BO ZHAO

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RESEARCH INTEREST

Parameter space symmetry, optimization, deep learning theory

EDUCATION

University of California San Diego *2021–2026 (Expected)*
Ph.D. in Computer Science
· Advisor: Rose Yu

Georgia Institute of Technology *2019–2021*
M.S. Computer Science

University of Illinois at Urbana-Champaign *2016–2019*
B.S. Computer Science (with highest honors)
B.S. Physics (cum laude and departmental highest distinction)

EXPERIENCE

Capital One New York, NY
Applied Research Intern *2025/6–2025/8*
· Improve efficiency of reasoning models through prompt complexity analysis.

NTT Research Cambridge, MA
Research Intern (Mentor: Hidenori Tanaka) *2024/6–2024/9*
· Studied representation and dynamics of emotion in large language models.

IBM Cambridge, MA
AI Intern (Mentor: Nima Dehmamy) *2022/6–2022/9*
· Studied parameter space symmetry and conserved quantities in gradient flow.

AWARDS & HONORS

Rising Stars in EECS, MIT and Boston University *2025*

Rising Stars in Data Science, Stanford University *2025*

NVIDIA Graduate Fellowship finalist *2025*

Qualcomm Innovation Fellowship finalist *2024*

DeepMind PhD Fellowship *2023*

PUBLICATIONS

Conference

[1] Understanding Mode Connectivity via Parameter Space Symmetry.
Bo Zhao, Nima Dehmamy, Robin Walters, Rose Yu.
International Conference on Machine Learning (ICML), 2025.

[2] Understanding the Difficulty of Solving Cauchy Problems with PINNs.
Tao Wang, **Bo Zhao**, Sicun Gao, Rose Yu.
The 6th Annual Learning for Dynamics and Control Conference (L4DC), 2024.

[3] Improving Convergence and Generalization Using Parameter Symmetries.
Bo Zhao, Robert M. Gower, Robin Walters, Rose Yu.
International Conference on Learning Representations (ICLR), 2024.
Oral presentation (top 1.2%).

[4] DYffusion: A Dynamics-informed Diffusion Model for Spatiotemporal Forecasting.
Salva Rühling Cachay, **Bo Zhao**, Hailey Joren, Rose Yu.
Advances in Neural Information Processing Systems (NeurIPS), 2023.

[5] Symmetries, Flat Minima, and the Conserved Quantities of Gradient Flow.
Bo Zhao*, Iordan Ganev*, Robin Walters, Rose Yu, Nima Dehmamy. (*equal contribution)
International Conference on Learning Representations (ICLR), 2023.

[6] Symmetry Teleportation for Accelerated Optimization.
Bo Zhao, Nima Dehmamy, Robin Walters, Rose Yu.
Advances in Neural Information Processing Systems (NeurIPS), 2022.

[7] LIMO: Latent Inceptionism for Targeted Molecule Generation.
Peter Eckmann, Kunyang Sun, **Bo Zhao**, Mudong Feng, Michael Gilson, Rose Yu.
International Conference on Machine Learning (ICML), 2022.

[8] Concentric Spherical Neural Network for 3D Representation Learning.
James Fox, **Bo Zhao**, Beatriz Gonzalez Del Rio, Sivasankaran Rajamanickam, Rampi Ramprasad, Le Song.
International Joint Conference on Neural Networks (IJCNN), 2022.

Journal

[1] Multiple Aging Mechanisms in Ferroelectric Deuterated Potassium Dihydrogen Phosphate.
Gregory A. Fields, Samuel F. Cieszynski, **Bo Zhao**, Kidan A. Tadesse, Mohammed A. Sheikh, Eugene V. Colla, and M. B. Weissman.
Journal of Applied Physics 125, 194102, 2019.

Preprints and Recent Workshops

[1] Optimizing Reasoning Efficiency through Prompt Difficulty Prediction
Bo Zhao, Berkcan Kapusuzoglu, Kartik Balasubramaniam, Sambit Sahu, Supriyo Chakraborty, Genta Indra Winata.
Workshop on Efficient Reasoning at NeurIPS 2025.

[2] Symmetry in Neural Network Parameter Spaces.
Bo Zhao, Robin Walters, Rose Yu.
ArXiv preprint arXiv:2506.13018

[3] Emergence of Hierarchical Emotion Organization in Large Language Models
Bo Zhao*, Maya Okawa*, Eric J. Bigelow, Rose Yu, Tomer Ullman, Hidenori Tanaka.
ArXiv preprint arXiv:2507.10599

[4] Data-Free Transformer Quantization Using Parameter-Space Symmetry.
Lucas Laird, **Bo Zhao**, Rose Yu, Robin Walters
Workshop on High-dimensional Learning Dynamics (HiLD) at ICML 2025.

[5] Improving Learning to Optimize Using Parameter Symmetries.
Guy Zamir, Aryan Dokania, **Bo Zhao**, Rose Yu
Workshop on Neural Network Weights as a New Data Modality at ICLR 2025.

[6] Finding Symmetry in Neural Network Parameter Spaces.
Bo Zhao, Nima Dehmamy, Robin Walters, Rose Yu.
Workshop on Unifying Representations in Neural Models at NeurIPS 2024.

SELECTED TALKS

Understanding Mode Connectivity via Parameter Space Symmetry
· *ELLIS Reading Group on Mathematics of Deep Learning* June 2025

Symmetries in the Parameter Space of Neural Networks
· *Northeastern University, Geometric Learning Lab* June 2024
· *Technion, Professor Haggai Maron's group* Feb 2024

Symmetries, Flat Minima, and the Conserved Quantities of Gradient Flow
· *Southern California Applied Mathematics Symposium* (contributed talk) April 2024
· *Boston Computation Club* July 2023

Symmetry Teleportation for Accelerated Optimization
· *Conference on the Mathematical Theory of Deep Learning* (contributed talk) Nov 2022

LIMO: Latent Inceptionism for Targeted Molecule Generation
· *ICML 2022* (spotlight) July 2022

TEACHING

Teaching Assistant, CS 291A Generative AI, UC San Diego Fall 2025

Teaching Assistant, CS 4641 Machine Learning, Georgia Tech Fall 2020

Lead Course Assistant, CS 225 Data Structures, UIUC Spring 2019

Course Assistant, CS 225 Data Structures, UIUC Fall 2017, Spring 2018, Fall 2018

SERVICE

Workshop organization
Organizer, NeurIPS Workshop on Unifying Representations in Neural Models (UniReps), 2025
Organizer, ICLR Workshop on Neural Network Weights as a New Data Modality, 2025
Student Program and Funding Chair, WiML Workshop at NeurIPS, 2024

Reviewer
ICML (2022-2025), NeurIPS (2022-2025), ICLR (2024-2025), AISTATS (2024-2025), AAAI (2025-2026), TMLR (2024–2025)