



## Thesis Project Form

**Title (tentative):** Modularity effect on 3D neuronal networks derived from human induced pluripotent stem cells coupled to high-density devices.

**Thesis advisor(s):** Frega Monica, Sergio Martinoia

**E-mail:** Monica.Frega@unige.it

**Address:**

**Phone:** (+39) 010 33 52144

### Description

#### Motivation and application domain

The neuronal networks derived from human induced pluripotent stem cells (hiPSCs) opened new perspectives in the neuroscience and neuroengineering fields. The evaluation of electrophysiology of 3D modular neuronal networks provides rich information and a solid baseline for future exploitation of in vitro human-derived experimental models.

#### General objectives and main activities

The goal is to investigate the electrophysiology of 3D neuronal networks derived from hiPSCs. In particular, the aim is to characterize the complexity of the model, analyzing differences between modular and non-modular systems. The activities involve the implementation of cell culture protocols for the generation of 3D homogeneous and heterogeneous models and the maintenance of such neuronal cultures on long-term. The activities include the definition and execution of experimental protocols for the acquisition and the analysis of the electrophysiological activity.

#### Training Objectives (technical/analytical tools, experimental methodologies)

Data acquisition platform (3Brain)  
3D neuronal culturesâ€™ generation  
3D neuronal culturesâ€™ maintenance  
Software tools for electrophysiological recordings  
Software tools for data analysis

**Place(s) where the thesis work will be carried out:** Bioengineering Lab (DIBRIS)

### Additional information

**Maximum number of students:** 1