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"Contribution of active dendrites to the neural dynamics of cortical circuits"

The architecture of neural networks is commonly encapsulated in terms of the connectivity between elements and the weights for these connections. The function of the neurons themselves is mostly reduced to simple integrative units. However, this view of the neuron ignores the tremendous complexity of real neurons, particularly neocortical neurons which have a rich array of active conductances that shape and even dominate the input/output function. Most of our knowledge about dendritic properties comes from careful, multi-site recordings in vitro. More recently, techniques have been developed that allow us to study the behaviour of dendrites in vivo which has opened up the possibility of exploring the influence of active dendrite on the neural dynamics of cortical circuits. In addition to the highly complex intracellular interactions, it has become clear that compartmentalized inhibition (inhibition impinging on different subdomains of the dendritic tree) can powerfully regulate active dendritic processes. The integrative process is therefore highly dependent on the spatiotemporal pattern of inhibitory input which can sometimes drastically change the output firing mode of the neuron. Furthermore, the output of the any give neuron tends to feeds back on to inhibitory circuits and further complexity to the resultant network activity. In this talk, I will summarize the recent advances in this field with an emphasis on the layer 5 pyramidal neuron. I will present data showing how the active properties of this highly complex neuron both shape and are influenced by the network in which it is embedded.

Host: Wulfram Gerstner

Conference Room **SV 1717A**
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