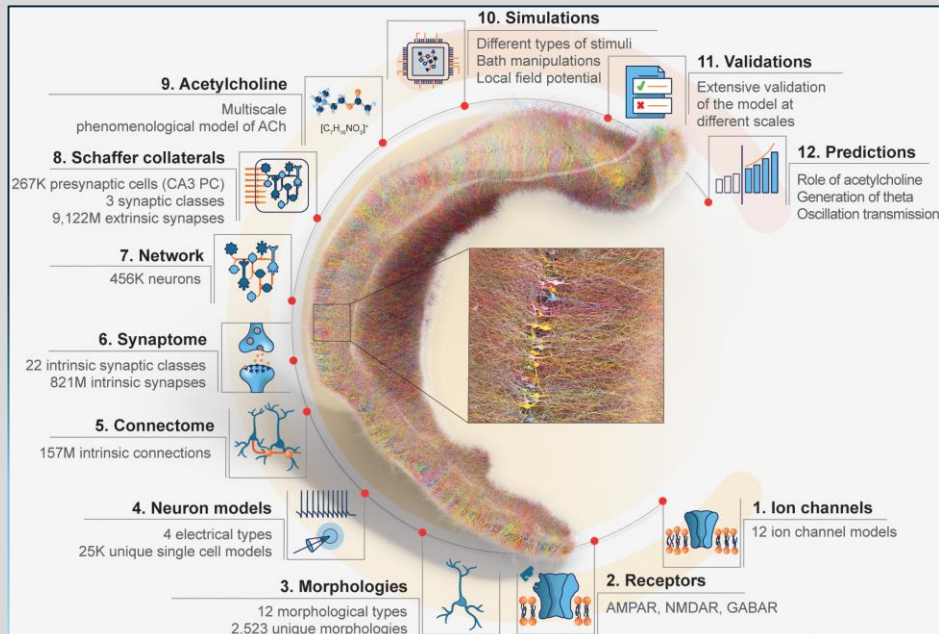




19

ottobre 2026



AUDITORIUM – IRCCS Centro Neuroelsi “Bonino Pulejo”

SEMINARIO SCIENTIFICO
Prof. Michele MIGLIORE

Ore 15:00

Cognitive functions (and dysfunctions) emerging from large-scale data-driven models of brain regions

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ABSTRACT:

Understanding the neural basis of brain functions and dysfunctions has a huge impact on several scientific, technical, and social fields. Experimental findings have given and continue to give important clues at different levels, from subcellular biochemical pathways to behaviors. However, most of the multi-level mechanisms underlying the cognitive architecture of the involved brain regions are still largely unknown or poorly understood. This mainly depends on the practical impossibility to obtain detailed simultaneous *in vivo* recordings from an appropriate set of cells, making it nearly impossible to decipher and understand the emergent properties and behavior of large neuronal networks. We are addressing this problem using full-scale computational models of brain regions and cognitive architectures. I will present and discuss the main results and techniques we use to design and exploit full-scale models of neurons and networks implemented following their natural 3D structure, with the main aim to uncover the mechanisms underlying higher brain functions and helping the development of innovative therapies to treat brain diseases.

Brief CV:

D.Phil. in Physics (1980, University of Palermo, Italy). He has been Research Director at the Institute of Biophysics of the Italian National Research Council (CNR-IBF, Palermo, Italy, 1983-2024), Director of the Palermo section of CNR-IBF (2015-2017), Visiting Professor of Computational Neuroscience at the University of Rome "La Sapienza" (Italy, 2018-2023), Visiting Professor of Cybernetics at the Department of Mathematics and Informatics of the University of Palermo (Italy, 2000-2018), and Visiting Scientist at the Department of Neuroscience of the Yale University School of Medicine (New Haven, USA, 2000-2020).

He is currently Research Scientist at the Dept. of Physiol. and Pharmacol. of SUNY Downstate Health Science University (Brooklyn, NY, USA), and Principal Investigator at the European Brain Research Institute (Rome, Italy). His lab is involved in modelling realistic neurons and networks, synaptic integration processes, and plasticity mechanisms. The main long-term goal is to understand the emergence of higher brain functions and dysfunctions from cellular processes, implementing new tools and using state of the art simulation environments on different supercomputer systems.