ICM/Inria/SCAI workshop
"Computational and mathematical approaches for neuroscience"
ICM auditorium
7-8 June, 2022

June 7ᵗʰ
10:00-10:30 - Introduction/Welcome: Alexis Brice, Eric Fleury, Nathalie Drach-Temam

10:30-12:00 : Session 1 - Theoretical modeling of neural circuits
10:30-10:50 - Claire Wyart and Gautam Sridhar, ICM - Investigation of motor states by unbiasedly analyzing sequences of actions over long time scales.
10:50-11:10 - Xavier Hinaut, Inria - Sensorimotor and hierarchical models of vocal and language learning: songbirds, humans, robots.
11:10-11:30 - Andrea Pinna, SCAI - Smart medical devices based on embedded frugal artificial intelligence.
11:30-12:00 - Discussion

12:00-14:00 : Lunch Break

14:00-15:30 : Session 2 - Cognition and Behavior (1)
14:00-14:20 - Leonie Koban, ICM - An fMRI-based brain marker of individual differences in delay discounting predicts overweight and metabolic markers.
14:20-14:40 - Alexandre Gramfort, Inria - Statistical learning from EEG signals in the clinic.
14:40-15:00 - Matthieu Cord, SCAI - Deep learning for computer vision.
15:00-15:30 - Discussion

15:30-16:00 : Coffee Break

16:00-17:30 : Session 3 - Cognition and Behavior (2)
16:00-16:20 - Jean Daunizeau, ICM - Synaptic plasticity in the orbitofrontal cortex explains how risk attitude adapts to the range of risk prospects.
16:20-16:40 - Axel Hutt, Inria - General anaesthesia from a dynamical systems point of view.
16:40-17:00 - Nathanaël Jarassé, SCAI - Toward intuitive and ecological robotic assistances to gesture.
17:00-17:30 - Discussion

18:00-20:00 : Cocktail (ICM)

June 8ᵗʰ
9:00- 10h30 : Session 4 – Omics data
9:00-9:20 - Sara Bizzotto, ICM - Somatic mosaic mutations and lineage tracing in human brain development and disease.
9:20-9:40 - Guillemette Marot, Inria - Clinical score building from high-throughput proteomic data.
9:40-10:00 - Alessandra Carbone, SCAI - Deep learning and protein interaction.
10:00-10:30 - Discussion

10:30-11:00 : Coffee Break

11h-12h30 : Session 5 - Multimodal data integration
11:00-11:20 - Violetta Zujovic, ICM - Multimodal approaches to uncover immune cell role in central nervous system diseases.
11:20-11:40 - Marco Lorenzi, Inria - Heterogeneous data-integration in biomedical studies: multi-view, multi-scale, and multi-centric.
11:40-12:00 - Isabelle Bloch, SCAI - Combining knowledge and data for image understanding.
12:00-12:30 - Discussion

12h30-13:00 : General discussion

13:00 : Lunch

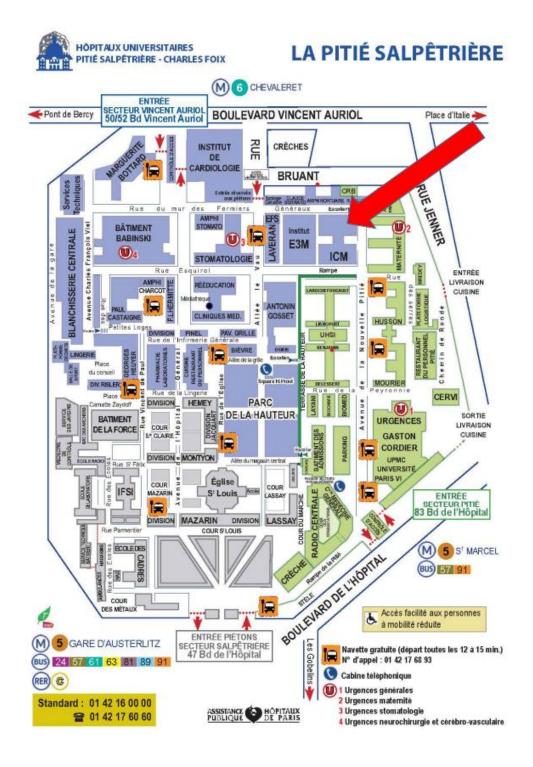## Registration here : WORKSHOP AT ICM ON JUNE 7 & 8

Institut du Cerveau / Paris Brain Institute • ICM :

Hôpital de la Pitié-Salpêtrière

47 boulevard de l'Hôpital

75013 Paris

Claire Wyart

C. Wyart & G. Sridhar Claire Wyart is a Research Director at INSERM and leads the Spinal Sensory Signaling lab (wyartlab.org) at the Paris Brain Institute. Her research interests include motor control, sensorimotor integration, and interoception. She will be presenting with Mr Gautam Sridhar, a talented graduate student who will show his work on the identification of motor patterns over long time scales. This work is done in collaboration with the theorists Antonio Costa and Massimo Vergassola in Ecole Normale Supérieure.

Xavier Hinaut

Xavier Hinaut is a research scientist in Computational Neuroscience at Inria, Bordeaux, France. His work is at the frontier of neurosciences, machine learning, robotics and linguistics: from the modeling of human sentence processing to the analysis of birdsongs and their neural correlates. He manages the DeepPool ANR project on human sentence modelling with Reservoirs. He leads ReservoirPy development: a new Python library for Reservoir Computing.

Andrea Pinna

Dr. Andrea Pinna is Associated Professor (HDR) in Electronics and Embedded Systems at Sorbonne Université. He received the engineering degree in microelectronic from the University of Genoa (Italy) in 1999 and the Ph.D. degree in Electronic Intelligent System from Université Pierre and Marie Curie (UPMC), in 2004. He was recruited as Associated Professor in 2004 at UPMC and from 2006-2011 he worked in the sector of semiconductor industry and technological innovation. Since 2011, he came back to the University research activities at Computer Science Institute (LIP6) in Sorbonne Université. His research interest is oriented on the areas at the border of electronics, computer science and medical science and fall under the thematic of Systems and Architectures. In particular he is interested in Codesign methodology for smart embedded system design like System Vision on-Chip for pattern recognition (artificial retina) or intelligent embedded systems or diagnostic support (medical device). He works on an automated personalized system for sleep scoring tool and on smart (AI@edge) endoscopic capsules. From 2013-2016 he was the Head manager of Electronics Computer Science - Embedded Systems department at Sorbonne Polytech Engineering school. From 2017-2021 he was project manager and scientific ambassador for Sorbonne Université at the EIT Digital France. A. Pinna has supervised 2 PhD on co-direction, 4 PhD co-advising (as executive member and both scientific and technical expert), 2 Post-doctoral student and 2 engineers. He is actually director of 3 PhD.

Leonie KOBAN

Leonie Koban is an Associate Researcher at CNRS and a PI in the Control-Interoception-Attention team at the Paris Brain Institute (ICM). She has recently been awarded an ERC Starting Grant to investigate how social context affects craving and dietary decision-making. In her research, she combines behavioral measures, brain imaging (fMRI), and machine-learning to identify brain signatures that predict behavioral and health outcomes.

Alexandre Gramfort

Alexandre Gramfort is a Research Director at Inria and the co-head of the MIND Lab, a joint team between Inria, CEA Neurospin and Université Paris-Saclay. He also holds a national AI chair from ANR called BrAIN "Bridging AI and Neuroscience". His research interests include machine learning, signal processing, open source software and their applications to cognitive and clinical neuroscience.

Matthieu Cord

Matthieu Cord is professor at Sorbonne University and part-time principal scientist at valeo.ai. His research expertise includes computer vision, machine learning, deep learning and artificial intelligence. He is an honorary member of the Institut Universitaire de France and served from 2015 to 2018 as an AI expert at CNRS and ANR (National Research Agency). He is the author of more 150 publications on image classification, segmentation, deep learning, and multimodal vision and language understanding. He currently holds a chair of research and teaching in artificial intelligence at ISIR.

Jean Daunizeau

Jean Daunizeau, 44 y.o., holds a BSc in psychology, and obtained a PhD in physics from Université de Montréal (Montréal, Canada) and a PhD in medical imaging from Université Paris XI (Paris, France). From 2006 to 2009, he performed a first post-doctoral training at the Wellcome Trust Centre for Neuroimaging (FIL, UCL, London, UK), under the supervision of Pr. Karl J. Friston. From 2009 to 2012, he performed a second post-doctoral training at the Social and Neural Systems Laboratory (Dpt. of Economics, UZH, Zurich, Switzerland), under the supervision of Pr. Klaas E. Stephan. Since 2013, he is co-heading a research group at the Paris Brain Institute (ICM, Paris, France) focused on the neuroscience of learning and decision making.

Axel Hutt

Axel Hutt is a Research Director at INRIA-Nancy Grand Est in the team MIMESIS located in Strasbourg. His research include computational and mathematical aspects of neuromodulation by medical drugs and transcranial neurostimulation with a strong focus on general anaesthesia and mental disorders.

Nathanaël Jarrassé

Nathanaël Jarrassé is a CNRS research scientist at the Institute of Intelligent Systems and Robotics of the Sorbonne Université in Paris. His research projects aim at understanding and improving the physical Human-Robot interaction (pHRi) for neuromotor rehabilitation and assistance applications to further embodiment of technological devices. He is especially interested in the natural control of wearable or interacting robotic devices (exoskeletons, prosthetics, instrumented interfaces, cobots), the physical coupling between robotic devices and the human body, and the analysis of human sensorimotor control and interactive behaviours.

Sara Bizzotto

Sara Bizzotto is an MSCA Research Fellow at Paris Brain Institute (ICM) in the BAULAC Lab (http://www.baulacleguernepilepsy.com). Her research focuses on brain development and the pathophysiology of developmental brain disorders. In particular, she applies single-cell omics to study genetic mosaicism in the human brain, its application to lineage tracing, and the role of somatic mutations in developmental brain disorders.

Guillemette Marot

Guillemette Marot is an associate professor at the Faculty of Medicine at Lille University and a member of the Inria project team MODAL. She is also the head of the axis called clinical evaluation of METRICS team, and the scientific head of bilille platform, the bioinformatics platform of Lille, member of the French Institute of Bioinformatics. Her research interests include statistical learning and omics data analysis.

Alessandra Carbone

Alessandra Carbone is Professor of Computer Science at Sorbonne Université, she leads the Analytical Genomics team since 2003 and is the director of the Department of Computational and Quantitative Biology since 2009. Her group works on computational problems concerning the functioning and evolution of biological systems. Mathematical methods coming from statistics and combinatorics, as well as algorithmic approaches including Deep Learning and combinatorial optimization are developed and employed to study fundamental principles of the cellular functioning starting from genomic, metagenomic and structural data. The projects are all aimed at understanding the basic principles of evolution and co-evolution of molecular structures in the cell.

Violetta Zujovic

Violetta Zujovic is a researcher at INSERM and the co-head of MY PLANET LAB (Myelin plasticity and regeneration) at the Paris Brain Institute. She is the scientific director of the data analysis core and the coordinator of the gender equity committee. Her research interest revolves around the role of immune cells in neurological diseases using multimodal approaches covering both multiomics data, functional assays and humanized models of diseases.

Marco Lorenzi

Marco Lorenzi is tenured research scientist (CR) at Inria Sophia Antipolis and Université Côte d'Azur, and holds a chair in the French Interdisciplinary Institutes of Artificial Intelligence (3IA Côte d'Azur). His research interests are in statistical and machine learning methods for the analysis of large-scale and heterogeneous biomedical data, as well as in federated learning for clinical applications.

Isabelle Bloch

Isabelle Bloch has been a Professor at Télécom Paris until 2020 and is now a Professor at Sorbonne Université, holding the chair in artificial intelligence. Her current research interests include 3D image understanding, mathematical morphology, information fusion, fuzzy set theory, structural, graph-based, and knowledge-based object recognition, spatial reasoning, symbolic and hybrid artificial intelligence, and medical imaging.