Guanhua Sun

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Department of Mathematics
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Interests

I have general interests in math biology with a theme of modeling and simulation. My current research focuses on large-scale simulation of the mouse brain, where I use advanced computational techniques to explore how network connectivity influence the overall behavior of the network. I have also researched about fluid-structure interaction problems in physiology.

Besides research, I'm the co-founder of Veritas China(2015-), the largest student-run non-profit organization that aims to promote liberal arts education in China.

Education

University of Michigan

- Ph.D., Applied Interdisciplinary Mathematics (expected graduation: May, 2025).
- Advisor: Daniel Forger and Brendon Watson.

New York University

- B.A., Mathematics with honors, minor in Physics (2019).
- References: Charles Peskin, Leif Ristroph and Miranda-Holmes Cerfon

Publications and Preprints

1. **Sun G**, Hazeldn J, Kim R and Forger DB **Whole-cortex simulation reveals spatiotemporal patterns emerging from the interplay of network connectivity and intracellular dynamics**, on bioRxiv and under review, 2024
2. **Sun G**, Tomoyuki M, Kompotis K, Wang N, Shi S, Brown S, Forger DB, **A Framework to Determine Active Connectivity within the Mouse Brain**, on bioRxiv and under review, 2023
3. ElGrawani W, **Sun G**,..., Brown S, Forger DB, **BDNF-TrkB signaling orchestrates the buildup process for local sleep**, *Cell Reports*, 2024
4. Nguyen QM, Oza AU, Abouezzi J, **Sun G**, S Childress, Ristroph L, **Flow Rectification in Loopy Network Models of bird Lungs**, *Physical Review Letters*, 2021
5. Sanaei P, **Sun G**, Li H, Peskin CS, Ristroph L, **Flight Stability of Wedges**, *Journal of Fluids and Structures*, 2021

Talks and Posters

1. *Spatiotemporal patterns in large-scale cortical simulations.* Courant Institute of Mathematical Sciences, New York, US, Apr 2024.
2. *How a pencil rolls down a slope?.* Math Club, Ann Arbor, US, 2024 Feb,

[1] Updated September 8, 2024

3. . *NeuroWiz: A platform for large-scale neuronal simulation.* Nanosymposium, Society for Neuroscience, Washington DC, US, 2023 Nov.
4. *Spontaneous Sleep Wake Transition Induced by Synaptic Weight Dynamics.* Courant Institute of Mathematical Sciences, New York, US, May 2023.
5. *Spontaneous Sleep Wake Transition Induced by Synaptic Weight Dynamics.* Society for Neuroscience, San Diego, US, 2022 Nov.
6. *Flip a Biased Coin.* Math Club, Ann Arbor, US, 2022 Sep.
7. *Spontaneous Sleep Wake Transition Induced by Synaptic Weight Dynamics.* European Biological Rhythms Society, Zurich, CH, 2022 Aug.
8. *Why do we sleep: three sleeping hypothesis.* MCAIM Graduate Seminar, Ann Arbor, US, 2021 Oct.
9. *The Cheerios Effect.* Math Club, Ann Arbor, US, 2021 Sep.

Awards

- Cameron&Jon Courtney Scholarship, Department of Mathematics, University of Michigan, 2023-2024
- MCAIM Award, University of Michigan, 2022-2023
- EBRS Poster Award, European Biological Rhythms Society (2022)
- Mathematics Award, Courant Institute of Mathematical Sciences (2019).
- Dean's Undergraduate Research Funds, College of Arts and Science, New York University (2017-2018)
- Presidential Honors Scholar, College of Arts and Science, New York University (2015-2016)

Teaching Experience

- Lab instructor, Math 216 (2024 Winter, University of Michigan)
- Instructor, Intro to Applied Math (2021 Summer, Veritas Workshop).
- Teaching Assistant, Special Topics in Modeling and Simulation. (2019 Fall, NYU).
- Teaching Assistant, Introduction to Computer Simulation. (2020 Spring, NYU).
- Grader, Calculus I (2018 Fall, NYU).

Organization

Seminars

- Co-organizer of *MCAIM Graduate Seminar*, with Jiajia Guo and Shirlyn Wang (2022-2023) Seminar website.
- Co-organizer of *Student Applied Math Seminar*, with Kashvi Srivastava, Preetham Mohan and C. Mavroyiakoumou(2021-2023). Seminar website.

Professional

- Co-founder and President, Veritas China website (2015-).