



David Holcman, PhD  
Director of Research CNRS  
Group of Applied Mathematics and Computational Biology  
46, rue d'Ulm  
75005 Paris, France  
Tél + 33 (0)1 44 32 36 61

Paris, Nov 29<sup>nd</sup> 2023

## Postdoc position available

**Title:** Decoding energy demand during cognition based on correlation analysis of voltage, calcium and ATP in neurons using image processing.

**Internship type:** Master internship, master project or engineer.

**Duration:** 6 months

### Project:

The energy demand following synaptic activity remains poorly understood. This project concerns the analysis energy demand during neuronal activity. We will use data generated by Pr. E. Korkotian (Weizmann. Institute).

We propose to develop a novel analysis to study energy demand under two conditions: network activity and direct synaptic activation. This project requires image processing to denoise images, correlation analysis to study the causality between calcium and voltage signal and classification algorithms to group the different responses.

### Refs.

- 1- Tricot, A., Sokolov, I. M., & Holcman, D. (2021). Modeling the voltage distribution in a non-locally but globally electroneutral confined electrolyte medium: applications for nanophysiology. *Journal of Mathematical Biology*, 82(7), 1-31.
- 2- Cartailleur J, Kwon T, Yuste R, Holcman D. Deconvolution of Voltage Sensor Time Series and Electro-diffusion Modeling Reveal the Role of Spine Geometry in Controlling Synaptic Strength. *Neuron*. 2018 Mar 7;97(5):1126-1136.e10.
- 5- D Holcman, R Yuste, The new nanophysiology: regulation of ionic flow in neuronal subcompartments, *Nature Reviews Neuroscience* 16 (11), 685-692 2015.

**Candidate:** The candidate for this position is expected to be strongly motivated by signal processing, correlation analysis, image analysis, classification methods and, neuroscience. He/she should have a background in applied mathematics, statistical physics or computer science. The candidate should be passionate by her/his research. Students are encouraged to write a publication at the end of the training period. We strongly encourage student motivated to continue on a PhD thesis. The group has a long tradition in training Phds and postdocs.

### Contact information:

**Supervisor:** Stephane Jaffard and David Holcman

**Contact information:** [stephane.jaffard@u-pec.fr](mailto:stephane.jaffard@u-pec.fr) and [david.holcman@ens.fr](mailto:david.holcman@ens.fr)