



ON-SITE BIOLOGY COLLOQUIUM

Friday, 10 Oct 2025 | 3.30 pm | S3 05-02 Conference Room 1

Hosted by Assistant Prof Phua Siew Cheng

Map to Block S3



Optical interrogation of synaptic plasticity and behaviour



By Michael Häusser

*Professor, Director, School of Biomedical Sciences, The University of Hong Kong
Honorary Professor, Wolfson Inst for Biomedical Research, University College London*

Understanding the causal relationship between activity patterns in neural circuits and behavior is one of the fundamental questions in systems neuroscience. Addressing this problem requires the ability to perform rapid and targeted interventions in ongoing neuronal activity at cellular resolution and with millisecond precision. I will describe results of experiments using a powerful new "all-optical" strategy for interrogating neural circuits which combines simultaneous two-photon imaging and two-photon optogenetics. This enables the activity of functionally characterized and genetically defined ensembles of neurons to be manipulated with sufficient temporal and spatial resolution to enable physiological patterns of network activity to be reproduced. We have used this approach to identify the lower bound for perception of cortical activity, probe how brain state influences the role of cortex in perception, and provide causal tests of the role of hippocampal place cells in spatial navigation. I will also provide an update about how this approach can be harnessed to measure synaptic efficacy in vivo.

About the Speaker

Michael Häusser received his PhD from Oxford University under the supervision of Julian Jack. He subsequently worked with Nobel Laureate Bert Sakmann at the Max-Planck-Institute for Medical Research in Heidelberg and with Philippe Ascher at the Ecole Normale Supérieure in Paris. He established his own laboratory at University College London in 1997 and became Professor of Neuroscience at UCL in 2001. He recently started a new lab at HKU, where he is Director of the School of Biomedical Sciences. His group is interested in understanding the cellular basis of neural computation in the mammalian brain using a combination of experimental and theoretical approaches. He helped to found the open-science collaboration International Brain Laboratory (internationalbrainlab.org), which aims to understand brain-wide mechanisms of decision-making. His group has developed a range of "neurotechnologies" for interrogating neural circuits, including all-optical interrogation which allows one to read and write neural activity at cellular resolution in the intact brain.