SUMMER LECTURE: Neurophotonics and Mechanical Systems Biology at ICFO - Using light to address complex biological problems

MICHAEL KRIEG

July 19, 2022

12:00

Blue Lecture Room

The central goal of neuroscience is to understand how the genes determine animal behavior. In the framework of this dogma, it is conceivable that modulating neuronal activity through changes of the cell's genetic makeup can alleviate diseases of the nervous system. In my lecture I will introduce the basic ingredients how light can be used to control and capture neuronal activity. The cloning of GFP 25 years ago, initiated an incomparable paradigm shift in modern biology. It not only allows to visualize the dynamics and localization of individual molecules in living cells beyond diffraction limit, but derivatives of it can be used as genetically encoded optical probes to measure mechanical forces, ion concentrations, protein turnover and neuronal activity in living animals. Latter opened a window to non-invasive recording of the activity of hundreds or thousands of neurons at the same time. In combination with genetically encoded tools to activate neuronal circuits with high spatial and temporal precision, an all-optical interrogation to decipher complex brain states by whole brain imaging became available. We will thus complete the lecture with an outlook into optogenetic steering of neuronal function and the use of light-activated proteins to interrogate cellular metabolism and complex animal behavior.

Hosted by: Academic Affairs