Titolo (provvisorio): Modeling up and down states in a cortical network model

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Motivazione e campo di applicazione
Both in vivo and in vitro recordings indicate that neuronal membrane potentials can make spontaneous transitions between up and down states.

Obiettivi generali e principali attività
At the network level, populations of neurons have been observed to make these up- and down- transitions synchronously. Although synaptic activity and intrinsic neuron properties play an important role, the precise nature of the processes responsible for these phenomena is unknown. Using a computational model, we would like to explore the interplay between intrinsic neuronal properties and synaptic fluctuations.

The main activities related to this thesis deal with the implementation of a large-scale network model with active synapses which reproduces this experimental behavior. A comparison with experimental recordings will be done to tune the parameters of the model.

Obiettivi di apprendimento (strumenti tecnici e analitici, metodologie sperimentali)
The activities of the thesis will require the use of network simulators (like Neuron, NEST, PyNN), as well as software analysis tools for developing and analyzing network dynamics.

Luogo/i in cui si svolgerà il lavoro: NBT Lab @ Via Opera Pia 11A

Informazioni aggiuntive

Abilità e capacità richieste: computational neuroscience

Curriculum: Bioengineering

Numero massimo di studenti: 2

Supporto finanziario/borse di studio: -