

MINDS CDT Webinar



Dendritic contributions to biological and artificial learning

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Biography

Panayiota Poirazi has a B.S. in Mathematics from the University of Cyprus (1996), an MSc (1998) and a PhD (2000) in Biomedical Engineering, both from the University of Southern California. Her work focuses on understanding how dendrites contribute to complex brain functions, at the single cell, microcircuit and network levels. Her lab uses primarily computational modelling approaches and has recently expanded to include experiments. She received many awards for academic excellence, including the EMBO Young Investigator award, an ERC Starting Grant, the Alexander von Humboldt Wilhelm Bessel Research Award, an Einstein Foundation Visiting Fellowship etc. She is a member of EMBO.

Abstract

Dendrites are thin processes that extend from the cell body of neurons, the main computing units of the brain. The role of dendrites in complex brain functions has been investigated for several decades, yet their direct involvement in key behaviors such as for example sensory perception has only recently been established. In my presentation I will discuss how computational modelling has helped us illuminate dendritic function [1]. I will present the main findings of a number of projects in lab dealing with dendritic nonlinearities in excitatory and inhibitory neurons and their consequences on memory formation [2], the role of dendrites in solving nonlinear problems in human neurons [3] and recent efforts to advance machine learning algorithms by adopting dendritic features.

Relevant references:

- [1] Panayiota Poirazi & Athanasia Papoutsis. Illuminating dendritic function with computational models. *Nature Reviews Neuroscience*, 11 May 2020
- [2] Tziliavaki A, Kastellakis G, Poirazi P. Challenging the point neuron dogma: FS basket cells as 2-stage nonlinear integrators. *Nat Commun*. 2019 Aug 14;10(1):3664.
- [3] Gidon A, Zolnik TA, Fidzinski P, Bolduan F, Papoutsis A, Poirazi P, Holtkamp M, Vida I, Larkum ME. Dendritic action potentials and computation in human layer 2/3 cortical neurons. *Science*. 2020 Jan 3;367(6473):83-87.



Wed 14th Apr 2021 14:00 - 15:00 (UK)

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