

Travor Zihao Liu
travor_liu@stanford.edu
<https://travorlzh.github.io/>
Stanford, California, USA

Education

- 2025– **Ph.D.**, Mathematics, Stanford University
- Advanced to candidacy in Sept 2025
- 2022–2025 **B.Sc.** Mathematics, University College London
- First Class Honours, Ranked 1st out of 341

Research Experience

- 2025– Higher Order Fourier Analysis (Supervisor: [Dr. Sarah Peluse](#)).
- Exploring Gowers norm and its applications to the theorems of Szemerédi, Green–Tao, and Green–Sawhney.
- 2024–2025 Explicit Quadratic Large Sieve Inequality, (Supervisor: [Dr. Ian Petrow](#))
- Funded by LMS Undergraduate Research Bursaries (URB-2024-41)
 - Followed the work of Heath-Brown and produced a research paper
- 2024 Special Values of the Riemann Zeta Function (Supervisor: [Dr. Cecilia Busuioc](#))
- Investigated Bernoulli numbers and computed $\zeta(2k)$ for integers $k \geq 1$
 - Studied Beukers’s proof that $\zeta(3)$ is irrational
- 2023–2024 p -adic Numbers (Supervisor: [Dr. Cecilia Busuioc](#))
- With Hantang Guo, May Jiang, and Qing Su
 - Proved Ostrowski’s theorem and p -adic Weierstrass preparation theorem
 - Wrote Python code for visualization
- 2023 Axiom of Choice (Supervisor: [Dr. Cecilia Busuioc](#))
- With Yi Liu, Daya Singh, and Tairan Wang
 - Investigated equivalent forms, consequences, and the independence of the Axiom of Choice from ZF set theory
 - Studied well-ordered sets, ordinals, and transfinite recursion
- 2021 Prime Number Theorem

- Developed a new method to prove the prime number theorem
- Published an academic research paper and presented at ICPAM 2021

2020 PM2.5 Density Prediction

- Studied PM2.5 density using signal processing, Pandas, and LightGBM
- Innovated and published a paper on a new PM2.5 prediction model

2017–2019 Operating System Development

- Created two 32-bit operating systems from scratch
- Implemented keyboard driver and virtual memory using C and x86 assembly

Publications

1. Liu, Z. *Explicit quadratic large sieve inequality* arXiv:2505.09637 [math]. May 2025. <http://arxiv.org/abs/2505.09637>.
2. Liu, Z. *On a weighted sum over multiplicative functions and its applications to the GPY sieve* arXiv:2210.01671 [math]. Mar. 2023. <http://arxiv.org/abs/2210.01671>.
3. Liu, Z. A Direct Proof of the Prime Number Theorem using Riemann's Prime-counting Function. *Journal of Physics: Conference Series* **2287**. Publisher: IOP Publishing, 012008. <https://doi.org/10.1088/1742-6596/2287/1/012008> (2022).
4. Liu, Z. *A Corrected Simplified Proof of Chen's Theorem* arXiv:2203.07871 [math]. Mar. 2022. <http://arxiv.org/abs/2203.07871>.
5. Liu, Z. *PM2.5 Density Prediction Based on a Two-Stage Rolling Forecast Model Using LightGBM in Computing and Data Science* (eds Cao, W., Ozcan, A., Xie, H. & Guan, B.) (Springer Nature Singapore, Singapore, 2021), 228–248. ISBN: 978-981-16-8885-0.

Presentations

Student-Run Seminars on Number Theory and Function Theory

1. *On the distribution of zeros of $\zeta(s)$* . July 2025.
2. *Ω results in number theory*. July 2023.
3. *GPY sieve - from Selberg to Maynard*. July 2022.

UCL Undergraduate Math Colloquium

1. *Special values of the Riemann zeta function*. Oct. 2024.
2. *Introduction to p -adic analysis*. Feb. 2024.
3. *Ray reflection and rational approximation*. Oct. 2023.
4. *Ellipses, pendulum, and double periodicity*. Mar. 2023.
5. *Bounded gaps between primes*. Oct. 2022.

UCL Undergraduate Project Talks

1. [Inverse Galois Problem](#). Dec. 2024.
2. [Axiom of Choice: Equivalents, Consequences, and Independence](#). June 2023.

Teaching

Stanford University

- 2025 Head Teaching Assistant, Applied Matrix Theory (Math 104)
- Holding 3 hours of Q&A sessions every week
 - Leading 5 course assistants to grade homeworks of over 130 students

Attended Seminars

- 2025 [Summer School on Analytic Number Theory \(Xi'an, China\)](#)
- 2024 International Number Theory Conference in Commemoration of Chengdong Pan (Jinan, China)
- 2022–2025 London Number Theory Seminars
- 2022–2025 London Junior Number Theory Seminars
- 2022–2025 London Heilbronn Colloquia

Other Experience

- 2020– [Math Stack Exchange](#) and [Math Overflow](#)
- Answered 250+ questions on complex analysis and number theory
 - Earned 7.5k+ score MSE and 1.3k+ scores on MO as of 2025
 - Top answerer under the tag “analytic number theory”
- 2020– Math Blogging on [Zhihu](#)
- Composed 160+ articles for 8 self-initiated math columns
 - Answered 980+ math questions from netizens
 - Obtained 82k+ followers, 87k+ upvotes, and 77k bookmarks as of 2025

Awards & Honors

- 2024 [LMS Undergraduate Research Bursaries \(URB-2024-41\)](#)
- 2024 MSci Prize in Mathematics (Best Year 2 overall performance)
- 2024 Kestelman Prize (Best Year 2 performance in Real and Complex Analysis)

2023	Filon Prize (Best Year 1 overall performance)
2022	Platinum Division, USA Computing Olympiad
2021	Bronze, S.-T. Yau High School Science Award (Mathematics)
2019	Finalist Award, High School Mathematical Contest in Modeling

Last updated: October 17, 2025