Songela W. Chen

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EDUCATION

University of California, Berkeley 2022–
PhD Candidate, Physical Chemistry
Advisor: David T. Limmer

Massachusetts Institute of Technology 2015–2019
SB Chemistry, minor in Chinese
Advisor: Adam P. Willard
Thesis: Modeling ion mobility in solid-state polymer electrolytes

EXPERIENCE

Limmer Group, UC Berkeley 2022–
Graduate Student Researcher
Minimize heat dissipation in logical circuits using stochastic thermodynamics and optimal control techniques.

D. E. Shaw Research 2019–2022
Scientific Associate
Improve methods to predict protein-ligand binding free energy for computational drug discovery applications.

Willard Group, MIT 2017–2019
Undergraduate Research Assistant
Model ion mobility in solid-state polymer electrolytes using coarse-grained molecular dynamics simulations.

D. E. Shaw Research Summer 2018
Intern
Develop enhanced sampling methods to compute binding free energies of protein-protein complexes.

Drennan Lab, MIT January–September 2017
Undergraduate Research Assistant
Characterize glycyl radical enzymes prominent in the human gut microbiome using X-ray crystallography.

D. E. Shaw Research Summer 2016
Early College Intern
Optimize Hamiltonian tempering schemes for molecular dynamics simulations of protein-ligand systems.

Hu Lab, University of Pittsburgh 2011–2014
Volunteer
Investigate effect of omega-3 polyunsaturated fatty acids on microglial responses to myelin pathology in murine cell cultures.

PUBLICATIONS

4. Stochastic thermodynamic bounds on logical circuit operation.
   Helms P*, **Chen SW***, Limmer DT.
   Phys Rev E 111, 034110 (2025).

3. Development of a Force Field for the Simulation of Single-Chain Proteins and Protein-Protein Complexes.
   Piana S, Robustelli P, Tan D, **Chen S**, Shaw DE.
   J Chem Theory Comput 16, 2494–2507 (2020).

2. n-3 PUFA supplementation benefits microglial responses to myelin pathology.
   Chen S, Zhang H, Pu H, Wang G, Li W, Leak RK, Chen J, Liou AK, Hu X.
   Sci Rep 4, 7458 (2014).

1. Microglia/Macrophage Polarization Dynamics Reveal Novel Mechanism of Injury Expansion After Focal Cerebral Ischemia.
   Hu X, Li P, Guo Y, Wang H, Leak RK, **Chen S**, Gao Y, Chen J.
   Stroke 43, 3063 (2012).

* denotes equal contribution.

PRESENTATIONS

3. Controlling dissipation of bit erasure in stochastic logic circuits
   APS Global Physics Summit, Anaheim, CA, March 2025*
   Berkeley Statistical Mechanics Meeting, Berkeley, CA, January 2025†

2. Controlling stochastic logic circuits subject to thermodynamic tradeoffs
   APS March Meeting, Minneapolis, MN, March 2024*

1. Stochastic thermodynamic constraints on logical circuits
   Berkeley Statistical Mechanics Meeting, Berkeley, CA, January 2024†

* denotes oral presentation; † denotes poster.

TEACHING

University of California, Berkeley

Graduate Student Instructor

CHEM 220A: Thermodynamics and Statistical Mechanics	Fall 2024
CHEM 120B: Physical Chemistry	Fall 2023
CHEM 1A: General Chemistry Laboratory	Fall 2022

Instructor

Mathematics Boot Camp for Physical Chemistry	August 2024, 2025

Discussion Leader

Mathematics Boot Camp for Physical Chemistry	August 2023

SERVICE

Women of DESRES 2019-2022
Coordinator
Organize monthly events for women's affinity group, including social lunches, book club, and outreach.

Northeast Regional Middle School Science Bowl 2015–2019
Assistant Director and Co-Founder
Organize a daylong quiz bowl event for middle school teams from five states. Contact potential sponsors, train volunteers for Science Bowl specific roles, and maintain website. This event was the first Science Bowl competition in the nation run entirely by students.

MIT ClubChem 2015–2018
President, Community Outreach Coordinator, Publicity Chair, Webmaster
Manage all aspects of the undergraduate association for chemistry students, including chemistry outreach events at K-8 schools, club presentation at USA Science and Engineering Fair in Washington, DC, and intra-department activities for chemistry majors.

SKILLS

Computational	Python, Bash, LaTeX, Git, C++, Mathematica, HTML, CSS
Laboratory	X-ray crystallography, protein purification, SDS-PAGE, ELISA, cell culture

AWARDS

NSF Graduate Research Fellowship Program Honorable Mention	2022, 2024
MIT Freshman Chemistry Achievement Award	2016

Last Updated: March 21, 2025