Genes, Photons, and Electrons: New Solutions for Problems in Systems Neuroscience

Organized by Michael Häusser, DPhil
Short Course I

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Introduction

The last decade has seen a dramatic resurgence of interest in systems neuroscience, together with a new optimism that many of its longstanding problems can soon be solved. This movement has been driven in part by the growing realization that an understanding at the level of the neural circuit is essential if we are to link the cellular and molecular properties of neurons and synaptic connections to behavior and in part by the development of a range of new technologies for manipulating neural circuits with unprecedented temporal and spatial precision.

This short course will bring together tool developers at the forefront of these advances and those who are applying these new tools to address longstanding challenges in systems neuroscience. The invited lecturers span the range of approaches and levels involved in the modern study of neural circuits: from new genetically encoded probes for circuit tracing and activity monitoring, to new imaging and electrophysiological approaches for dissecting activity patterns in defined neural populations during behavior, through to new methods for manipulating activity in intact circuits to make causal links between circuit elements and behavior. The emphasis will be on defining the key open questions in systems neuroscience and how the new tools can be used to solve them, and on comparing the practical advantages and limitations of various methods, with a view towards future developments.

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