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Neurophotonic approaches to brain research

**A combination between optogenetic stimulation
and high-density electrophysiological recordings**

Mercoledì 18 dicembre, 14:00

Aula Avogadro, Dipartimento di Fisica, via P. Giuria 1, Torino

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Abstract

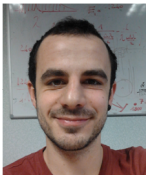
Neurophotonics is a research area at the interface between physics and neuroscience, where light is used to investigate neural systems. This talk aims to introduce how interdisciplinary methods, from the fields of optics, genetics, semiconductor processing and biology, are arranged together in order to develop advanced technologies to further the understanding of neural circuitry.

In particular, optogenetic methods will be described that allow optical control of neuronal sub-populations.

Furthermore, experimental setups for in vivo and in vitro studies will be illustrated. In the experiments, the stimulation light originates from micro-LED devices, with CMOS micro-LED arrays providing in vitro stimulation and custom-designed micro-LED probes for in vivo experiments. The resultant neural activity is recorded from hundreds of neurons using high-density micro-electrode arrays. Functional information and anatomical features of the recorded cells are matched by the integration of multi-photon imaging systems.

From a more general point of view, this seminar will underline how the synergy between optogenetic stimulation and high-resolution electrophysiological recordings has the potential to significantly contribute to the fields of neuroscience and neuroscience-related research.

The speaker



Filippo Pisano graduated in Physics in October 2012 with the thesis “Optical functionalization of artificial diamond for photonics ” performed within the Solid State Physics Group at the University of Turin, Department of Physics. Currently, he is a PhD student involved in the project “Neurophotonics: Advanced technologies for spatio-temporal control of neural circuits using optogenetics” at the Institute of Photonics-University of Strathclyde, Glasgow (UK).