JAY SHEN

Email Website GitHub LinkedIn

EDUCATION

Sept 2022 - June 2026 **University of Chicago** *BS Physics, BS Computer Science*
GPA 3.75/4.00

GRANTS, AWARDS, FELLOWSHIPS

2025 **Quad Summer Grant** Funding for Summer Research

2025 **Polsky Climate Fellowship** Funding and Programming for Summer Research

2024 **Quad Grant** Funding for Academic Year Research

2024 **UCTS Fellowship** Housing and Stipend for Summer Research Abroad

2024 **SITG Grant** Funding for Summer Research Abroad

2023 **Metcalf Grant** Funding for Academic Year Research

EXPERIENCE

Sept 2024 - Sept 2025 **Undergraduate Researcher** *Ferguson Lab (UChicago)*
Lead a project developing better structural biases for molecule transformer models.
- Conducted reviews of molecular property prediction literature.
- Designed custom transformers using PyTorch.
- Trained models and ran experiments on HPC.
- Presented a poster and submitted a workshop paper.

June 2024 - Aug 2024 **Exchange Research Intern** *Kao Lab (NTU)*
Studied and improved the MLRG algorithm for neurally learning renormalization group flows of Ising models.
- Implemented deep neural networks, restricted boltzmann machines, and tensor network algorithms using PyTorch.
- Applied finite group theory and condensed matter physics.
- Wrote a manuscript and presented a poster.

Oct 2023 - May 2024 **Research Intern** *Ferguson Lab (UChicago)*

Completed a project building generative models for drug design.
- Designed VAEs using PyTorch.
- Trained models and ran experiments on HPC.
- Implemented latent space Bayesian optimization loops.

Mar 2023 - Mar 2024 **Research Intern** *AIR Lab (UChicago)*
Contributed to a project creating and analyzing a corpus of internet content moderation policies.
- Built Selenium web scrapers and data caching tools that improved data completeness from ~30% to 98.6%.
- Compiled research on web throttling practices
- Provided materials to published paper.

June 2023 - Sept 2023 **Software Development Intern** *Duunokid*
Developed web and iOS apps for an EdTech startup.
- Maintained, built, and deployed company apps on AWS and AliCloud EC instances.
- Wrote documentation/runbooks about system design, operations, and troubleshooting for future maintainers.
- Led other interns in systematic testing of application frontends.

LITERATURE

Shen, Jay, Oliver Tang, Andrew Ferguson. "Power law attention biases for molecular transformers". 2025. Link.

Shen, Jay. "Learning Renormalization Group Flows for Lattices". 2024. Link.

Shen, Jay, Mark Lee. "Theory and Methods for the Ferromagnetic Ising Model". 2024. Link.

Schaffner, Brennan, Arjun Nitin Bhagoji, Siyuan Cheng, Jacqueline Mei, Jay L. Shen, Grace Wang, Marshini Chetty, Nick Feamster, Genevieve Lakier, and Chenhao Tan. '"Community Guidelines Make This the Best Party on the Internet": An In-Depth Study of Online Platforms' Content Moderation Policies'. In Proceedings of the CHI Conference on Human Factors in Computing Systems, 1–16. CHI '24. ACM, 2024. https://doi.org/10.1145/3613904.3642333.

PRESENTATIONS

June 23, 2025 **"Power law attention biases for molecule transformers"** (Poster)
Midwest Machine Learning Symposium 2025

June 2, 2025 **"Learning Renormalization Group Flows"** (Poster)
Midwest Thermodynamics and Statistical Mechanics Conference 2025

Sept 26, 2024 **"Learning Renormalization Group Flows"** (Oral)
AIChe RAGSAB Workshop

Aug 17, 2024 **"Learning Renormalization Group Flows"** (Oral)
NTU UCTS Physics Symposium

LEADERSHIP

UChicago Student Research Society Co-president
UChicago Biophysical Society Board Member
UChicago Climbing Club Board Member

SKILLS

Python PyTorch, SciKit, Flask/Jinja2, matplotlib/seaborn, Selenium/BeautifulSoup
C/C++ Criterion, LLDB, PPM, Valgrind/Leaks
HTML, CSS, JavaScript React.js
AWS EC2, Elastic Beanstalk, S3, Route53
Linux OS SSH, Samba, FTP, Netcat, Wireshark