential?

The local field potential (LFP) usually refers to the low-frequency part (<~500 Hz) of an extracellular potentials recorded inside the brain. It is among the oldest experimental measures of neural activity and has been widely used to investigate network mechanisms involved in, for example, sensory processing and higher cognitive processes including attention, memory and perception. The LFP has also been suggested as a candidate signal for neuroprosthetic devices as it is relatively easy to record and more stable than single-unit activity. Despite its wide use, there is still limited knowledge about the relation between the LFP and the underlying neural activity. The LFP is believed to primarily reflect synaptic activity in a population of neurons in the vicinity of the recording electrode, but there are contradicting reports on the spatial extent of the region generating the LFP.

In the seminar I will present new results from our group where we have used a biophysical forward-modelling approach (Linden et al., J Comp Neurosci, 2010) to address this question (Linden et al., Neuron, 2011). Specifically, we have calculated the LFP signal from synaptically activated populations of morphologically reconstructed cortical cells and investigated how various key factors determine the size of the region that an LFP electrode can 'see', in particular, the neuronal morphology, distribution of synapses, level of correlation in synaptic activity, and the position of the recording electrode. I will further present results for how steeply the LFP signal decays outside an active population and finally suggest some simple “rules-of-thumb”-answers to the question raised in the title.

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

Tuesday, January 17th, 2011
14h15, Room SV 2510

Computational Neuroscience Seminar

Gaute EINVOLL,
Computational Neuroscience Group
Norwegian University of Life Sciences

How local is the local field potential?

The local field potential (LFP) usually refers to the low-frequency part (<~500 Hz) of an extracellular potentials recorded inside the brain. It is among the oldest experimental measures of neural activity and has been widely used to investigate network mechanisms involved in, for example, sensory processing and higher cognitive processes including attention, memory and perception. The LFP has also been suggested as a candidate signal for neuroprosthetic devices as it is relatively easy to record and more stable than single-unit activity. Despite its wide use, there is still limited knowledge about the relation between the LFP and the underlying neural activity. The LFP is believed to primarily reflect synaptic activity in a population of neurons in the vicinity of the recording electrode, but there are contradicting reports on the spatial extent of the region generating the LFP.

In the seminar I will present new results from our group where we have used a biophysical forward-modelling approach (Linden et al., J Comp Neurosci, 2010) to address this question (Linden et al., Neuron, 2011). Specifically, we have calculated the LFP signal from synaptically activated populations of morphologically reconstructed cortical cells and investigated how various key factors determine the size of the region that an LFP electrode can 'see', in particular, the neuronal morphology, distribution of synapses, level of correlation in synaptic activity, and the position of the recording electrode. I will further present results for how steeply the LFP signal decays outside an active population and finally suggest some simple “rules-of-thumb”-answers to the question raised in the title.