Swiss Society for Neuroscience

25th Annual Meeting
February 6-7, 2025
University of Lausanne

Local Organizing Committee
Pierre Lavenex (UNIL; Chair)
Marzia De Lucia (CHUV/UNIL), Johanna Furrer (ySSN), Ana Jakšić (EPFL), Anita Lüthi (UNIL), Nicolas Toni (CHUV/UNIL), Ulrike Toepel (UNIL)

The accreditation by the Swiss Association of Cantonal Veterinaries is pending.

The SNS grants 8 credits for the program on February 7.

The SSNC grants 1 credit for the program on February 7.

The meeting is kindly supported by

PROGRAM AT A GLANCE

Thursday February 6, 2025		
TIME	**LOCATION**	**UNIVERSITY OF LAUSANNE – LAKE CAMPUS – ANTHROPOLE BUILDING**
9:00-9:30	**LOBBY**	Registration with Welcome Drinks and Snacks
9:30-9:45	**AUDITORIUM 1129**	**Welcome address** Adrian Roggenbach (ySSN President)
9:45-10:45	**AUDITORIUM 1129**	**PLENARY LECTURE** **Eduardo Martin Moraud (CHUV/UNIL)** **TOWARDS BRAIN-CONTROLLED THERAPIES OF DEEP BRAIN AND SPINAL CIRCUITS TO ALLEVIATE DEFICITS OF GAIT AND BALANCE IN PARKINSON'S PATIENTS**
10:45-11:15	**LOBBY**	Icebreaking and Coffee
11:15-12:15	**AUDITORIUM 1129**	Symposium talks - Session 1 & Spotlight Talks **Selected speakers from submitted abstracts** TBA
12:15-14:15	**LOBBY & HALL**	Lunch Break and Poster session
14:15-15:15	**AUDITORIUM 1129**	Symposium talks - Session 2 **Selected speakers from submitted abstracts** TBA
15:15-16:15	**SEMINAR ROOMS 3148, 3174, 3185, 4173**	Workshops - Technical Round Tables **Names, Affiliations** TBA
16:15-16:30	**LOBBY**	Coffee Break
16:30-17:30	**AUDITORIUM 1129**	Symposium talks - Session 3 **Selected speakers from submitted abstracts** TBA
17:30-17:45	**AUDITORIUM 1129**	Best Presentation and Best Poster Awards
17:45-18:00	**LOBBY**	Break
18:00-18:15	**AUDITORIUM 1129**	**Meet the Presidents** The SSN from 1997 to 2025 and beyond
18:15-19:00	**AUDITORIUM 1129**	**PUBLIC LECTURE** **Jocelyne Bloch (CHUV/UNIL) and Grégoire Courtine (EPFL)** **NEUROTECHNOLOGIES POUR COMBATTRE LA PARALYSIS (IN FRENCH)**
19:00-19:30	**LOBBY**	Meet the Public Apero

Friday February 7, 2025		
TIME	**LOCATION**	**UNIVERSITY OF LAUSANNE – LAKE CAMPUS – ANTHROPOLE BUILDING**
8:30-9:20	**LOBBY**	Registration and Poster Set-up
9:20-9:30	**AUDITORIUM 1031**	Welcome address, SSN President & Dean SSP UNIL
9:30-10:15	**AUDITORIUM 1031**	**PLENARY LECTURE** Chair : Marzia De Lucia **Paul Sauseng (UNIZH)** **WHAT CAN WE LEARN ABOUT HUMAN COGNITION FROM STUDYING SLOW RHYTHMICAL BRAIN ACTIVITY?**
10:15-10:45	**LOBBY**	Coffee Break
10:45-12:00	**AUDITORIUM 1031 & 1129**	**PARALLEL SYMPOSIA** **I. NEURODEVELOPMENTAL DISORDERS** Chair: Pierre Lavenex **Alessio Strano (ETHZ)** Harnessing the CRISPR toolbox to engineering biology **Nora Maria Raschle (UNIZH)** Emotion Regulation, Risk, and Resilience in the Developing Brain **Floriana Costanzo (OPBG Roma)** Potential tDCS applications for enhancing neuroplasticity and regulating excitatory/inhibitory imbalance in neurodevelopmental disorders and genetic syndromes **II. WHAT CAN WE LEARN FROM SMALL BRAINS** Chair: Ana Jaksic **Emi Nagoshi (UNIGE)** Degeneration and protection of dopaminergic neurons: exploring mechanisms conserved from flies to humans **Johannes Larsch (UNIL)** Neurogenetics of social affiliation **Marta Zlatic (U Cambridge)** Circuits for memory-based action selection
12:00-14:00	**LOBBY & HALLS**	**Poster Session & Lunch**
13:30-14:15	**AUDITORIUM 1031**	**SSN business meeting & Honorary membership award**
14:15-15:00	**AUDITORIUM 1031**	**SHORT PRESENTATION BY THE SWISS 3R COMPETENCE CENTRE (3RCC)** **PLENARY LECTURE** Chair: Anita Lüthi **Johannes Gräff (EPFL)** **MEMORY AIDS ON THE CHROMATIN – EPIGENETIC MECHANISMS OF MEMORY ENCODING**

15:00-15:15	**AUDITORIUM 1031**	**The SFCNS Swiss Brain Health Plan** **Claudio Bassetti (Insel & UNIBE)**
15:15-15:30	LOBBY	Coffee Break
15:30-16:45	**AUDITORIUM 1031 & 1129**	**PARALLEL SYMPOSIA** **III. BLOOD-BRAIN-INTERACTIONS** Chair: Nicolas Toni **Steve Proulx (UNIBE)** Rethinking CSF circulation: new insights into lymphatic clearance pathways **Nicolas Toni (CHUV/UNIL)** Circulating lipids regulate adult hippocampal neurogenesis in anxiety **Kevin Richetin (CHUV/UNIL)** Brain-Derived Extracellular Vesicles and Tauopathies: From Understanding to Diagnosis **IV. EEG-IEEG IN HUMAN NEUROSCIENCE** Chair: Marzia De Lucia **Pierre Megevand (HUG/UNIGE)** Unraveling the cortical substrates for the multisensory integration of speech using intracranial EEG and audiovisual speech illusions **Anais Llorens (Paris)** iEEG insights into the limbic system **Olivier David (Marseille)** Functional brain tractography
16:45-17:00	**AUDITORIUM 1031**	**SSN Meeting Awards** - **SSN Best Publication Awards** - **Volker Henn Poster Prizes** - **Various**
17:00-17:30	**LOBBY**	Farewell Apero

ABSTRACTS OF PLENARY AND SYMPOSIUM TALKS

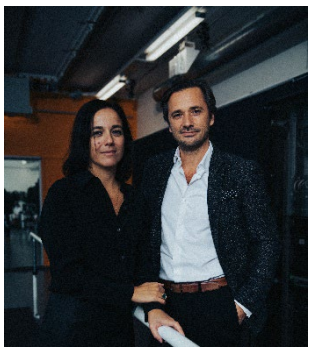
– IN ORDER OF APPEARANCE IN THE PROGRAM –

Thursday February 6

Eduardo Martin Moraud (CHUV/UNIL)

TOWARDS BRAIN-CONTROLLED THERAPIES OF DEEP BRAIN AND SPINAL CIRCUITS TO ALLEVIATE DEFICITS OF GAIT AND BALANCE IN PARKINSON'S PATIENTS

Despite impressive advances in neuromodulation therapies for Parkinson's disease (PD), a big majority of patients with advanced PD develop disturbances of gait and balance, including postural instability, festination, or freezing of gait, that are refractory to existing treatments. These deficits lead to frequent falls and increase comorbid conditions. Closed-loop stimulation therapies of brain and spinal cord have the potential to better address locomotor abnormalities. However, the delivery of stimulation must be tuned online to the fluctuating state of patients, as well as to task- and context-related constraints encountered in daily life. Such closed-loop therapies are contingent on biomarkers that inform about locomotor activities and deficits in real-time. We are leveraging the sensing capabilities of last-generation neurostimulators for deep brain stimulation (DBS) to identify neural biomarkers that underlie locomotor function and dysfunction in the subthalamic nucleus, and to prototype neural decoding algorithms that can robustly predict such deficits despite fluctuations and real-life constraints. In this talk, I will introduce our current developments in this direction, and how we intend to use them for personalising therapies of brain and spinal cord to better address gait deficits in patients with advanced PD.



Jocelyne Bloch (CHUV) and Grégoire Courtine (EPFL)

NEUROTECHNOLOGIES POUR COMBATTRE LA PARALYSIS

Lors de cette conférence publique, Jocelyne Bloch et G. Courtine partageront leurs travaux sur le développement de systèmes implantables pour restaurer les fonctions neurologiques altérées par des lésions de la moelle épinière ou la maladie de Parkinson. En combinant des techniques de neurochirurgie et des innovations en neurotechnologie, ils ont mis au point des implants pour la moelle épinière capables de réguler l'activité des neurones contrôlant les fonctions motrices et autonomes. Ces avancées ont permis à des personnes atteintes de paralysie de retrouver la marche, des mouvements des membres supérieurs ou encore une régulation de la pression artérielle. Par ailleurs, ces technologies ont contribué à réduire les troubles locomoteurs chez des patients atteints de la maladie de Parkinson. Cette présentation offrira un aperçu captivant des dernières découvertes et des perspectives prometteuses dans le domaine de la restauration des fonctions neurologiques.

Friday February 7, 2025

Paul Sauseng (UNIZH)

WHAT CAN WE LEARN ABOUT HUMAN COGNITION FROM STUDYING SLOW RHYTHMICAL BRAIN ACTIVITY?

The human brain is amazing when it comes to making sense of a complex environment, when it is necessary to flexibly perceive, attend, and store information from our surrounding world, and when it is required to coordinate action and behaviour. With billions of neurons there are of course plenty of loci where these functions can be implemented. A dimension at least equally important for coordinated information processing, however, is timing. Across different domains the brain frequently requires a temporal code in order to efficiently create cognition. In this lecture, several examples will be provided that demonstrate how important slow rhythmical brain activity is, so that optimally tuned time windows that allow coordinated information processing are established. Controlling temporal neural processes this way allows specifically perceiving, attending and storing relevant information as well as suppressing irrelevant information (and let's be honest, there is so much irrelevant stuff out there...). Moreover, the role of slow brain oscillations for temporo-spatial dynamics across the cortex will be addressed.

Alessio Strano (ETHZ)

HARNESSING THE CRISPR TOOLBOX TO ENGINEERING BIOLOGY

Molecular technologies enabling the high throughput interrogation of genetic elements fuel our capacity to understand and control complex biological systems. With current methodologies used in the field of biomedicine the rate at which genes are being associated with biological and disease processes has drastically outstripped the pace at which their causality can be tested and understood, especially in complex models. This talk will focus on how we are harnessing the CRISPR toolbox to engineer biology and overcome these challenges, specifically through developing tools and methods for in vivo CRISPR screens to interrogate gene function in the brain.

Nora Maria Raschle (UNIZH)

EMOTION REGULATION, RISK, AND RESILIENCE IN THE DEVELOPING BRAIN

Emotion regulation skills refer to the ability to regulate the intensity, duration, or extent of emotional experiences. These skills are supported by neo- and subcortical corticolimbic brain regions. My talk will review evidence of typical and atypical socioemotional development, highlighting how improvements in emotion regulation parallel age-appropriate behavioral and social development, and how they are linked to the functional integrity of corticolimbic regions. Disruptions in these processes are associated with neuropsychiatric disorders (e.g., conduct/oppositional defiant disorder) and relate to neural alterations in corticolimbic areas. Additionally, treatment success (i.e., cognitive therapy) is predicted by symptom severity and pre-treatment neural profiles.

Floriana Costanzo (OPBG Roma)

POTENTIAL TDCS APPLICATIONS FOR ENHANCING NEUROPLASTICITY AND REGULATING EXCITATORY/INHIBITORY IMBALANCE IN NEURODEVELOPMENTAL DISORDERS AND GENETIC SYNDROMES

Transcranial direct current stimulation (tDCS) is a promising new treatment for enhancing cognitive and behavioral functions in neurodevelopmental disorders. However, the current body of research in this area is limited, and the underlying mechanisms of action remain largely unexplored. We will discuss the potential role of tDCS in enhancing neuroplasticity and regulating excitatory/inhibitory imbalance in various neurodevelopmental disorders, including Autism Spectrum Disorders and genetic conditions such as Down syndrome, 22q11.2 deletion syndrome, NF1, Rett syndrome and Phelan-McDermid syndrome. To provide personalized treatment, it is imperative to optimize the parameters for tDCS based on the etiopathogenic mechanisms of each disorder.

Emi Nagoshi (UNIGE)

DEGENERATION AND PROTECTION OF DOPAMINERGIC NEURONS: EXPLORING MECHANISMS CONSERVED FROM FLIES TO HUMANS

Progressive degeneration of dopaminergic (DA) neurons in the substantia nigra is a pathological hallmark of Parkinson's disease (PD). Most PD cases are sporadic in origin, thought to be caused by the combination of genetic and environmental risk factors and age. However, the nature of risk factors and their interplay remain poorly understood. This talk will cover our work in addressing these questions using *Drosophila melanogaster*, mice and human DA neurons as model systems. Our results highlight the pivotal role of the conserved transcription factor FEER2/NATO3 in safeguarding DA neurons, offering potential avenues for developing new therapeutic strategies.

Johannes Larsch (UNIL)

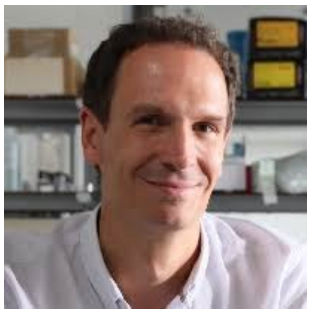
NEUROGENETICS OF SOCIAL AFFILIATION

Many species live in groups and affiliate with conspecifics. We investigate affiliation pathways in the brains of juvenile zebrafish during shoaling, the innate drive to swim in groups. Using virtual reality psychophysics, we identified self-like biological motion as one visual trigger of shoaling. We traced biological motion into the brain and discovered a specifically tuned tecto-thalamic visual pathway that detects this social signal and drives shoaling. We now use the tools available in zebrafish for whole-brain activity mapping and cell type discovery to reveal the neuronal implementation of shoaling as a model for social affiliation in vertebrates.

Marta Zlatic (U Cambridge)

CIRCUITS FOR MEMORY-BASED ACTION SELECTION

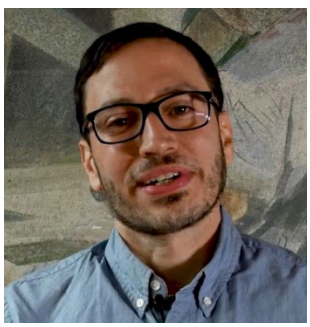
Animal behavior is shaped both by evolution and by individual experience. In many species parallel brain
pathways encode innate and learnt valences of stimuli. Furthermore, within the learning centers, opposite valences may be associated with the same cues, in parallel. How these opposing valences are integrated into an overall predicted value and used to drive a single coherent action is not well understood. In insects, the Mushroom Body Output Neurons (MBONs) and the Lateral Horn Neurons (LHNs) are thought to provide the learnt and innate drives, respectively. However, their patterns of convergence and the mechanisms by which their outputs are used to select actions are not well understood. Our recently published connectome of the entire *Drosophila* larval brain has revealed a complex, multi-layered network of neurons downstream of MBONs and LHNs and upstream of descending neurons that implements action selection. To discover the basic operational principles of this action-selection network, we have performed an optogenetic activation screen for neurons that promote distinct actions, and we have characterised the responses of these neurons to stimuli of distinct innate and learnt valances. Together, these studies reveal the circuit mechanisms allowing integration of opposing drives from parallel olfactory pathways.



Johannes Gräff (EPFL)

MEMORY AIDS ON THE CHROMATIN – EPIGENETIC MECHANISMS OF MEMORY ENCODING

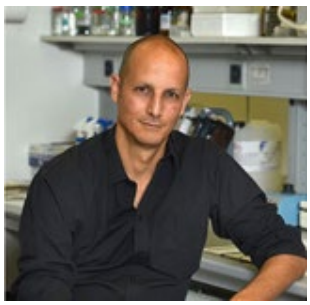
Memory formation relies on a bidirectional interplay between synaptic plasticity and nucleus-templated transcriptional programs, but how precisely this interplay is orchestrated by epigenetic mechanisms remains to a large extent unknown. In this talk, I will showcase my laboratory's recent efforts to better understand this aspect from two angles. First, we have found that epigenetic plasticity in the mouse brain is a key determinant for memory allocation, the process by which neurons become recruited into the memory trace: Neurons with enhanced chromatin plasticity before encoding are preferentially recruited into the encoding ensemble, while their optogenetic silencing prevents memory retention. Second, we have found that after encoding, the epigenetic make-up of a single locus within memory-bearing engram cells is necessary and sufficient to bidirectionally alter memory performance across different phases of memory consolidation. Together, these findings stipulate that both before and after memory encoding, epigenetic mechanisms play a pivotal role as molecular memory aids.



Steve Proulx (UNIBE)

RETHINKING CSF CIRCULATION: NEW INSIGHTS INTO LYMPHATIC CLEARANCE PATHWAYS

Our research is focused on determining the mechanisms of the exchange of cerebrospinal fluid (CSF) with the interstitial fluid (ISF) of the brain parenchyma and elucidating the routes of CNS clearance to the lymphatic system. My group has produced in vivo imaging data that challenges the popular "glymphatic" hypothesis of convective flow of CSF through the brain parenchyma. Improved knowledge of CSF-ISF exchange and drainage is essential for understanding CNS immunity and brain edema and, thus, should greatly aid in interpretation of several neurological disorders including stroke, glioblastoma and MS.



Nicolas Toni (CHUV/UNIL)

CIRCULATING LIPIDS REGULATE ADULT HIPPOCAMPAL NEUROGENESIS IN ANXIETY

Adult neurogenesis is the most drastic form of brain plasticity and in the hippocampus, it plays a role in mechanisms of learning and memory as well as in stress resilience. The aim of our research is to decipher the mechanisms of regulation of the production and maturation of hippocampal neurons and their implication in mood and memory disorders. With advanced ultrastructural approaches, we found that adult hippocampal stem cells establish perivascular processes, suggesting that their activation may be regulated by blood-circulating molecules. We are exploring this possibility in the context of anxiety and stress susceptibility.

Kevin Richetin (CHUV/UNIL)

BRAIN-DERIVED EXTRACELLULAR VESICLES AND TAUOPATHIES: FROM UNDERSTANDING TO DIAGNOSIS

In brain diseases marked by disruptions of Tau protein, including Alzheimer's disease (AD), frontotemporal dementia (FTD), and other neurodegenerative disorders, our research aims to uncover the mechanisms of brain cell secretions and their impact on nearby astrocytes. We have identified that extracellular vesicles and extracellular Tau released in AD and FTD exert distinct influences on glial cell functionality, affecting cellular function and overall brain connectivity. Moreover, the analysis of the complex protein signature of Brain-Derived EV revealed significant potential for refining the classification of various brain pathologies. By characterizing these molecular signatures, our work paves the way for more accurate diagnostic tools and a deeper understanding of neurodegenerative processes.

Pierre Megevand (HUG/UNIGE)

UNRAVELING THE CORTICAL SUBSTRATES FOR THE MULTISENSORY INTEGRATION OF SPEECH USING INTRACRANIAL EEG AND AUDIOVISUAL SPEECH ILLUSIONS

Speech is multisensory: when we speak, we move, and our movements provide visual clues to our interlocutors that complement and enrich the auditory information transmitted by the voice. The processing of audiovisual speech recruits a multitude of cortical areas; however, it remains uncertain which regions are particularly responsible for the merging of auditory and visual speech signals into a coherent and unitary percept. Here, I leveraged the unrivalled spatiotemporal resolution of intracranial EEG recordings in human patients with epilepsy to dissect the relative contributions of individual regions. In order to dissociate the physical features of the auditory and visual inputs from the participants' perception, I created innovative stimuli, inspired by the well-known McGurk audiovisual speech illusions. I found that, while early auditory and visual cortices are clearly involved in the perception of audiovisual speech, their activity patterns did not correspond to the participants' perception, which was better reflected by the activity of higher-order sensory and language-related areas in the temporal, parietal and frontal lobes. In conclusion, naturalistic audiovisual speech illusions represent a powerful tool to dissect the specific roles of individual cortical areas in the processing of audiovisual speech.

Anais Llorens (Paris)

IEEG INSIGHTS INTO THE LIMBIC SYSTEM

The advent of invasive techniques like intracranial electroencephalography (iEEG) has revolutionized our ability to explore deep brain regions with unparalleled precision. These studies are reshaping our understanding of the limbic system, highlighting its critical role in higher-order cognition rather than solely in autonomic functions. In this talk, I will delve into two key areas. First, I will examine the hippocampus's involvement in visual linguistic processes, presenting iEEG findings on its role in picture naming, repetition, and semantic manipulation. Next, I will explore functional distinctions within the insula. Specifically, I will highlight how the inferior insula contributes to auditory mismatch negativity detection, while the anterior and posterior insula support decision-making and response monitoring to visual cues during verbal working memory tasks. By bridging these findings, I aim to shed light on the intricate neural mechanisms underpinning cognition and sensory processing.

Olivier David (Marseille)

FUNCTIONAL BRAIN TRACTOGRAPHY

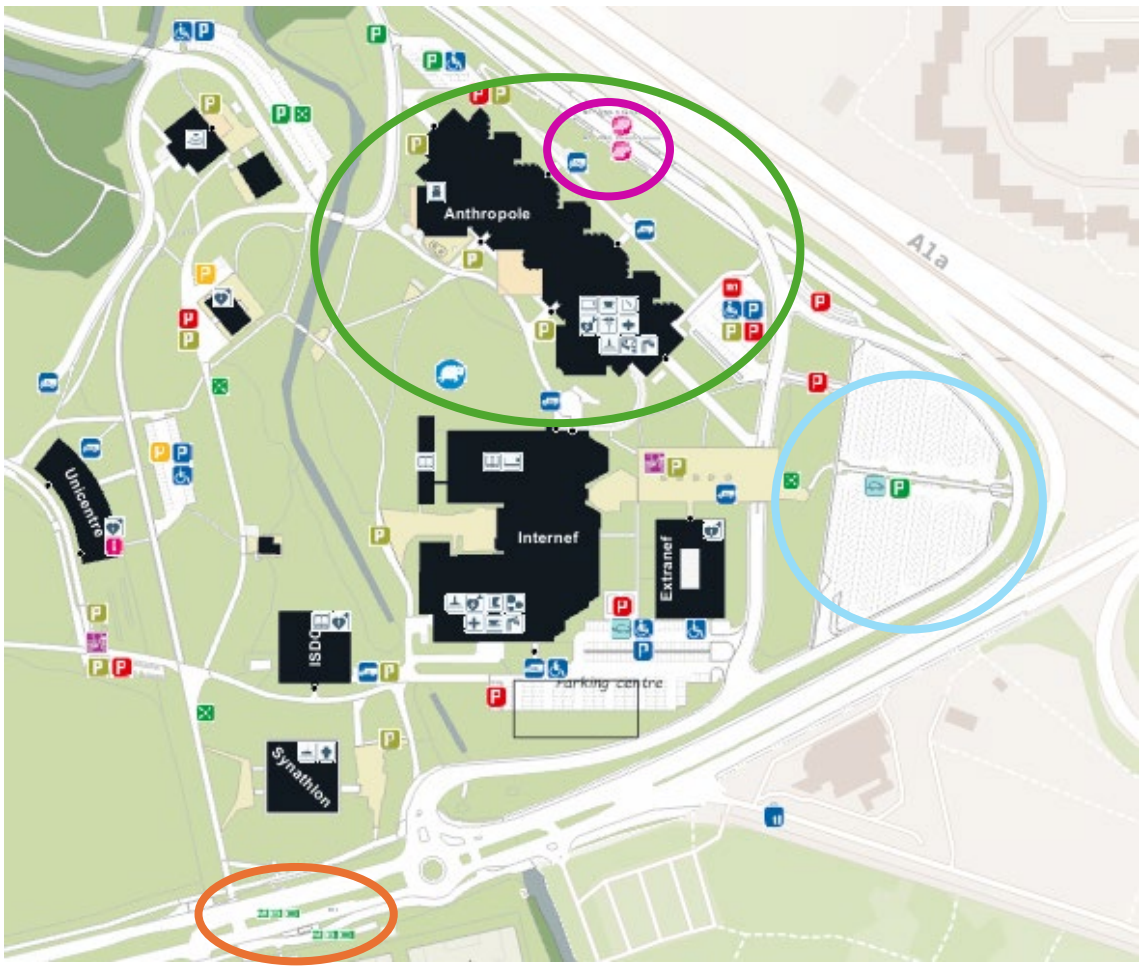
We will discuss how direct electrical cortical stimulation as performed in clinics for epilepsy surgery using single pulses can be used to study functional neuroanatomy in humans by considering large scale studies for developing brain atlases. We will first introduce the general framework of functional brain tractography to illustrate what neurophysiological features of large-scale brain connectivity can be inferred from cortico-cortical evoked potentials at the whole brain level. Then we will illustrate the particular case of the dorsolateral prefrontal cortex. The question will be to push the spatial resolution of our approach to dissociate its anterior and posterior parts, which presumably belong to different functional networks – central executive and salience networks.

PRACTICAL INFORMATION

GETTING TO THE VENUE

The SSN meeting 2025 is happening at the Anthropole building at the UNIL "lake" campus (green ellipse on the map below).
To get there you can either

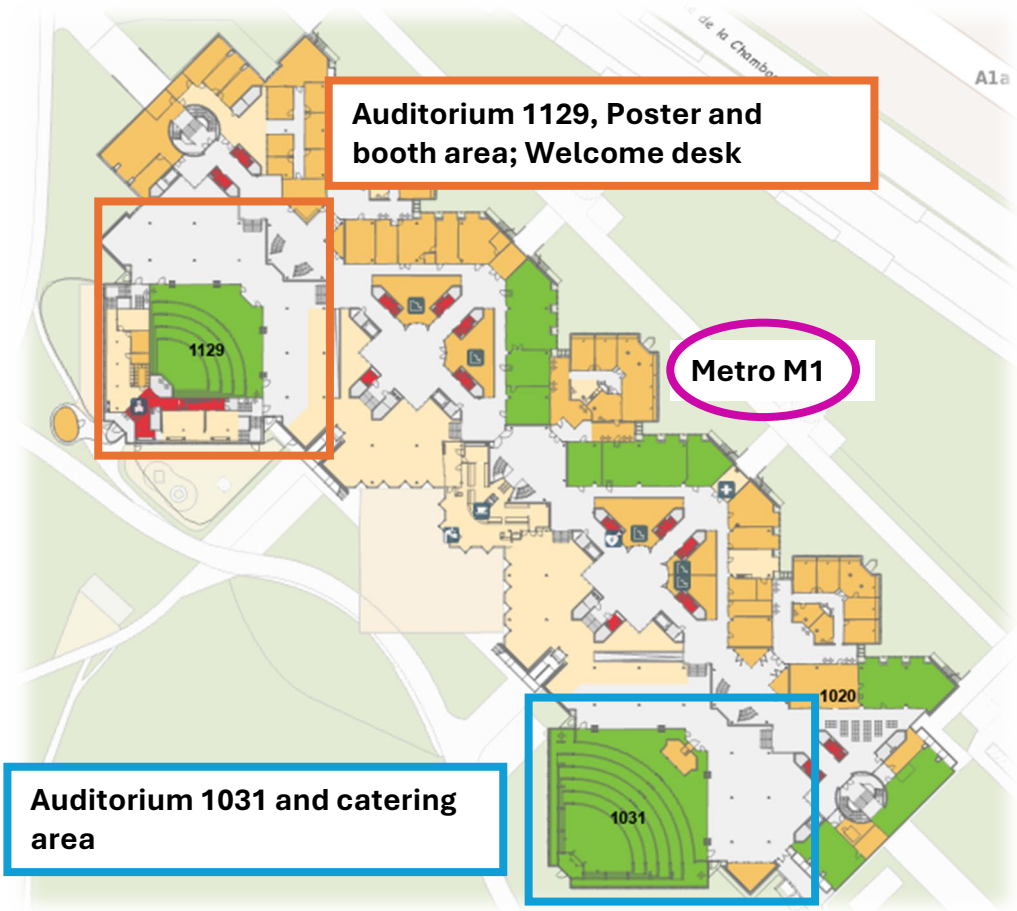
- Take metro M1 (stop "UNIL-Chamberonne; marked in pink within the green ellipse). The M1 is running from A) Renens train station directly or B) from Lausanne-Flon (when arriving via Lausanne train station you first need to take the M2 towards Sallaz/Croisettes and the change @ Flon to the M1 direction EPFL.
  OR
- Take Bus 1 from Lausanne train station towards Ecublens VD/EPFL and get off at "Ecublens VD, allée de Dorigny" (orange ellipse) below. (Attention, stop only served at peak hours!).
  OR
- Take Bus 701 from Morges train station and get off at "Ecublens VD, allée de Dorigny" (orange ellipse) >>> walking distance to venue ~300m.



If you are coming by car from motorway (A1), follow signs for Lausanne-Sud (A1a), then take the Lausanne Malley exit. At the first roundabout, turn (very) right, towards Route de la Chamberonne. One hundred meters further on, you'll find the parking lot marked in light blue.
Parking rates (Monday to Friday, 8.00 am to 7.00 pm): CHF 1.00 for the 1st hour, CHF 2.00 for subsequent hours.

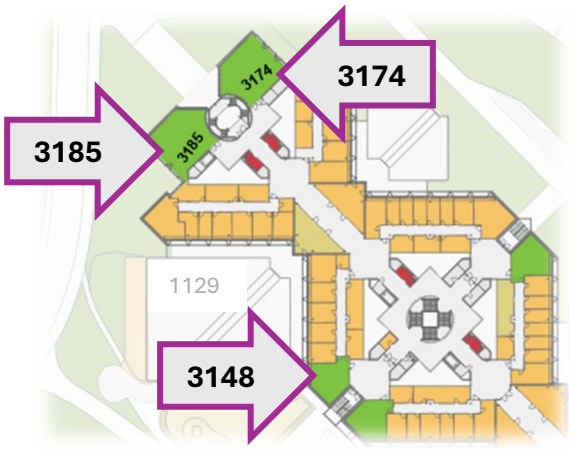
VENUE MAPS

FLOOR 1



YSSN Workshop rooms on February 6

FLOOR 3



FLOOR 4