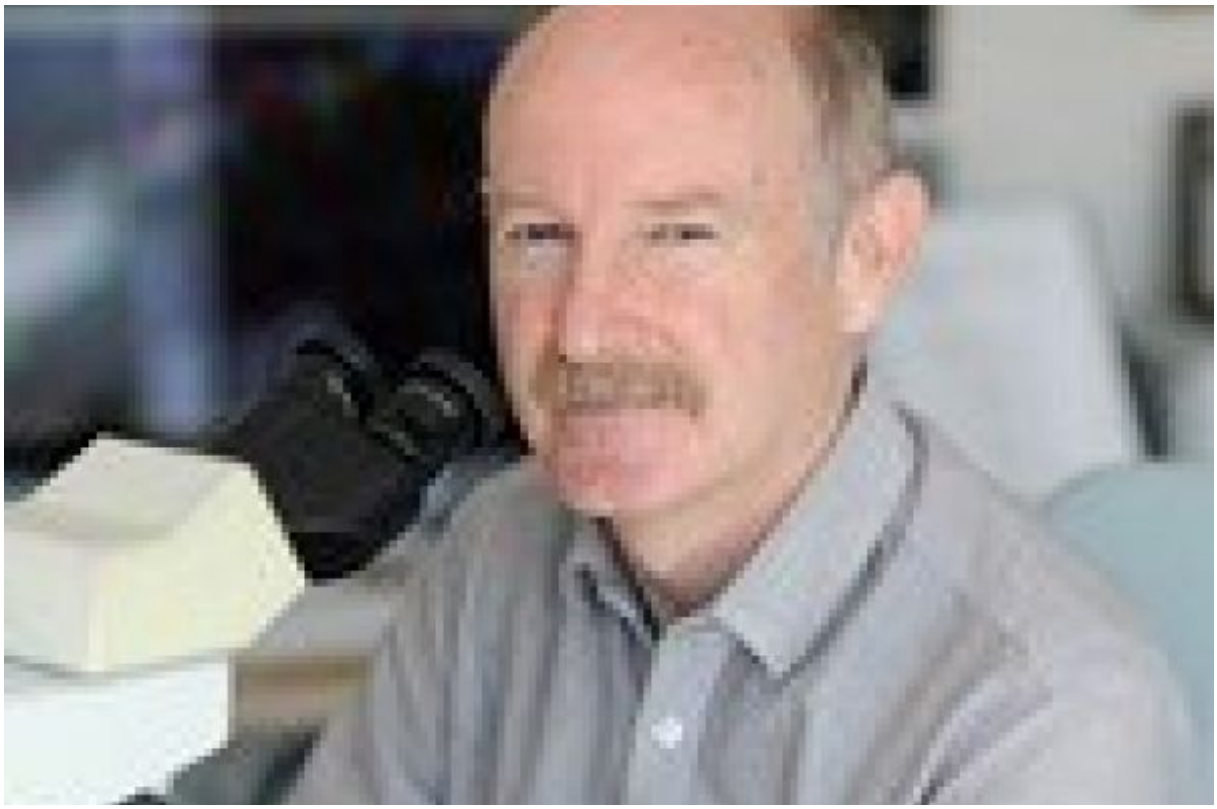

ICFO Colloquium RAFAEL YUSTE 'The Novel Neurotechnologies: simultaneous 3D all-optical imaging and activation of neurons in living brains'

RAFAEL YUSTE

May 21, 2015

Thursday, May 21st, 12:00, ICFO's Auditorium

RAFAEL YUSTE

MD. PhD., Neurotechnology Center, Columbia University, Chair of Cell Types and Connections Advisory Board$$Rafael Yuste is Professor of Biological Sciences and Neuroscience at Columbia University. He was born in Madrid, where he obtained his MD at the Universidad Autonoma. After a brief period in Sydney Brenner´s laboratory in Cambridge UK, he performed Ph.D. studies with Larry Katz in Torsten Wiesel?s laboratory at Rockefelle University and was a postdoctoral student of David Tank at Bell Labs. In 1996 he joined th Department of Biological Sciences at Columbia University, where he is Full Proefessor. I

2005 he became HHMI Investigator and co-director of the Kavli Institute for Brain Circuit and in 2014 Director of the Neurotechnology Center at Columbia. Yuste is interested in th structure and function of cortical circuits, the biophysical properties of dendritic spines an the pathophysiology of cortical diseases such as epilepsy and schizophrenia. To study thes questions, Yuste has pioneered the development of imaging techniques, such as calciu imaging of neuronal circuits, two-photon imaging of spines and circuits, photostimulatio using inorganic caged compounds, two-photon optogenetics and holographic spatial ligh modulation microscopy. Yuste has obtained many awards for his work, including New Yor City Mayor´s, the Society for Neuroscience´s Young Investigator and the NIH Director Pion er Awards. Finally, he led the group of researchers who proposed the Brain Activity Map Proje t, recently sponsored by the White House?s BRAIN initiative.

The function of neural circuits is an emergent property that arises from the coordinated activity of large numbers of neurons. To capture this, we proposed launching a large-scale, international public effort, the Brain Activity Map Project, aimed at reconstructing the full record of neural activity across complete neural circuits. This project was the origin of the White House´s BRAIN initiative. As our contribution to this initiative, I will review the efforts o our group developing optical methods to perform two-photon imaging and photostimulatio of neuronal populations using spatial light modulators, PSF engineering and a variety o optical, optogenetic and optochemical sensors. These techniques have single cell resolutio and enable online experiments on populations of neurons, such as detecting spatiotempora patterns of neuronal activity in primary visual cortex from awake behaving mice and opticall interfering with them. These novel neurotechnologies could prove to be an invaluable ste toward understanding fundamental and pathological brain processes.

Thursday, May 21st, 12:00, ICFO's Auditorium