FIU Biomedical Engineering
FLORIDA INTERNATIONAL UNIVERSITY

Biomedical Engineering
Wallace H. Coulter Foundation
Lecture Series

"Subcellular imaging of neuron-astrocyte communication with two-photon imaging of genetically-encoded calcium indicators in vivo"

Dr. James Schummers
Research Group Leader
Cellular Organization of Cortical Circuit Foundation
Max Planck Florida Institute for Neuroscience

Friday, 27th, 2016
Lecture: 9:00 AM-10:00 AM
ENGINEERING CENTER
ROOM EC 2300
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MIAMI, FL 33174

Abstract: Astrocytes are major constituents of neural circuits, comprising nearly one third of cells in gray matter. They interact with neural circuits functionally via bidirectional signaling with neurons. Astrocytes respond to neural activity by increasing intracellular calcium on multiple spatial and temporal scales, via a variety of mechanisms. These calcium signals are a necessary component of the signaling pathway for many forms of astrocyte signaling back to neurons. I will discuss our work examining astrocyte calcium signals using two-photon imaging of genetically-encoded calcium indicators in the visual cortex in vivo. With this approach, we have shown that astrocytes respond to neural activity with compartmentalized calcium transients on the scale of 5-10 microns. These data demonstrate a surprising spatial resolution of the communication between neurons and astrocytes, with important implications for the function of these interactions.

Biography: Dr Schummers received a BA in Neuroscience from Oberlin College and a PhD in Systems Neuroscience from MIT. His thesis work described the relationship between the behavior of individual cells and networks of neurons in their surrounding circuit in the visual cortex using novel combinations of electrophysiology and intrinsic signal imaging in vivo. His postdoctoral work involved the two-photon calcium imaging of neurons and astrocytes in visual cortex. Currently, he is a Group Leader at the Max Planck Florida Institute for Neuroscience, where he continues to study the interactions between neurons and astrocytes in visual cortex.