

# Chen Yao

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I am a second-year PhD candidate at Boston University majoring in Statistics. My research interests are in the areas of mathematical biology, computational mathematics, stochastic processes and statistics. Recently, my research has focused on the development, analysis and numerical approximations of stochastic and deterministic reaction-diffusion methods appropriate for modeling biochemical systems at the scale of a single biological cell.

## EDUCATION

### Boston University

Boston, MA

*Doctor of Philosophy in Statistics (GPA: 4.0)*

09/2023 – (Exp) 07/2028

Courses: Advanced Stochastic Process, Partial Differential Equations (PDEs), Numerical PDEs

### University of California, San Diego

La Jolla, CA

*Master of Arts in Applied Mathematics (GPA: 4.0)*

09/2021 – 07/2023

Courses: Mathematical Statistics, Numerical Optimization, Machine Learning (ML)

### Nankai University

Tianjin, China

*Bachelor of Science in Mathematics and Applied Mathematics*

08/2016 – 07/2020

## PUBLICATIONS

Isaacson, Samuel A., Qianhan Liu, Konstantinos Spiliopoulos, and Chen Yao. "A Macroscopically Consistent Reactive Langevin Dynamics Model." arXiv preprint arXiv:2501.09868 (2025).

## PRESENTATIONS

Jan 24 2025, poster session at the workshop CISE Graduate Student Workshop (CGSW 11.0), College of Engineering, Boston University, Boston MA, USA.

## RESEARCH

### Research Assistant in Mathematical Biology

04/2024 - Present

*Supervisor: Professor Konstantinos Spiliopoulos & Samuel Isaacson*

Boston University

- Developed asymptotic theory for particle-based reactive Langevin dynamics (PBRLD) models, which describe the movement and reactions of particles in biochemical systems, incorporating their velocity and inertial forces.
- Designed novel interaction kernels that ensure consistency between PBRLD models and their simplified high friction limits, capturing key physical behaviors.
- Successfully conducted large-scale numerical simulations of reaction-diffusion systems, validating the accuracy of the developed theory and overcoming significant computational challenges.

### Research Assistant in Trustworthy & Robust AI

07/2022 - 07/2023

*Supervisor: Professor Tsui-Wei (Lily) Weng*

HDSI, UCSD

- Created Fed-CLIP, an innovative federated deep learning model, which enables decentralized mobile devices to collaboratively train a high-performance neural network, integrating vision and language understanding while safeguarding user privacy.
- Fed-CLIP achieved remarkable accuracy, hitting 95.4% on CIFAR-10 and 89.6% on highly unbalanced datasets, a challenging but realistic scenario where standard models often falter.

### Research Assistant in Bioinformatics

*Supervisor: Professor Jianyi Yang*

09/2020 - 06/2021

- Created a program to align atomic protein structures with cryo-EM electronic density maps by optimizing objective function measuring differences between two structures based on BFGS method.
- Developed 3D structures from 2D cryo-EM electronic density maps by utilizing ReLion, cryoSPARC, and Chimera.

## HONORS

09/2020

Excellent Graduate Student Scholarship

Nankai University

11/2017

Annually Progressive Student in Mathematics Department

Nankai University

TEACHING

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|--|------------|-----------------------|-------------------|
| <b>Teaching Fellowship</b>                       |            |                       | 09/2023 - Present |
| <i>The Mathematics and Statistics Department</i> |            |                       | Boston University |
| 2023 Fall  | CAS MA 411 | Advanced Calculus     |                   |
| 2024 Spring                                      | CAS MA 416 | Analysis of Variances |                   |
| 2025 Spring                                      | CAS MA 214 | Applied Statistics    |                   |