Ryan C. Chen

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Positions

Clay Research Fellow
2025 – 2026 Princeton University
2026 – 2030

Education

Massachusetts Institute of Technology (MIT)
2020 – 2025
Ph.D. in Mathematics
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
Senior thesis advisor: Shou-Wu Zhang

Interests

Number theory, arithmetic geometry

Honors and Awards

2025 Clay Research Fellowship

2024 Charles and Holly Housman Award for Excellence in Undergraduate Teaching, MIT

2020 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

In addition to blue hyperlinks, this document also contains many hyperlinks in non-highlighted text, such as collaborator names.

Papers*

Faltings heights and the subleading terms of adjoint L-functions
with Weixiao Lu and Wei Zhang.
In preparation. Abstract (from Faltings birthday conference).

Co-rank 1 *Arithmetic Siegel–Weil IV: Analytic local-to-global*
Preprint, pp. 1–69.
`https://arxiv.org/abs/2405.01429` (2024).

Co-rank 1 *Arithmetic Siegel–Weil III: Geometric local-to-global*
Preprint, pp. 1–67.
`https://arxiv.org/abs/2405.01428` (2024).

Co-rank 1 *Arithmetic Siegel–Weil II: Local Archimedean*
Preprint, pp. 1–29.
`https://arxiv.org/abs/2405.01427` (2024).

Co-rank 1 *Arithmetic Siegel–Weil I: Local non-Archimedean*
Preprint, pp. 1–111.
`https://arxiv.org/abs/2405.01426` (2024).
Combined I–IV: `https://rycchen.github.io/papers/corank1_ASW.pdf` (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`.

Research talks

2026 The Gross–Zagier Formula, 40 Years Later, Cambridge USA
TBD

2026 Relative Langlands and Arithmetic, Marseille FRA
TBD

2025 Morningside Center of Mathematics, Beijing CHN
Near-center derivatives and arithmetic 1-cycles

2025 Number theory day at IASM and Zhejiang University, Hangzhou CHN
Near-center derivatives and arithmetic 1-cycles

2025 University of Chicago number theory seminar, Chicago USA
Near-center derivatives and arithmetic 1-cycles

2025 University of Wisconsin–Madison number theory seminar, Madison USA
Near-center derivatives and arithmetic 1-cycles

2025 Dartmouth Algebra and Number Theory Seminar, Hanover USA
Near-center derivatives and arithmetic 1-cycles

2025 University of Michigan Group, Lie and Number Theory seminar, Ann Arbor USA
Near-center derivatives and arithmetic 1-cycles

2025 Harvard number theory seminar, Cambridge USA
Near-center derivatives and arithmetic 1-cycles

2025 Johns Hopkins number theory seminar, Baltimore USA
Near-center derivatives and arithmetic 1-cycles

2024 The Ohio State University number theory seminar, Columbus USA
Fourier coefficients and arithmetic 1-cycles

2024 Columbia automorphic forms and arithmetic seminar, New York USA
Fourier coefficients, orbital integrals, and arithmetic 1-cycles

2024 MIT number theory seminar, Cambridge USA
Co-rank 1 *Arithmetic Siegel–Weil*

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

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

2017 Ohio State Young Mathematicians Conference, Columbus USA
Spectral statistics of non-Hermitian random matrix ensembles

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

2017 MAA Undergraduate Poster Session at JMM, Atlanta USA
On Reay's relaxed Tverberg conjecture

Other talks

2025 Spring learning seminar at MIT
On the meromorphic continuation of Eisenstein series after Bernstein and Lapid

2024 Fall learning seminar on arithmetic inner product formula at MIT
Beilinson–Bloch height pairing

2024 HMMT education talk
Sphere packing

2024 Spring learning seminar on Xiao–Zhu at MIT
Introduction to "Cycles on Shimura varieties via Geometric Satake" by L. Xiao and X. Zhu

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 cycles

2022 Fall internal 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
2021 Polymath Jr. number theory student seminar series
Diophantine equations and geometry
2020 University of Cambridge Part III Seminar Series
Integer points, rationality, and moduli spaces
2019 Princeton undergraduate math colloquium
Integer points, Diophantine geometry, and moduli spaces
2019 Arithmetic geometry internal seminar at Princeton
Diophantine problems and p-adic period mappings

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, and 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

Teaching

Massachusetts Institute of Technology (MIT)
2025 Spring Teaching Assistant for 18.102 (Functional analysis)
2024 Fall Teaching Assistant for 18.112 (Complex analysis)
2024 Spring Recitation instructor for 18.06 (Linear algebra)

Princeton University
2016 Fall Undergraduate Course Assistant/Grader for MAT 350 (Differential Manifolds)

Other Service and Organization

2024 Spring Co-organizer for internal number theory student seminar at MIT
2023 Fall Co-organizer for internal number theory student seminar at MIT
2023 Spring Social co-chair for program associates at SLMath/MSRI

Undergraduate Work

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

Conference, Program, and Workshop Attendance

2026	The Gross–Zagier formula, 40 years later, Cambridge USA
2025	Relative Langlands and Arithmetic, Marseille FRA
2025	Arithmetic and Diophantine Geometry ... (Ullmo 60th), Bures-sur-Yvette FRA
2025	The Legacy of John Tate, and Beyond, Cambridge USA
2024	Representation theory days (Lusztig conference), Cambridge USA
2024	The Mordell conjecture 100 years later, Cambridge USA
2024	AIM workshop: Arithmetic intersection theory on Shimura varieties, Pasadena USA
2023	Conference on Global Langlands, Shimura varieties, and shtukas, Bonn DEU
2023	Coates Memorial Conference (Iwasawa 2023), Cambridge UK
2023	SLMath/MSRI semester program: Algebraic Cycles, L-values, and Euler Systems, Berkeley USA
2022	Arizona Winter School: Automorphic forms beyond GL_2, Tucson USA
2021	Theta Series: Representation Theory, Geometry, and Arithmetic (Kudla 70th), Toronto CAN (virtual)