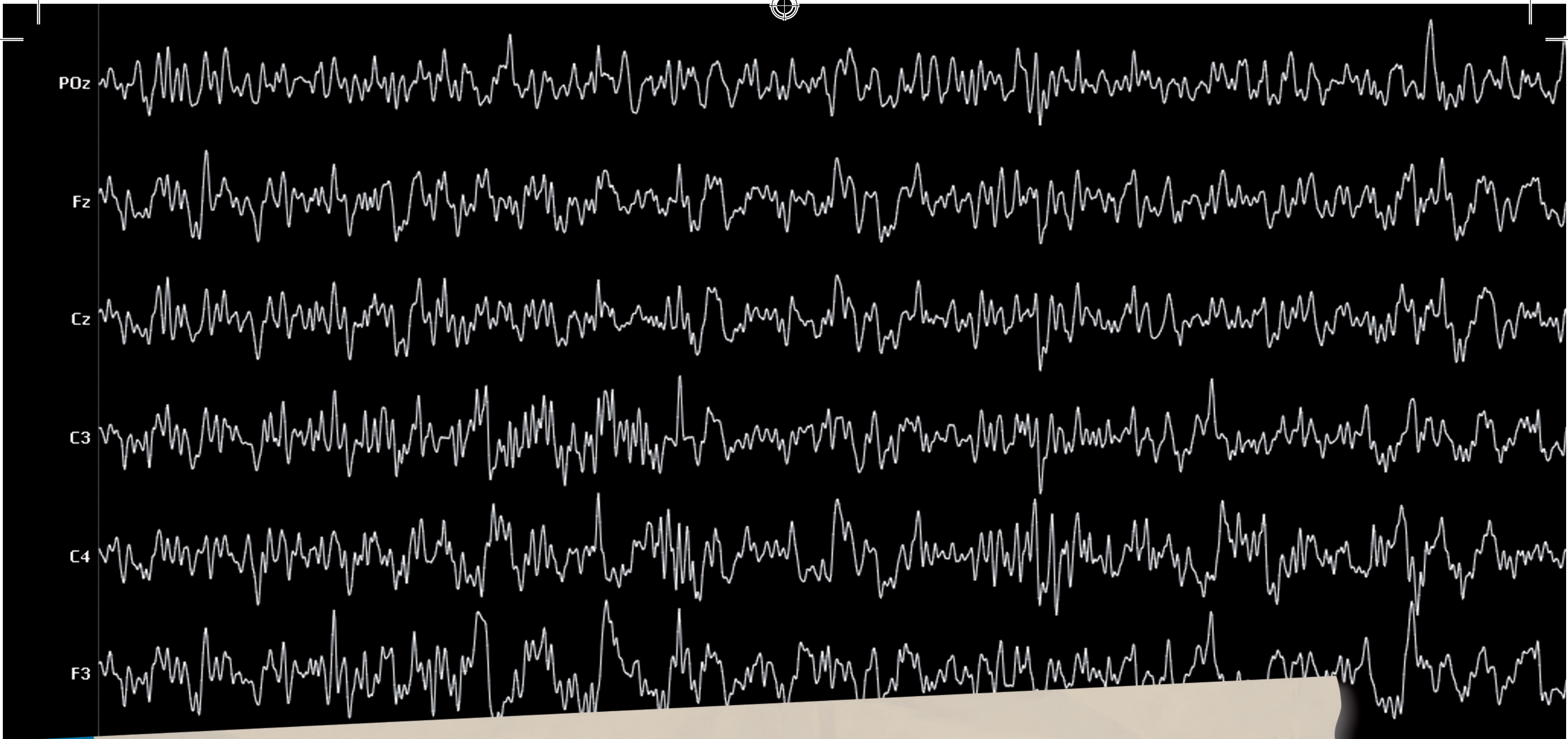

MEASURING AND MANIPULATING THE BRAIN'S INTRINSIC DYNAMICS

A TALK BY
CHRISTOPHER LEWIS
UNIVERSITY OF ZÜRICH

06
DICEMBRE
14:30

AULA SEMINARI VIMM
FONDAZIONE RICERCA
BIOMEDICA AVANZATA
VIA ORUS, 2
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The brain continuously generates a rich ensemble of intrinsic dynamics. Intrinsic activity leads to variable sensation, cognition and action, even for physically constant sensory stimulation. Two prominent factors which may contribute to intrinsic brain activity are the history of co-activation amoung sensory cells and feedback signals from higher order areas. I will discuss a series of experiments that investigate the effects of stimulus repetition and cortical feedback on sensory coding in the primary visual cortex. We find that both sensory experience and feedback activity increase the amount of sensory information retrievable from population responses without changing the average activity of single cells or the mean activity across the population. Specifically, the information is encoded in the distributed pattern of activity across the population, as predicted by population coding and Hebbian plasticity. In the case of feedback, these changes co-occur with distinct patterns of rhythmic synchronization. These findings suggest that early sensory cortices provide a flexible representation of external variables which reflects both the history of stimulation, as well as, the current state of higher order brain areas. I will discuss these results in light of recent progress to increase the spatial coverage of in vivo electrophysiology, while simultaneously acquiring multi-modal physiological signals at multiple spatial scales: from single neurons to whole brain areas.

Christopher Lewis is a project leader in the Laboratory of Neural Circuit Dynamics at the Brain Research Institute of the University of Zürich. He has experience in a broad range of neuroscience techniques, from human neuroimaging and psychophysics to the development of multi-electrode arrays for large scale (>1000 channel) recordings in cats and primates. He is currently combining multi-site electrophysiology with viral and transgenic approaches to target cellular imaging to specific pathways in rodents. He aims to combine the advantages of multiple techniques in order to bridge spatial and temporal scales, providing a unified perspective on intrinsic brain dynamics.

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