



Human Brain Project



EBRAINS

BRAIN SIMULATION SCHOOL 2022

**TRAINING ON SINGLE NEURON MODELS, BRAIN
CIRCUIT MODELS, COGNITION, COLLABORATORY,
SYNAPTIC PLASTICITY AND LEARNING**

30 May – 3 June 2022
Palermo, Italy

Registration deadline:
30 April 2022



ABOUT THE EVENT

The EBRAINS Brain Simulation School 2022 aims at introducing the participants to the latest achievements and innovations of the digital infrastructure for brain research EBRAINS, created by the Human Brain Project. The School will offer tutorials on EBRAINS Tools and eServices. The students will be presented with an overview of the EBRAINS research platform, discussed by the leaders of the Human Brain Project, and gain practical skills in using EBRAINS resources to implement cellular and network level computational models, to use EBRAINS Computing Services to configure and run simulations, and to visualise/analyse the results. Through tutorials, interactive sessions and hands-on activities, attendees will learn how to interact with EBRAINS to carry out their own research, to set up and manage a data-driven collaborative project, or to use the EBRAINS platform to interact with internal and external databases.

The target audience of this school are advanced master students, doctoral students and postdoctoral researchers in biomedical and technology sciences, from medicine, biology, psychology, to mathematics, informatics, information technology, physics, chemistry, who would like to get an introduction to the neuroinformatics and computational neuroscience tools available in the EBRAINS Infrastructure.

Scientific Committee:

Michele Migliore | Italian National Research Council
Aušra Saudargienė | Lithuanian University of Health Sciences
Francesca Spataro | Italian National Research Council
Alessia Bonafede | Italian National Research Council



National Research Council of Italy



LITHUANIAN UNIVERSITY
OF HEALTH SCIENCES

Contact:

training-support@humanbrainproject.eu

Further information & registration:

<https://www.humanbrainproject.eu/en/education/BRAINSIM>

Organised by:



Human Brain Project
Education Programme

Monday 30 May 2022

Please note that all times are in CEST (=GMT/UTC+2)

This programme is subject to change.

- 09:00 – 9:30** **Welcome & Introduction to the School**
Michele Migliore | Institute of Biophysics, Italian National Research Council
- Session I - EBRAINS Infrastructure for Brain Research
Chair: Michele Migliore | Institute of Biophysics,
Italian National Research Council
- 09:30 – 10:30** **The EBRAINS European Infrastructure in the European context**
Pawel Świeboda | EBRAINS CEO and Director General of the
Human Brain Project
- 10:30 – 11:00** **Coffee break**
- 11:00 – 11:45** **The EBRAINS Research Platform**
Jan Bjaalie | Institute of Basic Medical Sciences, University of Oslo
- 11:45 – 12:30** **The role of EBRAINS in engaging society and communities in neuroscience**
France Nivellet | EBRAINS
- 12:30 – 14:30** **Lunch break**
- 14:30 – 15:15** **EBRAINS technology for developers**
Marc Morgan | EBRAINS
- 15:15 – 16:00** **Workshop: The EBRAINS Collaboratory for users**
Annapaola Santarsiero | EBRAINS
- Tutorial I: Hands-on EBRAINS for electrophysiological feature extraction
- 16:00 – 17:30** **Basic tools for electrophysiological features extraction (theory and practice)***
Luca L. Bologna & Rosanna Migliore | Institute of Biophysics,
Italian National Research Council
- * Coffee available from 16:00 – 16:30
- 17:30 – 18:00** **Interactive session**

Tuesday 31 May 2022

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Session II: Student presentations

Chair: Paola Vitale | Institute of Biophysics, Italian National Research Council

09:00 – 10:30 **Student presentations I**

10:30 – 11:00 **Coffee break**

11:00 – 12:30 **Student presentations II**

12:30 – 14:30 **Lunch break**

Session III: Synaptic Plasticity and Learning

Chair: Rosanna Migliore | Institute of Biophysics,
Italian National Research Council

14:30 – 15:15 **Empiric models of synaptic plasticity**

Michele Migliore | Institute of Biophysics, Italian National Research Council

15:15 – 16:00 **Detailed models of synaptic plasticity**

Aušra Saudargienė | Lithuanian University of Health Sciences

Tutorial II: Hands-on EBRAINS for modelling local field potentials

16:00 – 17:30 **Modelling local field potentials (theory and practice)***

Gaute Einevoll | Norwegian University of Life Sciences

* Coffee available from 16:00 – 16:30

17:30 – 18:00 **Interactive session**

20:00 **Social Dinner**

Wednesday 1 June 2022

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Session IV: Single Neuron Models

Chair: Aušra Saudargienė | Lithuanian University of Health Sciences

- 09:00 – 10:30 **Scientific drive: single cell modelling**
Michele Migliore | Institute of Biophysics, Italian National Research Council
- 10:30 – 11:00 **Coffee break**
- 11:00 – 12:30 **Single cell model optimisation: algorithms, methods, resources**
Luca L. Bologna, Rosanna Migliore & Paola Vitale | Institute of Biophysics,
Italian National Research Council
- 12:30 – 14:30 **Lunch break**
- Tutorial III: Hands-on EBRAINS for single neuron modelling
- 14:30 – 17:30 **Build your own cell model***
Luca L. Bologna & Rosanna Migliore | Institute of Biophysics,
Italian National Research Council
- * Coffee available from 16:00 – 16:30
- 17:30 – 18:00 **Interactive Session**

Thursday 2 June 2022

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Session V: Brain Circuit Models

Chair: Michele Migliore | Institute of Biophysics,
Italian National Research Council

Success story: Detailed model of hippocampus CA1, Part I (science)

Chair: Michele Migliore | Institute of Biophysics,
Italian National Research Council

- 09:00 – 09:30** **General introduction to data-driven brain tissue modelling**
Felix Schürmann | Blue Brain Project, EPFL
- 09:30 – 10:00** **Reconstruction and simulation of a full-scale model of rat hippocampus CA1**
Armando Romani | Blue Brain Project, EPFL
- 10:00 – 10:30** **Hippocampus Hub and MOOC**
Jean-Dennis Courcol | Blue Brain Project, EPFL
- 10:30 – 11:00** **Coffee break**
- Success story: Detailed model of hippocampus CA1, Part II (hands-on)
Chair: Jean-Denis Courcol | Blue Brain Project, EPFL
- 11:00 – 12:30** **Hands-on Exercises on analysing the circuit and simulations and Hippocampus Hub**
Armando Romani, Gianluca Ficarelli & Joni Herttuainen | Blue Brain Project, EPFL
- 12:30 – 14:30** **Lunch break**
- Success story: Detailed model of cerebellum
Chair: Daniela Gandolfi | UNIMORE
- 14:30 – 15:15** **Multiscale brain modeling**
Egidio D'Angelo | University of Pavia
- 15:15 – 16:00** **Modeling pipeline for the Cerebellum**
Claudia Casellato | University of Pavia
- 16:00 – 16:15** **Coffee break (Coffee available from 16:00 – 16:30)**
- Tutorial IV: Hands-on, circuit modelling
- 16:15 – 17:15** **Scientific drive: modelling the mouse, and human Hippocampus with spiking neurons**
Daniela Gandolfi | UNIMORE
- 17:15 – 18:00** **The Brain Scaffold Builder**
Claudia Casellato & Robin De Schepper | University of Pavia

Friday 3 June 2022

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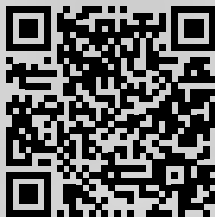
This programme is subject to change.

Session VI: Cognition

Chair: Egidio D'Angelo | University of Pavia

- 09:00 – 10:30 **Scientific drive: Modelling cognitive functions**
Michele Migliore | Institute of Biophysics, Italian National Research Council
- 10:30 – 11:00 **Coffee break**
- 11:00 – 12:00 **Using NEURON+python, from laptops to supercomputer systems**
Michael Hines | Yale University
- 12:00 – 12:30 **Tech drive: NetPyNE, a tool for multiscale modeling of brain circuits**
Salvador Dura-Bernal | SUNY
- 12:30 – 14:30 **Lunch break**
- Tutorial V: Hands-on EBRAINS for building networks
- 14:30 – 15:00 **Tech drive: interacting with HPC systems**
Luca L. Bologna | Institute of Biophysics, Italian National Research Council
- 15:00 – 16:00 **Hands-on session: using NetPyNE on EBRAINS to build networks**
Salvador Dura-Bernal | SUNY
Adam Ponzi | Institute of Biophysics, Italian National Research Council
- 16:00 – 17:30 **Interactive session and conclusions***

* Coffee available from 16:00 – 16:30



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