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

**Relatore/i:** Massobrio Paolo

**E-mail:** Paolo.Massobrio@unige.it

**Indirizzo:** Via All'Opera Pia, 13 - 16145 Genova

**Tel.:** (+39) 010353 - 2761

---

**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 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:** -