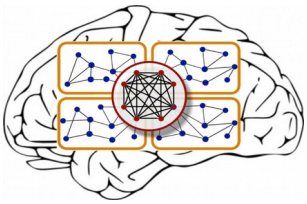

NeuroPhysics
Physics for Neurosciences

Addressing nowadays challenges in neurosciences requires more and more to merge expertises from multiple disciplines, namely from anatomy, biology, physiology, medicine, genetics, physics, computer science, modeling, signal processing, material sciences, micro and nanotechnology, electronics, etc. All these fields of research converge towards increasing our understanding of the nervous system and its relation to behavior. In particular, interdisciplinary studies are mandatory to develop new approaches and devices to interrogate the dynamics of neural networks from single cells to the whole brain and to interfere with this dynamics to decipher its fundamentals. Computational approaches also enable to model and decode neural activity to predict or mimic increasingly complex aspects of the CNS dynamics and behavior. Many questions remain largely open, as for instance understanding how neural architectures are constructed and how such highly complex organizations deal with stochastic bio-chemical processes, or efficiently achieves to code and convey signals in a reliable and adaptive manner. These fundamental mechanisms are key in the production of neural activity and the encoding by the CNS of basic and complex behavior such as perception, action, navigation, or inner thinking. Moreover, their understanding have tremendous implications to inspire artificial neuromorphic circuits and new neurotechnologies. In this context, cracking the neural code is a tremendous challenge requiring interdisciplinary approaches and multifunctional tools. Currently available technologies achieve structural mapping of the brain with unprecedented spatial resolution, that scientists now aim to combine with high spatio-temporal mapping of networks activity either in vitro or in vivo. Machine learning and inverse problems are modern tools which will allow to better understand these data and build models directly form them. Beside the obvious fundamental interest, there are major medical stakes to identify disable elements of the nervous architecture, in order to eventually replace and restore lost functions following a trauma, a stroke, an injury, or due to aging or a degenerative disease.

NeuroPhysics is an event gathering leading scientists of the French and European community working at the interface between Physics and Brain Sciences (including microtechnology, nanosciences, biomimetic sytems, brain-on-chip, neuromorphic computing, brain-computer interface, machine learning…) to simulate, map and interact with the nervous systems to better understand it in health and disease.

You are invited to submit an abstract on the following topics:

- Neural Network (computation, bioengineering, brain-on-chip)
- Brain mapping (structure, activity monitoring, clinical application)
- Nano&microtechologies (new device materials/design, microelectrophysiology, microfluidics)
- Signals analysis & closed-loop circuit (spike sorting, machine learning, big data)
- Photonics (optical imaging, 2 photons, optogenetics)
- Regeneration strategy (biomaterials, stimulations)

Please forward this message to colleagues; we encourage young researchers to take the opportunity for presenting their work to the community.

The Organizing team, S. Cocco, C. Delacour, J. Grollier, B. Yvert