

Focused Ultrasound Neuromodulation Conference 2025

July 9 - 11, 2025

The Hong Kong Polytechnic University, Hong Kong

PROGRAM BOOK

Presented by:



Hosted by:



THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學



DEPARTMENT OF
BIOMEDICAL ENGINEERING
生物醫學工程學系

Co-hosted by:



RESEARCH INSTITUTE FOR
SMART AGEING
智齡研究院

珠海市神经科学学会
Zhuhai Society
For Neuroscience

Official Sponsors of the 6th Focused Ultrasound Neuromodulation (FUN25) Conference

Presented by:



Hosted by:



Co-hosted by:



Platinum+



Platinum



Gold



Silver+



Silver



Table of Contents

◇ Welcome Message	1-2
◇ Organizing Committee	3
◇ Conference Information	4-6
◇ Location Map	7-8
◇ Industry Exhibition	9
◇ Sponsors' Information	10-13
◇ General Information of Hong Kong	14-15
◇ Program at a Glance	16-20
◇ Speakers	21-73
◇ Scientific Programs	74-91



Welcome Message

Message from the Conference General Chair

On behalf of the organizing committee, I am delighted to invite you to the 6th Focused Ultrasound Neuromodulation (FUN25) Conference, taking place from July 9th to 11th, 2025, at The Hong Kong Polytechnic University, Hong Kong. This year's conference is co-organized by the Zhuhai Society for Neuroscience and the Research Institute for Smart Ageing (RISA), and we are proud to present cutting-edge research on Transcranial Ultrasound Stimulation (TUS) in collaboration with iTRUSST, the International Transcranial Ultrasonic Stimulation Safety and Standards Consortium.

FUN25 will be held in a hybrid format, allowing for both in-person and remote participation via live Zoom access. We are particularly excited that this is the first time FUN25 is being hosted in Hong Kong, Asia, providing a unique opportunity for an enriching exchange of ideas and advancements in the field of ultrasound neuromodulation.

We are honored to welcome many renowned scientists from around the world who will share their expertise and insights. Besides, in-person poster presentations will enhance participants' experience and interaction with these leading researchers, and we will also introduce Best Poster Awards to encourage young researchers in the field.

We hope that all participants will engage fully in live discussions, collaborative opportunities, and networking events while immersing themselves in the vibrant atmosphere of Hong Kong.

Looking forward to seeing you at FUN25!



Prof. Lei SUN
Professor, Department of Biomedical Engineering
General Chair
The 6th Focused Ultrasound Neuromodulation (FUN25) Conference

Organizing Committee

Local Congress General Chair

Lei SUN The Hong Kong Polytechnic University

Organizing Committee Members

Zhihai QIU Guangdong Institute of Intelligence Science
and Technology

Hsin-Yi LAI Guangdong Institute of Intelligence Science
and Technology

Quanxiang XIAN The Hong Kong Polytechnic University

Yizhou JIANG The Hong Kong Polytechnic University

Jiejun ZHU Guangdong Institute of Intelligence Science
and Technology

Jiaru HE Guangdong Institute of Intelligence Science
and Technology

Jin YANG Guangdong Institute of Intelligence Science
and Technology

Conference Information

1. **Date and Venue**

Date: July 9-11, 2025 (Wednesday-Friday)
Venue: GH201, The Hong Kong Polytechnic University, Hung
Hom, Kowloon, Hong Kong

2. **Registration**

Registration counters are located outside GH201, Core G; and are open on:

July 8, 2025 (Tuesday) 2:00pm-5:50pm
July 9, 2025 (Wednesday) 8:00am-6:20pm
July 10, 2025 (Thursday) 8:00am-6:20pm
July 11, 2025 (Friday) 8:00am-5:30pm

Delegates with full registration are entitled to:

- Attend all scientific programs on July 9-11
- Opening Ceremony on July 9
- Closing Ceremony on July 11
- Congress Dinner on July 9
- Breakfasts on July 9-11*
- Lunches on July 9-11
- Coffee/Tea at morning and afternoon breaks on July 9-11
- Delegate's kit and all official publications
- Access to exhibition area

* *Limited availability, first-come, first-served*

3. **Name Badges**

Please put on name badges at all times for all sessions and social functions. Entry may be denied for people not wearing the badges.

4. **QR code for campus access**

Access to PolyU campus requires a QR code. All delegates would receive a system email 3 days prior the Conference. It is essential that delegates use the QR code to enter and exit the campus. The QR code will be rendered invalid for the subsequent day if it is not used for exiting the campus on the preceding day.

5. **Official Language**

The official language of the Conference is English. Some sessions may be delivered and conducted in Cantonese or Putonghua.

6. **Poster Presentation**

Poster zone is located at Podium, FG Wing throughout the Conference period.

7. **Best Poster Awards**

Prizes will be awarded to the best posters. Adjudicators will select the best papers from all the applicants' poster pitch presentations. Awards will be presented at the closing ceremony.

8. **Preview Service**

Oral presenters are required to preview their files or videos at least 2 hours before their sessions. The Preview Room is located at Room AG206.

9. **Breakfast, Lunch and Tea**

Meal coupons will be provided for breakfast and lunch. Lunch will be provided to all registered delegates, while breakfast will be available on a first-come, first-served basis with limited availability.

Coffee/Tea will be served outside AG206.

10. **Exhibition**

An exhibition of biomedical engineering products is held throughout the Conference period at Podium, FG Wing.

11. **Useful Telephone Numbers**

Police/Emergency	999
Congress Secretariat (during congress)	(852) 2766 7660
Harbour Plaza Metropolis Hotel	(852) 3160 6888
Hotel Icon	(852) 3400 1000

12. Disclaimer

Whilst every attempt will be made to ensure all aspects of the Conference mentioned in the booklet will take place as scheduled, the Organizing Committee reserves the right to make last minute changes should the need arise.

13. Wireless Access via ' Wi-Fi.HK via PolyU '

PolyU provides free Wi-Fi service to the public and visitors on campus. Visitors can enjoy free Wi-Fi service by selecting the WiFi SSID (Service Set Identifier) of 'Wi-Fi.HK via PolyU'. After accepting the terms and conditions, users can use the service for two hours, after which they have to accept the terms again to continue using the service.

The Hong Kong Polytechnic University

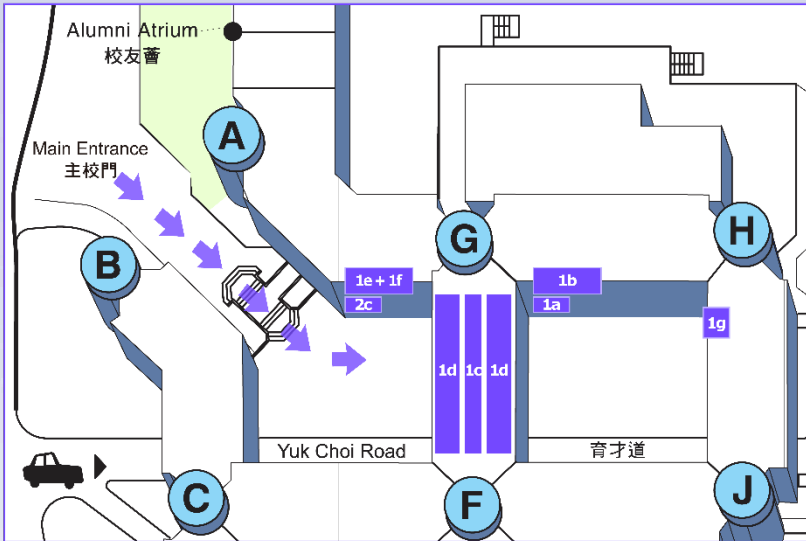
Main Venues of FUN25



Breakfast/ Lunch at U GARDEN 花園樓
 July 9-11, 2025
 8:00-9:00am, 12:30-2:00pm

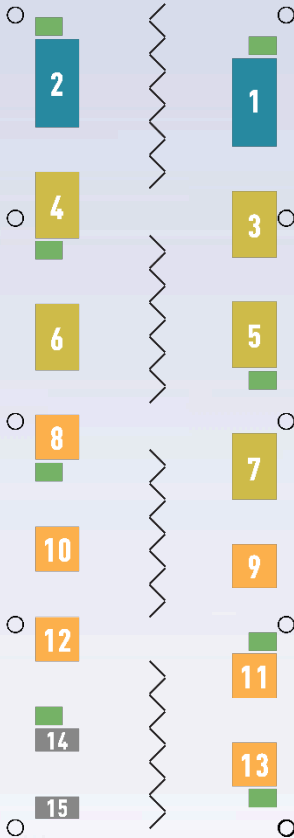
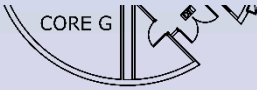
Congress Dinner at U.GREEN
 July 9, 2025
 6:30-9:30pm

Main Venues of FUN25



- | | | |
|----|--------------------------|---------------------------------|
| 1a | Registration/Secretariat | Podium, Core G |
| 1b | Scientific Programs | Room GH201 |
| 1c | Poster Display | Podium, FG Wing |
| 1d | Exhibitions | Podium, FG Wing |
| 1e | Preview Room | Room AG206 |
| 1f | Storage | Room AG206 |
| 1g | Office | Room HJ203 |
| 2a | Breakfast/Lunch | U Garden, Podium, DE Wing |
| 2b | Congress Dinner | U.GREEN, 5/F, Communal Building |
| 2c | Tea | Podium, Core G |

Exhibitions at Podium, FG Wing



- 1 Research Institute for Smart Ageing (RISA), The Hong Kong Polytechnic University
- 2 Zhuhai Society for Neuroscience
- 3 Brainbox Ltd / Sonic Concepts, Inc.
- 4 Siansonic Technology Limited
- 5 Transcend Vivoscope Bio-Technology Co., Ltd.
- 6 Rogue Research Inc.
- 7 Openwater
- 8 Focused Ultrasound Foundation
- 9 Shenzhen Hyus Meditec Co., Ltd.
- 10 Localite GmbH
- 11 RWD Life Science Co., Ltd.
- 12 CITRUS project
- 13 Deep Brain Technology Co., Ltd (Hengqin)
- 14 Brain Case (Shenzhen) Biotechnology Co., Ltd
- 15 SXULTRASONIC GROUP

Co-organizer (booths 1-2)

**Research Institute for Smart Ageing (RISA),
The Hong Kong Polytechnic University**

GH042, The Hong Kong Polytechnic University, Hung Hom, Kowloon,
Hong Kong

☎ +852 3400 3530

✉ risa@polyu.edu.hk

🌐 www.polyu.edu.hk/risa

Zhuhai Society for Neuroscience

Building 6, 2515 North Huandao Road, Hengqin Guangdong-Macao
In-Depth Cooperation Zone, Zhuhai , Guangdong, China

☎ 0756-2898999

✉ huangxiaoxia@gdiist.cn

Platinum+

Tianqiao and Chrissy Chen Institute

303 Twin Dolphin Drive, #6054 Redwood City, CA 94065, United
States

☎ contactus@cheninstitute.org

🌐 www.cheninstitute.org

Platinum (booths 3-7)

Brainbox Ltd

6, Museum Place, Cardiff, CF10
3BG, United Kingdom

☎ +44 (0)29 2022 9998

✉ info@brainbox-neuro.com

🌐 <https://brainbox-neuro.com>

/ Sonic Concepts, Inc.

18916 North Creek Parkway,
Suite 115, Bothell, Washington
98011, USA

(425) 485-2564

✉ info@sonicconcepts.com

🌐 <https://sonicconcepts.com>

Siansonic Technology Limited

No.1, Xingguang 5th Street, Opto-Mechatronics Industrial Base,
Tongzhou Park, Zhongguan Village Technology Park, 101111
Beijing, China

☎ +86 1081502288

✉ info@siansonic.com

🌐 www.siansonic.com

Transcend Vivoscope Bio-Technology Co., Ltd.

B2-1, Building 16, Treehouse, 73 Tanmi Road, Jiang Bei Xin Qu
District, Nanjing, Jiangsu, China

☎ +86 25 5889 5768

✉ info@tvscope.cn

🌐 www.tv-scope.com

Rogue Research Inc.

300-6666 rue Saint-Urbain, Montréal, Québec, H2S 3H1, Canada

☎ +1-514-284-3888

✉ info@rogue-research.com

🌐 www.rogue-research.com

Openwater

733 Front Street, Suite C1, San Francisco, CA, 94111, United States

🌐 www.openwater.cc

✉ community@openwater.health

Gold (booths 8-13)

Focused Ultrasound Foundation

1230 Cedars Court, Suite 206, Charlottesville, VA 22901,
United States

☎ 434.220.4993

✉ info@fusfoundation.org

🌐 www.fusfoundation.org

Shenzhen Hyus Meditec Co., Ltd.

12F, Building D3, Nanshan Zhiyuan Phase II, Xueyuan Avenue
1001, Shenzhen, China

☎ +86-0755-26418805

✉ info@hyusmeditec.com

🌐 <http://hyusmeditec.com>

Localite GmbH

Auguststraße 1, 53229 Bonn, Germany

☎ +49 228 41012220

✉ sales@localite.de

🌐 www.localite.de

RWD Life Science Co., Ltd.

9, 19-20/F, Building 7A, 9F Building 7D, Shenzhen
International Innovation Valley, Dashi 1st Road, Nanshan
District, Shenzhen, Guangdong, China

☎ +86 13544541583

✉ rwd@rwdstco.com

🌐 <https://www.rwdstco.com>

CITRUS project

c/o Medical University of Vienna
Spitalgasse 23, 1090 Vienna, Austria

☎ +4369917231820

✉ christian.windischberger@meduniwien.ac.at

🌐 <https://project-citrus.eu>

Deep Brain Technology Co., Ltd (Hengqin)

Office 3717-1, 128 Xingsheng 1st Road, Hengqin, Zhuhai, China

☎ +86 13540808567

✉ 13540808567@163.com

🌐 <http://deep--brain.com>

Silver+ (booths 14-15)

Brain Case (Shenzhen) Biotechnology Co., Ltd

Building A, Mingzhu Campus, Shenzhen University of
Technology, Xinhua Street, Guangming District, Shenzhen City,
Guangdong Province, China

☎ +86 18971215294

✉ BD@ebraincase.com

🌐 www.ebraincase.com

SXULTRASONIC GROUP

Room 2405 Tower B, Excellent City Phase II, 126 Zhongkang
Road, Shang Mei Lin Futian, Shenzhen, 518000, China

☎ (+86 755) 2399 5130

✉ inquiry@sxultrasonic.com

🌐 www.sxultrasonic.com

Silver

NaviFUS Corporation

16F., No. 508, Sec. 7, Zhongxiao E. Rd., Nangang Dist., Taipei City
115011, Taiwan

☎ +886-2-2586-0560

✉ info@navifus.com

🌐 <https://navifus.com>

General Information of Hong Kong

1. **Climate**

Hot, humid and sunny, with occasional showers and thunderstorms. The temperature can exceed 31°C but high humidity levels can make it feel even hotter.

2. **Language**

English is the language of international business, while Cantonese is the territory's local language. Street signs, menus, tourist and government publications are bilingual.

3. **Payment Methods**

Most international credit cards, such as American Express, VISA, and MasterCard, are accepted at hotels, shops, and restaurants in Hong Kong. Some stores also accept the mobile payments like Apple Pay, Google Pay, Alipay, and WeChat Pay. You can find out which payment methods are accepted by checking the signs displayed at the entrance or cash register.

There are still some shops and restaurants in Hong Kong that only accept cash or Octopus cards, so it is recommended that you visit a currency exchange to obtain enough cash before venturing out. Alternatively, you can purchase or rent an Octopus card, or download the tourist version of the Octopus app to your mobile phone. Using an Octopus card or app will not only make it easy for you to use public transportation, but also enable you to make purchases at convenience stores, supermarkets, and restaurants with just a simple tap.

4. **Stay Connected: Apps, SIM, Wi-Fi**

Staying connected and accessing the help you need have never been easier or faster. Tons of advice and helpful hints are available from travel apps and easily downloadable guidebooks. Getting a local sim card and finding Wi-Fi hotspots are super simple in the city.

5. **Transport**

Hong Kong is geographically compact and boasts one of the world's most efficient, safe, affordable and frequent public transport systems. Networks of double-decker buses and taxis operate territory-wide.

The underground Mass Transit Railway (MTR) covers all major districts in the territory, and includes stops at the boundary with Mainland China (Lo Wu and Lok Ma Chau).

If you buy an Octopus card on arrival at the Hong Kong International Airport, you can immediately put it to good use on the Airport Express, which forms part of Hong Kong's MTR network. The Airport Express takes you from the airport to Central in only 24 minutes - and it also gives you a free interchange on the MTR, which means you can jump on a train to your final destination without paying for that second leg.

Besides, Hong Kong's taxis are efficient with a HK\$29 (around USD3.7 or CNY26.5) flag-fall.

And for those looking for a mode of travel that has been used for decades, there are the Star Ferries and Hong Kong Island's Street Trams.

July 9, 2025 (Wednesday)

Time	Event
08:00-08:30	Registration & Breakfast (U Garden)
08:30-09:00	Opening Ceremony (GH201)
09:00-09:30	Plenary Talk (GH201) <i>Hairong ZHENG - Acoustic Cell Engineering: manipulation and neuromodulation</i>
09:30-09:50	Invited Talk (GH201) <i>Samuel PICHARDO - Tremor reduction using a multi-focus transcranial ultrasound stimulation method targeting the thalamus: Preliminary results</i>
09:50-10:10	Invited Talk (GH201) <i>Li Min CHEN - MRI-guided focused ultrasound neuromodulation of deep brain regions and its clinical translation</i>
10:10-10:30	Invited Talk (GH201) <i>Nima KHALIGHINEJAD - Recording and stimulating the serotonergic system in the primate brain</i>
10:30-11:00	Break & Discussion (GH201)
11:00-11:30	Plenary Talk (GH201) <i>Shy SHOHAM - Deconstructing the complexity of cortical circuit stimulation by transcranial ultrasound</i>
11:30-11:50	Invited Talk (GH201) <i>Hong CHEN - Advancing Sonogenetics: From Engineered Ion Channels to Neural Circuit Dissection and Therapeutic Applications</i>
11:50-12:10	Invited Talk (GH201) <i>Zhihai QIU - Functional ultrasound imaging and neuromodulation at developmental stage</i>

July 9, 2025 (Wednesday)

Time	Event
12:10-12:30	Invited Talk (GH201) <i>Marcus KAISER - FUN++: Towards personalised, closed-loop, and at-home ultrasound neuromodulation</i>
12:30-14:00	Lunch (U Garden) & Posters (Podium, FG Wing)
14:00-14:30	Plenary Talk (GH201) <i>Elisa E. KONOFAGOU - Displacement-guided Neuromodulation of the Brain and Peripheral Nerves Towards Pain Treatment using Focused Ultrasound</i>
14:30-14:50	Invited Talk (GH201) <i>Hao-Li LIU - Navigation-Guided Focused Ultrasound and Its Central Nervous System Applications</i>
14:50-15:30	Short Talks (GH201)
15:30-16:00	Break & Discussion (GH201)
16:00-16:30	Plenary Talk (GH201) <i>Elsa FOURAGNAN - Improving decision-making and learning with ultrasound neuromodulation</i>
16:30-16:50	Invited Talk (GH201) <i>Charlotte LUFF - Optimized focused ultrasound for non-invasive modulation of neural activity and behavior</i>
16:50-17:30	Short Talks (GH201)
17:30-18:30	Posters (Podium, FG Wing)
18:30-21:30	Congress Banquet (U GREEN)

July 10, 2025 (Thursday)

Time	Event
08:00-09:00	Registration & Breakfast (U Garden)
09:00-09:30	Plenary Talk (GH201) <i>Jean-François AUBRY - Promises and challenges of personalized transcranial ultrasound stimulation of the fiber tracts</i>
09:30-09:50	Invited Talk (GH201) <i>Chen YANG - Non-genetic High precision Photoacoustic Neural Stimulation</i>
09:50-10:10	Invited Talk (GH201) <i>Andreas HERRMANN - Mechanochemical Polymer Systems enable the Activation of Drugs, Proteins and Nucleic Acids by Ultrasound</i>
10:10-10:30	Invited Talk (GH201) <i>Quanxiang XIAN - Advanced Sonogenetic approaches for Neural Modulation</i>
10:30-11:00	Break & Discussion (GH201)
11:00-12:30	Poster Pitch (GH201)
12:30-14:00	Lunch (U Garden) & Posters (Podium, FG Wing)
14:00-14:30	Plenary Talk (GH201) <i>Robert CHEN - Transcranial Ultrasound Stimulation for Parkinson's Disease and Movement Disorders</i>
14:30-14:50	Invited Talk (GH201) <i>Til Ole BERGMANN - Optimizing target exposure and assessing proof of neural target engagement for transcranial ultrasonic stimulation (TUS) in humans</i>

July 10, 2025 (Thursday)

Time	Event
14:50-15:30	Short Talks (GH201)
15:30-16:10	Break & Discussion (GH201)
16:10-16:30	Invited Talk (GH201) <i>Hyungmin KIM - Precision Targeting in tFUS: From Image-Guided Navigation to AI-Driven Simulation</i>
16:30-16:50	Invited Talk (GH201) <i>Bradley TREEBY - Bridging the Gap: Translational Challenges and Opportunities in Focused Ultrasound Neuromodulation</i>
16:50-17:30	Short Talks (GH201)
17:30-18:30	Posters (Podium, FG Wing)

July 11, 2025 (Friday)

Time	Event
08:00-09:00	Registration & Breakfast (U Garden)
09:00-09:30	Plenary Talk (GH201) <i>Jürgen GÖTZ - Neuromodulatory effects of low-intensity ultrasound in amyloidosis and implications for treatment strategies in Alzheimer's disease</i>
09:30-09:50	Invited Talk (GH201) <i>Rongcai JIANG - Low-intensity pulsed ultrasound elevates blood pressure for shock</i>
09:50-10:30	Short Talks (GH201)
10:30-11:00	Break & Discussion (GH201)
11:00-11:30	Plenary Talk (GH201) <i>Kullervo HYNYNEN - Precise focused ultrasound neuromodulation - Sunnybrook experience</i>
11:30-11:50	Invited Talk (GH201) <i>Masafumi SHIMOJO - Ultrasound neuromodulation of cortical neurons via the activation of TRPC6 channels</i>
11:50-12:30	Short Talks (GH201)
12:30-13:00	Closing Ceremony (GH201)
13:00-14:00	Lunch (U Garden)
14:00-18:00	Education Sessions (GH201) <ol style="list-style-type: none"> 1. How to conduct an investigator-initiated clinical trial of ultrasound neuromodulation 2. Measuring neural transmitter release during ultrasound neuromodulation 3. DIY an ultrasound neuromodulation set-up 4. Imaging neural activity using mini-2P system

**Plenary Talk:****Acoustic Cell Engineering: manipulation and neuromodulation**

Date: 09 Jul 2025 (Wed)

Time: 9:00am-9:30am

Speaker Prof. Hairong Zheng, Ph.D.
Vice president
Nanjing UniversityAbout the Speaker

Hairong Zheng received his Ph.D degree in mechanical engineering from the University of Colorado at Boulder in 2006. He then joined the University of California, Davis, initially as a postdoctoral fellow, before becoming a project scientist in the Department of Biomedical Engineering. Currently, Dr. Zheng is an academician at the Chinese Academy of Sciences, serves as Vice President of Nanjing University. His research primarily focuses on medical imaging technology and instrumentation systems, with a particular emphasis on MRI and biomedical ultrasound. Dr. Zheng is the recipient of the National Science Fund for Distinguished Young Scholars and has led several major scientific research projects. Additionally, he holds the position of director at the National Innovation Center for Advanced Medical Devices, is a member of the National Manufacturing Powerhouse Strategy Advisory Committee, and acts as a vice-chairman of the Chinese Society for Biomedical Engineering. For his contributions, Dr. Zheng has been honored with the National Science and Technology Progress First Class Award.

Abstract

Cell engineering focuses on applying physical and engineering principles to understand and control cell behavior, offering unlimited potential in exploring human development and enhancing our understanding of complex biological systems. Among the innovations in this field, acoustic tweezers are gaining attention as a non-contact method capable of manipulating cells in a controlled manner. This presentation will first introduce recent advancements in acoustic tweezers, emphasizing complex and arbitrary wave fields. We will also discuss some biomedical applications related to acoustic tweezers, including cell separation, sonoporation, and fusion. Intriguingly, acoustic tweezers can activate mechanosensitive ion channels and then precisely control the excitability of neurons, apply ultrasound stimulation to specific nuclei, and control certain specific sensations and behaviors of organisms. Lastly, we will explore the future development prospects of high-frequency acoustic non-invasive brain-computer interfaces is prospected.



Tremor reduction using a multi-focus transcranial ultrasound stimulation method targeting the thalamus: Preliminary results

Date: 09 Jul 2025 (Wed)

Time: 09:30am – 09:50am

Speaker: Prof. Samuel Pichardo, Ph.D.

University of Calgary

About the Speaker

Samuel Pichardo obtained his Ph.D. in Imaging and Systems in 2005 from the INSA-Lyon, France, while conducting his research at the INSERM LabTau laboratory. From 2006 to 2008, he worked as a Postdoctoral fellow at Sunnybrook Research Institute and from 2008 to 2017, Samuel worked as a scientist in the Thunder Bay Regional Health Research Institute and was an adjunct professor at Lakehead University. He joined the University of Calgary in 2017, and he is currently an Associate Professor in the Departments of Radiology and Clinical Neurosciences, Cumming School of Medicine, and as a member of the Hotchkiss Brain Institute. His area of research concentrates in the exploration of Focused Ultrasound (FUs) as a non-invasive method for the characterization of neurological functions and the treatment of brain disorders. His research activities include numerical studies for sound propagation through the skull, characterization of transcranial ultrasound propagation, development of new ultrasound technology, new Magnetic Resonance-guided techniques for the targeting and monitoring of FUs, and clinical translation of FUs applications.

Abstract

Background. Transcranial ultrasound stimulation (TUS) is a non-invasive technique that focuses mechanical energy deep in the brain to modulate neural activity. However, targeting errors due to neuronavigation tracking imperfections can hinder TUS effectiveness, especially with deep brain targets. This study reports a multi-focus TUS strategy to target thalamus for tremor reduction in patients with essential (ET) and Parkinson's tremor (PD).

Methods. Fourteen patients (9 ET, 6 PD) underwent TUS targeting the ventrointermediate (Vim) using a 128-element phased array operating at 250 kHz in an open label study. TUS was first delivered at 7 locations arranged in a circular disc pattern with inhibitory parameters (100 Hz pulse repetition frequency, 10% duty cycle, intensity at situ of 10 W/cm², initially 30 s durations). BabelBrain software was used for planning the TUS delivery using subject 1 mm-isotropic T1- and T2-weighted MR imaging and diffusion tensor imaging (DTI) for tractography of the dentato-rubro-thalamo-cortical tract (DRTT) to identify its termination in Vim thalamus. Skull effects in ultrasound propagation were considered using CT (0.45 mm-pixel resolution, 0.63 mm-slice thickness, 120 kVp, 170 mA, BONEPLUS kernel) or pseudo-CT imaging derived from 1mm-isotropic Zero Echo Time MR imaging. The tremor was measured using accelerometry before and after stimulation (0 min and 5 min). The 7 locations were split into two groups, and the group showing the most tremor reduction was further explored with individual location targeting with 2 min sonications.

Results. Figure 1 shows the experimental setup, sonication strategies, patient workflow, simulation of acoustic fields and summary of accelerometer readouts. TUS inhibitory protocol reduced tremor in 9 (ET=6, PD=3) /14 patients. The mean reduction (in dB scale, +/- s.d.) compared between the last accelerometer measurement to baseline was -11.1 (+/- 8) dB and $p=0.0012$ (Wilcoxon signed rank test, 2-tailed). When considering only ET patients ($n=9$), the mean reduction was -14 (+/- 8.5) dB and $p=0.004$. When considering only PD patients ($n=6$), the mean reduction was -6 (+/- 7.7) dB and $p=0.312$. The ability to focus

around the Vim target with 15 mm axial coverage provided flexibility for multiple focusing. The procedure was well tolerated (took ~2h) with no side effects. However, cumulative effects made the selection of optimal targets challenging.

Conclusions. Multi-focus TUS improved targeting by identifying optimal stimulation locations, enhancing tremor reduction compared to baseline and over time. Because tremor seemed to remain suppressed after initial sonications, it suggests that there may be a cumulative effect of TUS. A major limitation is that this is open-label; future work will execute a sham-controlled, blinded protocol. Nevertheless, these initial findings are encouraging to justify new studies on TUS on movement disorders indications such as ET and PD.

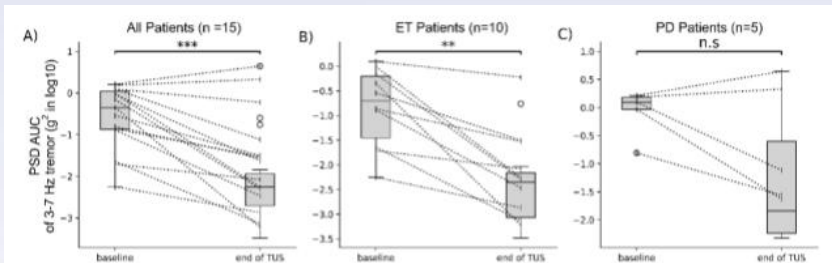


Figure 1: A, B and C represent baseline and end of TUS accelerometry data of the tremor for A) all 15 participants



MRI-guided focused ultrasound neuromodulation of deep brain regions and its clinical translation

Date: 09 Jul 2025 (Wed)

Time: 09:50am – 10:10am

Speaker: Prof. Li Min Chen, M.D., Ph.D.

Vanderbilt University

About the Speaker

Li Min Chen, MD, PhD, is a neuroscientist by training who completed a prestigious Brown-Coxe Postdoctoral Fellowship at Yale University School of Medicine before joining the faculty at Vanderbilt in 2003, where she is now a tenured professor. Dr. Chen is an expert in functional and multiparametric MRI, and she has extensively studied pain and sensorimotor functions in preclinical models. Her research primarily focuses on uncovering the neural mechanisms underlying pain and touch, exploring the role of neural plasticity in functional and behavioral recovery following spinal cord injury (SCI), and developing innovative therapies aimed at pain relief and enhancing recovery in individuals affected by SCI. Dr. Chen's lab adopts a multidisciplinary approach, incorporating advanced methods such as MRI, in vivo electrophysiology, tract tracing histology, and cutting-edge neuromodulation techniques, including electrical, optogenetic, and transcranial-focused ultrasound approaches, to investigate brain function and dissect brain circuits. For the past eight years, Dr. Chen has collaborated with Dr. Charles Caskey on developing an MR-guided focused ultrasound neuromodulation system for chronic pain relief. Dr. Chen is actively involved in several professional organizations, including the Society for Neuroscience, the International Society for Magnetic Resonance in Medicine, the International Association for the Study of Pain, and the Organization for Human Brain Mapping.

Abstract

Focused ultrasound (FUS) has emerged as a powerful noninvasive neuromodulation tool with immense therapeutic potential for neurological and mental disorders. Researchers are leveraging the unique capability to precisely focus ultrasound energy at the millimeter scale beyond the skull and into deep brain structures, an unmatched advantage compared to other noninvasive neuromodulation techniques. When combined with magnetic resonance imaging (MRI), focused ultrasound beams can be accurately guided in real-time using MR acoustic radiation force imaging (MR-ARFI). Additionally, functional MRI (fMRI) allows for monitoring and visualization of target engagement and neuromodulatory effects at the network level. This talk will delve into collaborative work at the Vanderbilt University Institute of Imaging Science (VUIIS), focusing on developing systems for image-guided FUS neuromodulation within the MRI environment, with capabilities for single or multi-site targeting, demonstrating robust neuromodulation of FUS on deep brain regions and associated neural networks implicated in pain perception, as evidenced by fMRI and intracranial electrophysiology recordings. Furthermore, the safety of repeated FUS exposure over time is simultaneously monitored using advanced parametric MRI metrics. I will present preclinical data demonstrating that MRI-guided FUS can precisely target specific brain regions, inducing downstream activations in remote areas within the neural circuitry and creating lasting neuromodulatory effects. Finally, I will introduce our ongoing efforts to translate these capabilities into clinical practice, particularly emphasizing the implementation of advanced spiral MR-ARFI techniques and the development of a human MR-guided FUS (MRgFUS) system. By harnessing the full neuromodulatory potential of ultrasound, we aim to establish it as a novel, noninvasive tool to interact with and modulate brain function, opening new avenues for therapeutic interventions for a variety of neurological and mental health disorders.



Recording and stimulating the serotonergic system in the primate brain

Date: 09 Jul 2025 (Wed)

Time: 10:10am – 10:30am

Speaker: Dr. Nima Khalighinejad, MD, PhD

University of Oxford

About the Speaker

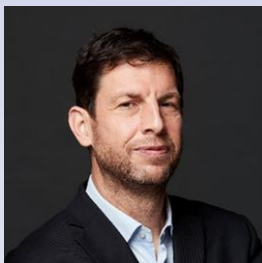
Nima Khalighinejad is a Research Fellow in the Department of Experimental Psychology at the University of Oxford. He studied medicine before completing an MSc in Neuroscience and a PhD in Cognitive Neuroscience at UCL, where he investigated voluntary action in humans. In 2017, he joined Prof. Matthew Rushworth's lab at Oxford as a postdoctoral researcher, using transcranial ultrasound to study the causal role of primate brain activity in decision-making. Since 2021, he has been an independent research fellow at the Department of Experimental Psychology and the Wellcome Centre for Integrative Neuroimaging. In autumn 2025, he will establish his own research group at Oxford, exploring the role of neuromodulatory systems in cognition and behaviour in both humans and non-human primates.

Abstract

Serotonin is a key neuromodulator in the brain. However, its role in cognition and behaviour remains unclear. This is because we lack appropriate methods for causal manipulation of the neuromodulatory systems in primates.

In the first half of this talk, I will present a combination of minimally invasive functional magnetic resonance imaging (fMRI) and low-intensity transcranial ultrasound (TUS) neurostimulation to demonstrate how the dorsal raphe nucleus (DRN)—the brain's primary serotonergic centre—modulates motivational states in non-human primates.

The DRN consists of both serotonergic and non-serotonergic neurons, making it challenging to isolate serotonin-specific effects. In the second half of my talk, I will discuss ongoing studies using transcranial ultrasound-induced blood-brain barrier (BBB) opening and targeted drug delivery to achieve focal manipulation of the serotonergic system in the primate brain. These approaches offer new avenues for understanding the causal role of the brain neuromodulatory systems in cognition and behaviour.



Plenary Talk:

Deconstructing the complexity of cortical circuit stimulation by transcranial ultrasound

Date: 09 Jul 2025 (Wed)

Time: 11:00am-11:30am

Speaker Prof. Shy Shoham, Ph.D.
NYU Langone Health

About the Speaker

Shy Shoham is a Professor of Neuroscience and of Ophthalmology at NYU School of Medicine, and co-director of the NYU Tech4Health institute. His lab develops acoustic, photonic and computational tools for bidirectional neural interfacing, and is exploring translational applications of transcranial ultrasound stimulation with clinical collaborators. He holds a Physics BSc (Tel-Aviv University), a PhD in Bioengineering (University of Utah) and was a Lewis-Thomas postdoctoral fellow at Princeton University. He is a Fellow of SPIE and serves on the editorial boards of Journal of Neural Engineering and of Neurophotonics and has co-edited the Handbook of Neurophotonics.

Abstract

Precision-targeted ultrasonic neuromodulation offers immense potential for studying brain function and treating neurological diseases. Yet, its application has been limited by challenges in achieving precise spatiotemporal control of ultrasound effects on brain circuits. Here, I will discuss the results of recent imaging and computational studies that together allow us to (roughly) deconstruct how network interactions mediate the responses to transcranial ultrasound stimulation (TUS). Our work shows how network interactions are mediated and govern dose-response characteristics at the cortical microcircuit for tightly focused TUS, and how they can dramatically lower the activation threshold for holographically-distributed TUS.



Advancing Sonogenetics: From Engineered Ion Channels to Neural Circuit Dissection and Therapeutic Applications

Date: 09 Jul 2025 (Wed)

Time: 11:30am – 11:50am

Speaker: Prof. Hong Chen, Ph.D.

Washington University in St. Louis

About the Speaker

Dr. Chen works on advancing the field of Neurosonics by integrating breakthroughs in neuroscience and ultrasonics to develop noninvasive ultrasound technologies that deepen our understanding of brain function and transform the diagnosis and treatment of neurological diseases. She earned bachelor's and master's degrees in biomedical engineering from Xi'an Jiaotong University, followed by a PhD in bioengineering from the University of Washington, and completed postdoctoral training at Columbia University. She is currently a Professor in the Department of Biomedical Engineering at the McKelvey School of Engineering and the Department of Neurosurgery at the School of Medicine at Washington University in St. Louis. She serves on the Board of Directors for the International Society of Therapeutic Ultrasound, is a member of the IEEE International Ultrasonics Technical Committee, and contributes to the Acoustical Society of America's Biomedical Ultrasound Technical Committee. She is the chair of the 2026 Gordon Research Conference on In Vivo Ultrasound Imaging. Dr. Chen is a senior member of the National Academy of Inventors and was recently honored with the NIH Director's Pioneer Award.

Abstract

Sonogenetics has emerged as a powerful strategy for noninvasive, cell type-specific neuromodulation by coupling focused ultrasound with genetically encoded actuators. We have been working on advanced sonogenetics on three interlocking fronts.

First, we identified and engineered an ultrasound-sensitive ion channel, TRPV4-F617L, which offers robust neuromodulatory control with reduced sensitivity to off-target stimuli such as heat and osmolarity. This mutation enhances ultrasound sensitivity while preserving physiological specificity and was shown to drive behaviorally relevant neuromodulation in freely moving mice.

Second, we developed Airy-beam holographic sonogenetics (AhSonogenetics)—a wearable, implant-free neuromodulation platform that uses 3D-printed metasurfaces to generate ultrasharp and dynamically steerable ultrasound beams. AhSonogenetics enables subregion-specific modulation within deep brain structures, seamless switching between unilateral and bilateral stimulation, and compatibility with optical calcium imaging—all in freely moving animals. This platform successfully alleviated motor deficits in a Parkinson's disease mouse model by enabling simultaneous bilateral stimulation of affected brain regions.

Third, to bridge cellular modulation and systems-level analysis, we integrated sonogenetics with functional PET, creating sonogenetic-PET, a novel framework for mapping global metabolic responses to targeted neuromodulation. This approach demonstrated precise activation of the basal ganglia circuit and downstream limb muscle activity, revealing effective connectivity across the brain and body. Incorporation of acoustic holography enabled flexible switching between brain targets within the same animal, increasing throughput and experimental control.

Together, these innovations form a cohesive and versatile toolkit that transforms sonogenetics into a precise, flexible, and scalable neuromodulation technology. They collectively pave the way for noninvasive dissection of neural circuits and open new avenues for therapeutic interventions in neurological disorders.



Functional ultrasound imaging and neuromodulation at developmental stage

Date: 09 Jul 2025 (Wed)

Time: 11:50am – 12:10pm

Speaker: Prof. Zhihai Qiu, Ph.D.

Guangdong Institute of Intelligence Science and Technology

About the Speaker

Dr. Qiu obtained his BSc in Physics and M Phil in Optical Engineering from Fujian Normal University in 2012 and 2015, and his doctoral degree in Biomedical Engineering from The Hong Kong Polytechnic University in 2019. He worked as a postdoc at Stanford with Kim Butts Pauly. Dr. Qiu is currently Principal Investigator at Guangdong institute of Intelligence Science and Technology. Dr. Qiu's current research is focusing on functional ultrasound imaging and ultrasound neuromodulation. His research has been published in high profile journals, including Cell Reports, PNAS, Brain stimulation.

Abstract

The developmental trajectory of the brain, once thought to be rigidly programmed, is increasingly understood as a dynamic process that is open to influence. The ultimate challenge, however, is to find a means to interact with the developing brain in a precise, non-invasive, and restorative manner. In this talk, I will present a new paradigm that leverages the unique dual capabilities of ultrasound to both observe and guide brain development. We have demonstrated that this technology can be used to functionally assess the developing brain and, crucially, to deliver targeted neuromodulation during critical early-life windows. The power of this approach is crystallized in our recent findings where this ultrasound-based intervention successfully reversed debilitating autism-like symptoms in a model of Rett syndrome. This breakthrough provides a foundational proof-of-concept, suggesting that we may one day be able to correct the course of neurodevelopmental disorders. I will discuss the profound implications of this work and the future horizons it opens for creating a new class of non-invasive therapeutics for challenging developmental brain disorders.



FUN++: Towards personalised, closed-loop, and at-home ultrasound neuromodulation

Date: 09 Jul 2025 (Wed)

Time: 12:10pm – 12:30pm

Speaker: Prof. Marcus Kaiser, Ph.D.

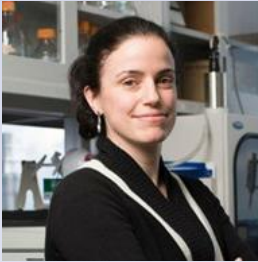
University of Nottingham

About the Speaker

Marcus Kaiser is Professor of Neuroinformatics at the University of Nottingham. His aim is to develop ultrasound interventions for cognitive improvements in severe mental health (depression and schizophrenia). He is author of 'Changing Connectomes' (<https://mitpress.mit.edu/books/changing-connectomes>), PI for the closed-loop neuromodulation for mental health MRC programme grant (<https://www.nottingham.ac.uk/news/new-research-will-lead-to-improved-brain-function-for-patients-with-a-range-of-mental-health-conditions>), and co-director of the Centre for Neurotechnology, Neuromodulation, and Neurotherapeutics (<https://www.nottingham.ac.uk/science/research/n3centre/n3centre.aspx>)

Abstract

Human connectomes are individual like fingerprints. The effect of stimulation not only depends on the target region, but also on its connectivity profile within functionally relevant circuits. To understand the role of a personalized approach, we developed a whole-brain model to represent fMRI changes, enabling us to investigate how TUS-induced effects propagate throughout the brain with increasing stimulus intensity. Communication models based on diffusion processes outperform models based on shortest path efficiency. Moreover, our mechanistic model suggests that stimulation mechanistically disrupts the excitatory/inhibitory balance by increasing inhibition, rather than by enhancing excitation. We will outline how this approach can be extended towards closed-loop stimulation with a goal towards applications in mental health (schizophrenia and depression). Finally, we discuss ultrasound stimulation at-home. This is already possible for vagus nerve stimulation: for example, using the Zenbud system led to a 79% remission rate for anxiety. However, future development might lead to mobile transcranial ultrasound devices.

**Plenary Talk:****Displacement-guided Neuromodulation of the Brain and Peripheral Nerves Towards Pain Treatment using Focused Ultrasound**

Date: 09 Jul 2025 (Wed)

Time: 14:00pm-14:30pm

Speaker Prof. Elisa E. Konofagou, Ph.D.
Columbia University**About the Speaker**

Elisa Konofagou is the Robert and Margaret Hariri Professor of Biomedical Engineering and Professors Radiology and Neurosurgery as well as Director of the Ultrasound and Elasticity Imaging Laboratory at Columbia University in New York City. Her main interests are in the development of novel imaging, theranostic and therapeutic ultrasound methods for the advancement of therapeutic ultrasound. Elisa has co-authored over 320 published articles in the aforementioned fields. Elisa is a Member of the National Academy of Medicine (US), an Elected Fellow of the International Society of Electrical and Electronic Engineering (IEEE), the American Institute of Biological and Medical Engineering (AIMBE) and the Acoustical Society of America (ASA).

Elisa is recipient of the CAREER award by the National Science Foundation (NSF), the Nagy award by the National Institutes of Health (NIH), the Technological Achievement Award by the IEEE Engineering in Medicine and Biology society (EMBS), the Carl Hellmuth Hertz Ultrasonics Award by the IEEE Society in Ultrasonics, Ferroelectrics and Frequency Control (UFFC), the Janette and Armen Avanesians Diversity Award and Faculty Service Award by Columbia university and the Elisabeth Papazoglou Inspired Leadership Award by Drexel university as well as additional recognitions by the American Heart Association, the Acoustical Society of America, the American Institute of Ultrasound in Medicine, the American Association of Physicists in Medicine, the Wallace H. Coulter foundation, the Bodossaki foundation, the Society of Photo-

optical Instrumentation Engineers (SPIE) and the Radiological Society of North America (RSNA). Elisa also serves as the current President of the International Society of Therapeutic Ultrasound.

Abstract

Chronic pain is often clinically defined as persistent or recurring pain that lasts longer than 3 months. This condition affects an estimated 20.4% of adults within the U.S. and hundreds of millions of adults worldwide. Current treatment methods include pharmacology (non-opioid analgesics, opioids, topical analgesics, adjuvants), transcranial magnetic stimulation (TMS), deep brain stimulation (DBS), and peripheral electrical stimulation. Despite all the different approaches available, there is still an unmet need for a pain therapy that is both targeted and non-invasive while providing long-term pain relief.

Focused ultrasound (FUS) has recently emerged as a promising noninvasive approach capable of both stimulating and suppressing neuronal activity. Several studies have shown that FUS can stimulate and/or suppress electrical and/or hemodynamic activity in rodents and primates. However, there is currently no cost- and time-efficient targeting and monitoring technique to ensure both correct targeting and monitor response during FUS modulation. In fact, in the case of pain suppression, our group has found that the current 'blind' targeting may lead to lack of treatment or worse, increase in pain rating, rendering targeting critical for treatment efficacy.

In this presentation, ultrasound-based techniques developed by our group will be described that map and control transcranially the 1) simultaneous mechanical displacement of the targeted tissue region, 2) hemodynamic changes and 3) neuronal modulation with EEG with real-time feedback. We will thus report on novel tools capable of applying FUS in both in specific brain regions (CNS-FUS) and peripheral nerves (PNS-FUS) and monitor both the physical mechanism both during and after FUS but provide real-time feedback of targeting through both changes in the displacement and hemodynamics that can inform changes in pain sensation. Results will be presented in rodents, non-human primates and neuropathic pain patients.



Navigation-Guided Focused Ultrasound Neuromodulation for Drug-Resistant Epilepsy: From Preclinical Mechanisms to Clinical Trials

Date: 09 Jul 2025 (Wed)

Time: 14:30pm – 14:50pm

Speaker: Prof. Hao-Li LIU, Ph.D.

National Taiwan University

About the Speaker

Dr. Hao-Li Liu received the Ph.D. degrees in Electrical Engineering, National Taiwan University, Taiwan in 2003, and finished his post-doc training in Brigham & Womens Hospital, Harvard Medical School, with Dr. Kullervo Hynynen in 2005. He is currently the Professor of Department of Electrical Engineering, National Taiwan University, Taipei, Taiwan. Dr. Liu is currently working on research topic in ultrasound non-thermal therapy and its treatment planning/simulation including blood-brain barrier opening, focused ultrasound neuromodulation, and ultrasound phased array design. Dr. Liu has published over 140 SCI ultrasound-related papers, over 40 worldwide patents been filed in areas of biomedical use of therapeutic ultrasound. He received the 2015 Frederic Lizzi Award from the International Society for Therapeutic Ultrasound (ISTU) for recognizing his contribution in preclinical advances of brain therapy application. He previously also joined as the board member of ISTU (term 2015-2018). He is currently joining the NaviFUS Inc. (dedicated to promote a clinical purposed neuronavigation-guided transcranial focused ultrasound device) as technical consultant to support the ongoing BBB-opening and epilepsy clinical trials conducted in Taiwan.

Abstract

Focused ultrasound (FUS) neuromodulation is gaining recognition as a promising noninvasive intervention for drug-resistant epilepsy (DRE). Leveraging advances in neuronavigation-guided transcranial delivery, FUS enables precise targeting of epileptogenic zones such as the hippocampus. Preclinical studies in both acute (PTZ) and chronic (KA) animal models reveal significant seizure suppression, underpinned by calcium dynamics modulation, functional connectivity alteration, and vascular remodeling. Low-intensity pulsed FUS demonstrates durable inhibitory effects without the need for high acoustic energy, as verified via EEG, fiber photometry, and imaging biomarkers. Recent phase I/II clinical trials using neuronavigation-aligned FUS systems (e.g., NaviFUS) confirm its safety and partial efficacy, with observed >50% seizure frequency reduction in subsets of patients. Integration of real-time acoustic feedback and multi-channel phased arrays further enhances treatment precision. This presentation summarizes the mechanistic insights and translational trajectory of FUS neuromodulation as an emerging therapy for refractory epilepsy.



fMRI Reveals Focused Ultrasound Neuromodulation Effects on Macaque Visual Cortex

Date: 09 Jul 2025 (Wed)

Time: 15:04pm – 15:16pm

Speaker: Prof. Hsin-Yi Lai, Ph.D.

Guangdong Institute of Intelligence Science and Technology

About the Speaker

Dr. Hsin-Yi Lai is a principal investigator at the Guangdong Institute of Intelligent Science and Technology and heads the Laboratory of Magnetic Resonance Imaging and Modulation for Cognitive Neural Networks. Her research focuses on: 1) Brain-Machine Fusion Technology, and 2) Perception-Metacognition Interplay Research. She earned her Ph.D. in Electrical and Control Engineering from National Chiao Tung University in 2011 and completed postdoctoral research at UNC Chapel Hill and Chang Gung University. From 2015 to 2024, she served as a PI Professor at Zhejiang University, where she was responsible for the management and innovative technology development of the 7T Magnetic Resonance Brain Imaging Center. Dr. Lai holds several academic positions, including committee memberships in the Chinese Society for Neuroscience (Basic and Clinical Neurology Subcommittee), the Chinese Society for Cognitive Science (Neuroimaging and Psychiatry Subcommittee), and the Zhejiang Neuroscience Society. She also serves as Associate Editor for the ACS Chemical Neuroscience and is on the editorial boards of Psychoradiology, Scientific Reports, and Frontiers. She has published over 60 papers in SCI journals (H-index 30), holds 11 invention patents (including one US patent), and has received multiple honors, including the "Outstanding Young Scholar in Engineering Frontiers" from the Chinese Academy of Engineering and the "Silver Award for Invention and Entrepreneurship" from the China Invention Association.

Abstract

The primary visual cortex (V1) plays a central role in processing visual input and relaying information to higher-order visual areas. Beyond its primary function, V1 is interconnected with multiple brain regions—including the hippocampus, anterior cingulate cortex, thalamus, and lateral habenula—highlighting its involvement in cognitive and emotional regulation. Studying the functional circuits of V1 is thus of broad neuroscientific significance. Focused ultrasound neuromodulation (FUN), a non-invasive technique, has emerged as a promising tool for modulating brain networks with high spatial precision. In this study, we applied functional magnetic resonance imaging (fMRI) to investigate the effects of FUN targeting the primary visual cortex in macaques. We assessed the online effects of stimulation using visual-evoked BOLD responses before and after FUN, and examined offline effects through multi-time-point resting-state fMRI (rsfMRI). Results revealed that online FUN induced a localized negative BOLD signal at the targeted V1 site, followed by significant enhancement of bilateral visual-evoked BOLD responses, indicating increased cortical excitability. Offline analyses demonstrated distinct hemispheric differences: left V1 stimulation primarily enhanced connectivity within the dorsal visual stream, while right V1 stimulation modulated the ventral visual stream. Additionally, FUN significantly altered functional connectivity among key regions involved in emotion and cognition, including the anterior cingulate cortex, hippocampus, thalamus, dorsolateral and ventromedial prefrontal cortices, basal amygdala, and lateral habenula. This study provides the first direct evidence of lateralized neuromodulatory effects of FUN on V1-associated circuits, demonstrating its capacity to differentially shape visual, cognitive, and emotional networks. These findings offer novel insights into the functional organization of the visual system and underscore the potential of FUN for targeted modulation in neuroscience and clinical research.

**Plenary Talk:****Improving decision-making and learning with ultrasound neuromodulation**

Date: 09 Jul 2025 (Wed)

Time: 16:00pm - 16:30pm

Speaker Prof. Elsa Fouragnan, Ph.D.
University of PlymouthAbout the Speaker

Elsa Fouragnan is a Professor in Neuroscience and the Director of the Brain Research Imaging Centre at the University of Plymouth, UK. Her work focuses on the pioneering use of transcranial ultrasound stimulation in humans, particularly in brain circuits related to decision making and learning. Her career transitioned from biomedical engineering to neuroscience, with postdoctoral fellowships at Glasgow and Oxford. In 2018, she founded her lab to study neuroplasticity induced by focused ultrasound in brain circuits mediating adaptive and dysfunctional decision making. After proof of concepts studies showing that ultrasound can induced neuroplasticity in humans, she is now bringing this technology forward to apply it to mental health disorders, particularly Obsessive Compulsive Disorder and Alcohol Use Disorder. Her lab organises annual workshops to train academics and non-academics to use the technology and contributes to ITRUSST, a consortium advancing ultrasound for neuromodulation. Elsa is also a UKRI Future Leader Fellow and an ARIA R&D creator.

Abstract

Transcranial Ultrasound Stimulation (TUS) is emerging as a powerful neuromodulatory technique capable of inducing short-term neuroplasticity in the human brain. In this talk, I will discuss the potential of TUS as a transformative tool in both neuroscience research and clinical applications. I will highlight its precision in targeting deep brain structures, its role in probing neural mechanisms, and its therapeutic potential for neuropsychiatric disorders. Focusing on recent studies, I will present findings on how TUS to the nucleus accumbens (NAcc) modulates reward sensitivity and how stimulation of the anterior insula and dorsal anterior cingulate cortex (dACC) influences perseverance and instrumental learning biases in a motivational Go/No-Go task. These insights underscore the capacity of TUS to transiently shape decision making and learning processes, offering new avenues for both fundamental research and clinical intervention.



Optimized focused ultrasound for non-invasive modulation of neural activity and behavior

Date: 09 Jul 2025 (Wed)

Time: 16:30pm – 16:50pm

Speaker: Dr. Charlotte Luff, Ph.D.

Stanford University

About the Speaker

Charlotte Luff is a postdoctoral researcher in the de Lecea Lab at Stanford University, where she studies the modulation of sleep and addiction-related behaviors using non-invasive neuromodulation techniques, including transcranial focused ultrasound. Her research focuses on uncovering the biophysical mechanisms and brain dynamics underlying these techniques, with the goal of improving their precision and efficacy. Charlotte completed her Ph.D. in the Interventional Systems Neuroscience Lab of Dr. Nir Grossman at Imperial College London, with a year as a visiting Ph.D. student in the lab of Professor Ed Boyden at MIT, where she investigated the biophysical basis of temporal interference (TI) brain stimulation using electrophysiology and computational modeling. She holds a B.Sc. in Biomedical Science from King's College London and an M.Res. in Experimental Neuroscience from Imperial College London.

Abstract

Transcranial focused ultrasound (tFUS) is an emerging non-invasive neuromodulation technology with therapeutic potential across a range of disorders marked by aberrant neural activity. However, its broad parameter space and the anatomical and functional heterogeneity of the brain pose challenges to its targeted application. To address this, we developed PhoCUS (Photometry-Coupled Ultrasound System), which enables simultaneous fiber photometry and tFUS in freely behaving animals. This system allows for real-time monitoring of genetically defined subcortical neuronal populations during tFUS stimulation. Using PhoCUS, we identified stimulation parameters that reliably elicit neural excitation or inhibition across temporal scales. These effects could be consistent across brain regions and cell types and were associated with modulation of arousal and locomotor behavior. Our work provides a foundation for dissecting network-level mechanisms of ultrasound neuromodulation and guiding rational development of tFUS-based interventions for neuropsychiatric and neurological disorders.



Novel transducers and systems for ultrasound neuromodulation: wearable, programmable, and multi-functional design

Date: 09 Jul 2025 (Wed)

Time: 16:50pm – 17:02pm

Speaker: Prof. Weibao Qiu, Ph.D.

Shenzhen Institutes of advanced Technology Chinese Academic of Science

About the Speaker

Weibao Qiu obtained his Ph.D. degree from The Hong Kong Polytechnic University, in 2012. He joined the Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences the same year and was promoted to Full Professor in early 2018. His research interests are novel ultrasound transducer and system for biomedical imaging and therapy. Several high frequency ultrasonic transducers have been developed including transparent high frequency transducer, textured ceramics based transducer, intravascular/intracardiac transducer, high frequency linear array and 2D matrix array. Several novel high frequency ultrasound device and system have also been developed including capsule ultrasound device, intravascular ultrasound system, small animal high frequency array imaging systems. He has published 83 SCI papers and has been granted 35 invention patents. He serves on the Technical Program Committee (Group 5) of IEEE International Ultrasonics Symposium (IUS). He is the founder of Shenzhen Hys Meditec Co., Ltd., a company specializing in advanced ultrasound solutions (novel ultrasound transducers, and imaging systems).

Abstract

Recent advances in ultrasound neuromodulation have revolutionized non-invasive neural interfacing by offering unprecedented spatial

resolution and depth-specific targeting while maintaining excellent penetration and eliminating risks associated with surgical operation. Despite these inherent advantages, current implementations remain constrained by some limitations: restricted portability compromising subject mobility, insufficient spatial precision for targeting small neural structures, and limited functional integration of stimulation with monitoring capabilities. This presentation details transformative solutions through the development of new ultrasound transducers and integrated systems specifically for low-intensity neuromodulation: (1) wearable designs enabling unconstrained subject movement, (2) fully programmable operation supporting complex stimulation paradigms, and (3) multi-functional integration of neuromodulation with simultaneous imaging modalities. Our innovations include a miniature head-mounted transducer demonstrating good targeting accuracy in freely behaving animal models, a high-performance 128-element concave array transducer (7.5MHz) utilizing advanced 2-2 piezocomposites with optimized acoustic matching layers achieving 60% bandwidth, >230mVpp echo amplitude, -39.38dB insertion loss, and exceptional crosstalk suppression (<-29.9dB nearest neighbor), with acoustic field characterization confirming more focal gain improvement over conventional flat probes. The system's programmable electronics enable real-time beamforming with flexible parameter control (0.3-15MHz frequency and 0-45Vpp amplitude) and simultaneous imaging/stimulation capabilities, as validated by successful non-invasive vagus nerve modulation in vivo. Complementary developments include optically transparent transducers for hybrid ultrasound-optics design and catheter-integrated design for endoscopic applications, collectively establishing a comprehensive technological foundation for expanding ultrasound neuromodulation into new domains including closed-loop therapies and minimally invasive procedures. These advances address critical limitations in current methodologies while maintaining the inherent safety advantages of ultrasound, positioning the technology for transformative impact across neuroscience research and clinical neuromodulation applications.



Plenary Talk:

Promises and challenges of personalized transcranial ultrasound stimulation of the fiber tracts

Date: 10 Jul 2025 (Thu)

Time: 9:00am-9:30am

Speaker Prof. Jean-François Aubry, Ph.D.
France's National Center for
Scientific Research

About the Speaker

Jean-Francois (Jeff) Aubry is a director of research at France's National Center for Scientific Research (CNRS). He works at Physics for Medicine Paris (Paris, France) and is the scientific director of the Focused Ultrasound Foundation center of excellence in Paris.

His main research interests are MR-guided transcranial brain therapy and Neuronavigated transcranial ultrasound stimulation and is an expert in focusing ultrasound waves in complex media. Aubry holds five patents on adaptive focusing. He has been a consultant for Supersonic Imagine (Aix en Provence, France) and FUS Mobile (Alpharetta, GA, USA) and is a co-founder of SonoMind (Paris, France). He has given more than 60 invited talks at international conferences and published more than 100 papers in international scientific journals.

He has been president of the International Society for Therapeutic Ultrasound (2015 – 2018).

Abstract

Transcranial ultrasound stimulation is the only technology that can non-invasively modulate the activity of deep-seated brain tissues. It thus has the potential to offer groundbreaking new approaches to treat mental and neurologic disorders. It has been demonstrated that ultrasound can excite neurons through a primarily mechanical mechanism mediated by the ultrasound-induced opening of mechano-sensitive channels on the cellular membrane [1]. Not only neurons but also astrocytes, endothelial cells, and pericytes are sensitive to mechanical ultrasound stimulation through mechanosensitive ion channels[2], leading to an overwhelming number of possible neuromodulation targets in the brain. It was proposed recently to specifically target fiber tracts: the dentato rubro thalamic tracts in essential tremor patients[3] and the crossing of the forceps minor, the cingulum bundle and the uncinate fasciculus in treatment-resistant depressed patients[4]. This lecture will present how these targets were selected and how they were bull's eyed.



Non-genetic High precision Photoacoustic Neural Stimulation

Date: 10 Jul 2025 (Thu)

Time: 09:30am – 09:50am

Speaker: Prof. Chen Yang, Ph.D.

Boston University

About the Speaker

Prof. Yang obtained her M Phil in Chemistry from HKUST in 2000 and her doctoral degree in Chemistry from Harvard University in 2006. She worked as an associate in McKinsey & Co. She worked in Purdue University Department of Chemistry and Department of Physics as Assistant Professor and Associate Professor. Dr. Yang is currently Professor in Department of Electrical and Computer Engineering and Department of Chemistry at Boston University. She is also Associate Chair for Master program in Department of Electrical and Computer Engineering at BU.

Prof. Yang's current research is focusing on novel photonics and bioelectronics materials and devices for non-genetic neuromodulation. Her research has been published in high profile journals, including Science, Nature, Nature communication, and featured in SPIE Bio Hot Topic Plenary Session in 2023. She was an NSF Career Awardee in 2008 and a AIMBE fellow since 2023.

Abstract

Neuromodulation at high precision poses great significance in advancing fundamental knowledge in the field of neuroscience and offering novel clinical treatments. Here we reported our research on developing the photoacoustic as high precision, genetic free and highly efficient technology for neural modulation in vitro and in vivo. Specifically, various platform technologies, including fiber emitters, film-based implants, nanotransducers and optic-generated focus ultrasound will be discussed. Sub-100 micron precision, miniaturized and multi-functional device design, and non-invasive potential will be highlighted for brain and retina applications. Fundamentally, we will report our recent development on elucidate photothermal and photoacoustic effects in interfacing with biological systems and their different mechanisms in neural stimulation. Towards clinical applications, we will report our work toward a flexible retinal prosthesis. We confirmed successful blind retina stimulation ex vivo and in vivo through a photoacoustic film safely. These results show the potential of using photoacoustic signal to drive activity in photoreceptor-damaged retinas in patients with age related macular degeneration and retinitis pigmentosa.



Mechanochemical Polymer Systems enable the Activation of Drugs, Proteins and Nucleic Acids by Ultrasound

Date: 10 Jul 2025 (Thu)

Time: 09:50am – 10:10am

Speaker: Prof. Dr. Andreas Herrmann, Ph.D.

RWTH Aachen University

About the Speaker

Andreas Herrmann studied chemistry at the University of Mainz (Germany). From 1997 to 2000 he pursued his graduate studies at the Max Planck Institute for Polymer Research in Mainz, Germany, in the group of Prof. Klaus Müllen. Then he worked as a consultant for Roland Berger Management Consultants in Munich (2001). In the years 2002 and 2003, he returned to academia as a postdoctoral fellow working on protein engineering with Prof. Don Hilvert at the Swiss Federal Institute of Technology, Zurich. In 2004, he was appointed as a head of a junior research group at the Max Planck Institute for Polymer Research. From 2007 to 2017 he held a position as full professor at the Zernike Institute for Advanced Materials at the University of Groningen, the Netherlands, where he headed the chair for Polymer Chemistry and Bioengineering. Since June 2017, he is scientific board member of the DWI – Leibniz Institute for Interactive Materials in Aachen, Germany, and fills a position as full professor at RWTH Aachen University for Macromolecular Materials and Systems. In 2018, he became vice-director of the DWI – Leibniz Institute and director in 2023.

Abstract

The field of optogenetics has enabled the fundamental understanding of neural circuits and disorders. However, current optogenetic techniques require invasive surgical procedures to deliver light to target cells due to the low penetration depth of light into tissue. Therefore, ultrasound (US) was used as alternative trigger since US can deeply penetrate tissue with high spatiotemporal control. Our group develops general molecular technologies based on polymer mechanochemistry to control the activity of drugs, proteins and nucleic acids by US. While initial efforts relied on low frequency (20 kHz) US that is destructive to cells and tissues, our current efforts are dedicated to two technology platforms that allow the activation of bioactive compounds by biocompatible imaging US and low intensity focussed US (LIFU). The first technology relies on high molecular weight polynucleic acids that are produced by rolling circle amplification or transcription and that encode multiple binding sites for drugs, proteins and nucleic acids. Once these loaded nucleic acid carriers are subjected to ultrasonication, covalent and non-covalent bond cleavage occurs by collapse of US-induced cavitation bubbles leading to activation of the cargoes. In this way, gene knock-down in vitro was achieved by liberating siRNA and immunostimulation was successfully realized in vivo by activating CpG oligonucleotides. Similarly, protein activity can be switched on by US, involving the mechanochemical activation of a protease that subsequently triggers split intein function for controlling the activity of a broad scope of proteins. A second platform technology for low-intensity US activation is mechanophore-incorporated microbubbles that also allow the spatiotemporally controlled release of bioactives.



Advanced Sonogenetic Approaches for Neural Modulation

Date: 10 Jul 2025 (Thu)

Time: 10:10am – 10:30am

Speaker: Dr. Quanxiang Xian, Ph.D.

The Hong Kong Polytechnic University

About the Speaker

Dr. Xian is currently a Research Assistant Professor in the Department of Biomedical Engineering (BME) at The Hong Kong Polytechnic University. She received her Ph.D. degree from the Department of Biomedical Engineering at The Hong Kong Polytechnic University in 2021. From 2021 to 2024, she served as a postdoctoral fellow at The Hong Kong Polytechnic University. Dr Xian is dedicated to conducting a comprehensive study of ultrasound neuromodulation, ultrasound stimulation mechanisms, and advancing the possibilities for clinical applications of ultrasound stimulation. Dr. Xian has served as the first author and co-first author of publications in prestigious journals, including PNAS, Advanced Science, and Cell Reports.

Abstract

Sonogenetics is an ultrasound-based method that offers a non-invasive approach to activating genetically targeted neurons. In this lecture, we will summarize recent developments in sonogenetics and discuss our findings regarding its applications for modulating the excitation-inhibition (E/I) balance in models of Parkinson's disease and epilepsy. We have also developed a non-invasive platform using the AAV-PHP.eB vector to deliver the mechanosensitive ion channel MscL-G22S in transgenic mice. This approach allows for cell-type-specific neuromodulation without the need for surgery. Overall, sonogenetics shows promise as a flexible and non-invasive tool for the precise manipulation of neural circuits, providing new treatment options for disorders characterized by E/I imbalance.

**Plenary Talk:****Transcranial Ultrasound Stimulation for Parkinson's Disease and Movement Disorders**

Date: 10 Jul 2025 (Thu)

Time: 14:00pm-14:30pm

Speaker Prof. Robert Chen, Ph.D.
University of TorontoAbout the Speaker

Professor Robert Chen undertook medical training at University of Cambridge and Guy's Hospital, London, and received his MA and medical (MBBChir) degrees from the University of Cambridge. He undertook Neurology residency at the University of Western Ontario (Canada), and fellowship at the National Institute of Neurological Disorders and Stroke in Bethesda, Maryland, USA. He is currently Professor of Medicine (Neurology) at University of Toronto, Senior Scientist at Krembil Research Institute, Editor-in-Chief of Clinical Neurophysiology and Associate Editor of Movement Disorders. His clinical and research interests include transcranial magnetic and ultrasound stimulation, neurophysiology and treatment of movement disorders, mapping of brain connectivity using functional magnetic imaging and electroencephalography, electromyography and neurophysiological assessment of the respiratory system. He has published over 420 research papers with H-index of 116 (Google Scholar), a book on Transcranial Magnetic Stimulation and edited two volumes of Handbook of Clinical Neurology on Respiratory Neurobiology in 2022.

Abstract

Several studies have applied low intensity transcranial focused ultrasound stimulation (TUS) in Parkinson's disease (PD) and other movement disorders. The first set of studies applied theta burst TUS (tbTUS) to the motor cortex (M1). tbTUS did not change M1 excitability in the off-medication state in PD subjects but increased M1 excitability in the on-medication state similar to age-matched normal subjects, suggesting that cortical plasticity is impaired in PD and is restored by dopaminergic medications. A pilot study showed that an accelerated tbTUS protocols with three sonications per day in PD patients off medication was safe and well tolerated, and increased cortical excitability. TUS has also been applied to the basal ganglia in PD. TUS of the internal globus pallidus (GPi) changed the power of oscillations in local field potentials in PD subjects, particularly in the theta and beta bands. These results show that the human GPi can be successfully targeted, and the changes depend on the TUS protocol used. For other movement disorders, TUS of the ventro-intermediate nucleus of the thalamus or the dentato-rubro-thalamic tract was found to transiently reduced tremor amplitude in subjects with essential tremor. Preliminary data suggest that TUS of the cerebellar dentate nucleus can reduce the amplitude of orthostatic tremor. TUS has the potentials to be further developed as is a novel non-invasive deep brain stimulation treatment for movement disorders, but further studies with multiple sessions to produce longer lasting effects are needed.



Optimizing target exposure and assessing proof of neural target engagement for transcranial ultrasonic stimulation (TUS) in humans

Date: 10 Jul 2025 (Thu)

Time: 14:30pm – 14:50pm

Speaker: Prof. Til Ole Bergmann, Ph.D.

Johannes Gutenberg University Medical Center

About the Speaker

Prof. Dr. Til Ole Bergmann is a Professor of Neurostimulation and deputy head of the Neuroimaging Center (NIC) at the Johannes Gutenberg University Medical Center in Mainz, Germany, as well as a group leader at the Leibniz Institute for Resilience Research (LIR). Dr. Bergman investigates the function of neuronal oscillations in sleep and wakefulness, memory, and attention. The methodological focus of his research group (www.tobergmann.de) is on the simultaneous combination of non-invasive brain stimulation techniques such as transcranial magnetic, electric, and ultrasonic stimulation (TMS, tES, TUS) with neuroimaging (fMRI) and electrophysiology (EEG) and the development of novel approaches, such as real-time EEG-triggered brain state-dependent brain stimulation. Dr. Bergmann has published >50 papers on non-invasive brain stimulation (>7000 citations, h-index 36). He is the chairman of the “Best Practice” working group of the International Transcranial Ultrasonic Stimulation Safety and Standards (ITRUSST) consortium (<https://itrusst.org>), co-organizer and program committee member of the Focused Ultrasound Neuromodulation (FUN) conference series (2022-2024), and chairman of the “Regulatory and Ethical Issues” working group of the European Society for Brain Stimulation (ESBS). He further serves as senior editor at Imaging Neuroscience (<https://www.imaging-neuroscience.org/>) and on the editorial board of Brain Stimulation and has received the John Rothwell Award for excellence in non-invasive brain stimulation research in 2021. For publications <https://scholar.google.nl/citations?user=IVdjmvsAAAAJ>

Abstract

Transcranial ultrasonic stimulation (TUS) comes with the promise of non-invasive deep brain neuromodulation at unprecedented spatial precision. However, two major challenges currently constitute roadblocks for a wider adoption in basic research and clinical application: Firstly, the human skull bone causes significant reflection, aberration, and attenuation of the ultrasound beam, often hampering precise targeting and sufficient target exposure. Secondly, the large parameter space of TUS protocols and the known state-dependency of neuromodulatory effects challenges the development of effective neuromodulation protocols, in particular given the constraints by peripheral co-stimulation confounds and safety limits. I will present ongoing work from our lab and discuss how we approach these challenges. To improve targeting precision (i.e., on- vs off-target exposure), we (i) develop the open-source tool PlanTUS (plan-tus.org) for quickly optimizing transducer positioning before running detailed acoustic simulations, (ii) optimize and empirically validate MR-bone imaging sequences to obtain high quality bone density information for acoustic simulations without the ionizing radiation of CT scans, and (iii) establish MR-guided robotized transducer navigation. To validate the effectiveness of neuromodulation protocols and provide empirical proof of neural target engagement, we combine TUS concurrently with fMRI, EEG, and TMS. I will further present recent advances of the CITRUS project (project-citrus.eu), developing a novel TUS-MR device, integrating a 256-channel phased-array TUS system for 3D-beam steering and cross-beam approaches with a custom-tailored 32-channel MR-receiver coil for accelerated imaging of TUS effects with maximal sensitivity.



Precision Targeting in tFUS: From Image-Guided Navigation to AI-Driven Simulation

Date: 10 Jul 2025 (Thu)

Time: 16:10pm – 16:30pm

Speaker: Prof. Hyungmin Kim, Ph.D.

Korea Institute of Science and Technology

About the Speaker

Hyungmin Kim received his B.S. and M.S. degrees in Mechanical Engineering from Seoul National University (Seoul, Korea) in 1998 and 2001, respectively. He then entered the medical industry and spent six years developing medical imaging software and surgical navigation systems at Cybermed, Inc. (Seoul, Korea). Later, he completed his Ph.D. in Biomedical Engineering from the University of Bern (Bern, Switzerland) in 2011, while working as a research scientist at the Institute of Surgical Technology and Biomechanics (Bern, Switzerland). He then worked as a postdoctoral fellow at the Department of Radiology, Harvard Medical School (Boston, USA). He is currently a principal research scientist at the Bionics Research Center, Korea Institute of Science and Technology (Seoul, Korea), and a professor at the Division of Bio-Medical Science & Technology, University of Science and Technology. His current research interests are focused ultrasound, image-guided therapy, and brain-machine interface.

Abstract

Transcranial focused ultrasound (tFUS) is a promising non-invasive neuromodulation technique that offers high spatial precision and the capability to reach both cortical and deep brain regions. Over the past decade, we have developed a series of technologies to enhance the precision and individualization of tFUS targeting. These efforts can be categorized into three main directions: image-guided navigation systems, subject-specific guide solutions, and AI-driven simulation frameworks.

Initial developments focused on real-time image-guided navigation systems integrated with optical tracking, enabling accurate targeting of brain regions in both preclinical and human applications. To address limitations associated with manual probe alignment and anatomical variability, we introduced subject-specific guides designed using individual anatomical images, which improved both usability and targeting accuracy.

Building upon these foundations, we further explored computational strategies for optimizing transducer placement. Techniques based on acoustic reflection modeling and numerical optimization algorithms were employed to identify efficient transducer positions in a computationally lightweight manner. More recently, we incorporated deep learning methods into the planning pipeline. Generative AI models were used to generate synthetic CT images and enable real-time acoustic simulations, removing the dependence on CT and significantly accelerating treatment planning.

This presentation will outline the progression of our work—from physical tracking to intelligent simulation—and share insights into the integration of imaging, modeling, and AI for personalized and precise tFUS neuromodulation.



Bridging the Gap: Translational Challenges and Opportunities in Focused Ultrasound Neuromodulation

Date: 10 Jul 2025 (Thu)

Time: 16:30pm – 16:50pm

Speaker: Prof. Bradley Treeby, Ph.D.

University College London

About the Speaker

Bradley Treeby is CEO of NeuroHarmonics, a spin-out company he co-founded in 2024, and Honorary Professor of Biomedical Ultrasound at University College London (UCL). His research sits at the interface of ultrasound technology and human neuroscience. Prof. Treeby's work focuses on advancing ultrasound neurotech for precision neuromodulation and developing models of ultrasound wave propagation in the human body. He has led multidisciplinary teams developing novel hardware platforms for targeted ultrasonic applications and created k-Wave, a widely-used open-source acoustics toolbox. At NeuroHarmonics, he's working to develop non-invasive ultrasound technology that can safely modulate specific brain circuits, with applications spanning therapeutic interventions for neurological conditions and brain-computer interaction.

Abstract

Focused ultrasound neuromodulation represents a promising frontier in non-invasive brain stimulation, offering unique advantages in spatial resolution and the ability to reach deep brain structures. Despite significant research advances, the journey from laboratory success to clinical implementation and commercial viability faces multifaceted challenges. This presentation examines the critical barriers and strategic opportunities in translating transcranial ultrasound stimulation (TUS) technology.

Technical hurdles remain significant, including skull transmission variability, acoustic coupling consistency, and the challenge of reliably engaging neural targets across multiple treatment sessions. The field continues to grapple with parameter optimization in a vast acoustic parameter space and lacks standardized protocols for chronic interventions. Regulatory pathways present additional complexity through safety validation requirements, appropriate clinical trial design, and the development of meaningful biomarkers for target engagement.

The commercial landscape introduces further considerations in miniaturization, manufacturing scalability, reimbursement strategies, and healthcare system integration. Patient and clinician acceptance depends on effective education, compelling value propositions, and demonstrated advantages over existing neuromodulation approaches.

Despite these challenges, transformative opportunities exist. TUS offers distinct advantages compared to other neuromodulation technologies, with potential applications across neuropsychiatric conditions, movement disorders, and pain management. The convergence of advanced imaging, computational modeling, and artificial intelligence enables increasingly personalized treatments. Novel delivery platforms and potential synergies with other emerging neurotechnologies further expand the horizon for clinical impact.

This presentation will provide a roadmap for researchers, clinicians, and industry stakeholders navigating the complex territory between promising laboratory findings and successful clinical translation, highlighting strategic approaches to overcome current limitations and accelerate the responsible development of this powerful technology.

**Plenary Talk:****Neuromodulatory effects of low-intensity ultrasound in amyloidosis and implications for treatment strategies in Alzheimer's disease**

Date: 11 Jul 2025 (Fri)

Time: 9:00am-9:30am

Speaker Prof. Jürgen Götz, Ph.D.
The University of QueenslandAbout the Speaker

Professor Jürgen Götz is the Lesleigh Green - Bill and Nancy Green Endowed Chair in Dementia Research and inaugural Director of the Clem Jones Centre for Ageing Dementia Research (University of Queensland). Professor Götz studied biochemistry in Switzerland and earned his PhD in immunology with Nobel Laureate Köhler in Germany. After postdoctoral work at UCSF and at Novartis, he became a group leader in Zürich, before moving to the University of Sydney in 2005, and then to the University of Queensland (Queensland Brain Institute) in 2012. A major focus of his laboratory is to gain insight into how tau and amyloid both separately and synergistically contribute to Alzheimer's disease. In recent years, the laboratory has started to develop therapeutic ultrasound into a treatment modality for Alzheimer's disease and other brain diseases, both by transiently opening the blood-brain barrier and as a neuromodulatory tool. Professor Götz has published more than 230 papers in leading journals including Cell, Science and Neuron, and has authored many authoritative reviews in the Nature Reviews journal family.

Abstract

Ultrasound is a therapeutic modality that is increasingly being explored both as a non-invasive brain stimulatory (NIBS) and blood-brain barrier (BBB) opening tool, the latter to facilitate targeted and effective drug delivery to the brain. A decade ago, we initiated a program of applying this technology to Alzheimer's disease, performing studies in mice and sheep, building a clinical trial ready device, and completing a FIH safety study in Alzheimer's disease (AD) patients.

We applied two types of low-intensity ultrasound, scanning ultrasound (SUS) used together with microbubbles to achieve BBB opening (SUS+MB), and SUS used without microbubbles to achieve neuromodulation (SUSonly). These modalities were applied to mouse models of senescence and Alzheimer's disease, and this preclinical work informed our clinical trial design.

More specifically, we explored SUS+MB and SUSonly over a range of ultrasound parameters in amyloid-depositing APP23 mice and senescent wild-type mice, with several weekly treatment sessions. Analysis tools included an extensive behavioural, electrophysiological, biochemical, histological, proteomics and imaging (MRI) analysis. We found that SUS+MB reduces amyloid pathology and restores cognition, that BBB opening is required for amyloid clearance and that, interestingly, SUSonly is sufficient to restore cognition even in the absence of amyloid reduction. We further found that both SUS+MB and SUSonly restore deficits in long-term potentiation (LTP) and improve cognition in senescent mice via pleiotropic mechanisms potentially converging on NMDAR-dependent signalling. Quantitative SWATH proteomics and functional magnetic resonance imaging revealed that ultrasound induced long-lasting functional changes that correlate with the improvement in memory. Intriguingly, the treatment was more effective at a higher frequency (1 MHz) than at a frequency within the range currently explored in clinical trials in AD patients (286 kHz).

Extending these studies, we exposed 2-month-old APP23 mice and age-matched WT littermates to low-intensity ultrasound weekly for

8 weeks. Sham-treated mice received anaesthesia only (1% isoflurane). After the final ultrasound session, the mice were left untreated for 6 weeks, followed by spatial memory tests revealing long-term restorative effects. These studies were accompanied ex vivo sonication of brain slices.

With this insight, we have built a clinical-trial ready ultrasound device and completed a clinical trial in 12 AD patients using SUSonly, demonstrating safety and tolerability. We are currently getting ready for a follow-up trial in AD, addressing the behavioural and psychological symptoms of dementia (BPSD).

We conclude that therapeutic ultrasound is a non-invasive modality for the treatment for AD and other brain diseases. We further posit that this modality has the potential of cognition enhancement in physiological aging.



Low- intensity pulsed ultrasound elevates blood pressure for shock

Date: 11 Jul 2025 (Fri)

Time: 09:30am – 09:50am

Speaker: Prof. Rongcai Jiang, Ph.D.

Capital Medical University Xuanwu Hospital

About the Speaker

Professor Jiang is a neurosurgical critical care provider who serves as Deputy Chairman of the Department of Neurosurgery and Head of the Neurosurgical ICU at Xuanwu Hospital, Capital Medical University. He undertook medical and scientific research training at Changzheng Hospital, Navy General Hospital (both affiliated with the Second Military Medical University), and Tianjin Medical University General Hospital. He also conducted research at the MD Anderson Cancer Center. Since 2011, his focus has been on brain trauma and neurocritical care. He specializes in treating severe traumatic brain injury and patients in persistent coma. Personally, he has treated >1,500 chronic subdural hematoma (CSDH) patients (from all Chinese provinces except Taiwan, Macau, and Tibet), achieving a ~90% cure rate. He is the primary inventor of the novel "statin + corticosteroid" therapy protocol for CSDH (patent holder) and a pioneer in using cervicocephalic lymphatic drainage as adjuvant therapy for CSDH. He was the first to confirm that low-intensity pulsed ultrasound (LIPUS) could elevate circulating blood pressure during shock resuscitation.

Abstract

Hemorrhagic shock resulting from trauma is invariably life-threatening, yet emergency therapeutic options in austere environments remain severely limited. Beyond basic interventions like bandages, blood products, and blankets—which often prove inadequate—few effective field treatments exist for trauma resuscitation. This study investigates low-intensity pulsed ultrasound (LIPUS) as a novel resuscitation strategy. Cervical LIPUS stimulation effectively elevated blood pressure in shocked rats. It also improved cerebral and multiorgan perfusion. Mechanistically, LIPUS activated pathways related to sympathetic nerve excitation and vascular smooth muscle contraction, increasing plasma catecholamines and stimulating blood pressure-regulating neural nuclei. Partial sympathetic nerve transection reduced LIPUS efficacy, while complete inhibition of these nuclei abolished the response. Preliminary clinical trials demonstrated LIPUS's ability to raise blood pressure in shock patients. The findings suggest that LIPUS enhances sympathetic nerve activity and activates blood pressure-regulating nuclei, offering a noninvasive, neuromodulation-based approach to shock treatment. This method holds potential for improving blood pressure and organ perfusion in shock patients, especially in resource-limited environments.

**Plenary Talk:****Precise focused ultrasound
neuromodulation - Sunnybrook
experience**

Date: 11 Jul 2025 (Fri)

Time: 11:00am-11:30am

Speaker Prof. Kullervo Hynynen, Ph.D.
University of TorontoAbout the Speaker

Dr. Hynynen earned his Ph.D. from the University of Aberdeen in the United Kingdom and began his academic career as a faculty member at the University of Arizona. In 1993, he joined the faculty of Harvard University and Brigham and Women's Hospital in Boston. In 2006, Dr. Hynynen was appointed Senior Scientist and Director of the Physical Sciences Platform at Sunnybrook Research Institute. He assumed the role of Vice President of Research and Innovation at Sunnybrook, Toronto, Canada in January 2020. Dr. Hynynen is a Professor in the Department of Medical Biophysics at the University of Toronto, with a cross-appointment in the Institute of Biomedical Engineering (BME). He holds the Temerty Chair in Focused Ultrasound Research and serves as Co-Director of the Focused Ultrasound Centre of Excellence at Sunnybrook Health Sciences Centre. Dr. Hynynen is also the founder and Co-Executive Director of INOVAIT, a nationwide network focused on advancing the use of artificial intelligence in image-guided therapy through training, networking, and funding. With over 450 peer-reviewed publications in the field of ultrasound therapy, he is internationally recognized as a leader in both basic and clinical research. He holds approximately 30 patents or patent applications and has been awarded numerous research grants and contracts. His intellectual property has been licensed by several companies, including two he founded. Notably, the focused ultrasound technology developed by InSightec, now in clinical use for essential tremor treatments, originated from Dr. Hynynen's laboratory.

Abstract

Focused ultrasound can deliver mechanical energy to deep targets within the brain. This focused energy can alter tissue function through either thermal or mechanical interactions. The resulting ultrasound exposure can produce a wide range of neuromodulatory effects, depending on the acoustic parameters used. In this talk, we will describe our newly in-house developed, 4000-element phased array designed for brain sonications. We will also review our experience using neuromodulation for brain treatments in various preclinical disease models.



Ultrasound neuromodulation of cortical neurons via the activation of TRPC6 channels

Date: 11 Jul 2025 (Fri)

Time: 11:30am – 11:50am

Speaker: Prof. Masafumi Shimojo, Ph.D.

National Institutes for Quantum Science and Technology

About the Speaker

My research interest is to understand the pathophysiological cascade of neurological disorders represented as Alzheimer's disease. I have studied the molecular and cellular mechanisms of inflammation, circuit dysfunction, and neurodegeneration in the brain of animal models utilizing a variety of imaging modalities. Recently, I also aim to develop in vivo neuromodulation techniques for future therapeutic applications.

Abstract

Neuromodulation is a fundamental biomedical approach to directly modulate nerve activity of brain circuits by various external stimuli. Among the variety of modalities, ultrasound has recently attracted enormous attention as an advanced tool for neuromodulation due to its non-invasiveness, excellent tissue permeability, and high spatiotemporal precision. Despite the expanding utility of ultrasound in neuroscience research and clinical application, the detailed mechanisms by which ultrasound impacts the brain circuit remain uncovered. To address this crucial issue, we utilized experimental configurations that enable side-by-side assessment of neuronal activities evoked by ultrasound irradiation in cortical neuronal culture and living mouse brain, and examined the molecular and cellular basis of ultrasound neuromodulation in mammalian neurons. We first established a fluorescence microscope-based live cell imaging platform coupled with an ultrasonic transducer and

examined how ultrasound stimuli affect Ca²⁺ oscillation in mammalian neurons. In this experimental setup, we demonstrated pulsed ultrasound irradiation induced rapid Ca²⁺ transients in cultured neurons, and this neuronal response depends on extracellular Ca²⁺ influx, the generation of action potentials, and synaptic transmission. Notably, both pharmacological and genetic disruptions of TRPC6 almost completely diminished this neuronal response to ultrasound. Furthermore, *in vivo* electrophysiological analysis also consistently validated the essential role of TRPC6 transcranial ultrasound neuromodulation. Taken together, we propose a sequential mechanism in which the activation of TRPC6 triggered by acoustic pressure is one of the major pathways of ultrasound neuromodulation. Our findings provide fundamental knowledge about the molecular and cellular basis of ultrasound-mediated regulation of neuronal function for the future feasibility of safe and fine-tunable ultrasound neuromodulation.

July 9, 2025 (Wednesday)

08:00-08:30 **REGISTRATION** (outside GH201)
BREAKFAST (U Garden)

08:30-09:00 **OPENING CEREMONY** (GH201) *Chair: Prof. Lei SUN*

SESSION 1 (GH201) *Chair: Prof. Lei SUN*

Plenary Talk

09:00-09:30 **Prof. Hairong ZHENG**, Nanjing University
Acoustic Cell Engineering: manipulation and neuromodulation

Invited Talks

09:30-09:50 **Prof. Samuel PICHARDO**, University of Calgary
Tremor reduction using a multi-focus transcranial ultrasound stimulation method targeting the thalamus: Preliminary results

09:50-10:10 **Prof. Li Min CHEN**, Vanderbilt University
MRI-guided focused ultrasound neuromodulation of deep brain regions and its clinical translation

10:10-10:30 **Prof. Nima KHALIGHINEJAD**, University of Oxford
Recording and stimulating the serotonergic system in the primate brain

10:30-11:00 **TEA BREAK** (outside AG206)
DISCUSSION

July 9, 2025 (Wednesday)

SESSION 2 (GH201)

Chair: Prof. Lei SUN

Plenary Talk

- 11:00-11:30 **Prof. Shy SHOHAM**, NYU Langone Health
Deconstructing the complexity of cortical circuit stimulation by transcranial ultrasound

Invited Talks

- 11:30-11:50 **Prof. Chen HONG**, Washington University
Advancing Sonogenetics: From Engineered Ion Channels to Neural Circuit Dissection and Therapeutic Applications
- 11:50-12:10 **Prof. Zhihai QIU**, Guangdong Institute of Intelligence Science and Technology
Functional ultrasound imaging and neuromodulation at developmental stage
- 12:10-12:30 **Prof. Marcus KAISER**, University of Nottingham
FUN++: Towards personalised, closed-loop, and at-home ultrasound neuromodulation

- 12:30-14:00 **LUNCH** (U Garden)
POSTERS (Podium, FG Wing)

July 9, 2025 (Wednesday)

SESSION 3 (GH201)

Prof. Zhihai QIU

Plenary Talk

- 14:00-14:30 **Prof. Elisa E. KONOFAGOU**, *Columbia University*
Displacement-guided Neuromodulation of the Brain and Peripheral Nerves Towards Pain Treatment using Focused Ultrasound

Invited Talk

- 14:30-14:50 **Prof. Hao-Li LIU**, *National Taiwan University*
Navigation-Guided Focused Ultrasound and Its Central Nervous System Applications

14:50-15:30 **Short Talks**

Prof. Jan KUBANEK, *The University of Utah*
Causal brain mapping with focused ultrasonic waves

Prof. Hsin-Yi LAI, *Guangdong Institute of Intelligence Science and Technology*
fMRI Reveals Focused Ultrasound Neuromodulation Effects on Macaque Visual Cortex Connectivity

Prof. Martin MCKEOWN, *University of British Columbia*
Target-specific effects of LIFUS on rest and postural tremor in Parkinson's Disease

- 15:30-16:00 **TEA BREAK** (outside AG206)
DISCUSSION

July 9, 2025 (Wednesday)

SESSION 4 (GH201)

Prof. Zhihai QIU

Plenary Talk

16:00-16:30 **Prof. Elsa FOURAGNAN**, *University of Plymouth*
Improving decision-making and learning with ultrasound neuromodulation

Invited Talk

16:30-16:50 **Prof. Charlotte LUFF**, *Stanford University*
Optimized focused ultrasound for non-invasive modulation of neural activity and behavior

16:50-17:30 **Short Talks**

Prof. Weibao QIU, *Shenzhen Institutes of advanced Technology Chinese Academic of Sciences*

Novel transducers and systems for ultrasound neuromodulation: wearable, programmable, and multi-functional design

Dr. Dylan CURTIN, *University of Plymouth*

Transcranial ultrasound stimulation induces pathway-specific plasticity in the human corticospinal tract

Prof. Yuanyuan SHEN, *Shenzhen University*

Ultrasound-enhanced delivery of Urolithin A alleviated motor function in a transgenic mouse model of ALS

17:30-18:30 **POSTERS** (Podium, FG Wing)

18:30-21:30 **CONGRESS DINNER** (U GREEN)

July 10, 2025 (Thursday)

08:00-09:00 **REGISTRATION** (outside GH201)
BREAKFAST (U Garden)

SESSION 5 (GH201)

Chair: Prof. Weibao QIU

Plenary Talk

09:00-09:30 **Prof. Jean-François AUBRY**, France's National Center for
Scientific Research
*Promises and challenges of personalized transcranial
ultrasound stimulation of the fiber tracts*

Invited Talks

09:30-09:50 **Prof. Chen YANG**, Boston University
Non-genetic High precision Photoacoustic Neural Stimulation

09:50-10:10 **Prof. Andreas HERRMANN**, RWTH Aachen University
*Mechanochemical Polymer Systems enable the Activation of
Drugs, Proteins and Nucleic Acids by Ultrasound*

10:10-10:30 **Dr. Quanxiang XIAN**, The Hong Kong Polytechnic University
Advanced Sonogenetic Approaches for Neural Modulation

10:30-11:00 **TEA BREAK** (outside AG206)
DISCUSSION

11:00-12:30 **POSTER PITCH** (GH201)

12:30-14:00 **LUNCH** (U Garden)
POSTERS (Podium, FG Wing)

July 10, 2025 (Thursday)

SESSION 6 (GH201)

Chair: Prof. Hsin-Yi LAI

Plenary Talk

14:00-14:30 **Prof. Robert CHEN**, University of Toronto

Transcranial Ultrasound Stimulation for Parkinson's Disease and Movement Disorders

Invited Talk

14:30-14:50 **Prof. Til Ole BERGMANN**, Johannes Gutenberg University Medical Center

Optimizing target exposure and assessing proof of neural target engagement for transcranial ultrasonic stimulation (TUS) in humans

14:50-15:30 **Short Talks**

Prof. Hanna LU, The Chinese University of Hong Kong

A simulation study for optimizing the protocol of low-intensity hippocampal transcranial ultrasound stimulation in human participants

Prof. Chenguang ZHENG, Tianjin University

Focused Ultrasound Stimulation Targeting Circuits in Neural Disorders

Dr. Shuai LI, The Hong Kong Polytechnic University

Restoration of Locomotion in Spinal Cord-Injured Rats via Ultrasound-Driven Piezoelectric Stimulation on Spinal Neurocircuits

15:30-16:10 **TEA BREAK** (outside AG206)

DISCUSSION

July 10, 2025 (Thursday)

SESSION 7 (GH201)

Chair: Prof. Hsin-Yi LAI

Invited Talks

16:10-16:30 **Prof. Hyungmin KIM**, Korea Institute of Science and Technology

Precision Targeting in tFUS: From Image-Guided Navigation to AI-Driven Simulation

16:30-16:50 **Prof. Bradley TREEBY**, University College London

Bridging the Gap: Translational Challenges and Opportunities in Focused Ultrasound Neuromodulation

16:50-17:30 **Short Talks**

Prof. Miriam KLEIN-FLUGGE, University of Oxford

Focused ultrasound reveals causal role for human basolateral amygdala in resolving emotional ambiguity

Prof. Junfeng SUN, Shanghai Jiao Tong University

LTP/LTD-like plasticity induced by transcranial ultrasound stimulation: A comparisons study

Dr. Camila Silveira AGOSTINO, Otto-von-Guericke Universität Magdeburg

Unraveling neural circuits of error processing in humans: Effects of a multi-regional Transcranial Ultrasound Stimulation approach on behaviour and electrophysiological markers

17:30-18:30 **POSTERS** (Podium, FG Wing)

July 11, 2025 (Friday)

08:00-09:00 **REGISTRATION** (outside GH201)
BREAKFAST (U Garden)

SESSION 8 (GH201)

Chair: Dr. Quanxiang XIAN

Plenary Talk

09:00-09:30 **Prof. Jürgen GÖTZ**, *The University of Queensland*
Neuromodulatory effects of low-intensity ultrasound in amyloidosis and implications for treatment strategies in Alzheimer's disease

Invited Talk

09:30-09:50 **Prof. Rongcai JIANG**, *Capital Medical University Xuanwu Hospital*
Low- intensity pulsed ultrasound elevates blood pressure for shock

09:50-10:30 **Short Talks**

Dr. Julian KOSCIESSA, *Donders Institute for Brain, Cognition, and Behaviour*
Biasing perceptual and cognitive control with thalamic ultrasound stimulation

Prof. Georg KRANZ, *The Hong Kong Polytechnic University*
Harnessing Shock Waves: A New Approach to Psychiatric Treatment

Prof. Yuxing YAO, *The Hong Kong University of Science and Technology*
Non-invasive actuation of chemical reactions through mechanochemistry and gas vesicle proteins

July 11, 2025 (Friday)

10:30-11:00 **TEA BREAK** (outside AG206)
DISCUSSION

SESSION 9 (GH201)

Chair: Dr. Quanxiang XIAN

Plenary Talk

11:00-11:30 **Prof. Kullervo HYNYNEN**, University of Toronto
Precise focused ultrasound neuromodulation - Sunnybrook experience

Invited Talk

11:30-11:50 **Prof. Masafumi SHIMOJO**, National Institutes for Quantum Science and Technology
Ultrasound neuromodulation of cortical neurons via the activation of TRPC6 channels

11:50-12:30 **Short Talks**

Prof. Daniel KEESER, LMU Hospital
Pilot Investigation of Theta-Burst Transcranial Focused Ultrasound: Impact on Cerebral Blood Flow and Functional Connectivity in M1

Prof. Fenfang LI, Shenzhen Bay Laboratory
Distinctive and State-dependent Effects of Ultrasound on Astrocytic and Neuronal Calcium Dynamics in Mouse Cortex

Dr. Yi CHEN, University of Zurich
Optoacoustic and Magnetic Resonance Imaging of Transcranial Ultrasound Brain Stimulation

July 11, 2025 (Friday)

12:30-13:00 **CLOSING CEREMONY** (GH201)

13:00-14:00 **LUNCH** (U Garden)

14:00-18:00 **EDUCATION SESSIONS** (GH201)

Prof. Hanna LU, *The Chinese University of Hong Kong*

How to conduct an investigator-initiated clinical trial of ultrasound neuromodulation

Dr. Bin LUO, *Chinese Institute for Medical Research*

Measuring neural transmitter release during ultrasound neuromodulation

Zihao CHEN, Na LI, *The Hong Kong Polytechnic University & Guangdong Institute of Intelligence Science and Technology*

DIY an ultrasound neuromodulation set-up

Prof. Runlong WU, *Beijing Information Science and Technology University*

Imaging neural activity using mini-2P system

Dan Phillips , *Brainbox Ltd / Brainbox Initiative*

Planning and Delivering a TUS Study: A Practical Overview

Poster Program

Podium, FG Wing | 08:30-18:30, July 9-10 | 08:30-12:30, July 11

Poster Mount up 08:30 on July 9 - 12:30 on July 11

Remove after 12:30 on July 11

-
- 1201 Echoes of Precision: Chronic and Targeted Neuromodulation via Hollow Silica Nanostructures
Xuandi HOU, Jianing JING, Zhuohan SHI, Yizhou JIANG, Lei SUN
- 1202 Targeted mechanogenetics to modulate specific deep neural circuits
Xuandi HOU, Jianing JING, Zhuohan SHI, Lei SUN
- 1203 Mapping Ultrasound-Driven Neural Activity at Millisecond Resolution via Voltage Sensors
Congmin CHEN, Langzhou LIU, Yong WU, Lei SUN
- 1204 Non-invasive targeted vector delivery for spatially precise and flexible sonogenetics
Danni LI, Quanxiang XIAN, Zihao CHEN, Jinzhao XIA, Yizhou JIANG, Lei SUN
- 1205 Inhibitory-Neuron-Specific Sonogenetics for Microcircuit Modulation
Dongshuai ZHAO, Quanxiang XIAN, Yong WU, Langzhou LIU, Congmin CHEN, Yizhou JIANG, Zihao CHEN, Binghao ZHAO, Min SU, Jianing JING, Xiaohui HUANG, Zhuohan SHI, Xinyi ZHAO, Lei SUN
- 1206 Non-ion channel protein mediated sonogenetics
Yong WU, Congmin CHEN, Langzhou LIU, Yizhou JIANG, Min SU, Quanxiang XIAN, Dongshuai ZHAO, Zihao CHEN, Jinghui GUO, Lei SUN
- 1207 Effects of brain segmentation on the prediction of transcranial ultrasound modelling
Samuel PICHARDO, Ali K. ZADEH, Björn SIGURSSON, Oula PUONTU, Axel THIELSHER
- 1208 The Role of PCDH15 in Ultrasound Neuromodulation
Xinxin WANG, Jiaru HE, Zhen YUAN, Zhihai QIU**
- 1209 Ultrasound Directly Activates Sparse Neurons and Modulates Visual Circuits in Deafened Mice
Jiaru HE, Zhihai QIU
- 1210 FUS-Assisted Oxytocin Therapy for Social Dysfunction in VPA-Induced Autism Model Rats
Yujian LUO, Xiaofang LI, Boyi QU, Jiayi WAN, Lang WANG, Hsin-Yi LAI**
- 1211 Multi-scale Analysis and Modulation of Sleep
Hanming ZHEN, Zihao CHEN, Jiaru HE, Na LI, Jinzhao XIA, Jiejun ZHU, Jin YANG, Greta MOK, Zhihai QIU

- 1212 Ultrasound modulation ameliorates Rett syndrome mice hippocampal memory and rescues social ability
Xiaohui HUANG, Jie jun ZHU, Zihao CHEN, Dongming HE, Na LI, Lei SUN, Zhihai QIU**
- 1213 Hypertonic-induced ventricular deformation and its contribution in thirst perception
Tingting ZHU, Chaohua JIANG, Jiejun ZHU, Haiyun REN, Yun SHI, Zhihai QIU
- 1273 Nanobubbles for neurovascular unit network modulation
Fang YANG, Xiao WANG, Mingxi LI
- 1285 Effectiveness of transcranial pulse stimulation for major depression: Preliminary evidence for clinical response and neuroimaging mechanisms
Ping QIN
- 1287 Construction and disruption of cognitive graphs in the human hippocampus
Deng PAN
- 1288 Dual-Frequency PMUT Array Design for Neuromodulation with High Axial Resolution
Lixiang WU
- 1289 Targeted manipulation of the serotonergic system with transcranial ultrasound
Sam WINIARSKI, Nima KHALIGHINEJAD
- 1295 Comparing Spiral and EPI MR-ARFI for Low-Pressure Focus Localization During Transcranial Ultrasound
Anthony PHIPPS, Saikat SENGUPTA, Li Min CHEN, Charles CASKEY, William GRISSOM
- 1299 Mapping the brain circuit of pain modulation with transcranial ultrasound stimulation (TUS)
Sophie CLARKE
- 1300 3D localization of microbubble cavitation activity through the skull with Row-column Arrays: in silico results
Xiran CAI
- 1301 Ultrasound-enhanced delivery of Urolithin A alleviated motor function in a transgenic mouse model of ALS
Ji ZHANG, Yuanyuan SHEN, Xifei YANG, Xuancan SUN, Qingqing BAO, Keyao ZHANG, Huiqin XU, Zanhua GAO, Ting QIN
- 1302 Transcranial ultrasound stimulation of the subthalamic nucleus: An evaluation of cognitive and motor effects
Fady GIRGIS, Terra FAIRBANKS, Alan COREAS, Shhirshak SHRESTHA, Milad NAGHIZADEH, Julia KAM, Bruce PIKE, Samuel PICHARDO

- 1304 Acoustic hologram-enabled simultaneous multi-target transcranial neuromodulation
Bingbing CHENG
- 1307 Low-Intensity Transcranial Ultrasound Modulates Cerebral Hemodynamics in the Human Motor Cortex: A Pilot fNIRS Investigation
Liyuan REN, Shanbao TONG, Junfeng SUN
- 1310 LTP/LTD-like plasticity induced by transcranial ultrasound stimulation: A comparisons study
Junfeng SUN, Liyuan REN, Yi ZHANG, Zhaolin ZHAI, Xuwei QIN, Shanbao TONG, Dengtang LIU, Qiang HU
- 1311 Temporal modulation of early stage organoid differentiation using precision ultrasound stimulation
Yehhyun JO, Jinseong JEONG, Youngsun LEE, Mi-Ok LEE, Hyunjoo LEE
- 1312 Low-intensity ultrasound stimulation for Tic behavior therapeutics
Yehhyun JO, Myunghyun JEONG, Subeen KIM, Miseon KANG, Jeongyeon KIM, Hyunjoo LEE
- 1315 Amygdala tFUS Impairs Emotion Recognition via Disrupted Amygdala–IPL/IPS Connectivity
Yuanzhou WEI, Masahiko HARUN, Toshiko TANAKA, Kazuki ENOMOTO
- 1317 Editing Benzotrithiophene-Based Covalent Organic Frameworks for Developing New Sonosensitizers
Chunyuan HOU
- 1318 A Biological Channel-Inspired Ultrasound-Responsive Metabolism Nanoswitch for Unleashing Cancer Sonometabolism Therapy
Shujun FENG
- 1319 Transcranial ultrasound stimulation induces pathway-specific plasticity in the human corticospinal tract
Dylan CURTI, Juhi WALINJINKAR, Elsa FOURAGNAN, Joshua HENDRIKSE, James COXON
- 1320 Neural recording, disruption, and connectivity analyses suggest an origin for metacognition in evidence accumulation mechanisms in primate ventral prefrontal cortex
Simone D'AMBROGIO, Kentaro MIYAMOTO, Caroline HARBISON, Nicole EICHERT, Urs SCHÜFFELGEN, Andrew EMBERTON, Jerome SALLET, Roger MARS, Nima KHALIGHINEJAD, Matthew RUSHWORTH
- 1321 Wearable Focused Ultrasound Device Based on 1-3-Type Piezoelectric Composite for Non-Invasive Neural Stimulation
Jinying ZHANG, Jiacheng WANG, Chong ZHAO, Shuai XU

- 1322 The Anterior Insular Cortex Causally Encodes Outcome-Dependent Inequity in Social Valuation
Qiang ZHANG, Masahiko HARUN, Yuanzhou WEI
- 1323 Passive Photoacoustic Patch for Neuromodulation
Shisheng ZHANG, Fei GAO
- 1326 Local Field Potentials Signatures of Transcranial Ultrasound Stimulation in the Human Basal Ganglia
Ghazaleh DARMANI, Can SARICA, Hamid REMEZANPOUR, Regina ANNIROOD, Andres LOZANO, Robert CHEN
- 1328 Optimizing Ultrasonic Stimulation Protocols to Modulate Human Subgenual Anterior Cingulate Cortex Activity Using the MR-compatible CITRUS System.
Suhas VIJAYAKUMAR, King Yi CHOMaximilian LUECKEL, Carys EVANS, Lennart VERHAGEN, Holger HEWENER, Steffen TRETBAR, Eleanor MARTIN, Bradley TREEBY, Arno SCHMITGEN, Sven ARNOLD, Jonas KIELMAN, Björn SIGURÐSSON, Axel THIELSCHER, Marta JAROŠ, Jirí JAROŠ, Lena NOHAVA, Elmar LAISTLER, Christian WINDISCHBERGER, Til Ole BERGMANN
- 1331 Ultrasound Control of Genomic Regulatory Toolboxes for Cancer Immunotherapy
Yiqian WU
- 1332 Low-Intensity Transcranial Focused Ultrasound Stimulation Improves Social Interaction and Stereotyped Behavior in a boy with Autism Spectrum Disorder
Shu CHENG¹, Mo Xian CHEN^{1}, Li Juan AO^{1,2*}*
- 1333 Airy-beam Holographic Sonogenetics Enables Precise and Flexible Neuromodulation
Zhongtao HU
- 1335 Portable Ultrafast Super-resolution Imaging Platform for Ultrasonic Neuromodulation Research
Lingyin JIANG
- 1342 Low-Intensity Focused Ultrasound in Neuromodulation: From Biophysical Mechanisms to Clinical Applications
Yiqing QIAO
- 1343 Development of a Feasible Experimental Setup for Robot-Navigated Real-Time Closed-loop EEG-TUS During Sleep
Saman SEIFPOUR, Mihir NATH, Anastasiia GRIGOREVA, Julian VESTING, Anna-Lina HECKSCHER, Umair HASSAN, Friederike BREUER, Maximilian LUECKEL, Ulf ZIEMANN, Til Ole BERGMANN

- 1345 Focused Ultrasound Therapy Planning using Deep Generative Models
Agustin CONESA, Pablo VILLOSLADA, Gonzalo FERNANDEZ
- 1348 Biocompatible coupling gel for transcranial ultrasound therapy
Samuel PICHARD, Sagid DELGADO, Breanna SCHNEIDER, Jake ROCKLIFF, Janae RUZICKI, Janice LIU, Nikita HASLINGER, Parker STEPHEN, Maryam BADV, Laura CURIEL
- 1349 Distinctive and State-dependent Effects of Ultrasound on Astrocytic and Neuronal Calcium Dynamics in Mouse Cortex
Fenfang LI
- 1352 Transcranial Pulse Stimulation (TPS) in Amyotrophic Lateral Sclerosis: Results from a Pilot Study on Cortical Excitability
Gonzalo FERNANDEZ RIZZOLI, Agustin CONES, Miguel Angel RUBIO, Bernat BERTRAN, Delia CEBALLOS, Ana MARQUES, Pablo VILLOSLADA, Alba LEON
- 1353 Concurrent two-photon imaging of mouse cortical Ca²⁺ and cAMP signaling evoked by ultrasound stimulation
Chaofeng QIAO
- 1354 Pressure Distribution Variability of Single Element Transducer Insonication through Mouse Skulls-*Tom PLOVIE, Emma Lescauwaet, Robrecht Raedt, Kristl Vonck, Paul Boon, Emmeric Tanghe, Thomas Tarnaud*
- 1357 PRESTUS – An open-source toolbox for imaging-based ultrasound simulations
Julian KOSCIESSA
- 1360 Effects of transcranial ultrasound stimulation on cortical-cortical connectivity
Xue XIA, Zhen WANG, Ke ZENG, Jean-François NANKOO, Robert CHEN
- 1361 Targeted Hippocampal Ultrasound-Brain-Computer Interface for Seizure Intervention
Qiyang LI
- 1362 Improving the intramembrane cavitation model for morphologically realistic neuron simulations
Joaquin GAZQUEZ, Thomas TARNAUD, Emmeric TANGHE, Wout JOSEPH
- 1363 Optimizing transducer placement for transcranial ultrasonic stimulation of specific thalamic nuclei
Anastasiia GRIGROEVA, Maximilian LUECKEL, Friederike BREUER, Saman SEIFPOUR, Suhas VIJAYAKUMAR, Ulf ZIEMANN, Til Ole BERGMANN

- 1364 Optimizing MRI-Derived Pseudo-CT Generation for Accurate Skull Modeling in Acoustic Simulations: An Ex-Vivo Comparative Study
Vasudev DEVULAPALLY, Marie WOLF, Bartulovic BARTOL, Petra SEYFARTH, Filip PAVLAS, Elisabeth GOLDHOFER, Heiko KARLE, Suhas VIJAYAKUMAR, Michael SCHMEISSER, Til Ole BERGMANN
- 1365 Assessing Motor Cortical Excitability Using Concurrent Transcranial Ultrasonic and Magnetic Stimulation
Bartol BARTULOVIC, Suhas VIJAYAKUMAR, Tulika NANDI, Melissa NULL, Stella PETKOVIC, Til Ole BERGMANN
- 1366 Investigating the role of human pgACC in cost-benefit decision-making using transcranial ultrasound stimulation (TUS)
Maja FRIEDEMANN, Naomi KINGSTON, Rong BI, Tim DEN BOER, Yongling LIN, Shujun YANG, Johannes ALGERMISSEN, Marco WITTMANN, Laurence HUNT, Lilian WEBER, Miriam KLEIN-FLÜGGE
- 1367 PlanTUS: An open-source tool for prospective planning of individual transcranial ultrasound transducer placements
Maximilian LUECKEL, Suhas VIJAYAKUMAR, Til Ole BERGMANN
- 1368 Row-Column Array based Rat Brain 3-D Ultrasound Localization Microscopy and Focused Ultrasound Transducer for Therapeutic Application
Jiyan DAI
- 1370 AI-enabled real-time prediction of acoustic pressure fields for transcranial focused ultrasound with a multi-element transducer array
Kyuheon LEE, Tae Young PARK, Wonhye LEE, Sang-Hoon YEO, Byoung-Kyong MIN, Hyungmin KIM
- 1371 Ultrasound Neuromodulation of the Human Basal Forebrain: A Multimodal Approach
Saman SEIFPOUR, Maximilian LUECKEL, Anna-Lina HECKSCHER, Julian VESTING, Til Ole BERGMANN
- 1372 Cognitive performance after prolonged theta-burst focused ultrasound stimulation of the cerebellum
Mohammad ALKHAWASHKI
- 1373 Pilot behavioral effects of 5 Hz vs 10 Hz transcranial ultrasound stimulation of the globus pallidus internus in Parkinsonian patients
Regina ANNIROOD, Hamidreza RAMEZANPOUR*, Ghazaleh DARMANI*, Can SARICA*, Amitabh BHATTACHARYA, Talyta GRIPPE, Marcus CALLISTER, Ke ZENG, Douglas CHEYENE, William HUTCHISON, Samuel PICHARDO, Andres M. LOZANO, Robert CHEN*


- 1374 Non-invasive actuation of chemical reactions through mechanochemistry and gas vesicle proteins
Yuxing YAO
- 1375 Quantitative assessment of local geometric distortions on structural magnetic resonance images in MR-guided focused ultrasound thalamotomy
Dae-Hyuk KWON, Hyung Ham KIM, Ho Sung MYEONG, Eun Jung LEE, Hye Ran PARK, Young Don SON, Sun Ha PAEK
- 1376 GPU Acceleration of Acoustic Field Propagator for Homogeneous and Heterogeneous Media with Nonlinear Wave Propagation
Jiri JAROS, Ben COX, Bradley TREEBY, Martin LUDVIK
- 1377 Astrocyte-Neuron Interactions as a Target of Ultrasonic Neurostimulation for Social Behaviors via Astrocytic TRPA1 Activation
Ling WANG, Ganjiang WEI, Jiajia YANG, Chenguang ZHENG
- 1378 White noise masking during transcranial ultrasound stimulation of human S1 and VPL: protocol and first data
Nina UHLE, Niklas KRONER-WEIGL, Andreas EGER, Till HANDEL, Jonas KIELMANN, Arno SCHMITGEN, Alexandra FAKHRI, Steffen TRETBAR, Andreas MELZER, Arno VILLRINGER
- 1380 Ultrasound-Mediated Neuromodulation: A New Strategy for Enhancing Forelimb Recovery After Cervical Cord Injury in Rats
Shuai LI, Rakib Uddin AHMED, Monzurul ALAM, Poonima PALANISAMY, Yong Ping ZHENG
- 1382 Causally dissociating appetitive and aversive learning in human subcortex with TUS
Eleonora CARPINO, Miriam KLEIN-FLUGGE, Elsa FOURAGNAN
- 1383 Wireless wearable multi-target ultrasound brain stimulation system
Guofeng LI, Runyu ZHANG
- 1402 Holographic All-Hydrogel lens for Transcranial Ultrasound Neuromodulation: a Preliminary Ex Vivo Evaluation.
Qiuchen ZHU, Jieqiong YANG, Jingxian WANG, Xin LIU
- 1411 Ultrasound-driven piezoelectret-based nanogenerator stimulates vagus nerve for the treatment of myocardial infarction
Lufang WANG, Qiaofeng JIN, Li ZHANG
- 1417 Transcranial ultrasound stimulation in neuromodulation: a bibliometric analysis from 2004 to 2024
Jingxuan WANG

- 1418 Transcranial ultrasound stimulation parameters for neurological diseases: a systematic review
Jingxuan WANG
- 1425 Simulator Software for MR-ARFI Sequence Optimization
Bernardo CAMPILHO, Shota HODONO, Michael WOLETZ, Holger HEWENER, Steffen TRETBAR, David NORRIS, Christian WINDISCHBERGER
- 1426 Cerebellar transcranial focused ultrasound for primary orthostatic tremor
Sumayya MUSTAFA, Jean-François NANKOO, Amitabh BHATTACHARYA, Talyta CORTEZ GRIPPE, Massimo PASCUZZI, Nika SAJADI NAEINI, Negar NASRKHANI, Avin SHARMA, Nasem RAIES, Ghazaleh DARMANI, Can SARICAa, Neil DRUMMOND, Andres LOZANOo, Robert CHEN
- 1428 Investigating the effects of cerebellar transcranial focused ultrasound on the motor cortex intracortical circuits
Jean-Francois NANKOO
- 1430 A real-time visualization system of ultrasound focus for neuromodulation in medium- to large-animal models
Dong-Guk PAENG, Junbin KO, Changsoo KIM
- 1441 Enhanced k-Wave Simulations for Focused Ultrasound Therapy: A Pruned FFT Approach
Ondrej OLSAK, Jiri JAROS
- 1446 Investigating axonal responses to ultrasound neuromodulation in vivo
Elena VICARI, Théo LEMAIRE, Thomas TARNAUD, Outman AKOUISSI, Olivier RIZZO, Tom PLOVIE, Bruno RODRIGUEZ-MEANA, Nicholas JAMES, Gregoire COURTINE, Emmeric TANGHE, Esra NEUFELD, Silvestro MICERA

My Notes

A series of horizontal blue lines for writing notes, with a vertical purple line on the left side.

My Notes



A series of horizontal blue lines for writing notes, starting from the top of the page and extending down to the bottom. The lines are evenly spaced and cover the majority of the page width.



©The 6th Focused Ultrasound Neuromodulation (FUN25) Conference.
All Rights Reserved.