



Dr. Panayiota Poirazi

poirazi@imbb.forth.gr

Research Director

*Institute of Molecular Biology and Biotechnology (IMBB),
Foundation for Research and Technology-Hellas (FORTH)
Heraklion, Crete, GREECE*



www.dendrites.gr



FET Open project 863245
NEUREKA: "A smart, hybrid
neural-computo device for
drug discovery"

Learning with dendrites in brains and machines

Seminar room in VIMM institute

Via Giuseppe Orus, 2, 35129 Padova PD

12 May 2023 at 15:00

Abstract:

Dendrites are thin processes that extend from the cell body of neurons and receive the vast majority of synaptic input. Their biophysical, anatomical and plasticity properties allow them to shape incoming signals in complex ways and have thus been suggested to serve as key players in learning and memory functions. During the talk, Dr. Poirazi will discuss how computational modelling has helped us illuminate dendritic function. Dr. Poirazi will present the main findings of a number of projects in lab dealing with dendritic nonlinearities in excitatory and inhibitory neurons, their consequences on memory formation, the role of dendrites in solving nonlinear problems in human neurons and recent efforts to adopt dendritic features in order to improve learning in artificial systems.

Relevant references:

- [1] Panayiota Poirazi & Athanasia Papoutsis. Illuminating dendritic function with computational models. *Nature Reviews Neuroscience*, 11 May 2020 | DOI: 10.1038/s41583-020-0301-7
- [2] Tzilivaki A, Kastellakis G, Schmitz D & Poirazi P. GABAergic Interneurons with nonlinear dendrites: from neuronal computations to memory engrams. *Neuroscience*, Nov 2021 | doi: 10.1016/j.neuroscience.2021.11.033
- [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. doi: 10.1126/science.aax6239.
- [4] Chavlis S, Poirazi P. Drawing inspiration from biological dendrites to empower artificial neural networks. *Current Opinion in Neurobiology*, Oct 2021. doi: 10.1016/j.conb.2021.04.007