2024 Chang Hsiang-Tung
Brain Science Symposium

超维景 RWD 瑞沃德 STAIRMED EVIDENT

1st Chang Hsiang-Tung
Brain Science Symposium

2024

Chang Hsiang-Tung Brain Science Symposium

第一届张香桐脑科学研讨会

October 26 - 28, 2024 | Shanghai · China

CATALOGUE

ABOUT CHANG HSIANG-TUNG BRAIN SCIENCE SYMPOSIUM

The Chang Hsiang-Tung Brain Science Symposium provides a unique forum in the vibrant modern city of Shanghai, bringing together the world's leading experts and scholars in brain science and intelligence technology to discuss cutting-edge research topics and to promote scientific exchanges and collaborations. The scientific program will cover a broad range of research topics, from systems and circuit neuroscience to molecular mechanisms of brain diseases and innovative methods for studying the brain.

ABOUT CHANG HSIANG-TUNG

Chang Hsiang-Tung, a renowned international neurophysiologist and the founder of Chinese neuroscience, was born in Zhengding, Hebei Province. He was a former researcher at the Shanghai Institute of Physiology, Chinese Academy of Sciences, and also served as a researcher, director, and honorary director at the Shanghai Institute of Brain Research, Chinese Academy of Sciences. He was also the honorary director of the Institute of Neuroscience, Chinese Academy of Sciences.

He is recognized as one of the pioneers in the study of dendritic physiological functions, having first discovered dendritic potentials and elucidated the importance of synaptic connections on dendrites. Chang also discovered the "light enhancement" phenomenon in the visual center, which was named the "Chang Effect" by the international physiological community. He mapped the muscle representation in the motor cortex, established a classification method for muscle afferent fibers, and revealed that the recurrent circuit between the cerebral cortex and the thalamus is the basis for the repetitive discharge following cortical evoked potentials. Zhang was also one of the main academic leaders in the study of acupuncture anesthesia mechanisms in China, making significant contributions to elucidating the neural mechanisms of acupuncture analgesia.

MAJOR CONTRIBUTIONS

01 Historical Significance of Dendritic Function

Chang Hsiang-Tung was recognized as one of the pioneers in the field of dendritic physiological function research internationally. He elucidated the importance of dendrites, demonstrating that they are excitable and can conduct nerve impulses. Dendrites are particularly sensitive to hypoxia and low temperatures.

02 Chang's Effect

Chang Hsiang-Tung discovered the "light enhancement effect," which was named the "Chang Effect." He found that cortical evoked potentials induced by stimulating the lateral geniculate body could be increased by the continuous exposure to weak background light. This background light not only enhances the excitability of the visual center but also that of the entire central nervous system.

03 Mechanism of Acupuncture Analgesia

Chang Hsiang-Tung was the first to discover neurons in the parafascicular nucleus and the central lateral nucleus of the thalamus that specifically respond to pain stimuli. Acupuncture and analgesic drugs inhibit the pain response of these neurons, which is achieved through the neural circuit involving the central medial nucleus, cerebral cortex, parafascicular nucleus, and central lateral nucleus. In his work "The Integrative Role of the Thalamus in the Process of Acupuncture Analgesia," he proposed the "Interaction of Two Sensations" theory, suggesting that acupuncture analgesia results from the interaction of sensory impulses from the pain source and those from the acupoint within the central nervous system.

In 1980, Chang Hsiang-Tung was awarded the Zülch Prize for his significant contributions to the field of acupuncture anesthesia principles.

In 1987, the American publication "Encyclopedia of Neuroscience" included two of Chang's research achievements:

Historical Demonstration of Muscle Representation in the Monkey Motor Cortex

Chang Hsiang-Tung demonstrated that each muscle has its own cortical representation area, with non-overlapping central areas but overlapping peripheral areas. This work deepened the understanding of the functional architecture of the motor cortex and is considered a classic in the field.

Classic Classification of Muscle Afferent Fibers

Together with D.P.C. Lloyd, Chang Hsiang-Tung measured a large number of afferent fibers in different muscle nerves and found that the afferent fibers in muscle nerves could be classified into types I, II, and III based on the diameter of the fibers. This classification method is still in use today.

ABOUT INSTITUTE OF NEUROSCIENCE (CEBSIT), CHINESE ACADEMY OF SCIENCES

As part of a major drive for excellence in basic research in the new millennium, the Chinese Academy of Sciences (CAS) founded the Institute of Neuroscience (ION) on November 27, 1999. The institute is devoted to research in all areas of basic neuroscience, including molecular, cellular and developmental neurobiology, and systems and cognitive neuroscience. At its inception, the Institute aims to establish the infrastructure of a modern research institute that provides an environment for rigorous scientific pursuit and fruitful interactions, a merit-based system for promotion and funding, and a high-quality training program for graduate students and postdoctoral fellows. In 2014, within the framework of institutional restructuring, ION became the core unit of CAS Center for Excellence in Brain Science and Intelligence Technology (abbreviated "Brain Intelligence Center", see website www.cebsit.ac.cn). The goal of the new Center is to help integrating research activity within and outside CAS and to promote team work and interdisciplinary collaboration, in order to address major problems in the frontier of brain science and brain-inspired intelligence technology.

There are currently 55 ION laboratories in various areas of molecular, cellular, systems and cognitive neuroscience. We are recruiting new laboratory heads at a rate of 3-4 per year, with a goal of reaching a steady state of 60 laboratories by 2025. Each laboratory consists of up to five permanent staff members and a variable number of graduate students and postdoctoral fellows. Many laboratories have ongoing collaborations with other research groups in China and abroad. Long-term collaborators are appointed as Guest Investigators of ION. Funding from the CAS, Ministry of Science and Technology, and Natural Science Foundation of China have provided research supports and facilities to our researchers at a level close to that of major international institutions in the frontier of neuroscience. An International Advisory Board consisting of a group of distinguished neuroscientists has offered critical inputs into ION's evolving organization and research activity. Academic review of individual ION laboratories by an international review committees is carried out on a regular basis, in order to ensure the quality of ION research programs.

The structure and function of the brain pose the ultimate challenge to human understanding of nature. Despite the spectacular progress in molecular and cellular biology over the last few decades, mysteries of the brain remain largely unsolved. Solution of these mysteries requires integration of experimental approaches from diverse disciplines and new conceptual frameworks that bridge understandings at different levels. The goal and agenda of neuroscience in the coming decades epitomize those of modern science - to understand nature is to understand how a natural phenomenon emerges from the properties of its constituent parts, and any description of a neural phenomenon, whether it is at the cognitive, circuit, cellular, or molecular level, is incomplete and unsatisfactory without addressing its causal links to the phenomena at a higher or lower level. To understanding the cognitive functions at the behavioral level, we need to know their underlying neural circuits, the neuronal types and synaptic connections comprising the circuits, the neuronal and synaptic properties giving rise to the circuit functions, and the genetic and molecular mechanisms responsible for the development, function, and plasticity of individual neurons and synapses.

The founding of ION in Shanghai provides a new opportunity for Chinese neuroscientists to flourish on their own soil and to contribute on a par with their peers in the international community. Visitors to ION are likely to agree with me that the vitality and enthusiasm of ION faculty and students point to a bright future for Chinese neuroscience. In the coming decades, we are looking forward to ever-lasting contributions by Chinese neuroscientists no less impressive than those bronze vessels in the Shanghai museum.

Mu-Ming Poo is nurturing the Institute of Neuroscience that offers a glimpse of his country's future as a bioscience superpower. (Source: Nature, Vol 476, August 4, 2011)

ABOUT KEY LABORATORY OF BRAIN COGNITION AND BRAIN-INSPIRED INTELLIGENCE TECHNOLOGY

KLBI

脑认知与类脑智能重点实验室

Key Laboratory of Brain Cognition and Brain-inspired Intelligence Technology

The Key Laboratory of Brain Cognition and Brain-inspired Intelligence (KLBI) is established in the Center of Excellence in Brain Science and Intelligent Technology of the Chinese Academy of Sciences. By constructing an innovative and cooperative environment, the KLBI aims to establish a world-class brain cognition and intelligence research institution, occupying a leading position in the field of brain cognitive principles.

The core goals of KLBI are to analyze neural mechanisms and algorithmic principles of advanced cognitive functions of the brain, such as concept formation, reasoning, generalization, and decision-making, and construct a general intelligence model. Clarifying the basic principles of brain intelligence serves as the crucial way to overcome the bottlenecks of artificial intelligence, like weak abilities of generalization and reasoning.

The three main researches are:
1.The neural mechanisms of the brain integrating multi-dimensional data of spatial cognition and temporal cognition.
2.The neural mechanisms of reasoning and decision-making.
3.The intelligent technology inspired by the principle of brain cognition.

Supporting Journal

Springer

Neuroscience Bulletin

The Official Journal of Chinese Neuroscience Society

Editors-in-Chief
Shu-Min Duan, Zhejiang University
Ru-Rong Ji, Duke University, USA

- Broad Scope Neuroscience Journal
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Impact Factor* 5.9 Q1

*2023JCR, Clarivate

CiteScore 2023: 7.2, 47/193 Physiology

Downloads: 567,068 (2023)

www.neurosci.cn

www.springer.com/journal/12264

ABOUT THE SHANGHAI SOCIETY FOR NEUROSCIENCE (SSN)

Brief Introduction

The Shanghai Society for Neuroscience (SSN) was founded in 1988, following its initial preparations that started in 1985. SSN encourages the formation of neuroscience-related social organizations in China.As a non-profit, non-governmental organization, SSN operates as an independent legal entity. It has received a three-star designation from the SHANGHAI ASSOCIATION for SCIENCE and TECH and holds an "AAA" rating from the Shanghai Civil Affairs Bureau.

Since 2021, SSN has been actively developing and expanding its branches. With the guidance of the Tenth Council, two new working committees have been formed: the Youth Innovation Working Committee and the Female Scientists Working Committee. In addition, the society has initiated 11 professional subcommittees.

Brief Introduction

Membership: At present, SSN has a total of 2,243 active members and 11 corporate members.

Brand Conference: Yangtze River Delta Neuroscience Forum, which has been successfully held

Schedule: The event takes place on the third Saturday of May each year.

Themes: Themes range from neurobiology to brain science and brain-inspired intelligence.

Scale: The event attracts over 500 participants from the Yangtze River Delta, and regions such as Jiangxi, and Hubei.

Integration of Industry, Academia, and Research: The event features a blend of exhibitions by companies and academic presentations.

Academic Frontiers: All presentations must include at least one-third of content related to unpublished, cutting-edge research

Hosting Mechanism: Since 2017, the event, with the SSN as the main organizer, will be hosted by local society with the Zhejiang Society for Neuroscience, Jiangsu Society For Neuroscience and Anhui Society for Neuroscience rotating as the local host each year.

Awards

1.The Yangtze River Delta Cloud Launch Award

Criteria:Professors or Investigatos with less than 3 years of experience 3 recipients

2.Yangtze River Delta Young Scientist Award in Neuroscience

Criteria:Associate professors and lower titles under 40-year old 6 recipients

3.Yangtze River Delta NeuroXess Postdoctoral Award

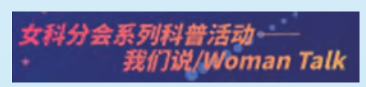
Criteria: Postdoctors 3 recipients

4.Yangtze River Delta NeuroXess Outstanding Graduate Student Award

Criteria: Graduate students under 35 years old 6 recipients

Special Activity

Yangtze River Delta Female Scientists Networking Event **— organized by Female**



Women Talk

New Youth — Yangtze River Delta Youth Forum in Neuroscience
— Youth Innovation Working Committee
Forum on Pain and Disease — Pain Research and Translation Branch

WORLD ARTIFICIAL INTELLIGENCE CONFERENCE

SYMPOSIUM COMMITTEES

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Institute of Neuroscience
(Center for Excellence in Brain Science and Intelligence Technology)
Chinese Academy of Sciences

CO-ORGANIZERS

Shanghai Society for Neuroscience
Key Laboratory of Brain Cognition and Brain-inspired Intelligence Technology

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MEETING INFORMATION

Onsite Registration and Reception

Onsite Registration starts on **OCT 25 Friday, 12:00-18:00**
Venue: **Shanghai Science Hall, 57 NanChang Road, Shanghai**
Reception (Registration Unavailable)

OCT 26: 7:30-10:30,12:00-15:00
OCT 27: 7:30-10:30,12:00-15:00
OCT 28: 7:30-10:30

Points for Attention

Badges should be worn all time and be visible anywhere in the conference hall. Badges can be report for losses at the registration & reception desk by showing ID.

Registration Fee includes

1.Admissions to all scientific program and exhibition area
2.Lunch (Non-Students: lunch buffet on 5F; Students: please pick up lunch-box at Ocean Hall)
3.A program book
4.Souvenirs

Invoice

This symposium provides participants with electronic invoice, which will be issued upon registration and payment. If you have any enquiries, please contact Anna via: <anna.bao@26decibel.com>

Safety & Security

The Symposium Secretariat and Organizers do not accept liability for personal accidents or loss of damages to private property. Please do not leave personal belongings unattended at any time, whether inside or outside Lecture Halls.

Photography and video recording of scientific program (lectures) are prohibited; the relevant documents, materials and reports of the symposium are only for internal communication and shall not be disseminated outside without the permission of the author.

No parking available at Shanghai Science Hall, please try to get to the conference hall on green transport.

INFORMATION FOR LECTURE HOSTS

Lecture hosts should introduce speakers, moderate speakers' presentations, manage speakers' time , Q & A, and finally introduce the next lecture host.

There will be IT support to assist on-call.

AGENDA

Day 1 (October 26, Saturday, 2024)		
Time	**Program**	**Details**
08:30-08:50	Opening Ceremony	**Institute of Neuroscience (CEBSIT), Chinese Academy of Sciences**
	Opening Remarks	**Ai-Ke Guo,** Academician Shanghai University, China / Beijing Normal University, China
	Photo	Venue: Main Lecture Hall
Time	**Speaker**	**Affiliation & Title**
08:50-09:30	Richard W. Tsien	**New York University, USA** Control of E/I ratio by Circuit and Lipid Signaling Mechanisms
09:30-10:10	Qiu-Fu Ma	**Westlake University, China** A neuroanatomical basis for electroacupuncture to modulate inflammation and pain
10:10-10:25		**Tea Break 15min** (Venue: Outside Main Lecture Hall)
10:25-11:05	Ole Kiehn	**University of Copenhagen, Denmark** Unraveling Brainstem Circuits for Movement: Insights into Motor Control and Implications for Treatment of Movement Disorders
11:05-11:45	Naoshige Uchida	**Harvard University, USA** The neural mechanisms for reinforcement learning in the brain
12:00-13:30	Photo	Group Photo (Invited Speakers Only)
	Luncheon	Non-Student Personnels: 5F Buffet Restaurant Students: Lunch at Ocean Hall
	Poster Session	Posters are displayed at Main Lecture Hall
13:10-13:25	Workshop	**Transcend Vivoscope Complete Solutions for in vivo Imaging** Presented by: Dan Li
13:30-14:10	Timothy Behrens	**University of Oxford, UK** A cellular basis for mapping behavioural structure
14:10-14:50	Li-Ping Wang	**Institute of Neuroscience (CEBSIT), Chinese Academy of Sciences** The control of sequence working memory in macaque frontal cortex
14:50-15:15	Zhen Liu	**Institute of Neuroscience (CEBSIT), Chinese Academy of Sciences** Genetic approaches in generating monkey models for brain study
15:15-15:30		**Tea Break 15min** (Venue: Outside Main Lecture Hall)
15:30-16:10	Matthew Larkum	**Humboldt University of Berlin, Germany** Chang's vision: blooming and bearing fruit - 张香桐的愿景：开花结果
16:10-16:50	Takaki Komiyama	**University of California, San Diego, USA** Motor cortex circuits for learned movements
16:50-17:05		**Tea Break 15min** (Venue: Outside Main Lecture Hall)
17:05-17:45	Michael Z. Lin	**Stanford University, USA** Imaging neuronal computations in space and time with new voltage indicators
17:45-18:10	Yi Du	**Institute of Psychology, Chinese Academy of Sciences** Processing of hierarchical structure and reward in music: Insights from neuroimaging and eye movements
18:10-19:40	Poster Session	Posters are displayed at Main Lecture Hall

Day 2 (October 27, Sunday, 2024)		
Time	**Speaker**	**Affiliation & Title**
08:30-09:10	Yang Dan	**University of California, Berkeley, USA** The how and why of sleep
09:10-09:50	Tadashi Isa	**Kyoto University, Japan** Roles of mesolimbic and mesofrontal dopaminergic pathway for motor recovery and decision making
09:50-10:05		**Tea Break 15min** (Venue: Outside Main Lecture Hall)
10:05-10:45	Arnold R. Kriegstein	**University of California, San Francisco, USA** Genomic insights into human brain development, evolution, and disease
10:45-11:25	Timothy Buschman	**Princeton University, USA** The geometry of cognitive flexibility
11:25-11:50	Xiao-Wei Chen	**Chongqing Institute for Brain and Intelligence, China** A novel thalamocortical circuit for sound processing
12:00-13:30	Luncheon	Non-Student Personnels: 5F Buffet Restaurant Students: Lunch at Ocean Hall
	Poster Session	Posters are displayed at Main Lecture Hall
13:10-13:25	Workshop	**Transcend Vivoscope Complete Solutions for in vivo Imaging** Presented by: Dan Li
13:30-14:10	Song-Hai Shi	**Tsinghua University, China** Primary ciliary PKA activity regulates animal stress in the prefrontal cortex
14:10-14:50	Denis Jabaudon	**University of Geneva, Switzerland** Neuronal trajectories in space and time
14:50-15:15	Jia-Yi Zhang	**Fudan University, China** Image-forming vision restoration and decoding
15:15-15:30		**Tea Break 15min** (Venue: Outside Main Lecture Hall)
15:30-16:10	Jackie Schiller	**Technion Medical School, Israel** Cell type dependent computations and learning in primary motor cortex
16:10-16:50	Yu-Long Li	**Peking University, China** Spying on Neuromodulator Dynamics In Vivo by Constructing Multi-Color Genetically-Encoded Sensors
16:50-17:05		**Tea Break 15min** (Venue: Outside Main Lecture Hall)
17:05-17:45	Alan Cheng	**Stanford University, USA** Regeneration of the mammalian inner ear-a balancing act
17:45-18:10	Ning-Long Xu	**Institute of Neuroscience (CEBSIT), Chinese Academy of Sciences** Dendritic computation for flexible decision-making

Day 3 (October 28, Monday, 2024)		
Time	**Speaker**	**Affiliation & Title**
08:30-09:10	Thomas McHugh	**RIKEN Center for Brain Science, Japan** Understanding the Dynamics of Hippocmapal Memory
09:10-09:50	Tian Xue	**University of Science and Technology of China** Light and Life – Neuronal Mechanisms of Image-forming and Non-image-forming Vision
09:50-10:05	**Tea Break 15min** (Venue: Outside Main Lecture Hall)	
10:05-10:30	Chun Xu	**Institute of Neuroscience (CEBSIT), Chinese Academy of Sciences** Target pattern-dependent emotional processing in hippocampal circuits
10:30-11:10	Xiao-Ke Chen	**Stanford University, USA** Circuitry and molecular mechanisms for chronic mechanical pain
Time	**Program**	**Details**
11:10-11:30	Poster Award	**Awards presented by Symposium Advisory Board**
	Closing Remark	**Shu-Min Duan**, Academician Zhejiang University, China/ Shanghai Jiaotong University, China
12:00-13:30	Luncheon	Non-Student Personnels: 5F Buffet Restaurant Students: Lunch at Ocean Hall

1st Chang Hsiang-Tung Brain Science Symposium

INVITED SPEAKERS

Richard Tsien

New York University

Tsien's laboratory is studying how the location and identity of presynaptic calcium channels is regulated. Voltage-gated Ca^{2+} channels provide the critical link between the firing of a presynaptic nerve terminal and its release of neurotransmitter. The Ca^{2+} channels must be positioned very close to sites of vesicle fusion, and come in diverse forms with distinct activity-dependence, responsiveness to GABA, dopamine, acetylcholine and other neuromodulators, and susceptibility to neurological disorders such as migraine, ataxia or dystonia. Our working hypothesis involves molecular "slots" for particular types of channels. Slots regulate the mix of channel types and also help explain how defective channels might displace normal ones in genetically dominant disorders.

Title: Control of E/I ratio by Circuit and Lipid Signaling Mechanisms

Qiu-Fu Ma

Westlake University

Professor Qiufu Ma received his bachelor's degree from Fudan University in 1987 and his Ph.D. degree from UCLA in 1994. From 1994 to 1998, he completed postdoctoral training，first at Bristol-Myers Spoor and then at Caltech. In early 1999, he became an assistant professor at Dana-Farber Cancer Institute and Department of Neurobiology, Harvard Medical School. He became a full professor in 2011. Dr. Ma was a CUSBEA student in 1988 and a Pew Scholar in 2000. In the fall of 2022, he joined Westlake University as a Chair Professor and as the director for the Center of Bioelectronic Medicine.

Titlle: A neuroanatomical basis for electroacupuncture to modulate inflammation and pain

Abstract:

Acupuncture at specific body regions can distantly modulate body physiology. Since the 1970s, researchers from Japan, Germany, and China have discovered that this long-distant acupuncture effect partially operates through somatosensory-autonomic reflexes. For example, we and others found that low-intensity electroacupuncture (EA) at limb-region acupoints, such as "Zusanli", could drive the vagal-adrenal reflexes and attenuate systemic inflammation induced by bacterial endotoxins. We then identified a group of sensory neurons necessary for EA to drive this anti-inflammatory axis. Based on the projections of these sensory nerves to tissues, we can predict effective and non-effective body regions. Most recently, we found that high-intensity EA is needed to attenuate post-surgery pain, likely via driving a different somatosensory-autonomic pathway. These findings offer neuroanatomical support for EA to modulate inflammation and pain.

Ole Kiehn

University of Copenhagen

Ole Kiehn is a Professor in Integrative Neuroscience at the Department of Neuroscience, University of Copenhagen, and a Professor in Neurophysiology at the Department of Neuroscience, Karolinska Institutet. Ole Kiehn earned his medical degree from the University of Copenhagen and his Doctorate of Science from the same institution. He conducted his postdoctoral work at Cornell University before returning to the University of Copenhagen as a group leader. In 2001, he was recruited to Karolinska Institutet, where he became a professor in 2004. Since 2016, he has held a position as a professor at the University of Copenhagen.

Kiehn's research focuses on understanding the molecular, cellular, and functional organization of motor circuitries in mammals. This work links motor circuit organization to behavior and demonstrates translational potential in the development of therapies for movement disorders caused by trauma or disease. He is an elected member of Academia Europaea, EMBO, the Royal Swedish Academy of Science, and The Danish Academy of Sciences and Letters. His research has been recognized with numerous honors including the Brain Prize 2022.

Title: Unraveling Brainstem Circuits for Movement: Insights into Motor Control and Implications for Treatment of Movement Disorders

Abstract:

Movement is the output of almost all brain functions. Among movement, locomotion is one of the most fundamental and universal to animals and humans. Locomotion is organised at many levels of the nervous system, with brainstem circuits acting as the gate between brain areas regulating innate, emotional, or motivational locomotion and the executing spinal motor circuits. To be executed, locomotion requires dynamic initiation and termination and appropriate directionally. This lecture will focus on recent advances that have elucidated the functional organisation of brainstem command circuits in mammals needed to perform these roles. The lecture will also show how these brainstem circuits are linked to selection of movement in widespread brain networks implicated in diverse brain functions and how locomotor disturbances following e.g. basal ganglia disorders may be alleviated by targeted activation of brainstem command pathways.

Naoshige Uchida

Harvard University

Naoshige Uchida is a professor at the Center for Brain Science and Department of Molecular and Cellular Biology at Harvard University. He received his Ph.D. from Kyoto University in Japan, where he worked on the molecular mechanism of synaptic adhesions done in Masatoshi Takeichi's laboratory. He first began studying olfactory coding in Kensaku Mori's laboratory at the Brain Science Institute, RIKEN, Japan. He then joined Zachary F. Mainen's laboratory at Cold Spring Harbor Laboratory, New York, where he developed psychophysical olfactory decision tasks in rodents. He started his laboratory at Harvard University in 2006. His current research focuses on the neurobiology of decision-making and learning, including neural computation in the midbrain dopamine system, functions of the cortico-basal ganglia circuit, foraging decisions and motor learning. His research combines quantitative rodent behaviors with multi-neuronal recordings, two-photon microscopy, computational modeling, and modern tools such as optogenetics and viral neural circuit tracing.

Title: The neural mechanisms for reinforcement learning in the brain

Timothy Behrens

University of Oxford

Timothy Behrens heads the Computational Neuroscience Group at WIN and study how our brains learn and represent knowledge about the world in service of flexible behaviour. Use computational descriptions at the behavioural network levels to form predictions, and test these in neurophysiological, neurochemical, and computational descriptions at the behavioural and network levels to form predictions, and test these in neurophysiological, neurochemical, and lesion data.

Title: A cellular basis for mapping behavioural structure.

Li-Ping Wang

Institute of Neuroscience (CEBSIT),
Chinese Academy of Sciences

Dr. Wang received his B.S. in Biology from East China Normal University (ECNU) Shanghai in 2003. From 2003 to 2009, he was in a joint PhD program between Johns Hopkins University and ECNU and received his Ph.D. in Cognitive Neuroscience from ECNU in 2008. He then did his first postdoctoral work at the University of Tokyo in Japan, and got his second postdoc training in INSERM NeuroSpin Institute in France. Wang joined the Institute of Neuroscience full time in 2016 as Investigator and Head of the Laboratory of Comparative Psychobiology. His main interests are the neural mechanisms underlying sequential learning, working memory and bodily self-consciousness.

Title: The control of sequence working memory in macaque frontal cortex

Abstract:

One of the most intriguing puzzles in cognitive neuroscience is understanding the neural mechanisms behind mental operations. How the brain mentally sorts a series of items in a specific order within working memory (WM) remains largely unknown. We investigated mental sorting using high-throughput electrophysiological recordings in the frontal cortex of macaque monkeys, who memorized and sorted spatial sequences in forward or backward orders according to visual cues. We discovered that items at each ordinal rank in WM were encoded in separate rank-WM subspaces and then, depending on cues, were maintained or reordered between the subspaces, accompanied by two extra temporary subspaces in two operation steps. Furthermore, the cue activity served as an indexical signal to trigger sorting processes. Thus, we propose a complete conceptual framework, where the neural landscape transitions in frontal neural states underlie the symbolic system for mental programming of sequence WM.

Zhen Liu

Institute of Neuroscience (CEBSIT),
Chinese Academy of Sciences

Dr. Zhen Liu is the head of the Laboratory of Reproductive Engineering in Primates. He graduated from Shandong Normal University with a B.S. degree in Biotechnology (2010) and received his Ph.D. degree in Neuroscience from the Institute of Neuroscience (ION), Chinese Academy of Sciences in 2017. After completing Ph.D., he continued postdoctoral research with Muming Poo and Qiang Sun in the Institute of Neuroscience (2017-2018). Dr. Liu joined ION as a Principal Investigator in September 2018.

Title: Genetic approaches in generating monkey models for brain study

Abstract:

Gene-modified models play crucial roles in the study of brain development, function and disease. However, gene-modified monkey model has not been widely used in brain study. In this report, I will make an introduction about different genetic approaches in generating gene-modified monkey models for brain study. Then, I will focus on introducing our recent study of monkey chimera using embryonic stem cells. Embryonic stem cell chimera has been widely used for generating gene-modified mouse model. However, monkey chimera generation using embryonic stem cell has not been well established. Here, we have systematically tested various culture conditions for establishing monkey naive embryonic stem cells (ESCs) and optimized the procedures for chimeric embryo culture. This approach generated an aborted fetus and a live chimeric monkey with high donor cell contribution. A stringent characterization pipeline demonstrated that donor cells efficiently (up to 90%) incorporated into various tissues (including the gonads and placenta) of the chimeric monkeys. Our chimeric monkey study has major implications for the study of primate naive pluripotency and genetic engineering of non-human primates.

Matthew Larkum

Humboldt University of Berlin

Prof. Matthew Larkum, Ph.D. He focuses on the processing of feedforward and feedback information in the cortex, in particular the contribution of active dendritic properties to the computational power of neocortical pyramidal neurons.

Recent topics include:

Cellular basis for interhemispheric inhibition in the cerebral cortex
Effect of fetal alcohol syndrome on dendritic processing
Dendritic spikes in the tuft and basal dendrites of neocortical pyramidal neurons
Inhibitory control of cortical microcircuits
Affects of common anesthetics on single-cell computation in the cortex
Development of state-of-the-art optical approaches for studying cortical dendritic activity

Title: Chang's vision: blooming and bearing fruit

Takaki Komiyama

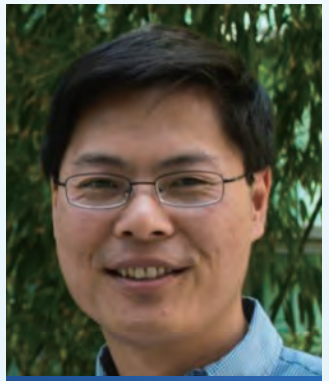
University of California, San Diego

Dr. Takaki Komiyama is a Professor of Neurobiology and Neurosciences at UC San Diego. Dr. Komiyama received his bachelor's degree at the University of Tokyo followed by his PhD at Stanford University under the guidance of Prof. Liqun Luo. He then conducted his postdoctoral research with Dr. Karel Svoboda at the Janelia Research Campus. Dr. Komiyama joined the faculty of UC San Diego in 2010. He applies cutting-edge circuit dissection tools to uncover neural circuit mechanisms underlying flexible behaviors.

Title: Motor cortex circuits for learned movements

Abstract:

My lab has been studying the mechanisms by which the motor cortex contributes to motor learning. I will share three of our latest, unpublished sets of results. First, I will present evidence that precise, learned activity patterns in the primary motor cortex (M1) is causally related to the generation of learned movements. By two-photon optogenetic stimulation combined with two-photon calcium imaging, we find that the learned activity pattern in M1 can drive learned movements when artificially induced. Further, an appropriate preparatory network state in M1 and a precise input to M1 are both critical for generating the learned activity. Second, I will describe how the inputs from the thalamus are critical for initiating the dynamics in the motor cortex to execute learned movements. Third, I will describe the synaptic plasticity rules that these neurons employ to generate the learned circuit within M1.

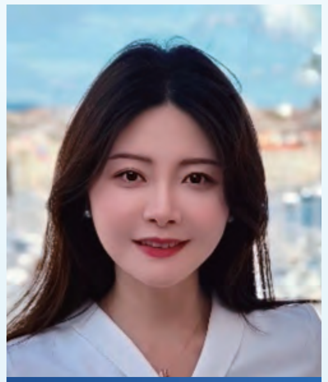


Michael Lin

Stanford University

Dr. Michael Z. Lin is a professor of Stanford University. He received an A.B. summa cum laude in Biochemistry (Harvard). After PhD training in biochemistry and neurobiology with Michael Greenberg at Harvard Medical School, Dr. Lin received his MD from UCLA, then performed postdoctoral research in protein engineering with Chemistry Nobel Laureate Roger Y. Tsien at UCSD. Dr. Lin is a recipient of a Burroughs Wellcome Career Award for Medical Scientists, a Rita Allen Scholar Award, a Damon Runyon-Rachleff Innovation Award, and a NIH Pioneer Award.

Title: Imaging neuronal computations in space and time with new voltage indicators



Yi Du

Institut e of Psychology,
Chinese Academy of Sciences

Professor Yi Du is the PI of the Lab of Auditory, Speech, and Music at the Institute of Psychology, Chinese Academy of Sciences. She received her B.S. from Peking University Health Science Center in 2005 and Ph.D. in Psychology from Peking University in 2011. From 2012-2015, she worked as a postdoc fellow at University of Toronto (Rotman Research Institute) and McGill University (Montreal Neurological Institute). Through the integration of psychophysics, neuroimaging (fMRI, MEG and EEG) and neuromodulation (TMS and tES) techniques, her research delves into the cognitive neural mechanisms underlying speech and music processing, with particular interest in 1) speech perception and comprehension; 2) musical training experience-related plasticity; and 3) musical perception and reward. She has published papers in high-profile journals, including Nature Communications, Science Advances, PNAS, Neuroimage, Journal of Neuroscience, and Neuroscience & Biobehavioral Reviews. Her research is supported by National Natural Science Foundation of China for Outstanding Young Scholars and Scientific and Technological Innovation 2030 Major Project.

Title: Processing of hierarchical structure and reward in music: Insights from neuroimaging and eye movements

Yang Dan

University of California, Berkeley

Professor Yang Dan's research aims to elucidate (1) how visual information is encoded and processed in the mammalian brain, and (2) how neural circuits are shaped by visual experience. Her Lab use a multidisciplinary approach combining computational analyses and experimental studies at multiple levels, from single neurons and dendrites to animal behavior.

Title: The how and why of sleep

Abstract:

Sleep is a fundamental biological process, and its disruption has profound impacts on human health. To identify neurons involved in sleep generation, we have performed whole-brain screening for sleep active and sleep promoting neurons, using a combination of optogenetics, electrophysiology, imaging, and gene expression profiling. We found that sleep is controlled by a highly distributed network spanning the forebrain, midbrain, and hindbrain, and the sleep neurons are part of the central somatic and autonomic motor circuits. This is summarized in a "motor theory of sleep control". To address the "why" question, we propose a "catecholamine hypothesis", in which inactivation of catecholamine signaling may be a basic process underlying how sleep interacts with the cardiovascular, immune, and neuroendocrine systems.

Tadashi Isa

Kyoto University

Tadashi Isa graduated from the Faculty of Medicine, the University of Tokyo in 1985 and obtained PhD from the University of Tokyo on the brainstem control of eye and head movements in cats in 1989. He worked as a visiting scientist in the University of Göteborg in Sweden, under Professor Anders Lundberg from 1988 to 1990, on the descending control of hand and arm movements in cats. Then, he returned to Japan and became an assistant professor in the Institute for Brain Research in the University of Tokyo and continued his studies on the eye and head movement control. Then, he switched his target to molecular level of studies and worked on the molecular physiology of AMPA type glutamate receptors as a lecturer and associate professor in Gunma University in 1993-1995. He was then appointed to be a professor of the National Institute for Physiological Sciences in 1996. There he switched back to the system neuroscience studies, particularly on the neural mechanism of recovery of hand movements following the spinal cord injury and mechanism of eye movements and cognitive functions following the lesion of the primary visual cortex, that is, the animal model of blindsight. More recently, he is studying the neural mechanism of decision making in macaque monkeys using the state-of-art circuit mamipulation techniques including those developed by his own laboratory.

Title: Roles of mesolimbic and mesofrontal dopaminergic pathway for motor recovery and decision making

Abstract:

Dopaminergic neurons in the ventral tegmental area (VTA) project to the striatum including the nucleus accumbens (NAc) and many cortical areas and are considered to regulate motivation and a variety of cognitive functions. Here, I talk about our recent studies on the functions of these mesolimbic and mesocortical dopaminergic pathways. First, our group found that NAc plays a critical role on the motor recovery after the spinal cord injuries (SCI)(Sawada et al. Science, 2015). NAc is considered not to be involved directly in the control of movements, but after it starts to activate the motor cortices and gets involved in the direct control of hand movements through activation of the motor cortex. These results may open up a new strategy for enhancing the effects of neurorehabilitation.

Second, we found that selective blockade of the pathway from VTA to NAc impaired effort-based decision for the monkeys to get larger amount of reward by waiting long for its delivery, rather than the reward based reinforcement learning (Vancraeyenest et al. Neuron, 2020). Furthermore, more recently, we found that the mesocortical pathway from VTA to the lateral-ventral portion of the area6 (area 6V) is involved in the control of decision making involving risk-based decision making which might require higher level of computation. Selective optogenetic activation of the VTA to the ventral portion of area 6V (area 6VV) enhanced high risk-high return (HH) preference, while stimulation of the VTA to the dorsal aspect of area 6V (area 6VD) reduced the HH preference. Moreover, repeated stimulation of the VTA-6VV and VTA-area 6VD chronically enhanced and reduced the HH preference, respectively (Sasaki et al. Science, 2024). These results may reveal the neuronal mechanisms underlying addiction such as gambling disorders.

Arnold R. Kriegstein

University of California, San Francisco

Dr. Kriegstein received BA from Yale University and his MD and PhD degrees from New York University in 1977 where his thesis advisor was Dr. Eric Kandel. He subsequently completed Residency training in Neurology at the Brigham and Women's Hospital, Children's Hospital, and Beth Israel Hospital in Boston. He has held academic appointments at Stanford University, Yale University, and Columbia University. In 2004 he joined the Neurology Department at the University of California, San Francisco. He is currently the John Bowes Distinguished Professor in Stem Cell and Tissue Biology and Founding Director of the Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research at UCSF. Dr. Kriegstein's own research focuses on the way in which neural stem and progenitor cells in the embryonic brain produce neurons, and ways in which this information can be used for cell based therapies to treat diseases of the nervous system. His lab found that radial glial cells are neuronal stem cells in the developing brain, and also identified a second type of precursor cell produced by radial glial cells that is responsible for generating specific neuronal subtypes. He has recently begun to characterize the progenitor cells within the developing human brain, to determine the genetic profiles of specific progenitor populations, and to explore how these cells contribute to the huge expansion of neuron number that characterizes human cerebral cortex.

Title: Genomic Insights into Early Human Brain Development, Evolution, and Disease

Abstract:

The human cerebral cortex is more than three times expanded compared to our closest non-human primate relatives. The cortex emerges from an initially pseudostratified neuroepithelium that gives rise to radial glia, the neural stem cells of the cortex. A number of subtypes of radial glia have been identified, and single cell RNA sequencing (scRNAseq) has contributed to a novel model of primate corticogenesis, highlighted human-specific features of cortical development, suggested a relationship between oRG cells and brain tumors, and provided a benchmark for in vitro organoid models of brain development and disease. Recently, we conducted paired RNA sequencing and ATAC-seq on single nuclei derived from multiple regions and age groups of the developing human neocortex. In addition, spatial transcriptomic analysis was utilized to reveal cellular niches and cell-cell communication. These datasets have enabled the construction of a multi-omic atlas of the human neocortex across different developmental stages at single-cell resolution. The results illuminate molecular and cellular dynamics of the developing human neocortex, including cellular composition, spatial organization, intercellular signaling, gene regulatory networks, lineage potential, and disease susceptibility, highlighting novel progenitor cell lineages and shedding light on mechanisms of glioblastoma and neuropsychiatric disorders.

Timothy Buschman

Princeton University

Timothy Buschman Ph.D., Massachusetts Institute of Technology.At the center of intelligent, rational, behavior is executive control – our ability to internally guide our actions towards a goal. My laboratory's research aims to understand how the brain accomplishes such control. It is becoming increasingly clear that complex, cognitive, behaviors arise through the interactions between many brain regions. In particular, three brain regions are at the center of executive control -- prefrontal cortex, parietal cortex, and the basal ganglia. The goal of my laboratory is to understand the roles of these brain regions in executive control and how complex behavior arises through their interactions with each other and with the rest of the brain.

To pursue this line of research our lab takes a multidisciplinary approach utilizing cutting-edge techniques in both non-human primate and rodent models. We begin by designing behavioral tasks that isolate particular cognitive functions underlying executive control. We then combine these tasks with large-scale, multiple-electrode electrophysiology and optogenetic control of neural circuits. Large-scale, multiple-electrode electrophysiology allows us to record from hundreds of neurons simultaneously, providing understanding of the network level mechanisms underlying complex, cognitive behaviors. Specific circuit-level mechanisms are then tested using the precise spatial, temporal, and cell-type-specific control afforded by optogenetics.

Through this combination of techniques our lab is able to gain insight into the functions that are fundamental to the highest forms of cognition. Leveraging this basic understanding, we hope to begin to understand (and eventually treat) the disruption of executive control in neuropsychiatric diseases, such as autism and schizophrenia, and neurodegenerative diseases, such as Parkinson's.

Title: The geometry of cognitive flexibility

Abstract:

Humans and animals are remarkably good at multi-tasking: we quickly learn many different tasks and flexibly switch between them. Theoretical work suggests such cognitive flexibility requires representing the current task and then using this task representation to selectively engage in task-relevant computations. In this talk, I will discuss recent research from my lab aimed at understanding the neural mechanisms underlying cognitive flexibility. In particular, how tasks are represented in the brain, how new task representations can be learned, and how the brain can flexibly switch between multiple tasks.

Xiao-Wei Chen

Chongqing Institute for Brain and Intelligence

Xiaowei Chen, Ph. D., Professor. He obtained his Bachelor's degree in Clinical Medicine and Master's degree in Neurobiology at the Third Military Medical University in 2004 and 2007, respectively. In 2011, he obtained his Ph.D. degree in neuroscience at the Technical University of Munich in Germany and then conducted postdoctoral research there. Since 2013, Dr. Chen has been a junior professor at the Third Military Medical University. Since 2023, he has been the Director/Professor at the Chongqing Institute for Brain and Intelligence. Since 2014, he has also been a member of the Brain and Intelligence Advanced Innovation Center at the Chinese Academy of Sciences. Dr. Chen has made contributions to understanding of cortical functions and memory, and has published over 80 papers in scientific journals.

Title: A novel thalamocortical circuit for sound processing

Song-Hai Shi

Tsinghua University

Songhai Shi, Ph. D., professor of Tsinghua University. His Labortory's research focuses on identifying the common commodities of neocortical circuits at both the structural and functional levels, and linking them with animal behaviors, with the ultimate goal of arriving at a circuit-and system-level understanding of neocortical operation and function under normal and disease conditions.

Title: Primary ciliary PKA activity regulates animal stress in the prefrontal cortex

Abstract:

New Cornerstone Science Laboratory, IDG/McGovern Institute of Brain Research, Tsinghua-Peking Centre for Life Sciences, Beijing Frontier Research Center for Biological Structure, School of Life Sciences, Tsinghua University, Beijing, P.R. China

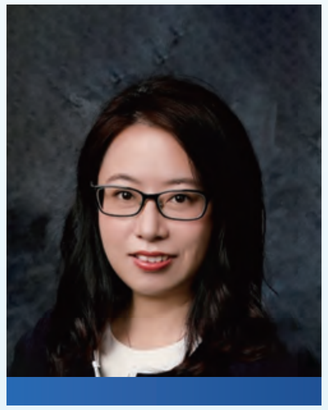
Primary cilia are special cellular antennae emanating from vertebrate cell surface to sense and transduce extracellular signals intracellularly to regulate cell behavior and function. However, their signal sensing and physiological function in neocortical neurons remain largely unclear. In this study, we show that, in response to various animal stressors, neuronal primary cilia in the mouse prefrontal cortex (PFC) exhibit a consistent axonemal elongation. Selective removal of excitatory neuron primary cilia in the prefrontal, but not sensory, cortex leads to a reduction in animal stress. Moreover, treatment of corticosterone, the major stress hormone, elicits an increase in primary ciliary cAMP level in PFC excitatory neurons and a primary cilium-dependent decrease in neuronal excitability. Furthermore, suppression of primary ciliary protein kinase A (PKA) activity in PFC excitatory neurons results in a decrease in animal stress. Together, these results suggest that excitatory neurons in PFC sense and regulate animal stress via primary ciliary cAMP/PKA signaling.

Denis Jabaudon

University of Geneva

Professor Denis Jabaudon's research interests are in studying the genetic mechanisms that control cortical neuron circuit assembly during development. Specifically, work in his laboratory is aimed at identifying the gene expression programs that enable distinct subtypes of thalamic and neocortical neurons to assemble into modality-specific circuits, and understanding how sensory experience regulates these differentiation programs during development. The approaches his laboratory uses to address these questions include in vivo genetic gain-and-loss of function approaches, including in utero electroporation; structural and functional analysis of transgenic mice, and electrophysiology. His lab have recently demonstrated functionally critical reciprocal interactions between developmental gene expression programs and circuit formation, and trust that in the long term these processes could be used to direct the recruitment of developmental mechanisms to repair abnormal or lesioned circuits.

Title : Neuronal trajectories in space and time



Jia-Yi Zhang

Fudan University

Dr. Jiayi Zhang received her B. Sc. Degree from Hong Kong Baptist University and Ph.D. degree from Brown University. She was a Brown-Coxe postdoctoral fellow in Yale University and joined Institutes of Brain Science at Fudan University in 2012. Her recent work focused on the decoding and restoration of vision. Her work was published in journals including Nature Biomedical Engineering, Neuron, Advanced Materials and Nature Communications. She received the Young Innovative Woman Award in Shanghai in 2020. She serves as the Vice chairman of the Neurotechnology Panel, Chinese Neuroscience Society (CNS). She is on the editorial board of Progress in Retina and Eye Research.

Title: Image-forming vision restoration and decoding

Abstract:

Photoreceptors in the retina are fundamental units of light perception and play a key role in vision, the most important sense for human being, by turning light signals into electrical activities of these cells. Vision loss could be induced in some retinal diseases simply by damage/degeneration of photoreceptors, even though the neural circuitries in the rest parts of the retina and visual centers remain functional. Photoreceptor diseases are exemplified by Retinitis Pigmentosa (RP, 370,000 patients in China) and Age-related Macular Degeneration (AMD, 30,000,000 patients in China).

In experimental RP mice model, she succeeded in restoring some visual functions, as demonstrated by a variety of electrophysiological and behavioral tests, by implanting titania nanowire arrays as artificial photoreceptors. These studies, designed and conducted through weaving technologies and concepts from physical and biological sciences, achieving a spatial resolution of 77.5 μm and a temporal resolution of 3.92 Hz. In photoreceptor-damaged monkeys, the arrays, which were implanted and remained stable for 54 weeks, allowed for the detection of a 10-μW mm-2 beam of light. These artificial photoreceptors are now being tested in human clinical trials, with several lines of promising evidence indicating partial restoration of blind person's vision.

The talk will also touch upon visual information decoding in the visual cortex.

Jackie Schiller

Technion Medical School

Professor Jackie Schiller is the Lily and Silvian Marcus Chair in Life Science, head of the Department of Neuroscience in the Technion's Ruth and Bruce Rappaport Faculty of Medicine, and director of the Allen and Jewel Prince Center for Neurodegenerative Disorders of the Brain. She is also affiliated with the Russell Berrie Nanotechnology Institute.

Title:Cell type dependent computations and learning in primary motor cortex

Yu-Long Li

Peking University

Yulong Li is a professor at Peking University and a New Cornerstone Investigator. Dr. Li received his bachelor's degree from Peking University and Ph.D. degree from Duke University. He took postdoctoral training at Stanford University. After that, he started his lab at Peking University in 2012. Now his lab is focusing on developing advanced imaging probes to untangle the complexity of nervous system in space and in time. Capitalizing on the advancement of research toolkits, he also studied the regulation of synaptic transmission, focusing on the modulation of presynaptic transmitter release in health and disease conditions. Specifically, he developed a non-invasive system "Paris" for opto-genetic mapping of electric synapses, and a toolbox of genetically-encoded sensors (GRAB sensors) for imaging neurotransmitters/ modulators. Dr. Li is awarded the National Science Fund for Distinguished Young Scholars, National Award for Excellence in Innovation, the "XPLORER PRIZE" by Tencent Foundation, CNS-CST Outstanding Neuroscientist Award, PKU & Boehringer-Ingelheim Faculty Research Award and so on. See more details on the Lab website: http://yulonglilab.org/

Title: Spying on Neuromodulator Dynamics In Vivo by Constructing Multi-Color Genetically-Encoded Sensors

Alan Cheng

Stanford University

Dr. Alan Cheng has been a physician-scientist investigator in the Department of Otolaryngology-Head and Neck Surgery at Stanford University for over 15 years. He is Edward and Amy Sewall Professor, director of the Stanford Clinician Scientist Training Program and chief of the division of Pediatric Otolaryngology. Dr. Cheng pursued his residency training in Department of Otolaryngology-Head and Neck Surgery at University of Washington. During residency, he undertook a two-year NIH-sponsored research fellowship investigating mechanisms of hair cell degeneration under the mentorship of Edwin Rubel. After residency he sought fellowship training in pediatric otolaryngology in Children's Hospital Boston, Harvard Medical School.

At Stanford Dr. Cheng's research has focused on inner ear cell regeneration and aminoglycoside ototoxicity. His work has led to the discovery of Wnt-responsive hair cell progenitors in the mouse cochlear and vestibular organs. His most recent work has helped define mechanisms of vestibular hair cell regeneration in mice and humans.

Title: Regeneration of the mammalian inner ear-a balancing act

Abstract:

Sensory hair cells in the inner ear balance/vestibular organs serve to detect head rotation and gravity. The mammalian balance organs have a remarkable and modest ability to regenerate lost hair cells. Using fate-mapping approaches and single-cell RNA sequencing, my group has compared and contrasted the morphology and transcriptome of developing and regenerating hair cells in the mouse vestibular organ utricle. I will also share our gene therapy approaches to enhance the innate regenerative capacity in the mouse utricle. Lastly, I will present our work on characterizing the molecular features of the normal and damaged human utricle at the single-cell level.

Ning-Long Xu

Institute of Neuroscience (CEBSIT),
Chinese Academy of Sciences

Dr. Ning-long Xu is the Head of the Laboratory of Neural Basis of Perception. He received his B.S. degree in Bioengineering from Si Chuan University (1999) and his Ph.D. degree in Neurobiology from the Institute of Neuroscience, Chinese Academy of Sciences in 2006. After completing his Ph.D., Dr. Xu conducted postdoctoral research with Dr. Zach Mainen at the Cold Spring Harbor Laboratory (2006-2008) and with Dr. Jeff Magee at Howard Hughes Medical Institute, Janelia Research Campus (2008-2013). Dr. Xu joined ION as a Principal Investigator in August 2013, and was promoted as Senior Investigator in 2020. His research combines novel behavioral task designs with advanced neuronal imaging and circuit manipulation technologies to investigate neural circuit mechanisms underlying fundamental cognitive functions, including perception and decision-making.

Title: Dendritic computation for flexible decision-making

Thomas McHugh

RIKEN Centre for Brain Science

Thomas McHugh majored in molecular and cellular biology at the University of California, Berkeley, before moving to the Massachusetts Institute of Technology for a PhD in Biology. At MIT, he studied genetics and the physiology of spatial memory with Matt Wilson and Susumu Tonegawa and continued to study the circuits of hippocampal memory as part of his postdoctoral studies. In 2009, he moved to what is now known as the RIKEN Center for Brain Science to start his own laboratory. His lab at RIKEN takes a multidisciplinary approach to understanding how memories are formed, stored and recalled in the mammalian brain, and how damage from factors such as stress and disease impair these functions.

Over the last few decades experimental neuroscience has made tremendous progress defining the circuits in the mammalian brain required for memory, including the canonical circuits of the hippocampus responsible for episodic memory, as well as non-canonical circuits impinging on, and radiating from, the hippocampus which modulate these processes. Behavioral studies have shown that these regions are crucial for the formation of new episodic and contextual memories, as well as their consolidation, but how dynamic changes in the well-characterized neuronal activity in the hippocampus map on to these functions and the theories explaining them has remained difficult to address. In rodents, genetic techniques allow specific access to discrete populations of neurons, both within the hippocampus and in areas projecting to it, permitting the manipulation of neuronal transmission and plasticity on a variety of timescales. In my talk I will introduce how we combine these tools with behavior and in vivo recording to gain a greater understanding of how information is processed in the structure. I will highlight some of the lab's recent efforts, including experiments designed to understand the links between place cell activity and the encoding of memory, as well as work characterizing less-studied circuits that influence these computations.

Title: Understanding the Dynamics of Hippocmapal Memory

Tian Xue

University of Science and Technology of China

Professor Tian Xue was born in May 1977 in Xuzhou, Jiangsu Province, China. From 2005-2012, he worked as a postdoctoral fellow and assistant researcher at the University of California, Davis and Johns Hopkins University School of Medicine, U.S.A. He has been a professor at the University of Science and Technology of China (USTC) since 2012. He has been the executive dean of the College of Life Sciences (CLCS) from 2014 to 2020, and the Executive Dean of the Department of Life Science and Medicine (DLM) from 2018-2022. Member of the Party Committee of the University of Science and Technology of China (USTC) from 2019, Director of the Department of Teachers' Work of the Party Committee and the Department of Human Resources from 2020-2022, and Assistant to the President of USTC from January 2022.

Title: Light and Life – Neuronal Mechanisms of Image-forming and Non-image-forming Vision

Abstract:

Light sensation not only provides us with the image vision perceptions, but also regulates many physiological functions, collectively known as non-image-forming vision, such as circadian rhythm, pupillary reflex, arousal, mood. But the underline neural circuits, molecular and cellular mechanisms are still elusive. There are mainly three types of photoreceptors in the mammalian retina: rods and cones and intrinsically photosensitive retinal ganglion cells (ipRGCs). It is generally believed that rods and cones mediate image-forming vision, while ipRGCs mediate non-image-forming vision.

Previously, we discovered the neurophysiological mechanisms of light-at-night induced depression; cortical synaptogenesis promoted by light sensation during infanthood. Recently, our laboratory found that light can directly influence glucose metabolism independently of circadian rhythms. We identified a neural circuit: ipRGCs in retina→hypothalamus→brainstem→brown adipose tissue (BAT), which mediates light-induced decreases in glucose metabolism by inhibiting sympathetic nervous activity. Importantly, this phenomenon and mechanism also exist in human, which may explain the many public health observations of the linkage of night-time light pollution with metabolic disorders such as obesity and diabetes.

Furthermore, we surprisingly found that the non-image-forming photoreceptor ipRGCs improves image vision orientation selectivity of mouse layer 2/3 neurons in the primary visual cortex (V1). Interestingly, we found that specific activation of ipRGCs in human subjects by visual spectrum manipulation significantly enhances human discriminability of the visual orientation. This unpublished work reveals the so-called "non-image-forming photoreceptor" working together with rods and cones to process the cortical visual features and facilitate image recognition.

All together, these works revealed that the interaction between "light and life" is much more extensive and important than we generally understood.

Chun Xu

Institute of Neuroscience (CEBSIT),
Chinese Academy of Sciences

Dr. Chun XU is the head of the Laboratory of Neurobiology of Context and Behavior. He received Ph.D. in neurobiology from Institute of Neuroscience (ION), Chinese Academy of Sciences (CAS) in 2009. After his postdoc research with Andreas Luthi at FMI, Novartis in Switzerland, he established his own lab at Institute of Neuroscience, CAS in 2017. His research interest focuses on emotional memory and spatial cognition. His lab uses mouse and marmoset as animal models, combines behavioral analysis, neural circuit tracing, optogenetics, electrophysiology, Ca2+ imaging and VR technologies to study: (1) How intra-hippocampal circuit connects dorsal and ventral hippocampus, processes context information and regulate emotional memories. (2) Projectome-subtype specific emotional processing and memory in ventral hippocampus. (3) How 3D spatial information is processed in hippocampal formation in mouse and marmoset. (4) How hippocampal-prefrontal circuit regulates spatial memory in WT and AD mice. Recent work in his lab includes intersectional tools for cell-type specific imaging and manipulation (Nat Commun, 2022) and brain-wide single-neuron projectomes of the mouse hippocampus (Science, 2024).

Title: Target pattern-dependent emotional processing in hippocampal circuits

Abstract:

The ventral hippocampus is widely connected with brain areas in the thalamus, hypothalamus, amygdala and prefrontal cortex, and plays crucial roles in the emotional processing for rewards and punishments. By leveraging the power of single-neuron projectome analysis, he will present findings on the target pattern of distinct projectome cell types in the thalamo-hippocampal circuit, and specific functions of these cell types and circuits in the emotional processing including fear memory generalization.

Xiao-Ke Chen

Stanford University

Dr. Xiaoke Chen is an associate professor in the Department of Biology at Stanford University. He received his PhD in 2005 from the Institute of Neuroscience, Chinese Academy of Sciences. From 2006-2012, Xiaoke did his postdoctoral work with Dr. Charles Zuker in UC San Diego and Columbia University, where he studied the neurobiology of taste. Currently, his lab at Stanford is studying brain circuits underlying motivated behaviors and how maladaptive change in these circuits leads to chronic pain, addiction, and depression. His findings have been published in internationally renowned academic journals such as Nature, Science, and Nature Neuroscience.

Title: Circuitry and molecular mechanisms for chronic mechanical pain

Abstract:

Chronic mechanical pam, whether caused by inflammation or nerve iniury. is a debiWhile injury and inflammation typically originate in the periphery, there is growing evidence implicating thcentral pam modulation systems m the process of pam chronification, Nearly 40 vears ago. semtal work fronHoward Fields and colleagues established the essential role of the Periaqueductal Gray (PAG)-RostraVentromedial Medulla (RVM) system in descending pain modulation. However, the precise mechanism brwhich injury information is transmitted from the periphery to the PAG-RY system in the brainstem remainsumclear. Moreover, the role of the PAG in pain chronification is still debated, given that PAG electrostimulation tends to suppress rather than promote pain. In this talk, I will describe a multisynaptic circuiconnectimng peripheral imput from the spinal cord to the OPRM1+ RVM neurons, which, in turn, projectimng backto the spinal cord. Interestingly, PAG is not part of this closed-loop circuit. To the best of our knowledge, thisis the first study to fully describe a complete circuit, from end to end, that drives a major neurological disorder.

POSTER SESSIONS

Poster Presentation

- Poster exhibition area is located in the Main Lecture Hall.
- Presenters should stand in front of the poster board according to specified poster serial number and presentation time.
- Time of putting on posters: OCT 26, 8:00-12:00 for Noon Session, 14:00-18:10 for Night Session; OCT 27, 8:00-12:00 for Noon Session.
- Poster Presentation Time: OCT 26, Noon Session 12:00-13:30, Night Session 18:10-19:40; OCT 27, Noon Session 12:00-13:30.
- Dinner will be provided to participants for OCT 26 night session from 18:10-18:40, First come, first served.

Poster Size: 120cm(H)*90cm(L) or vertical

Posters shall be printed by presenters and shall be carried to the poster area to paste.
There will be volunteers to assist you on-site.
Please put your poster away when your poster presentation is over.

OCTOBER 26, Saturday, 2024, 12:00 - 13:30

Location	Name	Abstract Title
1	Tianlin Luo	Limited efficiency in switching relevant sensory dimensions during flexible perceptual decision making
2	Zhao Zeng	Primate caudate nucleus causally contributes to multisensory decision making with distinctive neural geometry
3	Shunhang Tang	Dynamic ensemble balance in direct- and indirect-pathway striatal projection neurons underlying decision-related action selection
4	Yufan Wang	Structural, gene expression and functional atlas of the central cholinergic system
5	Weihao Sheng	The Neural Mechanisms of the Ventral Intraparietal Area (VIP) in Multimodal Perception (Vestibular-Visual) Causal Inference
6	Xiao Xu	The posterior parietal cortex mediates decision bias towards rare rewards during probabilistic decision-making
7	Tianlin Luo	Opposing gradients between recognition and navigation along the hippocampal long axis of macaques
8	JiahaoWu	Graded encoding of task context and its generalization in prefrontal cortex during face categorization
9	Jie Du	Brain-wide neuronal computation for rule inference during flexible decision-making
10	Hangyu Si	Immediate versus Long-Term Gain: A Non-Human Primate Study on Multi-Step Value-Based Decision Making
11	Ningyu Zhang	Unraveling the neural circuit computation and implementation of Bayesian inference in mouse flexible decision-making
12	Han Zhang	Monkeys rapidly learn visual object categorization based on abstract concepts
13	Kai Zhang	Prefrontal chandelier cells encode stimulus salience to facilitate associative learning
14	Jianxiang Zhou	Frontal cortical circuit dynamics for sensorimotor associative learning
15	Henry Evrard	Functional & Comparative Neuroanatomy of Interoception
16	Xufeng Zhou	Single-unit fMRI mapping of dorsomedial posterior parietal neurons during viewing and incidental memory tasks
17	YanHuang	The Primate Retrosplenial Cortex Translates between Hippocampal World-centered and Parietal Self-centered Representations
18	Wenxin Yan	Disrupted spatial selectivity in the primate hippocampal-orbitofrontal circuit during navigation in virtual reality
19	Xuanlong Zhu	Whole cortex neural replay of temporal order memory triggered by inter- and intra-hippocampal ripples
20	Yuan Zhang	Dendritic computation for rule-based flexible categorization
21	Chenhuan Zhou	Spatiotemporal Patterning of Astrogenesis in Developing Mouse Cortex
22	Hui Zhang	Cell-cycle-G2-dependent Notch activation is responsible for multi-lineage segregation in the developing retina
23	Yinggang Gao	Neuronal representation of choice value in mouse lateral orbitofrontal cortex during value-based decision-making
24	Hengkun Ren	Roles of the secondary motor cortex in reaction time and motor timing
25	Mengya Zhang	Different states of working memory support flexible goal switching
26	Joern Alexander Quent	A gradient of spatial novelty and familiarity along the hippocampal long axis
27	Qihang Wu	Heterogeneity of inter-regional projections shapes neural dynamics synchronization
28	Somi Lee	Brain activity and mood changes by emotional movements in healthy and depressed individuals
29	Zeyu Wang	Spatially precise and chronically stable deep brain stimulation via a novel ultra-flexible microelectrode in a mouse model of Parkinson's disease
30	Hanbo Wang	Impairment in Reaction Time Behavior Learning Induced by Prelimbic Cortex Lesion or Inactivation

OCTOBER 26, Saturday, 2024, 18:10-19:40

Location	Name	Abstract Title
1	Bingyu Liu	Robustly decoding physical self-motion from hemodynamic signals in brain measured by functional ultrasound imaging
2	Kexin Qi	Immobility Induced by Raphe Activation is Not Equivalent to Sleep
3	Zhujun Shao	Stimulus representation in human frontal cortex supports flexible control in working memory
4	Dongping Shi	Generalization principles of working memory in human parietal cortex
5	Yuhan Jiang	Cognitive Map in an Ever-Changing Environment
6	Ruoxi Luo	Hippocampal theta-gamma phase amplitude coupling distinguish between narrative generation and memory recall
7	Kai Liu	Interaction of spatial and non-spatial cognitive maps in the primate hippocampal-prefrontal networks
8	Zhiyong Jin	Classical Rescorla-Wagner models on reversal learning can be enhanced by inclusion of a metacognitive index
9	Kai Gao	Latent space is also space: dCA1 response to continuous, non-perspective visual sequences
10	Shitong Zhao	Bayesian modeling reveals distinct internal distributions of prior information for perception and imagery
11	Yefeng Shao	Combining connectomics and in vivo functional imaging in virtual reality for dissecting visuomotor integration during soc
12	Zhiqian Zhu	Studies of marmoset vocal communication in a semi-natural environment
13	Zixiang Luo	A non-stationary mechanism of working memory through nonlinear decays in RNNs trained on cognitive tasks
14	Fuhai Wang	Distinct role of limbic gamma-band rhythms in contextual fear extinction memory processing
15	Qiantao Lv	Efficient spatiotemporally patterned multi-photon optogenetics for all-optical physiology in behaving animals
16	Yannong Dou	Single neuron projectome-guided analysis revealed the neural circuit mechanism underlying endogenous opioid antinociception
17	Yongchang Li	Distinct circuits and molecular targets of the paraventricular hypothalamus decode visceral and somatic pain
18	Fuchao Zhang	A Vagus Nerve Dominant Tetra-Synaptic Ascending Pathway for Gastric Pain Processing
19	Yamin Liu	The role of primate-specific BTN3A2 for the functional evolution of excitatory synapse
20	Le sun	Patterned locus coeruleus-norepinephrine neuron-pericyte coupling orchestrates brain-wide blood flow
21	Wenzhi Sun	Chronic Stress Reinforces the BLA-mPFC-LHb Neural Circuit Initiating Depression
22	Bingqing Zhao	From Space to Cognition: Dynamic Integration of Information in CA1 Neurons Shapes Cognitive Maps
23	Can Shi/Funing Li	Vertebrate whole-brain connectome with cell-type labeling
24	YouranYang	The retrosplenial cortex shows functional and projectional variance along longitudinal axis.
25	Cho Hyun Byun	A brain-wide interneuronal wireless network mediated by extracellular vesicle
26	Chengcong Feng	Dynamical structure shifts of mouse mesoscale spiking brain network predict causality of various brain regions in visual decision learning
27	Jin Zhao	A group of preoptic neurons involved in sleep regulation
28	Yixuan Li	Multisensory Integration in Taxis Behaviors of Caenorhabditis elegans
29	Heying Shan	Hierarchical attractor dynamics mediates Experience-dependent decision-making in larval zebrafish
30	Wenliang Lei	A NeuroD1 AAV-based gene therapy for functional brain repair in a nonhuman primate model with Alzheimer's disease-like pathology

OCTOBER 27, Sunday, 2024, 12:00-13:30

Location	Name	Abstract Title
1	Qingge Wu	Thalamo-hippocampal circuit mechanisms for contextual fear generalization
2	Ning Li	Target-pattern-dependent emotional processing of ventral hippocampal neurons
3	Lijun Chen	Laminar Organization of the Brain-Spinal Cord Communication
4	Yuting Wang	A neural circuit for pain hyperalgesia induced by acute sleep deprivation
5	Zhaonan Chen	Input-Neuron-Type-Specific Whole-Brain Input-Output Networks of Distinct Cholinergic Subtypes in the Basal Forebrain
6	Xiaobo Ma	Two fine-projection defined prefrontal pyramidal neurons sequentially contribute to the motivational control in goal-directed behavior
7	Chengyong Jiang	Parallel circuit in oculomotor nucleus to control eye movements and REM sleep
8	Jialiang Zu	Visually Responsive Pretectal Dopaminergic Neurons Modulate Prey Capture
9	Yuxi Li/Yiqing Yang	A new type of mesencephalic excitatory neurons sensing noxious chemicals to coordinate a defensive behavior
10	Sha Li	Complementary neural circuits coordinately mediate threat-induced sequential processes dynamically modulated by serotoninergic subsystems
11	Meiyu Zheng	A cellular-resolution sympathetic projectome of zebrafish
12	Mei Wang	Excitatory neuron fate is the default in an excitatory-inhibitory neural lineage
13	Lianyan Li	Developmental mechanisms govern the spatio-temporal pattern of human cortical folding
14	Yanan Li	Homophilic interaction of cell adhesion molecule 3 coordinates retina neuroepithelial cell proliferation
15	Yunming Gao	Large-scale functional imaging in virtual reality reveals distributed processing of audiomotor transformation for social communication
16	Yue Huang	Kinematic encoding characteristics and representational stability in the motor cortex
17	Mingchao Yan	Mechanism of Evolutionary Cortical Expansion Revealed by ASPM Knockout Microcephaly Macaque Model
18	Meixin Hu	AAV-mediated Stambp gene replacement therapy rescues neurological defects in a mouse model of microcephaly-capillary malformation syndrome
19	Ze Liu	The role of SETD1A in Schizophrenia Pathogenesis: Insights from Genetic, Cellular, and Animal Models
20	Zikang Li	Decoding Chronic Stress: From Behavioral-Molecular Dynamics in Mice to Clinical Implications of Cortisol and IL-17 in Depression Severity
21	Jiayu Cheng	Bidirectional hippocampal-cortical ripple dialogue during narrative generation and retrieval
22	Li Wan	Synaptopathological heterogeneity for ZARD-related intellectual disability
23	Huiwen Qin	Age-dependent glial heterogeneity and TBI responses in the zebrafish midbrain
24	Sorgog Uzeen	Investigating the role of Bglap3 in neuron excitability and spatial coding in the Medial Entorhinal Cortex
25	Mengmeng Jin	Fixed and live single cell RNA sequencing — FL-seq
26	Yuming Chai	All-optical interrogation of brain-wide activity in freely swimming larval zebrafish
27	Yiheng Wang	Bidirectional photovoltaic subretinal prosthesis with various pixel designs
28	Jiaming Cao	A role of the striatum in continuous control of action
29	Yaokai Yang	Mapping complex visuomotor transformations via 3D kinematics during agonistic social interactions
30	Jinxi Pan	A stable and broad frequency-selective auditory brainstem implant using penetrating ultra-flexible electrode arrays

ACKNOWLEDGEMENTS

On behalf of the Organizers, CEBSIT / ION wishes to thank all invited speakers and hosts who have accepted to contribute to the program. Also, thanks to the scientists who submitted Poster abstracts for presentation, thus contributing to this wonderful event of Chang Hsiang-Tung Brain Science Symposium in Shanghai.

Sponsors

Special Thanks to Transcend Vivoscope

中国科学院脑科学与智能技术卓越创新中心
CAS CENTER FOR EXCELLENCE IN BRAIN SCIENCE AND INTELLIGENCE TECHNOLOGY (CEBSIT)

Chang Hsiang-Tung Brain Science Symposium
Meeting Announcement

➤ **Basic Information (More info could be found at: www.ChangBrainForum.cn)**

Symposium Dates: October 26 - 28, 2024 (On-site Registration starts on OCT 25)

Venue: Shanghai Science Hall (57 Nanchang Road, Huangpu District, Shanghai)

➤ **Symposium Registration :**

Registration Type	Early-Bird (Before JUL 31)	Regular After 1st August, 2024
Student	￥800.00	￥1,300.00
Non-student	￥2,000.00	￥3,000.00
Corporation	￥4,000.00	￥6,000.00

Payment: Bank transfer and Alipay. Go to website to register online.

Cancellation: Full refund before July 31, 2024; 50% of the conference registration fee for cancellation between August 1 and September 31; no refund for cancellation on or after October 1, 2024

➤ **Hotel Reservation**

Accommodations are not included in the registration fee. Please refer to the website for a list of recommended hotels nearby.

➤ **Invoice Information**

This symposium provides participants with electronic invoice, which will be issued upon registration and payment. If you have any enquiries, please contact Anna via: <anna.bao@26decibel.com>

Organizing Committee of the First Chang Hsiang-Tung Brain Science Symposium

September 2nd, 2024

中国科学院脑科学与智能技术卓越创新中心
CAS CENTER FOR EXCELLENCE IN BRAIN SCIENCE AND INTELLIGENCE TECHNOLOGY (CEBSIT)

第一届张香桐脑科学研讨会
会　议　通　知

一、会议基本信息

会议主题：脑科学前沿科研进展和发展态势

会议时间：2024 年 10 月 26 日至 28 日（10 月 25 日报到）

会议地点：上海科学会堂（上海市黄浦区南昌路 47 号）

二、报名参会信息（请访问我们的官方网站 www.ChangBrainForum.cn 进行在线注册）

1. 注册费用

注册类型	早鸟价 7 月 31 日前	常规价 8 月 1 日后
学生	RMB 800.00	RMB 1,300.00
非学生	RMB 2,000.00	RMB 3,000.00
企业参会	RMB 4,000.00	RMB 6,000.00

2. 缴费方式：支持银行转账汇款和支付宝缴费（详见会议官网注册通道）。

3. 取消参会：2024 年 7 月 31 日前，全额退款；8 月 1 日-9 月 31 日取消参会，退 50%会议注册费；10 月 1 日及以后取消参会则概不退款。

*会场向注册参会者提供会议资料和午餐。

*研讨会报告人、受邀嘉宾均免注册费。

三、酒店预订：本次会议主办方不安排住宿，敬请自理。

四、发票相关：请询 Anna via: <anna.bao@26decibel.com>

第一届张香桐脑科学研讨会筹备委员会

2024 年 9 月 2 日

中国科学院脑科学与智能技术卓越创新中心办公室

1st Chang Hsiang-Tung Brain Science Symposium

TRANSCEND VIVOSCOPE

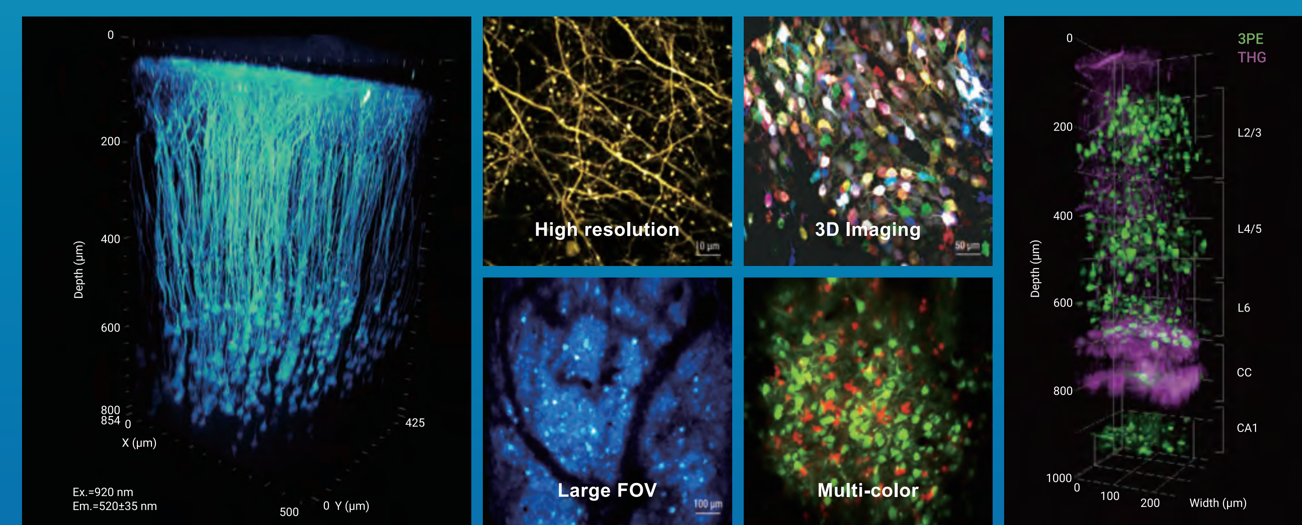
Transcend Vivoscope

Complete Solutions for in vivo Imaging

Speaker **Dan Li,Ph.D.**

Oct 26/27, 2024

13:10 15 Min



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TRANSPORTATION GUIDE

Shanghai Science Hall

Venue: 57 Nanchang Road, Huangpu District

01 Departure from: Shanghai Railway Station

Subway: Take Line 3 or Line 4 to Zhongshan Park Station, transfer to Line 2 towards Nanjing East Road Station, then transfer to Line 10 towards Xintiandi Station. Exit at Exit 4 and walk for about 10 minutes to reach the destination.

Taxi: The distance to the Science Hall is 5.3 kilometers, with an estimated travel time of about 30 minutes and a cost of approximately RMB 40.

02 Departure from: Hongqiao Railway Station/Hongqiao International Airport

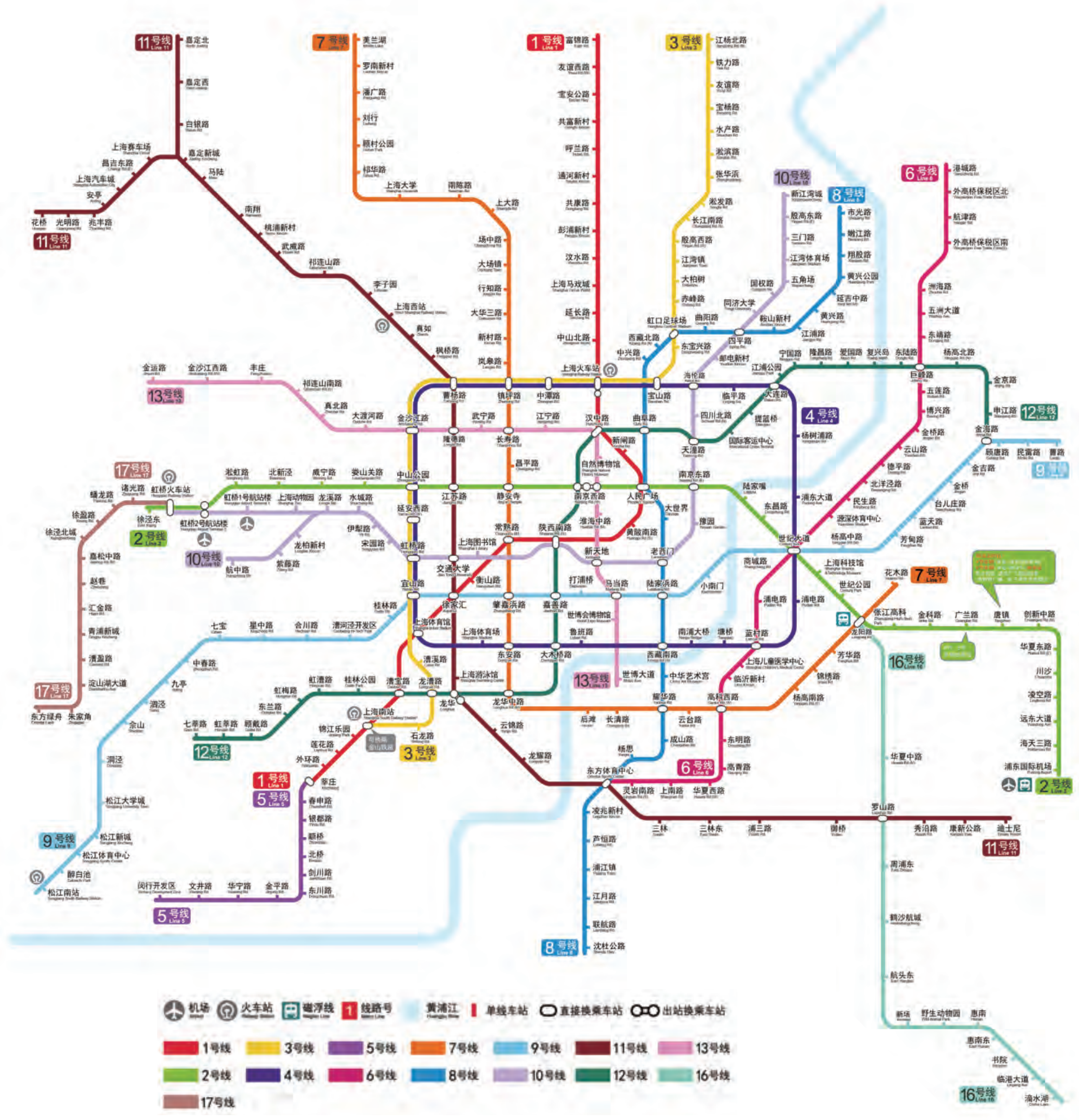
Subway: Take Line 2 to East Nanjing Road Station, then transfer to Line 10 towards Xintiandi Station. Exit at Exit 4 and walk for about 10 minutes to reach the destination.

Taxi: The distance to the Science Hall is 21 kilometers, with an estimated travel time of about 45 minutes and a cost of approximately RMB 80.

03 Departure from: Shanghai Pudong International Airport

Subway: Take the Maglev train to Longyang Road Station, or Line 2 to Nanjing East Road Station, then transfer to Line 10 towards Xintiandi Station. Exit at Exit 4 and walk for about 10 minutes to reach the destination.

Taxi: The distance to the Science Hall is 47 kilometers, with an estimated travel time of about 60 minutes and a cost of approximately RMB 180.



• Departure from: Hongqiao Railway Station, Hongqiao International Airport

Subway: Take Line 2 to East Nanjing Road Station, then transfer to Line 10 towards Xintiandi Station. Exit at Exit 4 and walk for about 10 minutes to reach the destination.

• Departure from: Shanghai Railway Station

Subway: Take Line 3 or Line 4 to Zhongshan Park Station, transfer to Line 2 towards Nanjing East Road Station, then transfer to Line 10 towards Xintiandi Station. Exit at Exit 4 and walk for about 10 minutes to reach the destination.

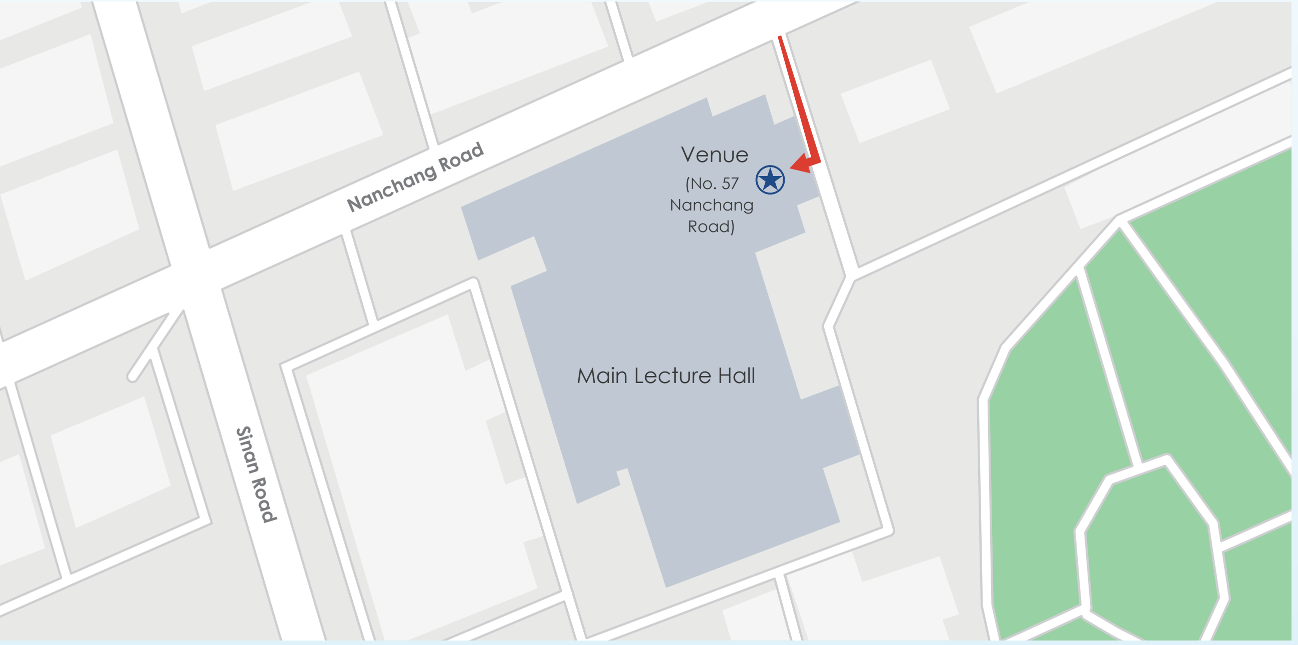
• Departure from: Shanghai Pudong International Airport

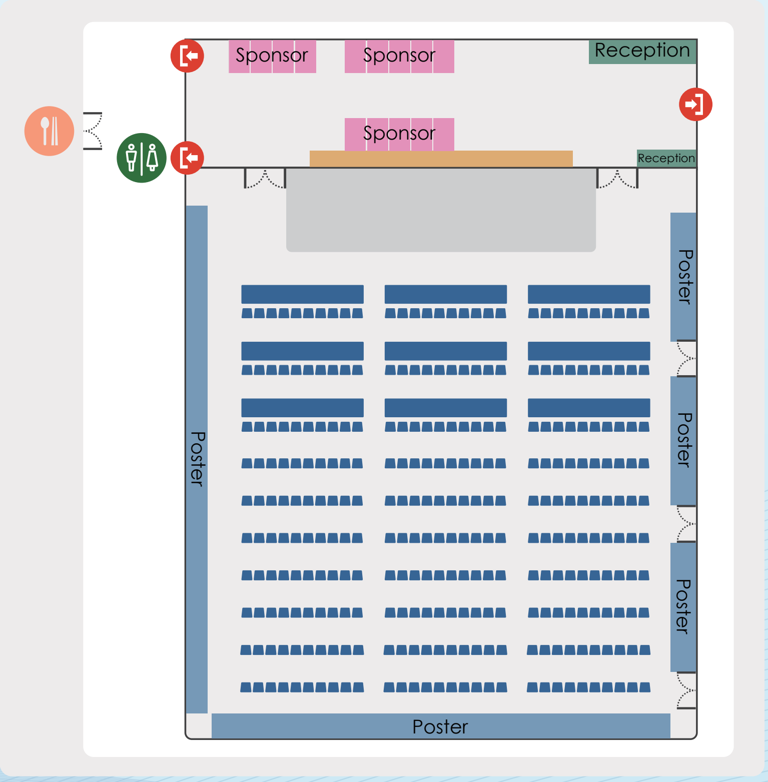
Subway: Take the Maglev train to Longyang Road Station, or Line 2 to Nanjing East Road Station, then transfer to Line 10 towards Xintiandi Station. Exit at Exit 4 and walk for about 10 minutes to reach the destination.

VENUE MAP

Shanghai Science Hall

Venue: 57 Nanchang Road, Huangpu District





Main Lecture Hall