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.

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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 Nieus)

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