Yuxiu Shao, Ph.D.

Assistant Professor, School of Systems Science

Beijing Normal University

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Birth: 7 April 1992, Chinese national

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Education

2014–2020   Ph.D. in Computational Neuroscience, School of Life Sciences, Peking University, P.R. China

Thesis:

Multi-scale Modeling and Analysis of Spatiotemporal Dynamics in Mammalian Primary Visual Cortex

Research:

Multi-scale modelling of visual processing in mammalian primary visual cortex.

Large-scale simulation of spiking neural network and coarse-graining ensemble model.

Supervisor: Louis Tao

Nomination for the Outstanding Doctoral Graduate Zhang Jing-yue Award

2010–2014   B.Eng. in Mechanical & Electronic Engineering, School of Mechanical Engineering and Automation, Beijing University of Aeronautics and Astronautics, Beijing, P.R. China

Research:

"Excellence in Engineering" training programme. Developing computer vision algorithms to control the robot arm to grasp target objects using the video acquired by the camera.

Obtained with Beijing Outstanding Graduates

Academic Appointments

2023.11–   Assistant Professor

School of Systems Science

Beijing Normal University, Beijing, China

2020–2023   Post-doc Researcher

Group for Neural Theory, Laboratoire de Neurosciences Cognitives & Computationnelles

Département d'Etudes Cognitives

École Normale Supérieure, Paris, France

Research:

Theoretical Neuroscience: random matrix theory, statistical physics, graph theory, mean-field theory, low-rank RNN, neural population dynamics.

Machine Learning Techniques: reinforcement learning, recurrent neural network, theory of latent dynamics (for lrRNNs).

Supervisor: Srdjan Ostojic (ENS);

Fellowships

2026–2031   Junior Associate, The Abdus Salam International Centre for Theoretical Physics (ICTP)

2021–2022   IN-BIC (International Network for Bio-Inspired Computing) Fellow, program in collaboration with UW Computational Neuroscience Center

Research:

Investigating the link between connectivity and dynamics in neural networks.

Dataset: © 2019 Allen Institute for Brain Science. Synaptic Physiology Coarse Matrix dataset. Available from: synaptic physiology.

Supervisor: Srdjan Ostojic (ENS); Collaborating supervisor: Eric Shea-Brown (UW)

Selected awards

2024–2025   Early Career award, International Brain Research Organization (IBRO)

2024   Traveling award for "the 6th Chinese Computational and Cognitive Neuroscience Conference (CCCN) Conference", The Chinese Neuroscience Society, Branch of Computational Neuroscience & Neural Engineering & HKUST

2024   Traveling award for "Junior Scientists Workshop on Recent Advances in Theoretical Neuroscience", The Abdus Salam International Centre for Theoretical Physics (ICTP)

2024   Traveling award for "Complex systems, statistical mechanics and machine learning crossover", The Journal of Statistical Mechanics: Theory and Experiment (JSTAT)

2016–2017   Award for Scientific Research, Peking University

2014–2015   Award for Academic Excellents, Peking University

2010-2013   National Scholarship, Ministry of Education, China

Publications

Preprints

[1] **Shao, Y.**[1], Dahmen, D., Recanatesi, S., Shea-Brown, E., & Ostojic, S.[*] (2024). Identifying the impact of local connectivity patterns on dynamics in excitatory-inhibitory networks. arXiv preprint arXiv:2411.06802

Journal articles

[1] **Shao, Y.**[1,*] & Ostojic, S.[*] (2023). Relating local connectivity and global dynamics in recurrent excitatory-inhibitory networks. PLOS Computational Biology, 19(1), e1010855. DOI: 10.1371/journal.pcbi.1010855

[2] Molano-Mazón, M.[1,*], **Shao, Y**., Duque, D., Yang, G. R., Ostojic, S. & de la Rocha, J. (2023). Recurrent networks endowed with structural priors explain suboptimal animal behavior. Current Biology. DOI: 10.1016/j.cub.2022.12.044

[3] Ren, Z.[*] & **Shao, Y.**[*] (2022). Future bio-inspired robots require delicate structures. Frontiers in Robotics and AI, 9, 1073329. DOI: 10.3389/frobt.2022.1073329

[4] **Shao, Y**.[1], Zhang, J. & Tao, L.[*] (2020). Dimensional reduction of emergent spatiotemporal cortical dynamics via a maximum entropy moment closure. PLoS computational biology, 16(6), e1007265. DOI: 10.1371/journal.pcbi.1007265

[5] **Shao, Y**.[1], Wang, B.[1], Sornborger, A. T. & Tao, L.[*] (2019). A mechanism for synaptic copy between neural circuits. Neural Computation, 31(10), 1964-1984. DOI: 10.1162/neco_a_01221

[6] Zhang, J.[1], **Shao, Y**., Rangan, A. V. & Tao, L.[*] (2019). A coarse-graining framework for spiking neuronal networks: from strongly-coupled conductance-based integrate-and-fire neurons to augmented systems of ODEs. Journal of computational neuroscience, 46, 211-232. DOI: 10.1007/s10827-019-00712-w

Conference articles

[1] **Shao, Y.**[1], Sornborger, A. T. & Tao, L.[*] (2016, November). A pulse-gated, predictive neural circuit. In 2016 50th Asilomar Conference on Signals, Systems and Computers (pp. 1051-1055). IEEE. DOI: 10.1109/ACSSC.2016.7869530

[*] corresponding author; [1] first/joint first authorship

Selected posters

Shao, Y., Dahmen, D., Recanatesi, S., Shea-Brown, E., & Ostojic, S.(2024). Beyond mean and i.i.d.: the impact of local connectivity features on network dynamics. ***Complex systems, statistical mechanics and machine learning crossover***, Les Houches, France.

Shao, Y., Dahmen, D., Recanatesi, S., Shea-Brown, E., & Ostojic, S.(2024). Identifying the impact of local connectivity features on network dynamics. ***Cosyne***, Lisbon, Portugal.

Molano-Mazon, M.,**Shao, Y.**, de la Rocha, J. & Ostojic, S.(2024). controlling behavioral strategy by constraining dynamics in RNNs. ***Cosyne***, Lisbon, Portugal.

Shao, Y., Molano-Mazon, M., Hermoso-Mendizabal, A., Bektic, L., de la Rocha, J. & Ostojic, S.(2023). Neural network dynamics underlying context-dependent perceptual decision making. ***Cosyne***, Montreal, Canada.

Shao, Y. & Ostojic, S.(2022). Relating local connectivity and global dynamics in excitatory-inhibitory networks. ***Cosyne***, Lisbon, Portugal.

Shao, Y. & Tao, L.(2019). A coarse-graining framework for spiking neuronal networks: from local, low-order moments to large-scale spatiotemporal activities. ***CNS***, Barcelona, Spain.

Shao, Y.,Guan, S., Ju, N., Yu, C., Tang, S. & Tao, L.(2017). Organization of orientation and spatial frequency preferences in V1: Two-photon imaging of awake monkey. ***sfN***, Washington, D.C, USA,

Talks

Chinese Computational and Cognitive Neuroscience Conference (CCCN) Conference (07/2024), Hong Kong, China.

The Abdus Salam International Centre for Theoretical Physics (ICTP): Junior Scientists Workshop on Recent Advances in Theoretical Neuroscience (06/2024), Trieste, Friuli-Venezia Giulia, Italy.

2024 International Conference on Mathematical Neuroscience (ICMNS) (06/2024), Dublin, Ireland.

Shanghai Jiaotong University, Seminar in Mathematical Biology (07/2023), Shanghai, China

2nd Symposium on Neural Computation and Beyond (11/2019), Suzhou, China.

CQB annual international conference "Quantitative Biology: Neuroscience and Artificial Intelligence Where Do We Meet" (07/2018), Beijing, China.

Professional Activities

Workshop Organizer at Bernstein Conference 2023, "Interrogating the ties that bind: Relationship between multi-level network connectivity and neural dynamics"

Workshop Organizer at Bernstein Conference 2021, "The geometry of neural activity: low-dimensional dynamics and high-dimensional representations"

Reviewer: npj Systems Biology and Applications, Elife, IEEE transactions on cognitive and developmental systems, Scientific reports, Cognitive neurodynamics, Cosyne 2024, Cosyne 2025

Teaching

2024-2025 Fall	Beijing Normal University, Artificial Intelligence	Zhuhai, China
2021,2023	CCN Summer School	Suzhou, China
2020-2022	CNeuro	Beijing, China/Basel Switzerland
2020	Neuromatch Academy (Leading TA)	Asia time-slot
2015–2016	Mathematical Modeling in the Life Sciences	MOOC on www.edx.org
2014–2016	Mathematical Modeling in the Life Sciences	Peking University

Skills

Neuroscience, Systems neuroscience, Theoretical neuroscience ● Decision-making, Animal behavior ● Data analysis ● Mathematical and statistical physics, Statistical machine learning ● Python, PyTorch, TensorFlow, C++, Matlab, Office, Adobe

Languages

Chinese: Native

English: Native or bilingual proficiency

French: Elementary proficiency

References

Available on request.