



XXIV School of Physiology and Biophysics 2021

NEURONAL BIOPHYSICS: FROM EXPERIMENTS TO MODELS

Pavia, July 5-7, 2021

Organizer: prof Egidio D'Angelo

Scientific committee:

Egidio D'Angelo, Gerardo Biella, Francesco Moccia, Mauro Toselli, Francesca Prestori, Lisa Mapelli, Claudia Casellato, Fulvia Palesi, Sergio Masetto, Giancarlo Russo, Paola Perin.

Technical assistance:

Simona Tritto, Stefano Masoli

Supported by:

Department of Brain and Behavioral Sciences (University of Pavia)

Department of Biology and Biotechnology (University of Pavia)

Center of Health and Technology (University of Pavia)

Human Brain Project – EBRAINS (EU)

DAY 1 - Principles of neuronal physiology and biophysics

9.00-10.00 Opening Lecture.

The data - models handshake: from data to models and back. (Egidio D'Angelo)

- What is a neuron model?
- how to extract data needed for models
- how use data in the models
- model construction, validation and prediction
- bottom-up top-down integration
- propagation of neuronal models into robotic controllers and virtual brains

10.00-10.15 coffee break

10.15-11.15 The biophysics of membranes and neurons (Egidio D'Angelo)

11.15-12.15 Ionic channel gating, localization and regulation (Mauro Toselli)



12.15-14.00 lunch break

14.00-15.00 Principles of dendritic and axonal functions (Stefano Masoli)

15.00-15.45 Principles of synaptic transmission and plasticity (Gerardo Biella)

15.45-16.30 Multiple forms of plasticity in neuronal microcircuits (Francesca Prestori)

21.00 Casella Prize: *lectio magistralis*, Almo Collegio Borromeo

DAY 2 - Advanced techniques for neuronal recording and stimulation

9.00-10.00 Featured Lecture

Photostimulation of Neurons (Fabio Benfenati, University of Genova)

10.00-10.15 coffee break

10.15-11.15 Patch-clamp (Sergio Masetto, Teresa Soda)

11.15-12.15 Imaging and 2-PM (Francesco Moccia, Marialuisa Tognolina)

12.15-14.00 lunch break

14.00-15.00 Optical and electrophysiological techniques in vivo (Lisa Mapelli, Ileana Montagna)

15.00 – 17.00 VISIT TO LABORATORIES

Optogenetics and optical recordings in vitro (Eleonora Pali)

Optogenetics and optical recordings in vivo (Ileana Montagna)

MEA recordings in vitro (Alessandra Ottaviani)

MEA recordings In vivo (Danila Di Domenico)

Patch-clamp recordings in vitro (Teresa Sorbo, Francesca Talpo, Francesca Raffin)

Calcium imaging in vitro (Francesco Moccia)

2-photon microscopy in vitro (Marialuisa Tognolina)

20.30 Social dinner

DAY 3 - Neural computation

9.00-10.00 Featured Lecture

Cognitive functions and dysfunctions emerging from large-scale brain models (Michele Migliore, CNR)

10.00-10.15 coffee break

10.15-11.15 Subcellular and cellular models (Stefano Masoli, Martina Rizza, Thierry Nieuu)

11.15-12.15 Microcircuit models (Claudia Casellato, Robin De Schepper)

12.15-14.00 lunch break

14.00-15.00 Whole-brain models and closed-loop controllers (Fulvia Palesi, Alice Geminiani, Claudia Casellato)

15.00 – 17.00 VISIT TO LABORATORIES

Single Neuron Models (Martina Rizza, Stefano Masoli)

Microcircuit Models (Robin DeSchepper, Stefano Casali, Alice Geminiani)

Large-scale models (Fulvia Palesi, Claudia Casellato, Roberta Lorenzi, Marta Gaviraghi, Alice Geminiani, Anita Monteverdi)

17.00 – 18.00 CONCLUSIONS AND FAIRWELL

