

# Vincent X. Wang

vincentxwang@uchicago.edu | vincentxwang.github.io

## EDUCATION

---

### University of Chicago

*B.S. in Mathematics and Computer Science*

Chicago, IL

*Expected June 2027*

- Transferred from Rice University (Aug 2023 – May 2025), Combined GPA: 3.99/4.0

## RESEARCH EXPERIENCE

---

### Differentially private stochastic convex optimization

Jan 2026 – Present

*Toyota Technological Institute – Chicago*

- Theoretical analysis of differentially-private stochastic convex optimization (DP-SCO) minimax rates in  $\ell_p$  norm, establishing fundamental limits on training of private machine learning models
- Advisor: Mahdi Haghifam

### SMALL REU: Tropical geometry and chip-firing games

June 2025 – Aug 2025

*Williams College, Department of Mathematics*

- Conducted theoretical research in algebraic combinatorics and graph gonality; co-authored two manuscripts
- Created performant [Julia library for analysis of chip-firing graphs](#) and ran multi-threaded computations
- Advisor: Ralph Morrison

### Differentially private statistical machine learning algorithms

Jan 2025 – June 2025

*Rice University, Department of Computer Science*

- Developed several differentially private algorithms, such as interior point and histogram estimation, assuming access to an unverified prediction
- Settled an open question of 6 years by discovering the first private nearly-linear time hypothesis selection algorithm, resulting in a publication at NeurIPS 2025
- Advisor: Maryam Aliakbarpour

### Texas A&M PDEs summer school

May 2025

*Texas A&M University, Department of Mathematics*

- Two-week workshop in the theory of PDEs and mathematical modeling
- Independently derived and implemented a 2D finite difference method for nonlinear elasticity problems
- Advisor: Matthias Maier

### Discontinuous Galerkin methods for wave equations ([GitHub](#))

Apr 2024 – Dec 2024

*Rice University, Department of Computational Applied Mathematics and Operations Research*

- Formulated new matrix algorithms for Bernstein basis operators in high-fidelity PDE simulations, resulting in over 100x speedups at high orders ( $N > 8$ ) over state-of-the-art
- Awarded Outstanding Presentation in Computational Applied Mathematics and Operations Research at Gulf Coast Undergraduate Research Symposium
- Advisor: Jesse Chan

### Single-cell RNA analysis via machine learning

Sept 2024 – Dec 2024

*Rice University, Department of Computer Science*

- Wrote tree-based learning models in R to integrate single-cell RNA datasets with genome-wide association studies
- Evaluated heuristics of several optimal cell clustering algorithms to eliminate manual hyperparameter tuning
- Advisors: Vicky Yao, Qiliang Lai

## PUBLICATIONS (AUTHORS IN ALPHABETICAL ORDER)

---

1. D. Leitz, R. Morrison, S. Newman-Taylor, V. X. Wang. *The  $d$ -gonal Locus in the Moduli Space of Tropical Plane Curves*. Preprint, [arXiv](#).
2. C. Chen, T. Gabrielsen, R. Morrison, N. Pasman, M. Reeve, V. X. Wang. *Graph Gonality Under Uniform Subdivision*. In preparation.
3. M. Aliakbarpour, Z. Shi, R. Stevens, V. X. Wang. *Nearly-Linear Time Private Hypothesis Selection with the Optimal Approximation Factor*. 39th Conference on Neural Information Processing Systems, **NeurIPS 2025**, [arXiv](#).

## AWARDS/HONORS

---

- 2026 Barry Goldwater Scholar Mar 2026
- JMM 2026 Undergraduate Travel Grant [\$1000] Nov 2025
- Putnam Top 500 (Score: 30) Dec 2025
- US Physics Olympiad Silver Medal (2x Qualifier) May 2022
- 3x AIME Qualifier 2021-2023
- USA Coding Olympiad Silver Contestant Jan 2020
- Lam Research Core Values Scholarship May 2023

## PRESENTATIONS

---

- JMM 2026 (AMS Contributed Paper Session on Combinatorics, IV), *Washington, D.C.* Jan 2026  
**Talk:** Minimality Results on Graphs with Different Discrete and Metric Gonality
- JMM 2026 (PME Contributed Session on Research by Undergraduates, V), *Washington, D.C.* Jan 2026  
**Talk:** Computation on Gonality of Uniformly Subdivided Graphs
- Williams College Mathematics Colloquium, *Williamstown, MA* Aug 2025  
**Talk:** The  $d$ -gonal Locus in the Moduli Space of Tropical Plane Curves
- Williams College Summer Science Research **Poster** Session, *Williamstown, MA* Aug 2025  
**Poster:** The  $d$ -gonal Locus in the Moduli Space of Tropical Plane Curves
- Gulf Coast Undergraduate Research Symposium, *Houston, TX* Nov 2024  
**Talk:** Efficient Julia Implementations of Bernstein Basis Discontinuous Galerkin Methods  
**Award:** Outstanding Presentation in Computational Applied Mathematics and Operations Research
- SIAM TX-LA, *Waco, TX* Oct 2024  
**Poster:** Efficient Julia Implementations of Bernstein Basis Discontinuous Galerkin Methods
- RTG Numerical Mathematics & Scientific Computing Annual Workshop, *Houston, TX* Oct 2024  
**Poster:** Efficient Julia Implementations of Bernstein Basis Discontinuous Galerkin Methods
- Materials Research Society Fall Meeting, *Boston, MA* Nov 2022  
**Talk:** Molecular Dynamics (MD) Simulations of Soil-Strengthening Nanocomposite-Polyelectrolyte Hydrogels

## PROJECTS

---

### [nestalgia\\_rs](#)

Nintendo NES emulator in Rust from scratch (can play Donkey Kong + more!)

### [rchess](#)

Rust-based chess library and engine

## ACTIVITIES

---

**Rice MATH 232 Grader**, *Honors Multivariable Calculus* Spring 2024, Spring 2025

**Rice Lovett College Academic Fellow** Fall 2024, Spring 2025  
Peer tutor for multivariable calculus and real analysis

**Rice COMP 182 TA**, *Algorithmic Thinking* Spring 2025

**Rice Integration Bee Problem Setter and Organizer** Feb 2025

**RiceApps** | *Full-Stack Developer* Sept 2023 – May 2024  
Developed and launched Speech Babble, a speech therapy app, on the App Store with nonprofit Texas Hearing Institute