

# BO ZHAO

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## RESEARCH INTEREST

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Parameter space symmetry, optimization, deep learning

## EDUCATION

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**University of California San Diego** 2021–2026  
*Ph.D. in Computer Science*

**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

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**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* 2024/6–2024/9  
• Studied representation and dynamics of emotion in large language models.

**IBM** Cambridge, MA  
*AI Intern* 2022/6–2022/9  
• Studied parameter space symmetry and conserved quantities in gradient flow.

## AWARDS & HONORS

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**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

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### 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\***, Jordan 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] Symmetry in Neural Network Parameter Spaces.  
**Bo Zhao**, Robin Walters, Rose Yu.  
*Transactions on Machine Learning Research (TMLR)*, 2026.
- [2] 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] A Survey of Weight Space Learning: Understanding, Representation, and Generation.  
Xiaolong Han, Zehong Wang, **Bo Zhao**, Binchi Zhang, Jundong Li, Damian Borth, Rose Yu, Haggai Maron, Yanfang Ye, Lu Yin, Ferrante Neri  
*ArXiv preprint arXiv:2603.10090*
- [2] Demystifying Mergeability: Interpretable Properties to Predict Model Merging Success.  
Luca Zhou, **Bo Zhao**, Rose Yu, Emanuele Rodolà  
*ArXiv preprint arXiv:2601.22285*
- [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] 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.
- [5] 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.
- [6] 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.
- [7] Finding Symmetry in Neural Network Parameter Spaces.  
**Bo Zhao**, Nima Dehmamy, Robin Walters, Rose Yu.  
*Workshop on Unifying Representations in Neural Models (UniReps)* at NeurIPS 2024.

## SELECTED TALKS

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- 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  
 · *Geometric Learning Lab, Northeastern University* *June 2024*  
 · *Technion. Host: Haggai Maron* *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*

## TEACHING

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- 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

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### Conference and workshop organization

Organizer, NeurIPS Workshop on Unifying Representations in Neural Models, 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 (2022-2026), NeurIPS (2022-2025), ICLR (2024-2026), AISTATS (2024-2026), AAAI (2025-2026), TMLR (2024-2026)