PADOVA
neuroscience
CENTER

14 NOVEMBER 2024 3:00 pm

SALA SEMINARI VIMM

(Via Giuseppe Orus 2, Padova)

PNC SEMINARS

A talk by Filippo Pisano
(University of Padua)

HARNESSING LIGHT IN DEEP BRAIN REGIONS FOR MULTIMODAL OPTICAL NEURAL RECORDINGS THROUGH THIN FIBER PROBES

Over the past two decades, a versatile technological framework combining optical methods with genetically encoded molecular reporters has opened unprecedented opportunities for monitoring neural activity in the living mouse brain. These advancements have been accompanied by a growing awareness that a comprehensive investigation of brain function must account for the brain's multifaceted complexity, including biomolecular changes associated with physiological and pathological dynamics. This seminar will explore the opportunities afforded by a broader perspective on light-brain interactions, presenting a methodology for low-invasive, label-free optical spectroscopy in deep brain regions. This approach can complement existing techniques towards a more complete understanding of neural mechanisms, with potential applications in both fundamental and translational research.

Biography

Filippo Pisano is an Assistant Professor (RTD-B) at the Dept. of Physics and Astronomy of the University of Padua. He obtained his Master's Degree in Physics at the University of Turin and his PhD at IoP-Strathclyde, where he worked closely with neuroscientists at UCSC to develop a large-scale, bidirectional optoelectronics system for single-cell functional and morphological characterization of neural circuits in the mouse retina, using simultaneous optogenetic stimulation and electrophysiological recordings. Over the past decade, he has worked in leading research institutions in Europe and in the US, such as the Istituto Italiano di Tecnologia (IIT) in Italy, the University of California Santa Cruz (UCSC) in the US, and the Institute of Photonics (IoP) at the University of Strathclyde in the UK.

His research focuses on novel tools and methods for optical neural interfaces, harnessing physical phenomena for bidirectional and minimally invasive communication with the brain. In particular, Filippo was one of the proponents of the DEEPER project (https://deeperproject.eu), a large interdisciplinary European consortium of 15 institutions that aims to develop photonic tools for imaging and manipulating the neuronal activity using exogenous molecular tools in deep brain regions to reveal the molecular and cellular dysfunctions in neurological diseases. He is also collaborating to the NANOBRIGHT project (https://projectnanobright.eu/), a consortium of four institutions in Italy, Spain and France that aims to exploit nano-photonic phenomena in the brain, with the vision of developing cutting-edge optical approaches to study and treat pathological conditions.