10:30am, Wednesday October 8th 2025
Ecole Polytechnique
Amphi Carnot

Laurent Bourdieu

Institut de Biologie (IBENS)
Section Neurosciences, Ecole Normale Supérieure, Paris, France
https://www.ibens.bio.ens.psl.eu/spip.php?rubrique35

3D random-access recording of cortical neuron activity

Custom-Access Serial Holography (CASH) is a high-speed 3D random-access two-photon imaging technique for recording neuronal activity in behaving animals. Using acousto-optic deflectors synchronized with a 40 kHz regenerative amplifier, CASH enables ultrafast phase and amplitude modulation of each laser pulse for digital holography over extended volumes. This allows calcium imaging at 200 Hz in 50–100 neurons, and voltage recordings at 4–10 kHz in up to 10 neurons in head-fixed mice on a treadmill. Aberration and scattering correction extend transcranial imaging beyond the scattering memory effect. Finally, we combine temporal focusing with CASH to improve the signal-to-noise ratio and optical sectioning, thus extending the use of CASH to densely labelled samples.