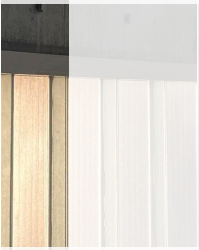
28, 29 & 30/09/2022

Marseille, Campus Timone

10th ANNIVERSARY

int institut de neurosciences de la timone

A DECADE'S PERSPECTIVE ON INTEGRATIVE NEUROSCIENCE



Eve Marder
Brandeis University, USA

Alfonso Renart
Champalimaud Centre, PT

Colette Dehay
SBRI, FR

Céline Amiez	SBRI, FR
Aldo Badiani	Sapienza Univ., IT
Andrea Benucci	RIKEN Center, JP
Anna Beyeler	Neurocentre Magendie, FR
Rémi Bos	INT, FR
Yoram Burak	Hebrew Univ., IL
Fanny Cazettes	INT, FR
Maxime Cazorla	INT, FR
Ruben Coen-Cagli	Albert Einstein Coll., USA
Laetitia Davidovic	Univ. Côte d'Azur, FR
Sophie Denève	ENS, FR
Alexandre Eusebio	INT, FR
Henry Evrard	Max Planck Inst., DE
Diego Ghezzi	EPFL, CH
Jean-Marc Goaillard	INT, FR
Richard Hahnloser	ETH, CH
Tim Harris	Janelia Farm, USA
Tomas Knapen	NIN, NL
Jens Kremkow	Charité Univ, DE
Hélène Marie	IPMC, FR
Naguib Mechawar	McGill Univ., CA
Timothy O'Leary	Univ. Cambridge, UK
Francesca Santoro	FZ Jülich, DE
Sylvia Wirth	ISC Marc Jeannerod, FR

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Welcome

This 5th edition of the international conference of the Institute de Neurosciences de la Timone also marks the 10th anniversary of the INT. The conference program illustrates the scientific approach pursued since 2012. First, our goal was to promote scientific exchanges between the different levels of approach to the nervous system, from the molecule to behavior, in animals and in humans. Second, our strategy was to put at the heart of these cross-fertilization the functional role of large and small networks, in order to better understand the relationships between the brain and cognition. Finally, our ambition was to put these relationships, with their diversity and variability, into a physiological perspective in order to always remember that neurons do not function alone, that the brain is best understood as being part of an organism and that behavior is always a part of a natural repertoire. These three pillars are at the core of our basic research projects but also our clinical research, as the pathologies of the nervous system keep challenging each of our a priori ideas about how the brain works. The four sessions of the Conference illustrate these different questionings.

This edition also outlines the future of INT: modeling neuronal and behavioral dynamics but also monitoring and manipulating them by innovating new technologies for in vivo functional exploration. These two new Centers underline the growing importance of interdisciplinary interactions between neuroscience, physics and information science. Technology, theory and functional approaches must increasingly come together for integrative neuroscience to succeed, on both fundamental and clinical questions.

In 10 years, we have formed a lively scientific community, widely open to its local, national and international environment. We have all worked hard to create a modern institute, grounded on what makes the richness of our laboratories, the research teams and the shared technological facilities. We have been fortunate to welcome many young researchers since 2012. The scientific program of this edition has been built by the most recent members of our Institute. It is enough to compare it to the 1st edition to realize how far we have come. This program has been designed above all to show young PhD students, post-docs, researchers and technicians where neuroscience is heading. They are the ones who will shape the next 10 years of INT.

On behalf of INT, I would like to thank all the speakers for their contribution to this event and for having accepted to facilitate the exchanges with all the participants during these 3 days.

Guillaume Masson
Director of the Institut de Neurosciences de la Timone
CNRS & Aix-Marseille Université

Program

Wednesday 28th

8:00 – 8:45 *Welcome and Registration*
8:45 – 9:00 *Introduction – Guillaume Masson, Director of INT*

9:00 – 12:30 CoNeCT (L Perrinet & D Hansel)

9:00 – 9:45 **Sophie Denève** (ENS, Paris, France) - *Learning generative models of latent dynamics in spiking neural networks*
9:45 – 10:30 **Andrea Benucci** (RIKEN CBS, Wakoshi, Japan) - *Motor-related signals support localization invariance for stable visual perception*

10:30 - 11:00 *Coffee break*

11:00 – 11:45 **Richard Hahnloser** (ETH, Zürich, Switzerland) - *Reinforcement learning of birdsong*
11:45 – 12:30 **Yoram Burak** (Hebrew University of Jerusalem, Israel) - *Stochastic dynamics of neural representations residing in low dimensional manifolds: from motor control to spatial cognition*

12:30 – 14:00 *Lunch*

14:00 – 17:00 NeuroTechCenter (Maxim Cazorla & Rod O'Connor)

14:00 – 14:45 **Maxim Cazorla** (INT, Marseille, France) - *Opto-electrical tools to manipulate brain connections on-demand*
14:45 – 15:30 **Diego Ghezzi** (EPFL, Lausanne, Switzerland) - *Neuroprostheses for artificial vision*

15:30 – 16:00 *Coffee break*

16:00 – 16:45 **Francesca Santoro** (RWTH Aachen, FZ Juelich, IIT) - *Desiging neuro-inspired in vitro platforms*
16:45 – 17:30 **Tim Harris** (Janelia farm, Ashburn USA) - *High capacity electrophysiology: Where we are and where can we go*

17:30 – 18:00 *Refreshment*

18:00 – 19:00 Eve Marder (Brandeis University, Waltham USA) - *Evening plenary lecture: From Modulation of Small Degenerate Circuits to Climate Change*

Program

Thursday 29th

8:00 – 9:00 *Welcome and Registration*

9:00 – 12:30 Embodied CNS (Remi Bos & Guillaume Masson)

9:00 – 9:45 **Remi Bos** (INT, Marseille, France) - *Astrocytic contribution to neuronal rhythmicity in the spinal locomotor network*

9:45 – 10:30 **Naguib Mechawar** (McGill U, Montréal, Canada) - *Early-life adversity and altered cerebral plasticity: recent cellular and molecular evidence in humans*

10:30 - 11:00 *Coffee break*

11:00 – 11:45 **Laetitia Davidovic** (IPMC, Nice, France) - *Reinforcement learning of birdsong The microbial metabolite p-Cresol induces autistic-like behaviors in mice by remodeling the gut microbiota and deregulation of central catecholamines*

11:45 – 12:30 **Henry Evrard** (MPG, Tübingen, Germany) - *Functional & Comparative Neuroanatomy of Interoception*

12:30 – 14:00 *Lunch*

14:00 – 17:00 Circuits, Maps and population dynamics (Martin Szinte & Guilhem Ibos)

14:00 – 14:45 **Fanny Cazettes** (INT, Marseille, France) - *Facial expressions and their neural correlates reveal a reservoir of decision variables in the mouse frontal cortex*

14:45 – 15:30 **Sylvia Wirth** (ISC, Lyon, France) - *From visual space to memory space: insights from neural recordings in parietal cortex and hippocampus*

15:30 – 16:00 *Coffee break*

16:00 – 16:45 **Jens Kremkow** (Charité Center, Berlin, Germany) **-** *Sensory maps in visual cortex and superior colliculus*

16:45 – 17:30 **Tomas Knapen** (KNAW & VU, Amsterdam, Netherlands) - *Turtles all the way up: sensory-topographic organization throughout the human brain*

17:30 – 18:00 *Refreshment*

18:00 – 19:00 Alfonso Renart (Champalimaud Foundation, Lisbon, Portugal) - *Evening plenary lecture: The mechanics and norms of perceptual choice*

Program

Friday 30th

8:00 – 9:00 *Welcome and Registration*

9:00 – 12:30 Variability and diversity at multiple scales (Jean-Marc Goaillard & Guillaume Auzias)

9:00 – 9:45 **Jean-Marc Goaillard** (INT, Marseille, France) - *Degeneracy, cell-to-cell variability and co-variations in ion channel properties*

9:45 – 10:30 **Tim O'Leary** (Cambridge U, UK) - *Continually reconfiguring neural circuits and feedback control in the brain*

10:30 - 11:00 *Coffee break*

11:00 – 11:45 **Ruben Coen-Cagli** (A Einstein Medical School, NYC, USA) - *Cortical activity fluctuations: the Good, the Bad and the Circuits*

11:45 – 12:30 **Celine Amiez** (SBRI, Lyon, France) - *Sulcal variability identifies differential evolution of prefrontal cortical regions in primates*

12:30 – 14:00 *Lunch*

14:00 – 17:00 Interrogating neural circuits to better understand brain function and disease (Corinne Beurrier & Mickael Degoulet)

14:00 – 14:45 **Alexandre Eusebio** (INT, Marseille, France) - *How do deep-brain recordings shape the future of DBS in Parkinson's disease ?*

14:45 – 15:30 **Hélène Marie** (IPMC, Nice, France) - *Amyloid precursor protein peptides: physiological modulators of glutamatergic signaling*

15:30 – 16:00 *Coffee break*

16:00 – 16:45 **Anna Beyeler** (Neurocentre Magendie, Bordeaux, France) - *Linking emotional valence and anxiety: case study of the insular cortex and amygdala*

16:45 – 17:30 **Aldo Badiani** (University of Sussex, UK) - *Drug addictions: putting drugs into context*

17:30 – 18:00 *Refreshment*

18:00 – 19:00 Colette Dehay (SBRI, Lyon, France) - *Evening plenary lecture: The role of OSVZ in shaping the primate visual cortex architecture*

Speakers

Celine Amiez
(SBRI, Lyon, France)

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(University of Sussex Falmer, UK)

Andrea Benucci
(RIKEN CBS, Wakoshi, Japan)

Anna Beyeler
(Neurocentre Magendie, Bordeaux, France)

Rémi Bos
(INT, Marseille, France)

Yoram Burak
(Hebrew University of Jerusalem, Israel)

Fanny Cazettes
(INT, Marseille, France)

Maxime Cazorla
(INT, Marseille, France)

Ruben Coen-Cagli
(A Einstein Medical School, NYC, USA)

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Francesca Santoro
(RWTH Aachen, FZ Juelich, IIT)

Sylvia Wirth
(ISC, Lyon, France)

Speakers

Sophie Denève,

Ecole Normale Supérieure, Paris, France

Learning generative models of latent dynamics in spiking neural networks

Sophie Deneve is a CNRS Director of research and a computational neuroscientist. After a PhD in Rochester and a Research fellowship in Gatbsy Computational Neuroscience unit, London, she joined the Cognitive and Computational Neuroscience laboratory in Ecole Normale Supérieure, Paris. Her research centers on how neural structures can learn and implement predictive (i.e. generative) models of the world, and what crucial role spiking dynamics and excitatory to inhibitory balance (ubiquitous features of biological networks) could play in these processes.

Our neural circuits, evolved under biophysical and energy constraints, support learning time-varying sensorimotor and cognitive computations exhibiting remarkable generalization capabilities and flexibility. It is unclear how these circuits, given few example trajectories, can stably learn a robust dynamical model that generalizes well. Here, we introduce a biologically plausible learning framework that enables model cortical neurons to stably and robustly solve this overfitting problem. In this framework, spiking and learning dynamics decrease a Lyapunov function guiding stable learning while trading-off coding accuracy for cost, resulting in a spike-by-spike representational regularization. The framework outperforms alternative spiking representations, solves generalization and classification of human motion dynamics, and learns to perform a flexible cognitive task by decomposing it into low-dimensional subspaces of the high-dimensional neural state space.

Wednesday 28th, Morning Session 1: 9:00 – 9:45

Speakers

Andrea Benucci,

RIKEN Center for Brain Science, Wakoshi, Japan

Motor-related signals support localization invariance for stable visual perception

Andrea Benucci is a Team Leader (equivalent to Assistant Professor) at RIKEN Center for Brain Science in Japan, near Tokyo. Andrea holds a Bachelor's degree in physics from the University of Padova in Italy, a Master degree in theoretical neuroscience from the International School for Advanced Studies (SISSA) in Trieste, and a PhD also in theoretical neuroscience from the ETH-Zurich in Switzerland. Before opening his laboratory at RIKEN across 2013-2014, he was a postdoctoral researcher at the Smith-Kattlewell Eye Research Institute in San Francisco, working with Matteo Carandini, and then he moved with Carandini to London, at the UCL Institute of Ophthalmology, as a Senior Research Associate. Andrea's research focuses on the principles that govern the dynamics of large populations of neurons in the visual cortex of mice, and on how the circuit dynamics support the computations that underlie visual perception and perceptual decisions.

Our ability to perceive a stable visual world in the presence of continuous movements of the body, head, and eyes has puzzled researchers in the neuroscience field for a long time. We reformulated this problem in the context of hierarchical convolutional neural networks (CNN) whose architectures have been inspired by the hierarchical signal processing in the mammalian visual system. We examined perceptual stability as an optimization process in networks trained to accurately classify images in the presence of self-generated movements (simulated saccades). Motor-related activations multiplexed with visual inputs along overlapping convolutional layers and carrying information about self-generated movements, aided classification invariance of shifted images by making the classification faster to learn and more robust relative to input noise. Classification invariance was reflected in activity manifolds associated with image categories emerging in late CNN layers and with network units acquiring movement-associated activity modulations as observed experimentally during saccadic eye movements. Our findings provide a computational framework that unifies a multitude of biological observations on perceptual stability under optimality principles for image classification in artificial neural networks.

Wednesday 28th, Morning Session 2: 9:45-10:30

Speakers

Richard Hahnloser,

Neuroscience Center Zurich and with the Swiss National Centre of Competence in Research, Switzerland

Reinforcement learning of birdsong

Richard Hahnloser studied Physics and is Professor and Co-director of the Institute of Neuroinformatics, jointly affiliated with the University of Zurich and ETH Zurich. He studies vocal production and vocal learning in songbirds and is interested in sensory and motor systems and how they interact to solve a computational task.

Reinforcement learning (RL) is a promising computational theory for understanding learned skilled behavior and its underlying neural mechanisms. Yet, most natural behaviors are too variable to be compatible with optimal action policies that strictly maximize reward. To reconcile these views, we postulate that optimality in reinforcement learning applies not to behavior itself but to a latent source of motor variability, from which an animal learns. We assume that this source is an ideal source of randomness, all other aspects of behavioral variability we attribute to non-ideal variability sources from which an animal cannot directly learn.

We test this hypothesis for brain organization in songbirds subjected to a vocal pitch reinforcement task. Our model agrees with a wealth of data and produces excellent fits to pitch data even when learning trends are non-monotonic due to circadian fluctuations. When we lesion the output area of the known pitch-learning circuit, we find an excellent linear relationship between lesioned volume and reduction of behavioral variability attributed to the latent learner. Estimation of learner variance is possible even from spontaneous unreinforced behavior, which provides a convenient access to a localized brain function.

Wednesday 28th, Morning Session 3: 11:00-11:45

Speakers

Yoram Burak,

Racah Institute of Physics and the Safra Center for Brain Sciences, Hebrew University of Jerusalem, Israel

Stochastic dynamics of neural representations residing in low dimensional manifolds: from motor control to spatial cognition

Yoram Burak is an Associate Professor at the Racah Institute of Physics and the Safra Center for Brain Sciences, at the Hebrew University of Jerusalem. Before joining the Hebrew University in 2012, Yoram Burak was a Swartz postdoctoral fellow in theoretical neuroscience at the Center for Brain Science at Harvard University, and a postdoctoral research associate at the Kavli Institute for Theoretical Physics at UCSB. His research aims to identify how neural circuits in the brain implement computational functions.

One of the most fundamental concepts in theoretical neuroscience is that of an attractor neural network, in which recurrent synaptic connectivity constraints the joint activity of neurons into a highly restricted repertoire of population activity patterns. In continuous attractor networks, these activity patterns span a continuous, low-dimensional manifold. I will survey research from my group which is related to this concept, focusing on two recent works. In one work we examined for the first time the joint dynamics of grid cells in the entorhinal cortex of rats that belong to different modules, using high density silicon probe recordings. We hypothesized that in order for grid cells to implement together an efficient coding scheme for position, network mechanisms must coordinate the activity of different grid cell modules, even when the internal representation of position in the brain deviates from the true position of the animal. To test this hypothesis, we analyzed the activity of hundreds of grid cells that were simultaneously recorded in animals that were foraging in the dark. The second work is concerned with fixational eye drifts, a form of eye motion that occurs between saccades and is characterized by smooth, yet random, diffusive-like motion. Fixational drift has been identified at least as early as the 19th century, and has been extensively studied since then, yet its mechanistic origins remained unknown. I will present experimental and theoretical evidence that the main drive for the motion is in the oculomotor integrator, a continuous attractor network which is responsible for maintaining a fixed activation of the ocular muscles between saccades.

Speakers

Maxime Cazorla,

Institut de Neurosciences de la Timone, Marseille, France

Opto-electricals tool to manipulate brain connections on-demand

Maxime Cazorla is an INSERM principal investigator at Institut de Neurosciences de la Timone in Marseille. Since 2020 he co-leads INT's Neurotech Center, promoting the development of innovative technologies to manipulate and record the brain at various scales. He received his PhD in Neuroscience from Paris Sorbonne University in 2008, and completed postdoctoral trainings at Columbia University (New York, USA) and Institut Curie (Orsay, FR). With his team he now studies the rewiring capacity of the adult brain in health and disease, using brain-on-chips, viral and photoinductible technologies.

The adult brain has long been considered a rigid and aging organ. A new concept, known as brain rewiring, now postulates that neural circuits profoundly reorganize during learning, or following a stroke. Although elegant, this theory is difficult to demonstrate because of technological limitations.

In this talk, I will present how a top-down approach led us to identify key cytoskeletal mechanism regulating axon remodeling in mature networks. Using this fundamental knowledge, our group recently developed a photoinducible technology named RAIL (Remodeling of Axons Induced by Light). This approach made it possible, for the first time, to modify the connectivity pattern of a neuronal network reconstituted in vitro on a chip. I will then discuss the next challenges of RAIL: How to organize newly-formed connections using weak electric fields, and how to implant this technology to living organisms.

Wednesday 28th, Afternoon Session 1: 14:00-14:45

Diego Ghezzi,

EPFL, Lausanne, Switzerland

Neuroprostheses for artificial vision

Prof. Diego Ghezzi holds the Medtronic Chair in Neuroengineering at the School of Engineering at the Ecole Polytechnique Fédérale de Lausanne. He received his M.Sc. in Biomedical Engineering (2004) and Ph.D. in Bioengineering (2008) from Politecnico di Milano. From 2008 to 2013, he completed his postdoctoral training at Istituto Italiano di Tecnologia in Genova at the department of Neuroscience and Brain Technologies; where he was promoted to Researcher in 2013. In 2015, he was appointed as Tenure Track Assistant Professor of Bioengineering in the EPFL Center for Neuroprosthetics.

Implantable neural prostheses are devices exploited to recover impaired or lost functions, such as vision. In this talk, I will present our group's effort to develop novel visual prostheses. I will cover aspects spanning from materials to manufacturing methods and preclinical validation. In particular, I will focus on wireless solutions for stimulation.

A common design constraint in neural implants is the presence of cables connecting the electrode-tissue interface to implantable electronic units. The presence of wires and connectors is a significant disadvantage for neural prostheses. They are weak points often leading to failure, they exert mechanical forces and tractions on the implant and the tissue, and they might lead to post-surgical complications, such as infection. Also, the use of implantable electronic units is another disadvantage due to constraints in power consumption, heat generation, and high risk of failure in a wet environment due to leakage. In neurotechnology, truly wireless electrodes are highly desirable.

POLYRETINA is a wireless retinal prosthesis allowing wide-field and high-resolution stimulation of the retina. First, I will describe our recent results related to POLYRETINA testing. Then, I will discuss how materials and solutions adopted for POLYRETINA are now applied to new devices for artificial vision and other applications.

Speakers

Francesca Santoro,

RWTH Aachen, FZ Juelich, IIT

Desiging neuro-inspired in vitro platforms

Francesca Santoro received her Bachelor's and Master's degrees in Biomedical Engineering at the 'Federico II' University of Naples (Italy) with specialization in biomaterials. She received a PhD in 2014 in Electrical Engineering and Information Technology in a joint partnership between the RWTH Aachen and the Forschungszentrum Juelich (Germany) with a scholarship by the International Helmholtz Research School in Biophysics and Soft Matter (IHRS BioSoft). In October 2014, she joined the Chemistry Department at Stanford University (USA) and received a research fellowship in 2016 by the Heart Rhythm Society. She joined IIT in July 2017 as Principal Investigator of the 'Tissue Electronics' lab at CABHC-Naples. In 2018 she has been awarded the MIT Technology Review Under 35 Innovator ITALIA and EUROPE. She has been awarded an ERC Starting Grant in 2020. She is among the Inspiring Fifty Italy and is also the winner of the Falling Walls Science Breakthrough of the Year in Engineering and Technology in 2021. Since January 2022, she is Professor in Neuroelectronic Interfaces at RWTH Aachen and Forschungszentrum Juelich.

Abstract to come

Wednesday 28th, Afternoon Session 3: 16:00-16:45

Speakers

Tim Harris,

Janelia Research Campus, Ashburn, VA, USA

High capacity electrophysiology: Where we are and where can we go

Tim Harris is a Group Leader and Senior Fellow at the HHMI Janelia Farm Research Campus in Ashburn, VA and a Research Professor at Johns Hopkins University Department of Biomedical Engineering. At HHMI his group originated Neuropixels and the SpikeGLX software system. At Johns Hopkins, with funding from the NIH BRAIN Initiative, the Harris lab will finalize the family of recording probes with Neuropixels NXT, small enough for more than 10,000 channels in a freely moving mouse.

Modern microelectronics is transforming electrophysiology research tools and results. Most prominent in this space are the Neuropixels probes (now more than 8000 probes in 7500+ labs) and INTAN multiplexer chips, the core of nearly every other recording system. This talk will touch the history of ephys, show the origin of Neuropixels and other technologies, discuss the data digestion logjam this new capacity has generated, and discuss the various new probes (for primates and, even smaller probes from NIH funded projects) emerging from this effort.

Wednesday 28th, Afternoon Session 4: 16:45-17:30

Speakers

Eve Marder,

Brandeis University, Waltham, MA, USA

From Modulation of Small Degenerate Circuits to Climate Change

Eve Marder is the Victor and Gwendolyn Beinfield Professor of Neuroscience at Brandeis University. Eve Marder has been working on the stomatogastric nervous system of crustaceans for more than 40 years, demonstrating that invertebrate models can help us elucidate fundamental principles of neural circuit function that are difficult to tackle in larger mammalian networks. Amongst her many contributions, she demonstrated how networks can be reconfigured by neuromodulators, how homeostatic plasticity underlies the recovery of neuronal activity after perturbations, how degenerate the biophysical solutions underlying neuronal function are and how resilient neural networks are to environmental changes. She is a former president of the Amercian Society for Neuroscience, a member of the National Academy of Sciences and has received many prestigious awards such as the Gruber Neuroscience Prize or the Kavli Prize in Neuroscience.

The crustacean stomatogastric nervous system houses two important central pattern generating circuits that generate the fast pyloric rhythm and the slower gastric mill rhythm. Numerous experimental and computational studies have demonstrated that individual neurons and small circuits are degenerate, that is, different sets of underlying intrinsic and synaptic currents can produce very similar motor patterns. This raises the question of whether these degenerate solutions can respond robustly and reliably to perturbations.

Consequently, we have been studying a number of global perturbations, including temperature, pH, and high extracellular potassium concentrations. While both the pyloric and gastric mill rhythms can operate over a range of temperatures, analysis of data collected over many years shows that ocean temperatures are correlated with the range over which these rhythms can function reliably. Moreover, many long-term perturbations produce "cryptic" changes that are not visible in the absence of perturbation, but are only revealed when the systems are challenged. These data give potential insight into how prior history can produce hidden changes in circuit function that change the reliance of circuits to future perturbations.

Speakers

Rémi Bos,

Institut de Neurosciences de la Timone, Marseille, France

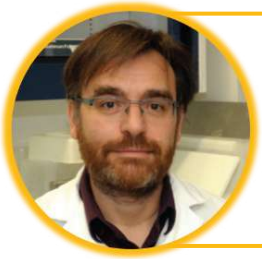
Astrocytic contribution to neuronal rhythmicity in the spinal locomotor network

Rémi Bos obtained his PhD in France in 2012 and moved to the U.S. at UC Berkeley for a post-doctoral fellowship. He came back to France in 2016 at INT where he has been recruited as a CNRS permanent researcher since 2018. His main scientific interest is to understand the plasticity of the spinal motor networks from the cellular levels to the behavioral aspects. His research focuses on the Neuron-Glia crosstalk in the spinal motor network.

Despite decades of research, the cellular mechanisms responsible of the synchronized rhythmic oscillations driving locomotion remain elusive. To gain insight into the function of the spinal locomotor network, numerous studies have characterized diverse classes of locomotor-related neurons to determine their role in generating rhythmic movements during locomotion. In contrast, studies investigating non-neuronal components of the spinal cord are sparse. Our study represents a significant breakthrough by identifying astrocytic K^+ uptake as a key regulator of neuronal rhythmicity synchronization and locomotor pattern at the cellular, microcircuit and system levels. These data provide mechanistic insights into the neuroglial dialogue at play during rhythmogenesis and point to a novel astroglial target for restoring normal neuronal network excitability in brain disorders and neurodegenerative diseases.

Thursday 29th, Morning Session 1: 09:00-09:45

Speakers



Naguib Mechawar,

McGill University, Montréal, Canada

Early-life adversity and altered cerebral plasticity: recent cellular and molecular evidence in humans

Dr. Naguib Mechawar is a Professor of Psychiatry at McGill University, and head of the Neuroanatomy of mood disorders and suicide laboratory as well as of the Douglas-Bell Canada Brain Bank at the Douglas Institute. His research is focused on the fine neuroanatomy and molecular neuroplasticity of limbic brain circuits in depression and suicide. In the past few years, his lab has focused most of its efforts at investigating the lasting impact of early-life adversity on glial cells and neuroplasticity.

This talk will present recent post-mortem data generated in well-characterized human brain samples showing that child abuse has lasting consequences on major features associated with cortical plasticity, namely myelination and perineuronal nets.

Thursday 29th, Morning Session 2: 09:45-10:30

Speakers

Laetitia Davidovic,

IPMC, Nice, France

The microbial metabolite p-Cresol induces autistic-like behaviors in mice by remodeling the gut microbiota and deregulation of central catecholamines

Laetitia Davidovic obtained her PhD in Canada in 2003 and has been a CNRS researcher since 2009. After working for over 12 years to unravel novel molecular and metabolic phenotypes in a genetic model of autism, she has shifted her interests towards environmental factors contributing to neurodevelopmental disorder, with a specific focus on autism. Since 2015, she has been combining preclinical studies with human cohort studies to understand whether and how the immune system and the microbiota influence behaviour.

Autism spectrum disorders (ASD) are frequent neurodevelopmental disorders characterized by social behaviour and communication deficits, repetitive behaviours, and restricted interests. Some ASD patients also display gastro-intestinal symptoms, intestinal microbiota dysbiosis, and abnormal levels of microbial metabolites. Studies in rodents have shown that both bacteria from the microbiota and microbial metabolites regulate brain function and behaviour, including social behaviour. These findings suggest that disruption of the microbiota-gut-brain axis could contribute to the development and/or maintenance of ASD symptoms. In recent years, we have focused on the microbial metabolite p-cresol that is abnormally elevated in the feces and urine of ASD patients. We have shown that C57Bl/6 mice exposed chronically to p-cresol exhibit severe social interaction deficits driven by changes in microbiota composition. This is accompanied by a decrease in midbrain dopamine neurons excitability, suggesting that p-cresol effects on behaviour may relate to perturbations of catecholamines within the social reward circuit. Our recent data suggest that p-cresol can modulate social behaviour by directly interfering with central catecholamine biosynthesis. Our results support the notion that some microbial metabolites directly mediate the deleterious effects of microbiota dysbiosis on behaviour.

Thursday 29th, Morning Session 3: 11:00-11:45

Speakers

Henry Evrard,

Max Planck Campus, Tübingen, Germany

Functional & Comparative Neuroanatomy of Interoception

Dr. Henry Evrard (doctor in science, University of Liège) holds senior positions at the International Center for Primate Brain Research in Shanghai, the Nathan Kline Institute in New York, and the Center for Integrative Neuroscience in Tübingen. His research concentrates on the peripheral and central pathways of interoception and autonomic control in complex behaviors, involving the co-regulation of brain and bodily 'states', and providing the basis for human subjective feelings.

The physiological condition of the body (interoception) exerts a major influence on central emotional and cognitive processes. Recent human and non-human primate studies in our and other labs suggest the existence of an Interocepto-Autonomic Circuit Loop (IACL) interfacing bodily and brain afferent-efferent 'states' in various cortical regions, including the insular cortex. Through iterative integrations of interoception with multi-modal activities, the IACL could provide a neurobiological basis for the anticipatory homeostatic filtering of salient events and adaptive autonomic and behavioral event-responses that accompany human subjective feelings. In this talk, we present neuroanatomical (architectonics and tract-tracing), functional (fMRI, electrophysiology, local perturbations) and comparative (human/monkey) insights on the organization of the primate IACL.

Thursday 29th, Morning Session 4: 11:45- 12:30

Speakers

Fanny Cazettes,

Institut de Neurosciences de la Timone, Marseille, France

Facial expressions and their neural correlates reveal a reservoir of decision variables in the mouse frontal cortex.

Fanny Cazettes was trained as a biomedical engineer in Paris before earning a PhD in Neuroscience at Albert Einstein in New York. In 2016, she moved to Lisbon for her postdoc in the lab of Zach Mainen at Champalimaud, and became a member of the International Brain Laboratory. She recently joined the INT in Marseille as a CNRS researcher. Her research focuses on the neural systems and computations underlying flexible decision-making in mice.

In any given situation, the environment can be parsed in different ways to define useful decision variables for any task, but the way in which this manifold of potential decision strategies is processed to shape behavior is not well understood. We have explored this question by monitoring behavior and recording large neural ensembles in the frontal cortex of mice trained to perform a foraging task that admits several possible strategies for deciding when to leave a resource site. Surprisingly, we found that, regardless of the decision variable best explaining the foraging behavior of each mouse, activity in the frontal cortex reflects a full basis set of computations spanning a repertoire of decision variables extending beyond those useful for the present task. Given the recent discovery that cortical activity patterns accurately reflect facial movement, we next explored the relationship between facial movement and the computations necessary to solve our task. Our analysis revealed that the reservoir of latent computations could be read out from high dimensional movements extracted from videos of the face. Optogenetic manipulations showed that the frontal cortex is needed for generating the facial expressions of decision variables. This tight coupling between brain and body suggests that characterization of rich multidimensional movements can offer a window into multiplexed neural computations used to form decisions.

Thursday 29th, Afternoon Session 1: 14:00- 14:45

Speakers

Sylvia Wirth,

Institut des Sciences Cognitives Marc Jannerod, Lyon, France

From visual space to memory space: insights from neural recordings in parietal cortex and hippocampus.

Sylvia Wirth is a researcher at the Center for Cognitive Sciences in Lyon, France. Following a PhD in neuroscience, obtained at the University Louis Pasteur, Strasbourg, France, she dedicates her work to the understanding of the link between neural codes and memory codes in the non-human primate. More recently, her results demonstrated the existence in the macaque hippocampus, of a mechanism supporting high level cognitive neural abstraction (Baraduc et al., 2019). These results show how hippocampal neurons provide a powerful data compression mechanism by encoding recurrent events in a common pattern. Her research relies on state-of-the-art electrophysiology and virtual reality techniques adapted to non-human primates, as well as naturalistic approaches involving the collection of data from animals free to interact with their environment.

How does a position in space reflect the processing of visual space to become a memory space? We show how neural selectivity to self-position in the posterior parietal cortex and hippocampus ties to saccades and fixations of salient cues during navigation in a virtual environment. Our results support a dynamic flow of activity organised along directed saccades and eye fixations towards anticipated landmarks at strategic position. We show how hippocampus may integrate target of fixation into a memory space, while parietal cortex drives saccades in the immediate space. We show how this translate in codes for position through a task-based processing of the visual cues, hence shedding light on the neural processes linking place and significant view.

Thursday 29th, Afternoon Session 2: 14:45- 15:30

Speakers

Jens Kremkow,

Neuroscience Research Center Charité, Berlin, Germany

Sensory maps in visual cortex and superior colliculus

Jens Kremkow studied biology in Freiburg, Germany. He obtained a PhD in the field of computational neuroscience in Marseille and Freiburg (cotutelle) supervised by Laurent Perrinet and Guillaume Masson (Marseille) and Ad Aertsen (Freiburg). He did a Postdoc in New York in the lab of Jose-Manuel Alonso in in vivo experiments and modeling visual processing and cortical maps and a Postdoc in Berlin in the lab of James Poulet in data analysis, thalamocortical system mouse. Since 2017 he is group leader at the Charité, funded by the DFG Emmy-Noether program.

The primary visual cortex (V1) and the superior colliculus (SC) in the midbrain are two important brain regions for visual processing and visually guided behaviors. A hallmark of V1 and SC is that the visual scene is organization in topographic maps within these circuits. Yet important differences between the sensory maps in both brain structures exists and the differential roles of V1 and SC in visual processing is still not fully understood. Revealing the functional organization of the thalamocortical and retinocollicular systems is an important step towards understanding the principles that underlie these sensory maps which in turn will provide important insights into how visual information is processed within them. We recently discovered that high-density electrodes (Neuropixels probes) simultaneously capture the activity of retinal ganglion cell axons and their postsynaptic target neurons in the superior colliculus, in vivo. This novel approach allowed us to study how axons from retinal ganglion cells organize within SC and reveal how retinal activity is integrated at the level of midbrain neurons in mice. In my talk I will present these experimental results together with a recent modeling study that together show that the afferents in the thalamocortical and retinocollicular system follow distinct wiring rules that shape the sensory maps in both brain structures.

Thursday 29th, Afternoon Session 3: 16:00-16:45

Speakers

Tomas Knapen,

Netherlands Institute for Neuroscience, Amsterdam, Netherlands

Turtles all the way up: sensory-topographic organization throughout the human brain

Tomas Knapen did a PhD in physics at Utrecht University, followed by postdocs in cognitive neuroscience in Paris, Nashville, and Amsterdam, where he now maintains a lab at the Spinoza Centre for Neuroimaging at the Royal Dutch Academy of Sciences. His work covers topics in bistable perception, action-perception integration, and attention. A dominant focus of his lab in Amsterdam is the sensory-topographic organization of the brain into retinotopic, tonotopic, and somatotopic maps. Recent findings highlight how the interplay of activations on these maps gives rise to cognitive processes and perceptual awareness.

A fundamental mode of brain organization is that of topographic maps: the homologous representation of a sensor array, such as the retina, on the surface of the cerebral cortex. This topographic organization was traditionally thought to be limited to purely sensory processing. In the first half of my presentation I will recount recent work from my lab demonstrating that sensory-topographic hierarchies extend all the way into the highest levels of the brain's processing. Specifically, using ultra-high field fMRI we have discovered sensory retinotopic maps in the cerebellum, default mode network, and hippocampus: regions traditionally implicated in coordination of action and memory. These discoveries make sense when we realize that these topographic maps are our sole connections to the world we inhabit, but they leave open the question: What role do these maps and their interactions play in our rich experience of the world? In the second half of my presentation, I will introduce a set of computational modeling and functional connectivity approaches that elucidate how sensory topographies scaffold our rich, real-world cognition.

Thursday 29th, Afternoon Session 4: 16:45-17:30

Speakers

Alfonso Renart,

Champalimaud Foundation, Lisbon, Portugal

The mechanics and norms of perceptual choice

Alfonso Renart studied physics and did my PhD in Computational Neuroscience, both at the Universidad Autónoma de Madrid. After a postdoc at Brandeis University — in the lab of Xiao-Jing Wang — and another one at Rutgers University — in the lab of Kenneth Harris — I became group leader of the Circuit Dynamics and Computation Lab at the Champalimaud Neuroscience Programme. In the lab, we combine theoretical and experimental approaches, and careful behavioral analysis, to study the computational principles underlying perceptual decision-making.

Work over the last 30 years in perceptual decision-making has identified bounded accumulation of evidence as a core computational principle describing how animals use information from the environment to guide categorical choices. In this seminar, I will describe two recent developments in our lab that characterize decision-making from a mechanistic and from a normative perspective. First, I will consider the problem of perceptual choice, but taking into account not only the relative evidence in favor of each alternative, but also the overall sensory intensity across alternatives — thus connecting modern approaches in decision-making with foundational questions in psychophysics. Mathematical analysis of behavioral experiments in rats and humans allowed us to identify the mechanistic basis of Weber's law, and to show that it follows naturally from a bounded accumulation of evidence framework. In the second part of the talk, I will describe a normative view on perceptual choice, that is, how agents *should* use sensory information to guide decisions. I will argue that the natural cost function to be optimized should include not only performance costs — as is generally assumed — but also costs derived from controlling default behavioral strategies shaped by evolution or prior learning, but possibly maladaptive in the context of a laboratory experiment. Using this philosophy, we derived optimal policies for perceptual choices in control-limited agents. These policies rely on accumulation of evidence, but control-limitations lead to probabilistic decision bounds. Our work shows that considering different levels of cognitive control explains a range of phenomena in decision-making, and provide a path for studying optimal decision strategies in real biological agents.

Thursday 29th, Evening plenary lecture: 18:00 – 19:00

Speakers

Jean-Marc Goaillard,

Institut de Neurosciences de la Timone, Marseille, France

Degeneracy, cell-to-cell variability and co-variations in ion channel properties

Jean-Marc Goaillard is leading the SANE team at INT. After obtaining a PhD in Neuroscience in Paris studying the link between second-messenger signaling and ion channel modulation, Jean-Marc Goaillard joined the Marder lab to work on invertebrate neuronal networks. His work in the Marder lab helped demonstrating that ion channel expression levels are highly variable in neurons, although ion channels share strong correlations in their expression, defining genetic co-expression modules that may underlie the stability of neuronal output. For the past 15 years, his group has been working on neuron-to-neuron variability in morphological, biophysical properties and ion channel expression in mammalian dopaminergic neurons, using electrophysiological, transcriptomics and computational approaches.

Since the first mathematical description of ion channel function by Hodgkin and Huxley in the 1950s, our understanding of the biophysical mechanisms underlying neuronal activity has been constantly growing, feeding on the genetic identification of hundreds of ion channel genes, the crystallography-mediated deciphering of their structure-function relationships and many other discoveries. In spite of 70 years of multi-disciplinary collection of data, we are still unable to quantitatively understand how every neuronal type invariably achieves the unique electrophysiological phenotype sustaining its physiological function. This paradoxical lack of understanding may be explained by several factors that I will review in this talk: 1) Every neuronal type expresses many subtypes of ion channel with partially degenerate functions and 2) the expression levels and biophysical properties of any ion channel subtype display strong cell-to-cell variability, even in neurons with virtually identical patterns of activity. Recent findings made in invertebrate and vertebrate neurons suggest that this cell-to-cell variability may hide invariant relationships between ion channel properties, such as co-variations in expression levels. These co-variations may be genetically encoded to ensure that the neuron always reaches its “expected” pattern of activity.

Friday 30th, Morning Session 1: 9:00-9:45

Speakers

Tim O'Leary,

University of Cambridge, Cambridge, UK

Continually reconfiguring neural circuits and feedback control in the brain

Timothy O'Leary is an associate professor of computational Neuroscience at the University of Cambridge (UK). After a training in mathematics, Timothy O'Leary obtained a PhD in neuroscience, performing electrophysiological recordings of cultured neurons, focusing in particular on homeostatic plasticity of synaptic function. He then became a post-doctoral fellow in the Marder lab where he published several important theoretical studies investigating the biophysical principles underlying the robustness of neuronal activity. His work addresses in particular the paradox that exists between the variability of neuronal components and the stability of neuronal output.

In 1950, Norbert Wiener, the founder of cybernetics and a pioneer of control and information theory, asserted "*We are but whirlpools in a river of ever-flowing water. We are not stuff that abides, but patterns that perpetuate themselves. A pattern is a message, and may be transmitted as a message… It is amusing as well as instructive to consider what would happen if we were to transmit the whole pattern of the human body, of the human brain with its memories and cross connections, so that a hypothetical receiving instrument could re-embody these messages in appropriate matter*." More than seventy years later, the view that the important stuff of the mind, nervous system and of life itself can be abstracted as a self-regulating system is more prescient than ever. Recent advances in neural recording technology have enabled us to identify and probe neural representations of behaviour as it happens, revealing a dynamic neural code that continually reconfigures, as in Wiener's whirlpools. I will describe our recent attempts to identify homeostatic principles that enable the brain to retain learned information while remaining plastic. This work helps us understand and potentially interface with dynamic cortical neural representations in behaving animals, and provides a mathematical framework that unifies neural variability, feedback and neural population codes.

Friday 30th, Morning Session 2: 9:45-10:30

Speakers

Ruben Coen-Cagli,

Albert Einstein College of Medicine, New York, USA

Cortical activity fluctuations: the Good, the Bad and the Circuits

Ruben Coen-Cagli is an Associate Professor at the Albert Einstein College of Medicine in New York. After a training in theoretical physics and obtaining a PhD from the University of Napoli studying eye-hand coordination with an interdisciplinary approach, Ruben Coen-Cagli joined the lab of Odelia Schwartz at the University of Miami to study the link between statistical structure in natural images and neuronal responses in the visual cortex. He then joined the lab of Alexandre Pouget to study the origins of cortical and perceptual variability. His current work addresses how probabilistic inferences are used in natural sensory processing, using in particular computer vision and machine learning approaches.

A central goal of vision science is to understand the principles underlying the perception and neural coding of the complex visual environment of our everyday experience. In the visual cortex, foundational work with artificial stimuli, and more recent work combining natural images and deep convolutional neural networks, have revealed much about the tuning of cortical neurons to specific image features. However, a major limitation of this existing work is its focus on single-neuron response strength to isolated images. First, during natural vision, the inputs to cortical neurons are not isolated but rather embedded in a rich spatial and temporal context which strongly modulates neural activity. Second, the full structure of population activity—including the substantial trial-to-trial variability that is shared among neurons—determines encoded information and, ultimately, perception.

In this talk, I will first briefly and selectively review classical literature on how variability impacts neural coding, through the lens of population codes for low-dimensional stimuli. I will then present a normative theory of population encoding of natural images in primary visual cortex (V1). In this framework, V1 activity serves to approximate a probabilistic representation optimized to the statistics of natural visual inputs, and contextual modulation and variability are integral aspects of achieving this goal. I will present a concrete computational framework that instantiates this hypothesis, and new data recorded with neuropixel arrays in macaque V1 to test its predictions. Lastly, I will discuss statistical analysis methods we are developing, and their application to mouse V1 population data, to probe the underlying circuit mechanisms.

Speakers

Celine Amiez,

Stem-cell and Brain Research Institute, Bron, France

Sulcal variability identifies differential evolution of prefrontal cortical regions in primates

Celine Amiez is Director of research at the Stem-cell and Brain Research Institute in Lyon, France. She did join the team of Emanuel Procyk in 2010, and continue to closely collaborate with M.petrides from MNI in Montreal where she worked seven years after her PhD. Celine's works aim to identify how brains produce complex behaviour and how these systems have evolved through primate evolution. These systems are assessed using a unique combination of neuroimaging methods in primates and subject by subject analysis, which gives access to the most precise level of the anatomo-functional organization of the cerebral cortex.

Although the relative expansion of the frontal cortex in primate evolution is generally accepted, the nature of its scaling and inter-species anatomo-functional comparisons of the frontal areas remain controversial. Indeed, a large literature has emphasized the link between the extent of gyrification, the rapid expansion of the cerebral cortex, and the complexity of the computational processing performed in a given brain. Although important, these discussions of cortical gyrification have not considered another major dimension of sulcal pattern organization, i.e. its variability. I present here results showing how the medial and the lateral frontal cortical sulcal organization has evolved through the primate order. By performing within- and across-species comparison of sulcal morphological variability based on neuroimaging anatomical scans, I provide evidences that both regions are comparable anatomically and functionally from Old World monkeys to Hominoidea, at the sole exception of the ventrolateral prefrontal cortex. In this latter region, although chimpanzees display the precursor of the human ascending sulcus rostrally limiting Broca's area (Area 44), this precursor does not join the insula as in human. This lack of opercularization prevents the formation of the frontal operculum, and consequently prevents the formation of the sulci featuring the pars triangularis and therefore the formation of a full Broca's complex. These discoveries, together with recent paleontological studies suggesting that the frontal operculum appears only in Neanderthals concomitantly with modern language abilities suggests that the frontal operculum might be key to support language functions.

Friday 30th, Morning Session 4: 11:45-12:30

Speakers

Alexandre Eusebio,

Institut de Neurosciences de la Timone, Marseille, France

How do deep-brain recordings shape the future of DBS in Parkinson's disease?

Alexandre Eusebio is Professor of Neurology in the Department of Neurology and Movement Disorders (La Timone Hospital, Marseille). His main research interests are the study of neuronal markers of motor and non-motor features of Parkinson's disease.

This talk will discuss the current role of deep-brain recordings in implementing deep-brain stimulation strategies as well as their potential future impact in shaping closed-loop stimulation paradigms.

Friday 30th, Afternoon Session 1: 14:00-14:45

Speakers

Hélène Marie,

Institut de Pharmacologie Moléculaire et Cellulaire, Nice, France

Amyloid precursor protein peptides: physiological modulators of glutamatergic signaling

After a PhD at University College London and a post-doc at the University of Stanford, Hélène Marie became an independent group leader at the European Brain Research Institute (EBRI) in Rome. She came back to France in 2010 to set up her group at "Institut de Pharmacologie Moléculaire et Cellulaire" in Valbonne, France, where her research focuses on the mechanisms governing neuron function in the healthy brain and in neurological disorders such as Alzheimer's disease, depression and addiction.

The amyloid precursor protein (APP) and the peptides generated from its cleavage are generally studied in the context of Alzheimer's disease pathology. Yet, little is known of their endogenous role in the physiological brain. Here, I will summarize evidence we obtained over the last years demonstrating that APP peptides control glutamatergic signaling at the hippocampal CA3-CA1 excitatory synapse in the healthy brain. With these data in hand, we propose that APP peptides represent a new class of endogenous physiological neuromodulators of glutamatergic signaling. These findings shed new light on the complex regulation this essential neurotransmitter pathway that drives information processing in the brain.

Friday 30th, Afternoon Session 2: 14:45-15:30

Speakers

Anna Beyeler,

Neurocentre Magendie, University of Bordeaux, France

Linking emotional valence and anxiety: case study of the insular cortex and amygdala

Anna Beyeler received her undergraduate degree in Biochemistry from the University of Bordeaux in 2006. Her expertise in electrophysiology roots in her doctoral training in the same university. In 2012 she joined the Picower Institute for Learning and Memory (MIT) as post-doctoral fellow. There, she identified circuit and synaptic mechanisms in the amygdala underlying memory formation and retrieval of positive and negative associations. In 2020, Dr. Beyeler has been tenured as a principal investigator at the French Institute of Health (INSERM). Her research group is dissecting circuits of the insular cortex, to identify their role in emotional valence and anxiety. Dr. Beyeler has received the Avenir fund of INSERM, is an associate member of the American College of Neuropsychopharmacology (ACNP) and a member of the FENS-Kavli Network.

Anna Beyeler will present published and unpublished work on the dissection of neural circuits of the insular cortex and amygdala, and their implication in the control of behaviors related to emotional valence and anxiety in mice pre-clinical models.

Friday 30th, Afternoon Session 3: 16:00-16:45

Speakers

Aldo Badiani,

University of Sussex, Falmer, UK

Drug addictions: putting drugs into context

Aldo Badiani is Professor of Pharmacology and Director of the Department of Physiology and Pharmacology at the Sapienza University of Rome (Italy). He also holds a position of Emeritus Professor of Psychology at the University of Sussex (UK), where he founded the Sussex Addiction Research & Intervention Centre (SARIC) in 2014. He has been President of the European Behavioural Pharmacology Society (EBPS) from 2011 to 2013, and received the Distinguished Achievement Award from the EBPS (https://ebps.org/awardees/) in 2021. Aldo Badiani conducts preclinical and translational research in the field drug addiction.

This presentation will review translational studies concerned with environmental influences on the behavioural and neurobiological response to addictive drugs in people with substance use disorders as well as in animal models of drug use and addiction. These findings point to crucial differences between opiate versus psychostimulants, and challenge current theories of drug reward and addiction.

Friday 30th, Afternoon Session 4: 16:45-17:00

Speakers

Colette Dehay,

Stem cell and Brain Research Institute, Lyon, France

The role of OSVZ in shaping the primate visual cortex architecture

Colette Dehay's research has largely addressed specific features of primate cortical development. This concerns the intrinsic specification of cortical areas and how extrinsic factors such as thalamic afferents can shape the dynamics of neuron production. A major finding is that the germinal zone of the primate has unique features which are highly specialized for the production of the supragranular layers. She have a long-standing interest in the distinctive features of the primate upper-layers neurons and their involvement in the hierarchical organization of the adult cortex.

The study of the cellular and molecular mechanisms controling corticogenesis in the primate visual system highlight the dual pillar role of the primate-specific germinal zone: the OSVZ in the establishment of area-specific cytoarchitectural features. The OSVZ is responsible for (i) generating area-specific numbers of SG neurons with increased diversity and (ii) providing an area-specific scaffolding that is constraining the properties and dynamics of postmitotic radial migration. Together our work points to the OSVZ as a unique machinery to build the primate cortex and its connectivity.

Friday 30th, Evening plenary lecture: 18:00 – 19:00

Posters – Wednesday 28th

- Hugo Ladret, NeOpto team

A resilient neural code in V1 to process natural images

- Antoine Lefrere, CANOP team

IRM global and local cortical folding alterations are associated with neurodevelopmental subtype in bipolar disorders: a sulcal pits analysis

- Tony Barbay, P3M team

Astrocytic contribution of astrocytes in spasticity after spinal cord injury

- Tiphaine Villaume, HIP

Clinical Research at INT

- Cassandre Vielle, BaGaMoRe team

Reversing escalated cocaine intake with peers presence and optogenetic modulation of the subthalamic nucleus

- Melina Cordeau, BaNCo team

Anatomical characterization of the Frontal Voice Areas based on the individual sulcal anatomy

- Elysa Crozat, SpiCCI team

Properties of thoracic CSF-contacting neurons and interaction with sympathetic preganglionic neurons

- Laura López Galdo, CoMCo team

Exploring layer-resolved spectro-spatial beta rhythm patterns in macaque motor cortex

- Etienne Combrisson, BraiNets team

Group-level inference of information-based measures for the analyses of cognitive brain networks from neurophysiological data

- Rohit Yadav, MeCA team

On the relevance of multi-graph matching for sulcal graphs

- David Meunier, NIT team

An open multi-software framework for non-human primate (NHP) anatomical MRI processing

Posters – Thursday 29th

- Emmanuelle Bonnet, InVibe team

Sensory motor recalibration of time and causality rely on identity predictions

- Maxime Dieudonne, MeCA team

Size independent sulcal depth estimation

- Edith Blasco, SpiCCI team

Anatomical and functional identification of CSF-contacting neurons connectivity in the lumbar spinal cord

- David Roura Martinez, SONIC team

Optimized reporters uncover differences in miR-124 expression among neuronal populations in the brain

- Ruggero Basani, BraiNets team

Neural interactions in human prefrontal cortex dissociate reward and punishment prediction error signals

- Lucio Condro, CoMCo team

Behavioral Correlates of Long-term Motor Skill Learning in Macaque Monkeys

- Antoine Grimaldi, NeOpto team

Detection of precise spiking motifs using spike-time dependent plasticity on synaptic delays

- Simon Nougaret, CoMCo team

Low and high frequency beta oscillations in macaque motor cortex reflect different cognitive and sensorimotor functions

- Priscille Riondel, SpiCCI team

GABA evokes depolarizations and calcium transients in adult cerebrospinal fluid-contacting neurons of mouse spinal cord

- Hannah Ihme, CanoP team

Results of a moderated mediation analysis: Childhood trauma, anxious attachment, and mental pain predict suicidal ideation

- Montaine Lion, CanoP team

A specific GPR56/ADGRG1 splicing isoform to monitor response to antidepressant treatment in patients with major depressive disorder: a digital PCR assay

Posters – Friday 30th

- Natalia Popa, SONIC team

Region-specific microRNA alterations in marmosets carrying SLC6A4 polymorphisms are associated with anxiety-like behavior

- Andrea Brovelli, BraiNets team

Beta oscillations in monkey striatum encode reward prediction error signals

- Nicolas Meirhaeghe, CoMCo team

Parallel planning through an optimal neural subspace in motor cortex

- Marguerite Le Marois, CanoP team

A response eQTL of GPR56 expression is associated with antidepressant response

- Benoît Drouillas, P3M team

Differential contribution of Nav1.1 and Nav1.6 channels to bistable properties within the lumbar spinal locomotor network

- Isabelle Racicot, NeOpto team

High resolution, wide field optical imaging of macaque visual cortex with a curved detector

- Nejada Dingu, P3M team

The genetic down-regulation of calpain-I reverts spinal hyperexcitability and alleviates signs of spasticity in a neonate mouse model of complete spinal cord injury

- Jean-Nicolas Jeremie, NeOpto team

Ultra-rapid visual search in natural images using active deep learning

- Vincent Escarrat, ImaPath team

Immunomodulator and proregenerative effect of fibrin hydrogel and carbon microfibres based biocompatible neuroprosthetic implant to reconnect injured spinal cord

- Shrabasti Jana, CoMCo team

Direction Specific Energy Demands and Joint Kinematics Define Trajectory Variability Patterns

- Maxime Poinsot, SONIC team

A multiplexed brain-on-chip platform to study the plasticity of neural networks

- Marie Bourzeix, SONIC-BaGaMoRe teams

Do striatal cholinergic interneurons exhibit molecular diversity?

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