INTERNATIONAL
PHD PROGRAM
IN NEUROSCIENCE

Zenith

ZENITH SEMINARS

FRIDAY, 16 APRIL 2021
AT 5:00 PM (CET)

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FROM CONNECTOME TO FUNCTION: CONNECTIVITY FEATURES UNDERLYING NEURONAL POPULATION DYNAMICS IN THE NEMATODE *C. ELEGANS*

The field of neuroscience is currently undergoing enormous efforts to map synapse-resolution connectomes of entire brains, e.g. from fruit flies and mice. These endeavours bear the potential of uncovering fundamental principles in brain-architecture that are linked to brain-function. The connectome of the nematode *C. elegans*, composed of just 302 neuronal nodes, has been mapped decades ago. However, a solution to the structure-function problem was still pending. I will present unpublished results from our approach in which we systematically compare neuronal population activity data, obtained from single cell resolution whole brain imaging, with connectivity measures, obtained from graph-theory. I will discuss with you, which features in brain-architecture likely serve globally correlated neuronal dynamics.

Zimmer did his PhD at the EMBL in Heidelberg and the Max Planck Institute. He did his postdoc studies at The University of California, and The Rockefeller University, where he developed microfluidic lab-on-a-chip devices and calcium-imaging techniques to investigate the chemosensory mechanisms by which animals sense oxygen in the environment, using *C. elegans* as a model. He started his own research group at IMP in Vienna. His research team developed an approach to record the activity of all neurons in the brain of *C. elegans*, which enabled them to decipher fundamental principles of how the brain organizes behavior. His current research is focused on how neuronal networks processes the sensory world and generate internal representations and actions, how neuronal population dynamics arise from a network of individual neurons, and why brains regularly need to switch from wakefulness to sleep. With these approaches in the tiny roundworm, he and his team aim at understanding the fundamental principles of neuronal computations, which can be generalized to more complex brains including humans.

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