

ANNA WANG ROE

Zhejiang University Interdisciplinary
Institute of Neuroscience and Technology (ZIINT)
KeXueLou Rm 205, Huajiachi Campus, Zhejiang University
268 KaiXuan Road, Hangzhou, China 310029
<http://www.ziint.zju.edu.cn/en/index.asp>
Email: annawang@zju.edu.cn
(First, Middle: Anna Wang, Last: **Roe**); Citizenship: US

EDUCATION and POSITIONS

- 4/15 – present Zhejiang University Hangzhou, China
Director and Professor of Interdisciplinary Institute of Neuroscience and Technology (ZIINT),
School of Medicine, Zhejiang University
Director of Zhejiang University 7T Brain Imaging Research Center
Professor of Neuroscience at Zhejiang University School of Medicine
Professor of Biomedical Engineering at Key Laboratory of Biomedical Engineering of Ministry
of Education, College of Biomedical Engineering and Instrument Science
Professor of Clinical Neurosurgery at Zhejiang University Second Hospital
- 9/15 – 8/20 Oregon Health Sciences University Portland, OR
Professor in Division of Neuroscience, Oregon National Primate Research Center (ONPRC)
Professor in Department of Behavioral Neuroscience, OHSU
- 7/10 – 8/15 Vanderbilt University Nashville, TN
Professor in Department of Psychology
Professor in Dept of Radiology (secondary appointment).
Professor in Biomedical Engineering (secondary appointment).
Fellow of Vanderbilt University Institute of Imaging Sciences
- 2/12 – 7/12 Institute of Neuroscience, Chinese Academy of Sciences Shanghai, China
Visiting Scholar (sabbatical)
- 9/03 – 6/10 Vanderbilt University Nashville, TN
Associate Professor (tenured) in Department of Psychology.
Associate Prof in Dept of Radiology (secondary appointment).
Associate Prof in Biomedical Engineering (secondary appointment).
- 7/02 – 8/03 Yale University School of Medicine New Haven, CT
Associate Professor (tenure track) in Department of Neurobiology.
- 9/96 – 6/02 Yale University School of Medicine New Haven, CT
Assistant Professor (tenure track) in Section of Neurobiology.
- 3/96 - 8/96 University of Queensland Brisbane, Australia
Visiting Scholar at Vision Touch & Hearing Research Center.
- 7/95 - 2/96 Baylor College of Medicine Houston, TX
Research Assistant Professor (non-tenure track) in Division of Neuroscience.
- 12/92 - 6/95 Baylor College of Medicine Houston, TX
Post-doctoral fellow in Division of Neuroscience under Dr. Daniel Y. Ts'o.
- 6/91 - 11/92 Rockefeller University New York, NY
Post-doctoral fellow in Dept. of Neurobiology under Dr. Daniel Y. Ts'o & Torsten Wiesel.
- 9/86 – 5/91 M.I.T. Cambridge, MA
Ph.D. program in Dept. of Brain and Cognitive Sciences. (Thesis under Dr. Mriganka Sur)
- 9/85 – 8/86 Yale University New Haven, CT
Doctoral program in Section in Neuroanatomy (lab moved to MIT).
- 9/84 – 6/85 Harvard University Boston, MA
Doctoral program in Program in Neuroscience (transferred to Yale).

RESEARCH HISTORY

My research interests are driven by the question of how the organization of the brain produces behavior. My academic travels began at Harvard where studies in mathematics quickly drove me to study the brain. At MIT, under Mriganka Sur, my doctoral work on the 'rewired ferret' preparation is now part of neuroscience textbook curricula on brain development. In 1991, I joined the group of Nobel Laureate Torsten Wiesel at Rockefeller University and helped to develop intrinsic signal optical imaging methods for mapping basic submillimeter (mesoscale) units of brain function in anesthetized monkeys. In 1996, I joined Yale as a junior faculty in Pasko Rakic's department where the Packard Foundation Engineering Fellowship gave me support to develop methods for watching, in real time through windows on the brain in behaving monkeys, arrays of basic submillimeter (mesoscale) cortical modules. This then launched a series of studies on comparisons of how the brain's modules process simple visual feature information (such as color, form, motion, and depth) vs categorical visual information, and led to hypotheses about the fundamental modular layout of the brain. These questions pushed me to develop, at Vanderbilt, MRI technologies to understand mesoscale organizations at whole brain scale, giving me glimpses of how mesoscale units were behaving in systematic and cooperative fashion across multiple brain areas. Lacking a method to study networks of mesoscale units systematically, I developed focal stimulation (electrical, optogenetic, and infrared neural stimulation) and ultrahigh field imaging methods. Needless to say, consistently, interdisciplinary interactions have been at the root of scientific discovery and technological breakthroughs. This fundamental theme marks every phase of my scientific, technological, and administrative evolution and is at the core of my views on scientific education.

CURRENT RESEARCH

My current primary research project is the establishment of a mesoscale functional connectome (study of all brain connections) in the Macaque monkey. This project aims to understand the brain architecture underlying primate intelligent behavior. My hypothesis is that there is a one-to-one mapping of mesoscale networks to behaviors. Understanding the organization of these networks unlocks how our brain systematically organizes our behavioral repertoire. This is a new view of brain organization, one which is not based on topographic organization of areas but on topographic organization of networks. I currently focus is on understanding networks underlying primate-specific visual foveolar behavior, which directs motor, cognitive, limbic networks such as those for fine manual manipulation and social communication. The method I developed for these studies is a novel brain network mapping technology INS-fMRI (2019 top 10 medical technologies in China) which generates mesoscale functional circuits in the brain *in vivo*, at high resolution, rapidly, and systematically. This has finally permitted me to pursue a fundamental and theoretical pursuit. My hypothesis about brain architecture is that it contains a great deal of regularity comprising repeating brainwide network motifs. Since such motifs are simply classes of topological relationships, they can be captured mathematically, forming a set of basis vectors for human behavior. This work addresses the heart of AI and will lead to a *Theory of Brain*.

BRIEF SYNOPSIS OF 2015-2022

In 2014, I made a proposal to build an interdisciplinary brain research institute at Zhejiang University (ranked 42nd in the world, 3rd in China, tops in engineering and medicine). The university enthusiastically supported this proposal and seeded with a \$25 million investment, an amount at the time was the largest yet in Chinese universities. Over the past several years, I have built a successful Institute of Neuroscience and Technology at Zhejiang University (www.ziint.zju.edu.cn). The funds were used to construct The Science Building (comprising a nonhuman primate facility for up to 200 macaques and marmosets, 2-photon and 3-photon facility, and 15 labs) and The Zhejiang University MRI Center of which I am director (comprising a Siemens 7T MRI, electronics lab for constructing custom multi-array RF coils, psychophysics lab with 64 ch eeg). As the first successful 7T MRI center in China, we run both animal and clinical research projects and devote significant time to MR technology development. I also

hired 15 PIs with different neuroscience and engineering backgrounds and a dozen administrative staff. In our research laboratories, over 80 graduate students from both biological and engineering backgrounds work on interdisciplinary projects, something rather unique in China. While each lab is independent, flexibly assembled teams are formed for specific projects. Thus, the institute has been a true pioneer with respect to scientific, engineering, educational, clinical and administrative accomplishments.

PUBLICATIONS

PEER-REVIEWED PUBLICATIONS

Under Review

- Ping A, Li LH, Xu AG, ..., Zhang XT, García-Cabezas MA, Gothard K, **Roe AW** (2023) Brainwide Networks Revealed at Mesoscale by Optical Stimulation of the Amygdala in Macaques. *Under review*.
- Fu P*, Liu Y*, Zhu L, Wang M, Zhang W, Zhang H, **Roe AW****, Xi W** (2023) Two-photon Imaging of GABAergic and Non-GABAergic Neuronal Activity Induced by Infrared Neural Stimulation in Awake Mouse Cortex. *Under review*.
- Qian MJ*, Wang JB*, Gao Y, Zhou DF, Liu Y, Zhang XT**, Hu JM**, **Roe AW**** (2022) Multiple foveolar representations in awake macaque monkey imaged in 7T MRI. *Under review*.
- Tian FY, Zhang Y, Hu JM, Schriver KE, **Roe AW** (2023) A novel interface for cortical columnar neuromodulation with multi-point infrared neural stimulation. *Under review*.
- Wang JB, ..., **Roe AW** (2023) Mesoscale organization of ventral and dorsal visual pathways in macaque monkey revealed by 7T fMRI. *Under review*.

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- Roe AW** (2023) BMI 2.0: Towards a technological interface with brainwide networks. *Neuron*, 111(11):1687-1688. doi: 10.1016/j.neuron.2023.05.012. [18.688]
- Pan L*, Ping A, Schriver KE, **Roe AW****, Zhu JM**, Xu KD** (2023) Infrared neural stimulation in human cerebral cortex. *Brain Stimulation*, S1935-861X(23)01680-7. <https://doi.org/10.1016/j.brs.2023.01.1678>. [8.955]
- Yao SP*, Shi S*, Zhou Q, Wang J, Du Xiao, Takahata T**, **Roe AW**** (2023) Functional topography of mesoscale pulvinar-visual cortex networks in the macaque monkey revealed with INS-fMRI. *J Comp Neurol*, 531(6):681-700. DOI: 10.1002/cne.25456. [3.215]
- Zhang Y, Hu JM**, Schriver KE**, **Roe AW**** (2023) Spatial frequency representation in V2 and V4 of macaque monkey. *Elife*, 12:e81794. doi: 10.7554/eLife.81794 [8.713]
- Lou F, Tang X, Quan Z, Qian MZ, Wang JB, Qu S, Gao Y, Wang YM, Pan G, Lai H-Y, **Roe, AW**, Zhang X (2023) A 16-channel loop array for in vivo macaque whole-brain imaging at 7T. *MRI*, 102:179-183. <https://doi.org/10.1016/j.mri.2023.06.014>. [2.81]
- Li X-Y, Xie J-J, Wang J-H, Bao Y-F, Dong Y, Gao B, Shen T, Huang P-Y, Ying H-C, Xu H, **Roe AW**, Lai H-Y, Wu Z-Y (2023) Perivascular spaces relate to the course and cognition of Huntington's disease.. *Translational Neurodegeneration*, 12(1):30. doi: 10.1186/s40035-023-00359-9. [9.883]
- Qu S, Shi S, Quan Z, Gao Y, Zhang S, Pan Gang, Wang YM, Lai H-Y*, **Roe AW***, Zhang X* (2023) Design and application of a multimodality-compatible 1Tx/6Rx RF coil for monkey brain MRI at 7T. *Neuroimage*, 276:120185. doi: 10.1016/j.neuroimage.2023.120185. [7.4]

Hartig R, Klink C, Polyakova Z, ..., **Roe AW**, ..., Basso M, Petkov C, Mitchell AS (2023) A framework and resource for global collaboration in non-human primate neuroscience. Curr Research Neurobiol, 4:100079. <https://doi.org/10.1016/j.crneur.2023.100079>. [6.267]

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Hu JM, **Roe AW** (2022) Functionally specific and sparse domain-based micro-networks in monkey V1 and V2. Curr Biol, 32(13):2797-2809.e3. [IF 10.9]

Roe AW (2022) Neuromorphic model of human intelligence: Brain Neuromorphics Needs An Architectural Framework. IEEE BrainInsight (<https://brain.ieee.org/publications/braininsight/>). Dec 2022. *Viewpoint*.

Zaraza D*, Chernov MM*, Yang Y, Rogers JA, **Roe AW****, Friedman RM** (2022) Head mounted optical imaging and stimulation system for use in behaving primates. Cell Reports Methods, 2(12):1-13. <https://doi.org/10.1016/j.crmeth.2022.100351>. [IF 9.995]

Zhu L, Wang M, Fu P, Liu Y, Zhang H, **Roe AW****, Xi W** (2022) Precision 1070 nm Ultrafast Laser-Induced Photothrombosis of Depth-Targeted Vessels In Vivo. Small Methods. 7(1):e2200917. doi: 10.1002/smt.202200917. [15.637]

Mir Y, Zalányi L, Pálfi E, Ashaber M, **Roe AW**, Friedman RM, Négyessy L (2022) Modular organization of signal transmission in primate somatosensory cortex. Frontiers in Neurosci, 16:915238. [5.15]

Du X*, Jiang X*, Kuriki I, Zhou T, **Roe AW****, Tanigawa H** (2022) Representation of Cone-Opponent Color Space in Macaque Early Visual Cortices. Frontiers in Neurosci, 16:891247. [5.15]

Wang JB, Nasr S, **Roe AW****, Polimeni JR** (2022) Critical factors in achieving submillimeter-resolution MRI imaging: removing sources of inadvertent spatial smoothing. Human Brain Mapping, 43(11):3311-3331. [IF 5.04]

Zhang H*, Fu P*, Liu Y*, Zheng Z, Zhu L, Wang M, Abdellah M, He M, Qian J, **Roe AW****, Xi W** (2022) Large-depth three-photon fluorescence microscopy imaging of cortical microvasculature on nonhuman primates with bright AIE probe *In vivo*. Biomaterials. 289:121809. doi.org/10.1016/j.biomaterials.2022.121809. [IF 15.304]

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Xie J-J, Li X-Y, Dong Y, Chen C, Qu BY, Wang S, Xu H, **Roe AW****, Lai H-Y**, Wu Z-Y** (2022) Local and Global Abnormalities in Pre-symptomatic Huntington's Disease Revealed by 7T Resting-state Functional MRI. Neurosci Bull. 39(1):94-98. doi: 10.1007/s12264-022-00943-5. [IF 5.203]

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Zhang X, Zhang Y, **Roe AW** (2021) Ultra-high-field MRI studies of brain structure and function in humans and non-human primates: a collaborative approach to precision medicine. Curr Opin BME 20:100320. <https://doi.org/10.1016/j.cobme.2021.100320>. *Review & Viewpoint*. [4.16]

Chernov M, Friedman RM, **Roe AW** (2021) A fiberoptic array for multi channel infrared neural stimulation of the brain. Neurophotonics, 8(2):025005. doi: 10.1117/1.NPh.8.2.025005. [4.212]

Klink PC, ..., **Roe AW**, ...Petkov CI (2021) Combined Brain Perturbation and Neuroimaging in Non-human Primates. Neuroimage, 235: 118017. doi: 10.1016/j.neuroimage.2021.118017. [PMID 33794355] [7.12]

Shi S*, Xu AG*, Rui YY, Romanski LM, Gothard KM, **Roe AW**** (2021) Infrared neural stimulation with 7T fMRI: a rapid *in vivo* method for mapping cortical connections of primate amygdala. Neuroimage, 231, 117818. 2021 Feb 3;117818. doi: 10.1016/j.neuroimage.2021.117818. [PMID 33548458] [7.12]

Zhang X*,**, Zhang J*, Gao Y*, Qian M*, Qu S, Quan Z, Yu M, Chen X, Wang Y**, Pan G, Adriany G, **Roe AW** (2021) A 16-channel Dense Array for in vivo Animal Cortical MRI/fMRI on 7T Human Scanners. IEEE Trans Biomed Eng. 68(5):1611-1618. doi:10.1109/TBME.2020.3027296. [PMID 32991277] [4.538]

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Hu J*, Song XM, Wang Q, **Roe AW**** (2020) Curvature domains in V4 of Macaque Monkey. Elife. 9:e57261. doi: 10.7554/eLife.57261. [PMC7707819][PMID 33211004] [7.08]

Friedman RM*, Chehade NG, **Roe AW**, Gharbawie OA** (2020) Optical imaging reveals functional domains in primate sensorimotor cortex. Neuroimage, 221:117188. doi: 10.1016/j.neuroimage.2020.117188. [PMID 32711067][PMC 7841645] [6.076]

Hu J*, Qian M, Tanigawa H, Song XM, **Roe AW**** (2020) Focal electrical stimulation of cortical functional networks. Cerebral Cortex. bhaa136, <https://doi.org/10.1093/cercor/bhaa136>. [PMID 32483588] [4.98]

Gao Y*, Mareyam A, Sun Y, Witzel T, Arango N, Kuang I, White J, **Roe AW**, Wald L, Stockmann J**, Zhang XT** (2020) A 16-Channel AC/DC array coil for anesthetized monkey whole-brain imaging at 7T. Neuroimage. 207:116396. [PMC: 7309650] [PMID: 31778818] [6.076]

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Roe AW**, Chen G, Xu AG, Hu JM (2020) A roadmap to a columnar visual cortical prosthetic. Curr Opin Physiol, 16:68–78. <https://doi.org/10.1016/j.cophys.2020.06.009> *Review & Viewpoint*. [2.283]

Zhang Y*, Yao L, Yang F, Yang S, Edathodathil A, Xi W, **Roe AW****, Li P** (2020) INS-fOCT: a label-free, all-optical method for simultaneously manipulating and mapping brain function. Neurophotonics. 7(1), 015014, doi: 10.1117/1.NPh.7.1.015014. [PMC 7108754][PMID 32258220] [3.593]

Cai ZC, Zhu L, Wang MQ, **Roe AW****, Xi W**, Qian J** (2020) NIR-II fluorescence microscopic imaging in non-human primates. Theranostics. 10(9):4265-4276. doi:10.7150/thno.43533. [PMC: 7086344] [PMID: 32226552][IF 11.556]

Friedman RM*, Morone K, Gharbawie OA, **Roe AW**** (2020) Mapping mesoscale cortical connectivity in monkey sensorimotor cortex with optical imaging and microstimulation. J Comp Neurol. 528(17):3095-3107. doi:10.1002/cne.24918. [PMC 7541397][PMID: 32255200] *Cover figure*. [3.215]

Ashaber M, Zalányi L, Pálfi E, Stuber I, Kovács T, Friedman RM, **Roe AW**, Négyessy L (2020) Synaptic organization of cortico-cortical communication in primate somatosensory cortex. Eur J Neurosci, 52(9):4037-4056. doi: 10.1111/ejn.14905. [PMID: 32654301] [3.386]

Song XM*, Li M, Xu T, Hu D, **Roe AW**** (2020) Precise targeting of single microelectrodes to orientation pinwheel centers. Bio-Protoc, 10(11): e3643. doi:10.21769/BioProtoc.3643. [PMID 33659313] [5.78]

Quan QY*, Gao Y, Qu SX, Wang XJ, Friedman RM, Chernov M, Kroenke C, **Roe AW**, Zhang XT** (2020) A 16-Channel Loop Array for in vivo Macaque Multi-modal Neuroimaging at 3T MRI. MRI. 68:167-172. [PMC 7784245] [PMID: 32081631] [2.247]

Milham MP*, Petkov CI*, Margulies DS, Schroeder CE, ..., **Roe AW**, ... (2020) Accelerating the evolution of nonhuman primate neuroimaging: The PRIMatE Data Exchange (PRIME-DE) Global Collaboration Workshop & Consortium. Neuron. 105(4):600-603. <https://doi.org/10.1016/j.neuron.2019.12.023> [PMID: 32078795] [10.569]

Mekbib DW*, Han JW, Zhang L, Fang S, Jiang HJ, Zhu JM, **Roe AW****, Xu DR** (2020) Virtual reality therapy for upper limb rehabilitation in patients with stroke: a meta-analysis of randomized clinical trials. Brain Injury. 34(4):456-465. [PMID: 32064964] [1.837]

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Roe AW (2019) Columnar connectome: towards a mathematics of brain function. Network Neuroscience 3(3):779-791. doi.org/10.1162/netn_a_00088 . [PMC: 6663318][PMID: 31410379] [4.07]

Li M*, Song XM*, Xu T, Hu D*, **Roe AW****, Li C-Y** (2019) Subdomains within orientation columns of primary visual cortex Science Advances, 5(6):eaaw0807. doi: 10.1126/sciadv.aaw0807. [**co-first author, *co-corresponding] [PMC: 6551190][PMID: 31183405] [13.117]

Xu AG*, Qian M*, Tian F, Xu B, Friedman RM, Wang J, Song X, Sun Y, Chernov MM, Cayce JM, Jansen ED, Mahadevan-Jansen A, Zhang XT**, Chen G**, **Roe AW**** (2019) Focal infrared neural stimulation with high-field functional MRI: a rapid way to map mesoscale brain connections. Science Advances, 5(4):eaau7046 DOI: 10.1126/sciadv.aau7046. [PMC: 6482007][PMID: 31032400] [13.117]

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Pálfi E, Zalányi L, Ashaber M, Palmer C, Kántor O, **Roe AW**, Friedman RM, Négyessy L (2018) Connectivity of neuronal populations within and between areas of primate somatosensory cortex. Brain Struct Funct. 223(6):2949-2971. doi: 10.1007/s00429-018-1671-8 [PMID: 29725759] [3.739]

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CONFERENCE & SYMPOSIUM ORGANIZER

CONFERENCE ORGANIZER

- Roe AW (2023) Conference organizer. Prime-De Nonhuman Primate Consortium 2023. July 2023. Montreal, Canada.
- Roe AW (2020) Conference organizer. Gordon Research Conference on Neuroplasticity of Sensory Systems. June 7-12, 2020. Hong Kong [cancelled due to coronavirus]
- Roe AW (2018) Conference organizer. Asia-Pacific Conference on Vision. July 13-16, 2018. Hangzhou, China.
- Roe AW (2018) Conference organizer. Gordon Research Conference on Neuroplasticity of Sensory Systems. June 3-8, 2018. Hong Kong
- Roe AW (2017) Conference organizer. Frontiers in Neuroscience & Technology 2017: Sensation & Emotions. Oct 28-Nov 3, 2017. Hangzhou, China.
- Roe AW (2017) Retreat organizer. ZIINT Annual Retreat. Sept 21-22, 2017. Hangzhou, China.
- Roe AW (2017) Conference organizer. Asia-Pacific Workshop on Advances in UHF MRI. May 2-3, 2017. Hangzhou, China.
- Roe AW (2016) Conference organizer. West Lake Ultrahigh Field Conference. Dec 10, 2016. Hangzhou, China.
- Roe AW (2016) Conference organizer. Frontiers in Neuroscience and Technology 2016: Audition. Sept 24-25, 2016. Hangzhou, China.
- Roe AW (2015) Conference organizer. Frontiers in Neuroscience and Technology 2015. Hangzhou, China.

SYMPOSIUM ORGANIZER

- Roe AW (2023) Symposium Organizer. Combining human and animal studies for planning, interpretation, and modeling of mesoscale fMRI. Organization for Human Brain Mapping. Montreal, Canada.
- Roe AW (2023) Program Organizer: Optogenetics and Optical Manipulation. SPIE Photonics West. San Francisco CA.
- Roe AW (2021) Topic Area Leader. "Circuit-Level Perturbations: Methods and Applications." Global Collaboration Workshop, Prime-DE. April 12-14. Online.
- Roe AW (2021) Program organizer. Neurophotonics. SPIE Photonics West. Online.
- Roe AW (2020) Program organizer: Neurophotonics. SPIE Photonics West, San Francisco CA.
- Roe AW (2020) Program organizer: Neurophotonics. SPIE Photonics West, San Francisco CA.
- Roe AW (2019) Co-organizer. Neuroimaging Techniques: from a single cell to the whole brain. 2019 CNS Meeting, Suzhou, China.
- Roe AW (2019) Co-organizer. 2019 Annual ONPRC Scientific Symposium. ONPRC, OHSU. Beaverton, OR.
- Roe AW (2018) Panelist. The Marmoset Social. Soc Neurosci Meeting. San Diego CA.
- Roe AW (2018) Symposium organizer. Asia Communications and Photonics Conference (ACP). Oct 26-29, 2018. Hangzhou, China.
- Roe AW (2018) Symposium organizer. Multisensory processing. Asia-Pacific Conference on Vision. July 13-16, 2018. Hangzhou, China.
- Roe AW (2018) Symposium organizer. Binocular depth perception. Asia-Pacific Conference on Vision. July 13-16, 2018. Hangzhou, China.
- Roe AW (2016) Symposium organizer on Primate Cognition. EMBO Conference 2016. Taipei, Taiwan.
- Roe AW (2015) Program organizer: Neurophotonics. SPIE Photonics West, San Francisco CA.
- Roe AW (2014) Program organizer: Neurophotonics. SPIE Photonics West, San Francisco CA.
- Roe AW, Usuda Adachi, Wim Vanduffel, Bas Neggens (2013) Chair and organizer: Resting state connectivity: views from nonhuman primates. Organization for Human Brain Mapping, Seattle, WA.
- Roe AW (2012) Chair and organizer: Primate optogenetics nanosymposium. Soc Neurosci Meeting, New Orleans, LA.
- Roe AW (2011) Chair and organizer: Spatiotemporal profiles of cortical processing: a view from optical imaging studies in awake, behaving nonhuman primates, International Brain Research Organization Meeting, Florence, Italy.
- Roe AW (2010) Symposium organizer. Symposium on Visual Function and Neuroimage/fMRI. Fourth Shanghai International Conference on Biophysics and Molecular Biology. Shanghai, China.
- Roe AW (symposium organizer), Romo R, Hsiao S, Kaas J (2010) The power of touch. Current Issues In Developmental Psychobiology Manzaillo, Mexico.
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- Roe AW, Schwartz A, Meyer U, Rotter S (2000) Neural Prostheses (Organizer). German-American Frontiers of Science Symposium. Irvine, CA.
- Roe AW, Kaas JH, Recanzone GG, Hahn J, Montague PR (1994) (organizer) New views of cerebral cortical topography: discontinuities, non-topographies, and time-varying topographies. Winter Conference on Brain Research, Snowbird, Utah.

RECENT CONFERENCES (2019-2023)

- Wang JB, Yao S, Du X, Li L, **Roe AW** (2023) Mesoscale functional architecture in macaque visual ventral and dorsal pathways revealed by 7T fMRI. Organization for Human Brain Mapping 2023. Montreal, Canada.
- Qian MZ, Wang JB, Gao Y, Liu Y, Zhang X, Hu JM, **Roe AW** (2023) Cortical Specialization for Foveolar Vision in Macaque Monkey. Organization for Human Brain Mapping 2023. Montreal, Canada.
- Zhang Y, Liu Y, Schriver KE, **Roe AW** (2023) Multi-channel infrared neural stimulation with fMRI for brain connectome study. Organization for Human Brain Mapping 2023. Montreal, Canada.
- Roe AW** (2023) **Symposium speaker**. Combining optical stimulation and high-resolution functional MRI in primates for mapping brain-wide mesoscale and laminar networks. Organization for Human Brain Mapping. Montreal, Canada.
- Roe AW** (2023) **Invited speaker**. My travels in mesoscale cortical architecture. Conference on Cortical Plasticity and Dynamics. MIT, Cambridge, MA.
- Roe AW** (2023) **Invited speaker**. Mapping Mesoscale Neural Circuits for Clinical Diagnosis and Intervention. Siemens Healthineers Clinical Ultrahigh Field Meeting. Shanghai, China.
- Roe AW** (2023) **Invited speaker**. Understanding intelligence brain architecture through INS-fMRI. Seminar on MRI/fMRI in macaques. Kunming Institute of Zoology, Kunming, China.
- Fu P*, Liu Y*, Zhu L, Wang M, Zhang W, Zhang H, **Roe AW****, Xi W** (2023) Two-photon Imaging of GABAergic and Non-GABAergic Neuronal Activity Induced by Infrared Neural Stimulation in Awake Mouse Cortex. SPIE Photonics West 2023, San Francisco, CA.
- Li P*, Ping A, **Roe AW****, Zhu JM**, Xu KD** (2023) Infrared neural stimulation in human cerebral cortex. SPIE Photonics West 2023, San Francisco, CA.
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- Qian M, Wang J. Liu Y, Hu J, Zhang X, **Roe AW** (2022) Multiple foveolar representation in awake macaque monkey imaged in 7T fMRI. Soc Neurosci Abstr, San Diego CA.
- Li L-H, Ping A, **Roe AW** (2022) Brain-wide connections of nucleus CE in primate using 7T fMRI and infrared neural stimulation. Soc Neurosci Abstr, San Diego CA.
- Roe AW** (2022) **Invited symposium speaker**. Infrared stimulation of the mesoscale primate neuro-connectome. Fed Eur Neurosci Soc. Paris, France. July 9-13, 2022.
- Schriver KE, Zhang Y, Liu Y, **Roe AW** (2022) Illuminating the Mesoscale Connectome: A 100-fiber Infrared Neural Stimulation System. Fed Eur Neurosci Soc. Paris, France. July 9-13, 2022.
- Roe AW** (2022) **Invited symposium speaker**. Basis Elements of Intelligent Primate Systems. RIKEN BDR Symposium. Online. Mar 3, 2022.
- Roe AW** (2022) **Discussion Leader**. Prime-DE meeting (online).
- Roe AW** (2021) **Invited symposium speaker**. INS-fMRI: a novel method for studying the architecture of brain networks. SPIE Advanced Biophotonics Conference 2021. Busan, Korea. Hybrid. Online talk. Invited Keynote Speaker.
- Roe AW** (2021) **Keynote Speaker**. Identifying fundamental features of efficient processing architecture in human and nonhuman primate brains. Westlake International Symposium in Engineering 2021. Hangzhou, China.
- Roe AW** (2021) Understanding limbic networks in nonhuman primates via INS-fMRI. Invited symposium speaker. Human Brain Project Summit 2021. Brussels, Belgium. Online talk.
- Roe AW** (2021) Understanding limbic networks in nonhuman primates via INS-fMRI. Symposium speaker. Chinese Society Neuroscience 2021.
- Roe AW** (2021) **Invited symposium speaker**. Functional Columnar Basis of Human and Non-human Primate Intelligence. Global Artificial Intelligence Technology Conference 2021 (GAITC). Hangzhou, China.

- Roe AW (2021) **Keynote Speaker**. INS-fMRI: a method for mapping mesoscale connectomes in nonhuman primates. Organization for Human Brain Mapping 2021. Online.
- Wang J, Nasr S, **Roe AW**, Polimeni JR (2021) Evaluation of spatial blur induced by preprocessing and distortion in UHF fMRI data. International Soc Magnetic Reson & Medicine. Chosen for E-Poster, oral. Online.
- Xu AG, Shi S, Rui Y, Zhang X, Romanski L, Gothard KM, **Roe AW** (2021) A rapid in vivo method for mapping cortical connections of primate amygdala with infrared neural stimulation and 7T fMRI. International Soc Magnetic Reson & Medicine. Chosen for oral presentation. Recipient of **Summa Cum Laude postdoctoral award**. Online.
- Roe AW** (2021) **Invited topic leader**. PRIME-DE conference (International Primate Data Exchange) (online).
- Roe AW** (2020) A roadmap to a columnar visual cortical prosthesis. Chinese Computational & Cognitive Neuroscience 2020, Beijing, China. [online conference]
- Yang Gao, Meizhen Qian, **Anna Wang Roe**, Xiaotong Zhang (2020) Investigating the Optimal RF Coil Design for Functional MRI. International Soc Magnetic Reson & Medicine. Sydney, Australia. [cancelled: coronavirus]
- Roe AW** (2020) Optical Brain-Machine Interfaces. Gordon Research Conference on Neuroelectric Interfaces. Ventura, CA. [cancelled: coronavirus]
- Zhang Y, Lin Y, Fen Y, **Roe AW**, Song XM, Li P (2020) Simultaneous three-dimensional detecting of neural activity and hemodynamics responses in cat cortex by optical coherence tomography. SPIE Photonics West 2020, San Francisco, CA.
- Zaraza D, Chernov MM, Friedman RM, Yang Y, Rogers JA, **Roe AW** (2020) Going wireless: an optical imaging and optogenetics system for use in awake behaving primates. Proc. SPIE 11227, Optogenetics and Optical Manipulation, 1122705 (20 February 2020); doi.org/10.1117/12.2546289
- Hu JM, Song XM, **Roe AW** (2019) Curvature domains in V4 of Macaque Monkey. Soc Neurosci Abstr, Chicago IL.
- Rui YY, Xu AG, Wang JB, Zhou DF, Shi SH, Edathodathil A, Gothard KM, **Roe AW** (2019) Amygdalo-cortical networks revealed by high-field fMRI during infrared neural stimulation of amygdalar subnuclei in the primate. Soc Neurosci Abstr, Chicago IL.
- Ashaber M, Zalányi L, Pálfi E, Stuber I, Kovács T, Friedman RM, **Roe AW**, Négyessy L (2019) Synaptic organization of cortico-cortical communication in primate somatosensory cortex. Soc Neurosci Abstr, Chicago IL.
- Baldwin MKL, Fan R, **Roe AW**, Kaas JH. (2019) Connections of functionally distinct regions within and adjacent to visual area V3 in a primate. Soc Neurosci Abstr, Chicago IL.
- Edathodathil A, Friedman RM, **Roe AW** (2019) Quantitative Analysis of Ocular Dominance Columns in Macaque Monkeys. Soc Neurosci Abstr, Chicago IL.
- Chernov MM, Zaraza D, Friedman RM, Yang YY, Rogers JA, **Roe AW** (2019) Development of Multimodal Wireless Brain Interfaces in Nonhuman Primates. Soc Neurosci Abstr, Chicago IL.
- Xu AG, **Roe AW** (2019) A novel method for mesoscale connectome mapping with infrared neural stimulation and high-field fMRI. 13th Biennial Conference of Chinese Neuroscience Society. Suzhou, China.
- Zhu L, Wang Xi, Cai ZC, Wang MQ, **Roe AW**, Qian J (2019) High spatial and temporal resolution differentiation of cortical vessels in nonhuman primate. Asia-Pacific Conference on Vision, Osaka, Japan.
- Du X, Kuriki I, Xinnui J, Tao Z, **Roe AW**, Tanigawa H (2019) Hue maps of the DKL color space at columnar resolution in the early visual cortex of macaques. Japanese Neuroscience Society, Kyoto, Japan.
- Qian MZ, Hu JM, Wang PY, Gao Y, Zhang XT, **Roe AW** (2019) Awake Macaque Imaging on 7T Human Scanner Platform Organization for Human Brain Mapping. Rome, Italy.
- Xu AG, Rui YY, Wang JB, Song XM, Gothard KM, **Roe AW** (2019) Infrared neural stimulation of monkey amygdala with fMRI reveals long-distance connections. Organization for Human Brain Mapping. Rome, Italy.
- Zhang JL, Wang DX, Li XF, Ugurbil K, **Roe AW**, Zhang XT (2019) Evaluation of Diffusion-Weighted Imaging of the Macaque Brains Using Diffusion-Prepared TSE. International Soc Magnetic Reson & Medicine. Montreal, Canada.
- Gao Y, Wang XJ, Friedman RM, Chernov M, Kroenke C, **Roe AW**, Zhang XT (2019) A 16-Channel Array Coil for Anesthetized Monkey Multi-modal Neuroimaging at 3T. International Soc Magnetic Reson & Medicine. Montreal, Canada.
- Gao Y, Mareyam A, Zhang, Sun Y, Witzel T, Arango N, Kuang I, White J, **Roe AW**, Wald L, Stockmann J (2019) 16-Channel RF Receive Array with Integrated B0-shim Capability for Anesthetized Monkey Whole Brain Imaging at 7T. International Soc Magnetic Reson & Medicine. Montreal, Canada.

Gao Y, Qian MZ, Wang PY, Sun Y, **Roe AW**, Zhang XY (2019) Awake Macaque MRI Setup on 7T Human Scanner Platform for High-Resolution Anatomical and Functional Imaging. International Soc Magnetic Resonance & Medicine. Montreal, Canada.

Kahler-Quesada S, Friedman RM, McGill TJ, Chernov MM, Zaraza D, Renner LM, Neuringer, **Roe AW** (2019) Neural Development of Macaque Monkey Foveal Vision. Neurofutures2019. OHSU, Portland OR.

Roe AW, Neuringer M (2019) Retinal and Cortical Development Underlying Foveal Vision. 2019 Annual ONPRC Scientific Symposium. ONPRC, OHSU. Beaverton, OR. [talk]

Xu AG**, Qian M**, Tian F, Xu B, Friedman RM, Wang J, Song X, Sun Y, Chernov M, Cayce J, Jansen ED, Mahadevan-Jansen A, Zhang XT*, Chen G*, **Roe AW*** (2019) Focal infrared neural stimulation with high-field functional MRI: a rapid way to map mesoscale brain connections. 2019 Annual ONPRC Scientific Symposium. ONPRC, OHSU. Beaverton, OR.

Roe AW (2019) Chair. 2nd International Primate Neuroscience Research Symposium. Shenzhen, China.

Xu AG*, Rui Y*, Wang J, Song X, Gothard K**, **Roe AW**** (2019) INS-fMRI reveals functional connections of amygdalar subnuclei in the Macaque monkey. SPIE Photonics West. San Francisco, CA.

Wang J*, Xu AG*, Qian M, Song X, Zhang X, **Roe AW**** (2019) INS-fMRI: a novel method for rapidly mapping brain networks in vivo. SPIE Photonics West. San Francisco, CA.

Zhang X, Xu AG, Xi W, **Roe AW** (2019) Quantifying tissue temperature change induced by infrared neural stimulation by 7T MR thermometry. SPIE Photonics West. San Francisco, CA.

FUNDING (China)

Institute Funding

Zhejiang University 985 Grant (Roe) 2014 – 2019

Zhejiang University Interdisciplinary Institute of Neuroscience and Technology, Hangzhou, China

The goal of this proposal is to establish a brain research institute comprising 15 faculty, ultrahigh field MRI platform, and nonhuman primate facility. The MRI platform will support both animal and clinical research. Students will be recruited from both medical science and engineering sciences.

Zhejiang University Grant (Roe) 2019 - 2020

Zhejiang University Interdisciplinary Institute of Neuroscience and Technology, Hangzhou, China

The goal of this proposal is to further develop the Interdisciplinary Institute of Neuroscience and Technology at Zhejiang University as a world renowned brain research institute. The institute will grow to 20 labs and will build new multimodal technologies (combined with ultrahigh field MRI) for neuroscience, engineering, and clinical applications.

Ongoing Research Support

China Brain Initiative (脑信号获取与干预项目) 2021ZD0200401 (Wu, Roe,...) 01/01/21-11/30/26

Brain computer interactive computing fusion research platform

This is a grant aimed at understanding computational aspects of brain function. Investigators include neuroscientists, engineers, computer scientists, and clinicians.

China NSFC-Provincial NSF Cooperative Grant (Roe, Yu, PIs) 01/01/21 – 12/30/24 China NSFC Grant #U20A20221

基于INS-fMRI技术绘制活体猴脑皮层介观网络连接组：功能和计算(Mapping of in vivo mesoscale connectomes in primate cortex using INS-fMRI: function and computation)

The goal of this proposal is to map the whole brain connectome at mesoscale in macaque monkeys, understand the functionality of these networks in behaving monkeys, and model the architectural basis of intelligent networks.

Chinese Zhejiang Province Department of Science and Technology (浙江省科技厅) Grant No. 2020C03004 (Pan, Roe) 01/01/20-09/30/22

High-throughput Neurochip and Application in Visual Restoration (脑机融合神经芯片及视觉修复原理应用)

The goal of this proposal is to develop brain-computer interface chip for visual restoration.

Dual Brain Center at Zhejiang University, Chinese Ministry of Education grant. 01/01/20 – 12/30/21

Interdisciplinary Dual Brain Center

The goal of this proposal is to establish a multidisciplinary center for integration of biological and computation brain scientists.

China NSFC-US NIH Cooperative Biomedical Grant (Roe, Gothard, PIs) 01/01/20 – 12/30/24 China NSFC Grant # 8191101288

Development of Amygdalo-Prefrontal Connections in Adolescent Macaques

The goal of this proposal is to study establishment of prefrontal control of socio-emotional behavior by examining the changes in functional connectivity between the amygdala prefrontal cortex in juvenile macaque monkeys.

**Zhejiang University President's Fund (Roe) 01/01/19 – 12/31/20 RMB 2,000,000
Fundamental Research Funds for the Central Universities (2019XZZX003-20)**

Development of connectome mapping device in highfield MRI

The goal of this proposal is to develop a device capable of mapping hundreds of networks at high spatial resolution using laser-fMRI within the brain in nonhuman primates *in vivo*.

Chinese Ministry of Science and Technology "National Key R&D Program of China" (脑机融合的脑信息认知关键技术研究) Grant No. 2018YFA0701400 (Wang, Roe,...) 09/01/19 – 8/30/24

Key Technology Development for Brain-Computer Integration

The goal of this proposal is to develop multimodal methodologies for ultrahigh field MRI and brain interface technology.

Chinese NSF Instrumentation Grant No. 31627802 (Chen, Roe, Zheng) 01/01/17-12/31/21

Development of a 2000 channel neural interface with feedback

The goal of this proposal is to develop a large channel (over 2000) neural interface that is modular and flexible in design. It can interface with any electrode or recoding system with high throughput and with sufficiently high speed to permit real-time feedback.

Chinese NSF Key Project No. 81430010 (Roe, PI) 01/01/15 – 12/30/19

Functional organization and attentional modulation in visual area V4

The goal of this proposal is to establish the functional organization of color and shape representation in area V4 in macaque monkeys, and the role of mesoscale domains in visual attention.

Chinese 863 Hi-Tech Research and Development Program No. 2015AA020515 (Roe, Ding, Wang, PIs) 01/15 - 12/17

Development of a multifunctional microscope for multiscale imaging

The goal of this proposal is to develop a microscope for conducting optical imaging and multiphoton imaging in mice and monkeys.

FUNDING (US)

Previous Research Support (grants transferred to Robert Friedman in July, 2020)

NIH/NEI 5 R01EY029753 (Roe PI, Friedman, Neuringer, co-PIs) 02/01/19 - 01/31/23 \$3,153,596

Neural development of Macaque monkey foveal vision

The goal of this proposal is to investigate the development of the brain circuits underlying central (foveal) vision, which is critical for high spatial acuity vision, color vision, and visual attention. This will provide important understanding about development of foveally guided behaviors, such as reading, visuomotor behavior, social behaviors, and for treating visual developmental disorders.

NIH/NEI 2 R21 EY031073 (Friedman, PI; Roe, consultant) 07/21/20 – 6/30/22 \$150,000

Development of multimodal wireless brain interfaces in nonhuman primates

The goal of this research is to develop wireless optical imaging, electrical recording, and optogenetic stimulation capabilities for awake monkey behavioral studies.

NIH/NINDS 5 R01 NS093998 (Roe, Friedman, PI)

04/01/16 – 03/31/21 \$3,123,991

Neural basis of tactile object perception in SI cortex

The goal of this research is to examine how tactile object features such as shape, texture, and weight are encoded in SI of the monkey.

Completed Research Support

- 05/18 – 04/19 **ONPRC Pilot Grant Research Program (Roe, PI)** *Studying Neural Basis of Attention in Non-headfixed Monkeys* (\$72,500, direct).
- 8/12 – 6/15 **NIH/NIMH 1R21MH095009-01A1(Roe, PI)** *Functional mapping of cortical networks in primates with laser stimulation* (\$275,000, direct). Role: PI.
- 9/12-8/14 **1R21 EY022853-01 (Stoner, Roe)** *Optogenetic modulation of neuronal and behavioral responses in the primate*. Role: co-PI.
- 7/10-8/14 **NIH/NINDS 5R01NS044375-10 (Roe)** *Optical imaging of tactile information in SI cortex* (\$1,798,357, direct). Role: PI.
- 7/02-8/14 **NIH/NINDS 5R01NS044375-10 (Roe)** *Optical imaging of tactile information in SI cortex* (\$1,798,357, direct). Role: PI.
- 10/12-9/14 **NIH/NIMH 1R21 EY022853-01(Stoner/Roe)** *Optogenetic neuronal and behavioral modulation in primates with minimal invasiveness* (\$75,000 direct), role: co-PI.
- 7/09 – 6/12 **NIH/NEI RO1 EY11744-10 (Roe)**, *Inter-areal Cooperativity During Perception of Visual Contours and Surfaces* (\$842,808 direct), role: PI.
- 9/12-8/13 **NIH/NINDS R01 NS044375-08S1 (Roe)** *Optical imaging of tactile information in SI cortex*. Supplemental funds awarded to cover additional fMRI and per diem costs. (\$25,000)
- 9/11 – 8/12 **NIH/NINDS 3R01 NS044375-09S1**, *Optical imaging of tactile information in SI cortex* (\$40,280), role: PI. Supplemental funds awarded to cover additional fMRI and per diem costs.
- 9/08-8/09 **NIH/NINDS R56 NS044375**, *Optical imaging of SI cortex in the awake primate* (\$329,000), role: PI.
- 9/06-8/09 **NIH/NIDA R21 DA023002**, *Fast optical imaging of cortical signals in the behaving primate* (\$275,000), role: PI.
- 9/06-8/10 **NIH/NINDS R03 NS059061**, *Perceptual circuits in somatosensory cortices* (\$30,000), role: PI.
- 4/06-3/09 **NIH/NINDS R21 NS052821**, *Optical imaging of SI cortex in the awake primate* (\$275,000), role: PI.
- 9/03 – 8/08 **NIH/NINDS RO1 NS044375**, *Optical imaging of tactile information in SI cortex* (\$2,043,750 total; \$1,250,000 direct), role: PI.
- 3/02 – 2/07 **NIH/NEI RO1 EY11744**, *Inter-areal Cooperativity During Perception of Visual Contours and Surfaces* (\$1,274,996; \$819,823 direct), role: PI.
- 1997-2001 **NIH RO1 EY11744** , *Inter-areal Processing of Visual Contours* (\$947,894 total; \$585,941 direct) role: PI.

Other

- 6/12 – 5/15 **Vanderbilt University Discovery Grant (Maier, Roe)** *Microanatomy of cortical resting state functional connectivity*. (\$50,000) Role: co-PI.
- 8/12 – 7/1 **Vanderbilt Brain Institute Grant (Johnson, Roe)**, *Development of BRET sensors and imaging methods* (\$25,000)
- 2008 - 2009 **Vanderbilt University VIO Grant**, *International Grant Exploring potential for conducting nonhuman primate brain research in China* (\$4000), role: PI.
- 5/05 – 6/07 **Vanderbilt Discovery Grant**, *Optical imaging of short-term working memory in prefrontal cortex of the Macaque monkey* (\$50,000), role: PI.
- 1998-2003 **David and Lucile Packard Foundation Fellowship**, *High Spatial Resolution Imaging of Perception and Cognition* (\$625,000 total; \$562,500 direct) role: PI.
- 1997-1999 **Alfred P. Sloan Research Fellowship**, *Modular organization of mammalian sensory neocortex*, (\$60,000) role: PI.
- 1996-1999 **Whitehall Foundation Research Fellowship**, *Higher Order Visual Contour Processing in Area V2 of the Primate* (\$150,000) role: PI.

INVENTIONS

- Patent Serial No. 61/489,522: Method and apparatus of pulsed infrared light for the inhibition of central nervous system neurons
- Chinese Patent No 专利号 ZL 201810935858.5: High spatial resolution infrared laser stimulation-fMRI whole brain mapping (红外神经刺激诱导 全脑功能磁共振 高分辨率成像方法) Approved May 2020. 王菁, 陈岗, 徐国华。
- Chinese Patent No. 2022111407302: Visual motion perception detection method and device based on VR equipment” (pending).

AWARDS and HONORS

- 2023 D-Index: #1 in Neuroscience at Zhejiang University; #46 in Neuroscience China
- 2021 Member, National Key Laboratory of Brain and Computer Intelligence 脑机智能全国重点实验室
- 2019 2019 Top 10 Medical Technologies in China: Xu et al 2019 Science Adv
- 2019 Elected Fellow of SPIE
- 2018 Zhejiang Optical Society Council Member
- 2018, 2020 Gordon Research Conference Organizer
- 2017 International Neuropsychological Symposium Member
- 2017 Elected Senior Member of SPIE
- 2016 ISMRM Plenary Speaker
- 2015 AAAS Fellow
- 2013 1000 Faculty Award, China
- 2008 Vanderbilt University International Grant "Exploring potential for conducting nonhuman primate brain research in China"
- 2007 Vanderbilt University College of Arts & Sciences Travel Award
- 2005-2007 Vanderbilt Discovery Grant: "Optical Imaging of Short-term Working Memory in Prefrontal Cortex of the Macaque Monkey" \$30,000
- 2004 Vanderbilt University College of Arts & Sciences Travel Award
- 1998-2003 David and Lucile Packard Foundation Fellowship
- 1997-1999 Alfred P. Sloan Research Fellowship.
- 1996-1999 Whitehall Foundation Research Fellowship
- 1991-1994 NIH NRSA Post-doctoral Fellowship, Rockefeller Univ and Baylor College of Medicine.
- 1993 Winter Conference on Brain Research Fellowship Award, Whistler, Canada.
- 1992 Center for Visual Science Symposium Travel Fellowship, Rochester, NY.
- 1989-1991 Whittaker Health Sciences Fellowship, M.I.T.
- 1986-1989 NIGMS Graduate Traineeship, M.I.T.
- 1987 Gordon Research Conference Scholarship.
- 1985-1986 NIGMS Graduate Traineeship, Yale University.
- 1984-1986 NIGMS Graduate Traineeship, Harvard University.

SERVICE

ACADEMIC SERVICE

- 2021 Advisor, “浙江省精神心理疾病临床研究中心”和“浙江大学脑机调控转化研究中心精神疾病分中心” "Zhejiang Clinical Research Center for mental and psychological diseases"

and "mental disease sub center of brain computer regulation and transformation research center of Zhejiang University"

2015 – present Member, Dual Brain Faculty Search Committee

Grant Reviews

2019 US Brain Initiative grant reviewer
2018 Israel Science Foundation grant reviewer
2018 UK Medical Research Council grant reviewer
2017 Chinese 1000 Talents Faculty Applications reviewer
2011 – 2017 NIH study section, Sensorimotor Integration, member
2009 NIH study section, ad hoc
2006 NIH special review committee
2005 NIH special review committee
2002 NSF Cognitive Neuroscience Study Section, ad hoc
2000-2005 NIH IFCN-8 (COG) Study Section, member

Site Visit Reviews

June 2007 NIH/NIMH Board of Scientific Counselors review committee (ad hoc).
Oct 2006 NIH/NICHHD Site visit member.

Editorships, manuscript & abstract reviews

2019 - Associate Editor, eLife
2017 - Advisory Editorial Board, TINS
2016 - Assoc Editor, Network Neuroscience
2014 - 2015 Special Issue Editor, Visual Neuroscience
2013 – present Assoc Editor, Neurophotonics
2013 – present Editor, Neuroimage
2012 – present OHBM abstract review committee
2010 – present Assoc Editor, Frontiers in Integrative Neuroscience
2007 - present Editor, Frontiers in Systems Neuroscience
2003 - 2014 Assoc Editor, Neuroscience Letters
2006 Optical Soc America abstract review committee
2003 – 2011 Vision Sciences Society abstract review committee
9/96 – present Ad hoc reviewer for Nature, Science, Neuron, Nature Neuroscience, Current Biology, J Neuroscience, J Neurophysiology, Nature NS, Neuroimage, Neurophotonics, Vision Research, PNAS, Frontiers of Neuroscience, J Neurosci Methods, Cerebral Cortex, American J Physiology, European J Neuroscience, BMC Journals, PLOS Biology, Attention Perception & Psychophysics, J Cereb Blood Flow & Metabolism, Neuroscience Letters, Neuroreport, Biomed Optics Express

Other

2020 ISMRM Overseas Chinese Awards Committee
2019- Univ Marburger – Zhejiang Univ Partnership Ambassador
2019-2022 OHBM Awards Committee
2019 FENS Summer School Lecturer, Bologna, Italy
2018, 2020 Gordon Research Conference Organizer (Hong Kong, China)
2018 - NIH Marmoset Advisory Committee, ONPRC representative
2019-2021 SFN Swartz Prize Selection Committee
2018 – present Head of Neuroengineering Consortium, Zhejiang University.
2012 - present Advisory committee to McGovern Institute at Beijing University, Beijing China.
2011 – present SFN Peter Gruber International Research Award Selection Committee
2008 - present Advisory committee to Systems Neuroscience Program at Tsinghua University, Beijing China.
1999-2001 German-American Frontiers of Science Symposia (Organizer and Participant)
2003 - present Ad hoc reviewer on funding applications and promotion reviews for investigators from Europe, Asia, Australia.

TEACHING

Cold Spring Harbor Summer School (June 2023, Cold Spring Harbor NY)
Modern methods to visualize complex visual activity

FENS Summer School (June 2-8, 2019, Bologna, Italy)
Brain reading and writing: new perspectives of neurotechnology
Optical neurotechnology: Cold Spring Harbor

Zhejiang University, Hangzhou China

Fall 2015-2022 Course director and lecturer. Systems Neuroscience.
Spring 2016 Graduate Student Journal Club.
Fall 2022 Medical School Neuroanatomy

Other courses:

Visual Neuroscience
Neuroanatomy
Neuroimaging
Systems Neuroscience
Cortical Networks for Behavior

MENTORSHIP

Past trainees who are faculty

Full Prof: Limin Chen (Vanderbilt University)
Haidong Lu (Beijing Normal University)
Zheng Wang (Peking University)
Group Leader Chou Hung (US Army)
Assoc Prof: Robert Friedman (OHSU)
Asst Prof: Omar Gharbawie (Univ Pittsburgh)
Jiaming Hu (Zhejiang Univ)
Yang Gao (Hangzhou Univ of Electronics)
Gang Chen (Zhejiang University)
Hisashi Tanigawa (Zhejiang University)
Ling Wang (Univ Electronic Science & Technology of China)

INVITED TALKS

(last 3 years, typically ~10 talks per year)

6/23 Invited seminar speaker. SISSA, Trieste, Italy.
6/23 Invited seminar speaker. Massachusetts General Hospital, Boston, MA.
6/23 Invited conference speaker. Cortical Plasticity & Dynamics. MIT, Cambridge, MA.
4/23 Invited seminar speaker. Xian 4th Military University, Xian, China.
3/23 Invited conference speaker. Kunming Institute of Zoology. Kunming, China.
2/23 Invited seminar speaker. ONPRC, OHSU, Portland, OR.
1/23 Invited seminar speaker. Univ California at Berkeley, Berkeley, CA.
1/23 Invited seminar speaker. Columbia Univ, New York, NY.
1/23 Invited seminar speaker. New York Univ, New York, NY.

- 1/23 Invited seminar speaker. Nathan Kline Institute, Orangeburg, NY.
- 12/22 Invited symposium speaker. SIAT (ShenZhen Institute of Advanced Technology), China (online). 第二届国际脑科学前沿与产业大会·会议日程（2022年12月28-29日）
- 9/22 Invited seminar speaker. Fudan Univ, Shanghai, China.
- 6/22 Invited seminar speaker, IDIBAPS, Barcelona, Spain.
- 6/22 Invited Plenary Talk, Zhejiang Univ, Hangzhou, China.
- 3/22 Invited symposium speaker. RIKEN BDR Symposium, Riken, Japan. Online.
- 12/21 Invited topic leader. PRIME-DE conference (International Primate Data Exchange) (online).
- 11/21 Invited Keynote Speaker. SPIE Advanced Biophotonics Conference 2021. Busan, Korea. Online talk.
- 11/21 Invited Keynote Speaker. 9th International Conference on Parkinson's and Motor Disorders, West Lake, Hangzhou, China 2021
- 10/21 Invited Keynote Speaker. Westlake International Symposium in Engineering 2021. Hangzhou, China.
- 10/21 Invited Symposium Speaker. Human Brain Project Summit 2021. Brussels, Belgium. Online talk.
- 9/21 Symposium speaker. Chinese Society Neuroscience 2021. Chongqing, China.
- 6/21 Keynote speaker. Organization for Human Brain Mapping. Online.
- 6/21 Invited speaker for Siemens symposium. Organization for Human Brain Mapping. Online.
- 6/21 Invited seminar speaker. Psychology Dept, Zhejiang University.
- 6/21 Invited symposium speaker for GAITC (Global AI Technology Conference 2021). In person.
- 5/21 Invited speaker. "Developing Ultrahigh Field MRI in China" International Society Magnetic Resonance & Medicine (ISMIRM). Online.
- 5/21 ZJU Medical School Seminar.
- 4/21 Invited speaker. Dual Brain Annual Conference. Zhejiang U Med School. Hangzhou, China.
- 1/21 Invited speaker. Dual Brain Institute, Zhejiang University. Hangzhou, China
- 1/21 Invited speaker. Second Hospital Neurosurgery, Zhejiang University. Hangzhou, China.
- 1/21 Invited speaker. Second Hospital Neurology, Zhejiang University. Hangzhou. China.
- 1/21 Invited speaker. Institute of Neuroscience, Chinese Academy of Science, Shanghai, China.
- 1/21 Invited speaker. Univ Colorado. [online]
- 1/21 Invited speaker. "Brain Connectomes: The Future of Personalized Medicine." ARCS, Portland OR.

SOCIETY MEMBERSHIPS (past & present)

Society for Neuroscience	American Association of University Women
Women in Neuroscience	Society of Women Engineers
Association for Advancement of Science	Association for Women in Science
Cognitive Neuroscience Society	Biomedical Engineering Society
American Physiological Society	SPIE (Society Photonics, Imaging, & Engineering)
Oregon Chapter Society for Neuroscience	Organization for Human Brain Mapping
American Psychological Society	Chinese Society for Neuroscience
Optical Society of America	Vision Sciences Society
International Society Magnetic Resonance & Medicine	Zhejiang Optical Society
International Neuropsychological Symposium	