# Ryan C. Chen

Department of Mathematics
Massachusetts Institute of Technology
182 Memorial Dr., Cambridge, MA 02139

Email: rcchen@mit.edu
Website: rycchen.github.io

February 2024

## Education

**Massachusetts Institute of Technology**
2020–
Ph.D. in Mathematics (expected 2025)
Advisor: Wei Zhang

**University of Cambridge**
2019–2020
Churchill College
MASt in Mathematics (Part III)

**Princeton University**
2015–2019
A.B. in Mathematics, summa cum laude

## Interests

Number theory, arithmetic geometry

## Papers*

*Co-rank* 1 *Arithmetic Siegel–Weil*
Preliminary version (2024), pp. 1–223.
https://rycchen.github.io/papers/corank1_ASW (2024).

*A refined conjecture for the variance of Gaussian primes across sectors*
with Yujin H. Kim, Jared D. Lichtman, Steven J. Miller, Alina Shubina, Shannon Sweitzer, Ezra Waxman, Eric Winsor, and Jianing Yang.
Experimental Mathematics, vol. 32 no. 1 (2023), pp. 33–53.
https://arxiv.org/abs/1901.07386 (2019).

*p-adic Properties of Hauptmoduln with Applications to Moonshine*
with Samuel Marks and Matt Tyler.
Symmetry, Integrability, and Geometry: Methods and Applications (SIGMA), vol. 15 (2019), pp. 1–35.
https://arxiv.org/abs/1809.02913 (2018).

*Lower-Order Biases in the Second Moment of Dirichlet Coefficients in Families of L-functions*
with Megumi Asada, Eva Fourakis, Yujin Hong Kim, Andrew Kwon, Jared Duker Lichtman, Blake Mackall, Steven J. Miller, Eric Winsor, Karl Winsor, Jianing Yang, and Kevin Yang.
Experimental Mathematics, vol. 32 no. 3 (2023), pp. 431–456.
https://arxiv.org/abs/1808.06056 (2018).

*Spectral statistics of non-Hermitian random matrix ensembles*
with Yujin H. Kim, Jared D. Lichtman, Steven J. Miller, Shannon Sweitzer, and Eric Winsor.
Random Matrices: Theory and Applications, vol. 8, no. 2 (2019), pp. 1–40.
https://arxiv.org/abs/1803.08127 (2018).

*On Reay's relaxed Tverberg conjecture and generalizations of Conway's thrackle conjecture*
with Megumi Asada, Florian Frick, Frederick Huang, Maxwell Polevy, David Stoner Ling Hei Tsang, and Zoe Wellner.
The Electronic Journal of Combinatorics, vol. 25, no. 3 (2018), pp. 1–14.
https://arxiv.org/abs/1608.04279 (2016).

*Listed in reverse order of first arXiv appearance (with arXiv year also indicated).
arXiv author ID link: https://arxiv.org/a/chen_r_2.

## Honors and Awards

2019 MIT Presidential Fellowship

2019 NSF Graduate Research Fellowship

2019 Churchill Scholarship

2018 Barry M. Goldwater Scholarship

2017 Shapiro Prize for Academic Excellence, Princeton University

2016 Manfred Pyka Memorial Prize in Physics, Princeton University

## Research talks

2024 Arithmetic intersection theory on Shimura varieties (AIM workshop)
*Co-rank* 1 *Arithmetic Siegel–Weil*

2019 MAA Undergraduate Poster Session at JMM
*p-adic Properties of Hauptmoduln with Applications to Moonshine*

2017 Ohio State Young Mathematicians Conference
*Spectral statistics of non-Hermitian random matrix ensembles*

2017 Ohio State Young Mathematicians Conference
*Bounds for vanishing of L-functions at the central point*

2017 MAA Undergraduate Poster Session at JMM
*On Reay's relaxed Tverberg conjecture*

## Other talks

2024 Spring internal seminar at MIT
*Co-rank* 1 *Arithmetic Siegel–Weil*

2023 Fall learning seminar at MIT
*Integral canonical models of orthogonal Shimura varieties*

2023 Fall learning seminar at MIT
*Integral models of orthogonal Shimura varieties and K3 surfaces*

2022 Program associate seminar at SLMath/MSRI
*Rapoport–Zink uniformization and Kudla–Rapoport cyclexs*

2022 Fall learning seminar at MIT
*Introduction to Kudla's program*

2022 Summer learning seminar on Gross–Zagier at MIT
*Archimedean local heights*

2022 MIT graduate student seminar (PUMAGRASS)
*Polytopes and toric varieties*

2021 Seminar on Topics in Arithmetic, Geometry, etc. (STAGE) at MIT
*Moduli spaces of curves and abelian varieties*

2021 Fall learning seminar on $p$-adic shtukas at MIT
*Perfectoid spaces*

2021 Summer learning seminar on moduli of $p$-divisible groups at MIT
*Local models for Rapoport-Zink spaces*

2020 University of Cambridge Part III Seminar Series
*Integer points, rationality, and moduli spaces*

2019 Princeton Undergraduate Colloquium
*Integer points, Diophantine geometry, and moduli spaces*

2019 Arithmetic geometry internal seminar at Princeton
*Diophantine problems and p-adic period mappings*

## Undergradute Research

**Princeton undergraduate work**
2018–2019 Advisor for undergraduate senior thesis: Shou-Wu Zhang
*Integer points on complements of dual curves and on genus one modular curves*

2018 Advisor for undergraduate junior paper: Christopher Skinner

**2018 Emory REU in mathematics**
Advisors: Ken Ono and John F. R. Duncan

**2017 SMALL REU in mathematics at Williams College**
Advisors: Steven J. Miller and Ezra Waxman

**2016 Summer Program for Undergraduate Research in mathematics at Cornell University**
Advisor: Florian Frick

## Mentoring

**2021 Polymath Jr. Mentor**
Co-mentored two undergraduate student projects in number theory,
with Steven J. Miller and Ezra Waxman.

*One-level density for a family of L-functions associated to super-even characters over function fields.*
Dang Dang, Hari Iyer, Sanford Lu, Steven J. Miller, Ezra Waxman. In preparation.

*A Hardy–Littlewood Conjecture for Artin Primes.*
Mengzhen Liu and Ezra Waxman. In preparation.

**Mentor, Grad-Undergrad Math Mentoring Initiative (GUMMI) at MIT**
2020 – present

## Conferences, Programs, and Workshops

2024 AIM workshop: Arithmetic intersection theory on Shimura varieties

2023 Conference on Global Langlands, Shimura varieties, and shtukas

2023 Coates Memorial Conference (Iwasawa 2023)

2023 SLMath/MSRI program: Algebraic Cycles, $L$-values, and Euler Systems

2022 Arizona Winter School: Automorphic forms beyond $\mathrm{GL}_2$