



**EBRAINS**



Human Brain Project  
Education Programme

**EBRAINS WORKSHOP**  
**BRAIN ACTIVITY ACROSS SCALES**  
**AND SPECIES: ANALYSIS OF EXPERIMENTS**  
**AND SIMULATIONS (BASSES)**

**13–15 JUNE 2022**  
**ROME, ITALY AND ONLINE**

**SCIENTIFIC PROGRAMME**



Human Brain Project



Co-funded by  
the European Union

## ABOUT THE EVENT

The study of brain rhythms and of spatio-temporal patterns of brain activation is an important test-bench for understanding connectivity and the mechanisms that determine cognitive systems in mammals.

The large variety of available experimental protocols and measurement techniques enable researchers to investigate new scientific questions. In addition, the input from experimental observations is used to design theoretical models able to emulate brain dynamics and cognitive mechanisms in in-silico experiments.

The goal of the BASSES Workshop (Brain Activity across Scales and Species: Analysis of Experiments and Simulations) is to provide an overview of the scientific topic of brain states and complexity, state transitions, and their connection with cognitive functions, and to demonstrate the achievements in this field obtained within the Human Brain Project thanks to the functionalities provided by the EBRAINS research platforms.

Lectures will showcase the latest advancements in analysis strategies and whole-brain modelling tools. Hands-on Sessions will allow the participants to be actively engaged and test the EBRAINS functionalities for data storage, curation, analysis, and modelling.

BASSES will allow people with different expertise, from experimental and theoretical neuroscientists to computer scientists, to share results and ideas and connect into a wider community.

### Further information:

[humanbrainproject.eu/en/education/ebrains-workshops/basses](https://humanbrainproject.eu/en/education/ebrains-workshops/basses)

Use the hashtag #BASSES to share your experiences at the workshop on social media!

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### Scientific Chairs & Local Hosts:

Anna Letizia Allegra Mascaro | CNR - National Research Council, Italy &  
LENS - European Laboratory for Non-Linear Spectroscopy, Firenze, Italy  
Giulia de Bonis | INFN - National Institute of Nuclear Physics, Rome, Italy

### Contact:

[workshop.edu@humanbrainproject.eu](mailto:workshop.edu@humanbrainproject.eu)

### Organised by:



Human Brain Project  
Education Programme

### In cooperation with:



# MONDAY 13 JUNE 2022

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

- 12:30 – 14:00**      **Registration**
- 14:00 – 14:15**      **Welcome & Introduction**
- 14:15 – 16:30**      **PLENARY SESSION I: BRAIN STATES AND COMPLEXITY**  
(Chairs: **Anna Letizia Allegra Mascaro** | CNR/LENS, Italy  
& **Giulia de Bonis** | INFN, Italy)
- 14:15 – 14:45**      **When Casualty meets Inference: complexity in neuroscience**  
**Viktor Jirsa** | Aix Marseille Université, France
- 14:45 – 15:15**      **Models for bridging scales from neural circuits to the whole brain**  
**Alain Destexhe** | CNRS, France
- 15:15 – 15:30**      Student Flash Talk Session #1
- 15:30 – 16:00**      **Cortical Slow Waves: mechanisms, dynamics and modulation**  
**Mavi Sanchez-Vives** | IDIBAPS, Spain
- 16:00 – 16:30**      **Measuring brain complexity across states and scales:  
a perturbational approach**  
**Mario Rosanova** | University of Milan, Italy
- 16:30 – 17:00**      **Coffee break**
- 17:00 – 18:50**      **PLENARY SESSION II: STATE TRANSITIONS AND THEIR  
COGNITIVE ROLE** (Chair: **Giulia De Bonis** | INFN, Italy)
- 17:10 – 17:40**      **Cognitive and energetic benefits of awake/sleep cycles during  
incremental learning in multi-areal spiking neural networks**  
**Pier Stanislao Paolucci** | INFN, Italy
- 17:40 – 18:10**      **A simple account of the complexity of slow wave activity**  
**Maurizio Mattia** | ISS, Italy
- 18:10 – 18:30**      Student Flash Talk Session #2
- 18:30 – 18:55**      **A comprehensive neural simulation of slow-wave sleep and highly  
responsive wakefulness dynamics**  
**Jennifer Goldman** | CNRS, France
- 18:55 – 19:30**      **Informal discussions**
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## TUESDAY 14 JUNE 2022

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- 09:00 – 10:45**      **PLENARY SESSION III: MULTI-SCALE APPROACHES TO INVESTIGATE THE BRAIN COMPLEXITY (I) - DATA ANALYSIS METHODS AND RESULTS** (Chair: Mavi Sanchez-Vives | IDIBAPS, Spain)
- 09:05 - 09:35**      **Mechanisms of brain signaling and consciousness across scales, species, and conditions**  
**Johan Storm** | University of Oslo, Norway
- 09:35 - 10:00**      **State-dependent cortex-wide broadcasting of sensory information**  
**Francesco Resta** | LENS, Italy
- 10:00 - 10:25**      **Loss of differentiation and complexity in the sleeping human brain: a multi-scale analysis**  
**Andrea Pigorini** | University of Milan, Italy
- 10:25 - 10:45**      **Multiscale dynamical characterization of cortical brain states: integrating experimental and computational research in EBRAINS**  
**Arnau Manasanch Berengué** | IDIBAPS, Spain
- 10:45 - 11:15**      **Coffee break**
- 11:15 – 12:40**      **PLENARY SESSION IV: INTRODUCTION TO EBRAINS RESOURCES**  
(Chair: **Pier Stanislao Paolucci** | INFN, Italy)
- 11:20 - 11:50**      **The transformative impact of the EBRAINS research infrastructure on research on brain structure, activity and cognitive function: Why - What - How**  
**Jan Bjaalie** | University of Oslo, Norway
- 11:50 - 12:20**      **EBRAINS Modeling and Simulation Workflows**  
**Michele Migliore** | Institute of Biophysics, CNR, Italy
- 12:20 – 12:30**      **Student Flash Talk Session #3**
- 12:30 – 13:30**      **Posters and Lunch**
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## TUESDAY 14 JUNE 2022

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- 13:30 – 15:15 **PLENARY SESSION V: MULTI-SCALE APPROACHES TO INVESTIGATE THE BRAIN COMPLEXITY (II) - DATA ANALYSIS METHODS AND RESULTS** (Chair: **Arnau Manasanch Berengué** | IDIBAPS, Spain)
- 13:35 - 14:00 **Brain-state dependence of functional connectivity in a mouse model of autism**  
**Elena Montagni** | LENS, Italy
- 14:00 - 14:30 **Local changes in brain oscillations after stroke**  
**Eric Landsness** | Washington University in St. Louis, United States
- 14:30 - 15:00 **Blocks instead of puzzles pieces - analyzing cortical wave activity across scales in an adaptable framework**  
**Robin Gutzen** | Forschungszentrum Jülich, Germany
- 15:00 – 15:15 Student Flash Talk Session #4
- 15:15 – 15:45 **Coffee break**
- 15:45 – 17:15 **Hands-on Session 1: Handling EBRAINS Data**  
**Lyuba Zehl** | Forschungszentrum Jülich, Germany
- 17:15 – 18:45 **Hands-on Session 2: Running analysis in EBRAINS**  
**Michael Denker, Robin Gutzen & Moritz Kern** | Forschungszentrum Jülich, Germany
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## WEDNESDAY 15 JUNE 2022

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- 09:00 – 11:10**      **PLENARY SESSION VI: FROM DATA TO MODELS AND SIMULATIONS:  
A. MEAN FIELD SIMULATIONS**  
(Chair: **Alain Destexhe** | CNRS, France)
- 09:05 - 09:30**      **Computational approaches to study cortical dynamics at  
multiple scales**  
**Alessandra Camassa** | IDIBAPS, Spain
- 09:30 - 09:55**      **Cortical Slow Waves in Inferred Models of the Whole Hemisphere of  
Mouse**  
**Chiara de Luca** | INFN/Sapienza University of Rome, Italy
- 09:55 - 10:20**      **A general theory of cortical columns from first principle: out-of-equilibrium  
dynamics**  
**Gianni Valerio Vinci** | ISS, Italy
- 10:20 - 10:45**      **Burst-dependent plasticity and dendritic amplification support target-  
based learning and hierarchical imitation learning**  
**Cristiano Capone** | INFN, Italy
- 10:45 - 11:10**      **A multi-class logistic regression algorithm to reliably infer network  
connectivity from cell membrane potentials**  
**Thierry Nieuw** | University of Milan, Italy
- 11:10 – 11:40**      **Coffee break**
- 11:40 – 13:30**      **PLENARY SESSION VII: FROM DATA TO MODELS AND SIMULATIONS:  
B. SPIKING SIMULATIONS** (Chair: **Cristiano Capone** | INFN, Italy)
- 11:45 - 12:10**      **High resolution wide-field spiking simulations of mouse cortical  
hemisphere**  
**Elena Pastorelli** | INFN, Italy
- 12:10 - 12:20**      **Student Flash Talk Session #5**
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## WEDNESDAY 15 JUNE 2022

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- 12:20 - 12:50**      **Multi-area full-density spiking network models of monkey and human cortices: from anatomy to resting-state dynamics**  
**Sacha van Albada** | Forschungszentrum Jülich, Germany
- 12:50 - 13:20**      **Simulation of large-scale spiking network models on GPU systems: recent advances**  
**Bruno Golosio** | University of Cagliari, Italy
- 13:20 - 13:30**      Student Flash Talk Session #6
- 13:30 - 14:30**      **Posters and Lunch**
- 14:30 - 15:30**      **Hands-on Session 3: Simulating spatially organised networks with NEST**  
**Johanna Senk & Jasper Albers** | Forschungszentrum Jülich, Germany
- 15:30 - 16:30**      **Hands-on Session 4: Validating models against data in EBRAINS**  
**Andrew Davison & Shailesh Appukuttan** | CNRS, France
- 16:30 - 17:00**      **Closing remarks**
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## LIST OF POSTERS

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Posters marked with \* will be presented in a flash talk during the main programme.

**Poster 01\*** Mean field model of resting state cortical dynamics in prodromic phases of Alzheimer's disease  
**Lorenzo Gaetano Amato** (University of Pisa)

**Poster 02\*** In premotor cortex functional connected populations are hierarchically organized during movement planning. Canceling a programmed movement requires a network reshuffle  
**Giampiero Bardella** (INFN & Sapienza University of Rome)

**Poster 03\*** Hierarchical Optimal Sampling (HOS): a tool for managing and manipulating wide-field imaging datasets  
**Irene Bernava** (INFN)

**Poster 04\*** A multiscale network model to investigate the basal ganglia and cerebellum interplay in Parkinson's Disease  
**Marco Biasizzo** (Scuola Superiore Sant'Anna, Pisa)

**Poster 05** The effects of synaptic plasticity and membrane potential on neural synchronization  
**Rahmi Elibol** (Middle East Technical University)

**Poster 06\*** Investigating the impact of cortical lesions on brain complexity in silico  
**Gianluca Gaglioti** (University of Milan)

**Poster 07\*** One Fractional Anisotropy in one scan minutes: a generalised deep neural network for clinical applications  
**Marta Gaviraghi** (University of Pavia)

**Poster 08\*** NMDA spike dynamics under Timed Synaptic Inhibition  
**Dhuruva Priyan Gowri Mariyappan** (University of Montreal)

**Poster 09** Exploring Student Engagement in a Classroom Setting Using EEG Based Brain-to-Brain Synchrony Analysis  
**Iqbal Hassan** (Advanced Intelligent Multidisciplinary Systems Lab, Institute of Advanced Research, United International University, Dhaka, Bangladesh)

**Poster 10\*** Standardised scientific computational workflows as introduced at EBRAINS Research Infrastructure  
**Sofia Karvounari & Eleni Mathioulaki** ("Athena" Research and Innovation Center in Information, Communication and Knowledge Technologies)

**Poster 11** The role of input on phase transitions in brain networks  
**Sheida Kazemi** (Tarbiat Modares University, Iran)



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**Poster 12\*** Multi-layer cerebellar Mean-Field Model for improving BOLD signal simulations

**Roberta Lorenzi** (University of Pavia)

**Poster 13\*** Burst-dependent plasticity and dendritic amplification support target-based learning and hierarchical imitation learning

**Cosimo Lupo** (INFN)

**Poster 14** An Intelligent Neuromarketing System for Predicting Consumers' Choice from Electroencephalography Signals and Eye Tracking

**Fazla Rabbi Mashrur** (United International University)

**Poster 15\*** Venturing into multiple brain sub-networks excitatory/inhibitory balance

**Anita Monteverdi** (IRCCS Mondino Foundation)

**Poster 16** Ethanolic E.tapos yoghurt mitigates transgenerational inheritance of obesity and cognitive deficit in F1 generation of maternal obese dams

**Ruth Naomi** (Department of Human Anatomy, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia)

**Poster 17** Effects of the ethanolic root bark extract of *Stachytarpheta Indica* on the histology of the cerebrum of adult albino wistar rats

**Enobong Edoabasi Obong** (University of Ibadan, Nigeria)

**Poster 18\*** Machine learning of diversified sex features across mental disorders

**Andreea Prisecaru & Zuzanna Onderko** (King's College London)

**Poster 19\*** In silico brain-inspired meta-learning framework for task-specific action suppression

**Federica Robertazzi** (The BioRobotics Institute, Sant'Anna School of Advanced Studies, Pisa)

**Poster 20\*** EEG-based Major Depressive Disorder (MDD) Identification through Functional Connectivity Analysis

**Jannatul Ferdous Srabonee** (Advanced Intelligent Multidisciplinary Systems (AIMS) Lab, Bangladesh)

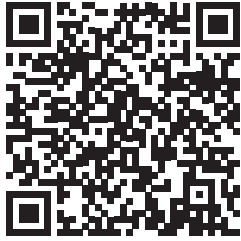
**Poster 21\*** Incremental Awake-NREM-REM Learning Cycles: Cognitive and Energetic Effects in a Multi-area Thalamo-Cortical Spiking Model

**Leonardo Tonielli** (INFN)

**Poster 22\*** Inferring E/I (im)balance in Alzheimer's disease from large-scale neuronal signal variability and functional connectivity using a symbol dynamics approach

**Anne van Nifterick** (Amsterdam UMC)





This project has received funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation under the Specific Grant Agreement No. 945539 (Human Brain Project SGA3).

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