Seminar Series

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Microfabricated Tools for Measuring Neural Dynamics: Development, Dissemination, and Applications

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ABSTRACT: This is an exciting era for neuroscience, with our understanding of the brain growing at a tremendous pace. A key enabling force for these advances is technology for measuring brain activity from large populations of neurons. In this talk, first I will discuss our development of microfabricated recording electrode arrays, which are mass-produced at a commercial MEMS foundry. We have also created 3-D microstructures for simultaneous measurements from multiple brain areas with 1,024 electrodes. Second, I will discuss our approach to disseminating the silicon microprobes as inexpensive open-source tools. This approach has allowed us to share hundreds of devices with other labs. Finally, I will talk about some specific applications of how we are using our recording technology to study brain function in behaving mice. I will focus on the striatum, a brain area involved in learning and performing movements. For example, by combining recordings with optogenetic manipulations, we have discovered that a class of striatal interneuron can boost behavioral performance early in learning, by amplifying neural output. These findings may have important implications for brain disorders in which interneuron function is disrupted.

BIOGRAPHY: Sotiris Masmanidis received his BS degree in Physics from University College London, and his PhD degree in Applied Physics from Caltech. For his postdoctoral studies, also at Caltech, he began the switch from physics to neuroscience. In 2012, he became an Assistant Professor in the Department of Neurobiology at UCLA. His group carries out research in both neural engineering and neuroscience. About half of his lab members are engineers, and learn to do neuroscience experiments. His main interest is using large-scale recordings to study brain dynamics associated with learning and performing reward-guided actions, and how aberrant dynamics are implicated in disorders such as Parkinson's disease and addiction.

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