

# YULAI ZHAO

[Homepage](#) [Google Scholar](#) [DBLP](#) [ORCID](#) [Semantic Scholar](#) [ResearchGate](#) [GitHub](#) [LinkedIn](#)

yulaiz@princeton.edu

## RESEARCH INTERESTS

---

Reinforcement Learning, ML for Science

## EDUCATION

---

**Princeton University, Department of Electrical and Computer Engineering** 2022 - Present

- Ph.D. in Machine Learning
- Advisor: S.Y. Kung

**Princeton University, Department of Electrical and Computer Engineering** 2022 - 2024

- M.A. in Electrical and Computer Engineering
- Advisor: S.Y. Kung

**Tsinghua University, Department of Electronic Engineering** 2018 - 2022

- B.Eng. in Electronic Information Science and Technology
- Advisors: Simon S. Du, Hongwei Chen

## RESEARCH INTERNSHIPS

---

**Magnit Global @ Genentech** Sept 2024 - Dec 2024

- Machine Learning Scientist
- Employed by Magnit Global to conduct research at Genentech.
- Develop novel generative models for protein/RNA design to contribute to the drug discovery process.
- Mentors: Gabriele Scalia, Ehsan Hajiramezanali, Masatoshi Uehara

**Genentech — BRAID (Biology Research | AI Development)** May 2024 - Aug 2024

- Intern - Fundamental ML and Generative AI, DELTA Lab
- Affiliated to gRED (Research & Early Development) Computational Science.
- Worked on diffusion models specifically tailored for DNA/RNA sequences.
- Mentors: Ehsan Hajiramezanali, Masatoshi Uehara

## PUBLICATIONS

---

\* denotes equal contribution or alphabetical ordering.

### Conference Proceedings

1. **Reward-Guided Refinement in Diffusion Models With Applications to Protein and DNA Design**

Masatoshi Uehara, Xingyu Su, **Yulai Zhao**, Xiner Li, Aviv Regev, Shuiwang Ji, Sergey Levine, Tommaso Biancalani

*International Conference on Machine Learning (ICML) 2025*

2. **Adding Conditional Control to Diffusion Models with Reinforcement Learning**

**Yulai Zhao\***, Masatoshi Uehara\*, Gabriele Scalia, Sunyuan Kung, Tommaso Biancalani, Sergey Levine, Ehsan Hajiramezanali

*International Conference on Learning Representations (ICLR) 2025*

3. **Bridging Model-Based Optimization and Generative Modeling via Conservative Fine-Tuning of Diffusion Models**

Masatoshi Uehara\*, **Yulai Zhao\***, Ehsan Hajiramezanali, Gabriele Scalia, Gökçen Eraslan, Avantika Lal, Sergey Levine, Tommaso Biancalani

*Conference on Neural Information Processing Systems (NeurIPS) 2024*

4. **Feedback Efficient Online Fine-Tuning of Diffusion Models**  
Masatoshi Uehara\*, **Yulai Zhao\***, Kevin Black, Ehsan Hajiramezanali, Gabriele Scalia, Nathaniel Lee Diamant, Alex M Tseng, Sergey Levine, Tommaso Biancalani  
*International Conference on Machine Learning (ICML) 2024*
5. **Provably Efficient CVaR RL in Low-rank MDPs**  
**Yulai Zhao\***, Wenhao Zhan\*, Xiaoyan Hu\*, Ho-fung Leung, Farzan Farnia, Wen Sun, Jason D. Lee  
*International Conference on Learning Representations (ICLR) 2024*
6. **Local Optimization Achieves Global Optimality in Multi-Agent Reinforcement Learning**  
**Yulai Zhao**, Zhuoran Yang, Zhaoran Wang, Jason D. Lee  
*International Conference on Machine Learning (ICML) 2023*
7. **Blessing of Class Diversity in Pre-training**  
**Yulai Zhao**, Jianshu Chen, Simon S. Du  
*International Conference on Artificial Intelligence and Statistics (AISTATS) 2023*  
(Oral presentation & notable paper, 2% acceptance rate)
8. **Provably Efficient Policy Gradient Methods for Two-Player Zero-Sum Markov Games**  
**Yulai Zhao**, Yuandong Tian, Jason D. Lee, Simon S. Du  
*International Conference on Artificial Intelligence and Statistics (AISTATS) 2022*

## Working Papers

1. **Iterative Distillation for Reward-Guided Fine-Tuning of Diffusion Models in Biomolecular Design**  
Xingyu Su, Xiner Li, Masatoshi Uehara, Sunwoo Kim, **Yulai Zhao**, Gabriele Scalia, Ehsan Hajiramezanali, Tommaso Biancalani, Degui Zhi, Shuiwang Ji  
*arXiv preprint*
2. **Inference-Time Alignment in Diffusion Models with Reward-Guided Generation: Tutorial and Review**  
Masatoshi Uehara, **Yulai Zhao**, Chenyu Wang, Xiner Li, Aviv Regev, Sergey Levine, Tommaso Biancalani  
*arXiv preprint*
3. **Derivative-Free Guidance in Continuous and Discrete Diffusion Models with Soft Value-Based Decoding**  
Xiner Li, **Yulai Zhao**, Chenyu Wang, Gabriele Scalia, Gokcen Eraslan, Surag Nair, Tommaso Biancalani, Shuiwang Ji, Aviv Regev, Sergey Levine, Masatoshi Uehara  
*arXiv preprint*
4. **Understanding Reinforcement Learning-Based Fine-Tuning of Diffusion Models: A Tutorial and Review**  
Masatoshi Uehara\*, **Yulai Zhao\***, Tommaso Biancalani, Sergey Levine  
*arXiv preprint*
5. **Fine-Tuning of Continuous-Time Diffusion Models as Entropy-Regularized Control**  
Masatoshi Uehara\*, **Yulai Zhao\***, Kevin Black, Ehsan Hajiramezanali, Gabriele Scalia, Nathaniel Lee Diamant, Alex M Tseng, Tommaso Biancalani, Sergey Levine  
*arXiv preprint*
6. **Optimizing the Performative Risk under Weak Convexity Assumptions**  
**Yulai Zhao**  
*NeurIPS 2022 Workshop on Optimization for Machine Learning*

## AWARDS/HONORS

- 
- |   |                   |
|---|-------------------|
| <b>International Conference on Artificial Intelligence and Statistics (AISTATS) Notable Paper</b> | <i>2023</i>       |
| <b>Scholarship of Academic Excellence</b>   | <i>2019, 2020</i> |
| Awarded to Tsinghua students ranking top 5 %.   |                   |
| <b>Toyota Scholarship</b>   | <i>2019</i>       |
| Awarded to the department's top 3 out of 260+ students.   |                   |
| <b>Top 10 in the <i>Infinity of Math</i> Competition</b>  | <i>2018</i>       |
| Awarded to students outperforming 150+ participants in the school-wide calculus contest.          |                   |

- Proficient: Python (NumPy, PyTorch, pandas)
- Intermediate: MATLAB, C/C++, Kdb+