

Zhuo-Cheng Xiao

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Employment	Courant Institute of Mathematical Sciences, New York University	
	Courant Instructor	09/2021 – 08/2023 expected
	Swartz Fellow	09/2020 – 09/2021
	Working with Prof. Lai-Sang Young	
Education	Program in Applied Mathematics, The University of Arizona	08/2016 – 08/2020
	Ph.D., Applied Mathematics, August 2020	
	Co-Advised by Professors Kevin Lin and Jean-Marc Fellous	
	Thesis: <i>Neuronal oscillations: In hippocampal functions and in simulations.</i>	
	School of Life Sciences, Peking University, China	09/2012 – 07/2016
Research Interests	Bachelor of Biological Science, July 2016	
	Dual Bachelor of Mathematical Science, 2016	
	Advised by Prof. Louis Tao	
	I use realistic large-scale cortical modeling and interpretable model reduction methods to investigate computation principles in brain functions. I also develop theoretical and computational methods for abstract and realistic cortical models.	
	Specific Research Items	
Publications	<ul style="list-style-type: none">• Efficient large-scale models of visual cortex.• Interpretable model reductions capturing crucial cortical dynamics in complex models.• Using modern learning methods to map parameters and cortical model dynamics.	
	Manuscripts	
	<ul style="list-style-type: none">• Wu T, Cai Y, Zhang R, Wang Z, Tao L*, Xiao, ZC*. <i>Multi-band oscillations emerge from a simple spiking network</i>. arXiv preprint arXiv:2206.14942. 2022 Jun 29.	

- **Xiao, ZC**, Lin KK, Young LS. *A data-informed mean-field approach to mapping of cortical parameter landscapes*. PLoS computational biology. 2021 Dec 23;17(12):e1009718.
- **Xiao, ZC***; Lin, KK. *Multilevel monte carlo for cortical circuit models*. Journal of Computational Neuroscience. 2022 Feb;50(1):9-15.
- Cai Y, Wu T, Tao L*, **Xiao, ZC***; . *Model Reduction Captures Stochastic Gamma Oscillations on Low-Dimensional Manifolds*. Frontiers in Computational Neuroscience. 2021:74.
- **Xiao, Z**, Lin K, Fellous JM. *Conjunctive reward-place coding properties of dorsal distal CA1 hippocampus cells*. Biological cybernetics. 2020 Apr;114(2):285-301.
- **Xiao, Z**, Wang B, Sornborger AT, Tao L. *Mutual information and information gating in synfire chains*. Entropy. 2018 Feb 1;20(2):102.
- **Xiao, Z**, Zhang J, Sornborger AT, Tao L. *Cusps enable line attractors for neural computation*. Physical Review E. 2017 Nov 7;96(5):052308.
- Wang C, **Xiao, Z**, Wang Z, Sornborger AT, Tao L. *A Fokker-Planck approach to graded information propagation in pulse-gated feedforward neuronal networks*. arXiv preprint arXiv:1512.00520. 2015 Dec 1.

Ongoing Work

- **Xiao, ZC**; Lin, KK; Young, LS. *Efficient models of cortical activity via local dynamic equilibria and coarse-grained interactions*. In preparation.
- Zhang R; Wang, Z; Wu, T; Cai, Y; Tao, L*; **Xiao, ZC***; Li, Y*. *Learning biological neuronal networks with artificial neural networks: neural oscillations*. In preparation.
- **Xiao, ZC**; Lin, KK. *Multilevel Monte Carlo for Spiking Networks*. Submitted.
- **Xiao, ZC**; Lin, KK; Fellous, JM. *The Dynamics and Reconsolidations of Spatial Representations of Reward in Brain*. In Preparation.

Presentations

Talks

- *A data-informed mean-field approach to mapping cortical landscapes*, SIAM Annual Meeting 07/2022
- *Efficient models of cortical activity via local dynamic equilibria and coarse-grained interactions*, Courant Instructor Day, NYU 02/2022
- *A data-informed mean-field approach to mapping cortical landscapes*, Society for Mathematical Biology 06/2021
- *A data-informed mean-field approach to mapping cortical landscapes*, A Bio Dynamics Days, LMAH-Le Havre Normandie - NYU 06/2021

- *Model Reduction of Gamma Oscillations*, Modeling and Simulation Group Meeting, NYU 04/2021
- *Computational Strategies in Analysis of Hippocampal Data*, Analysis and Its Applications Seminar, University of Arizona 03/2019
- *Multi-Level Monte Carlo Methods for Spiking Networks*, Modeling and Computation Seminar, University of Arizona 02/2018

Posters

- “*Continuous Reward-Place Coding Properties of Dorsal Distal CA1 Hippocampus Cells*”, Society for Neuroscience 2019 10/2019
- “*Multi-Level Monte Carlo Methods for Spiking Networks*”, SIAM Conference on Applications of Dynamical Systems (DS19) 05/2019
- “*Multi-Level Monte Carlo Methods for Spiking Networks*”, and “*Cusps Enable Faithful Information Transfer in Feed-Forward Networks*”, 27th Annual Computational Neuroscience Meeting (CNS 2018) 07/2018

Teaching

At New York University:

- Math-UA 233 *Theory of Probability*, 2022 Fall
- Math-UA 262 *Ordinary Differential Equations*, 2022 Spring
- Math-UA 120 *Discrete Mathematics*, 2021 Fall

At The University of Arizona:

- Math 583 *Principles and Methods of Applied Mathematics*, Super TA 2018 Fa – 2020 Sp
- Math 254 *Ordinary Differential Equations*, TA 2017 Fa – 2018 Fa
- Math 112 *College Algebra*, Instructor 2016 Fa – 2017 Sp

Good teaching review in Spring and Fall 2018 for Math 254.

Review Services

- PLOS One
- NPJ Schizophrenia
- Neural Computation
- Cognitive Neurodynamics

AWARDS

Courant Instructorship, New York University, 2021-2023
 Swartz Fellowship in Computational Neuroscience, 2020-2021
 Best Presentation, Annual Meeting of Undergraduate Research Honor Program, Peking University 2015
 Undergraduate Research Honor Program, Peking University 2013-2016
 Ranking 5th, Chinese Western Mathematical Olympiad 2010

SKILLS

Coding Skills for:

- Matlab, C, R