Zenith

INTERNATIONAL PHD PROGRAM IN NEUROSCIENCE

ZENITH SEMINARS

FRIDAY, 30 APRIL 2021
AT 5:00 PM (CET)

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LAUSANNE, SWITZERLAND

PROBING NEURONS AND NETWORKS IN THE *C. ELEGANS* BRAIN USING DYNAMIC STIMULI

In the *C. elegans* brain, computations occur at the level of individual neurons as well as in networks of neurons. We have been interested in how to use dynamic stimuli to probe these systems. At the single-cell level, many neurons show adaptation to external stimuli. There are two difficult-to-distinguish biochemical networks that can produce this type of response: negative feedback loops and incoherent feedforward loops. Through computational searches and mathematical theorems, we found that by using periodic stimuli and detecting dynamic signatures, one can discriminate whether the underlying circuit is of one or the other type. We then applied this method experimentally. We are currently designing similar probes for elucidating neuronal circuits. However, a bottleneck for multi-neuron readouts is image processing, for which we are currently developing deep learning methods to annotate the images as accurately as possible with as little hand annotation as possible.

After studying mathematics, physics, and biochemistry at the University of Pennsylvania, Sahand Jamal Rahi completed his PhD in theoretical physics studying quantum fluctuation forces at the Massachusetts Institute of Technology (MIT). He then switched to the intersection of physics and biology as an Independent Fellow at The Rockefeller University, working on experiments and theory in systems biology in yeast. Since July 2018 he has been leading the Laboratory of the Physics of Biological Systems at the Institute of Physics at EPFL. After being hired at EPFL, he spent an intervening year working on systems neuroscience in *C. elegans* at Harvard University.

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