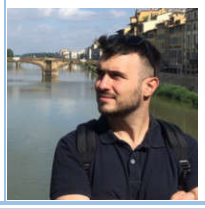
AVVISO DI SEMINARIO

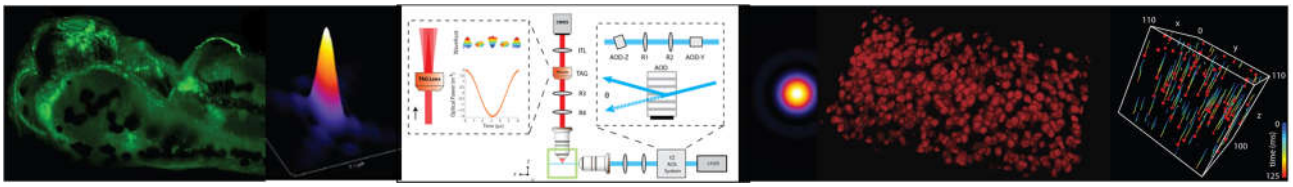
Lunedì 25 Marzo 2019 alle ore 16.00, presso l'Aula Specializzazione del Dipartimento di Fisica e Chimica, viale delle Scienze ed. 18, si terranno due seminari riguardanti metodi innovativi di imaging a fluorescenza *in vivo* applicati al modello Zebrafish per l'analisi dell'attività neuronale in un'estesa scala spaziotemporale:

Ore 16:00	**Advanced fluorescence microscopy for in vivo imaging of neuronal activity.**  **Giuseppe Sancataldo** LENS -European Laboratory for Non-linear Spectroscopy University of Florence email: sancataldo@lens.unifi.it
Ore 16:40	**Neuronal basis of color discrimination in zebrafish larvae.**  **Chiara Fornetto LENS -European Laboratory for Non-linear Spectroscopy University of Florence** **email: fornetto@lens.unifi.it**

Siete tutti invitati a partecipare.

Prof. Vincenzo Cavalieri

Prof. Valeria Vetri



Advanced fluorescence microscopy for in vivo imaging of neuronal activity.

G. Sancataldo LENS -European Laboratory for Non-linear Spectroscopy University of Florence

email: fornetto@lens.unifi.it

Abstract:

Brain function emerges from the coordinated activity of many neurons spanning multiple spatial and temporal scales. Exploring this multi-dimensional space requires a large flexibility in terms of spatio-temporal resolution and field-of-view, while keeping invasiveness in living animals to a minimum. Fluorescence microscopy is a formidable tool to achieve this goal. Here we describe the latest advancement in the field of linear and non-linear optical microscopy for the investigation of brain functionality in vivo. The present work aims to guide researchers through the main optical challenges in the field towards future directions for in vivo microscopy development.

Neuronal basis of color discrimination in zebrafish larvae.

C. Fornetto LENS -European Laboratory for Non-linear Spectroscopy University of Florence

email: fornetto@lens.unifi.it

Abstract:

The brain is an extremely complex system, not only for the number and different types of neurons that constitute it, but especially for their connections to form dynamic networks through synapses. Understanding the mechanisms of information processing in the brain, and their alterations in neurological disorders, requires mapping the neuronal circuits activated during the response to controlled stimuli. This is a daunting task since it requires imaging large volumes with enough spatial and temporal resolution to map cellular networks and their activity. Zebrafish larvae represent an ideal model for these studies, both for their optical transparency and a simple CNS allowing single-cell recordings of activity. At the same time, zebrafish is also capable of complex behaviors already at early stages of development (4-5 days post fertilization), in particular visually-guided behaviors such as Opto-Motor Response (OMR), Opto-Kinetic Response (OKR), phototaxis and pray capture, thus showing a high dependence on vision. Indeed, vision and color perception represent important sources of information for the majority of animal species, and in zebrafish the capability to detect and discriminate different colors come from its tetrachromatic retina. On the basis of these characteristics, in this work we study visual circuitry in larval zebrafish brain and the phototactic behaviors associated with color sensing. While the different encephalic areas and regions involved in processing visual information have been identified, the actual neuronal circuits activated during stimulation with visual colored stimuli have not yet been characterized. The study of visual neuronal circuitries requires at first mapping neurons, in different areas of zebrafish brain, responsive to controlled stimuli and then the identification of connectivity patterns that form the circuits themselves. The stimuli used in this work were divided based on their color at each of the four wavelengths relevant for color vision (570, 480, 415 and 362 nm) while imaging neuronal activity with two-photon microscopy. For the identification of responsive neurons, we developed a correlation analysis and we obtained a whole brain map of color-sensitive neurons with cellular resolution. The same stimuli are used to study phototaxis and color preference, performing behavioral tests in freely swimming larvae. This approach will provide a comprehensive map of all neurons involved in color-driven responses in the zebrafish larva, opening the way to a detailed dissection of the circuits responsible for different phototactic behaviors.