

# Roy Zhao

## PERSONAL INFORMATION

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EMAIL: rhzhao@caltech.edu  
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CITIZENSHIP: USA

## EMPLOYEMENT

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<b>Yau Mathematical Center</b> , Tsinghua University, Beijing, China Caltech–Tsinghua Joint Postdoctoral Fellow Mentor: Koji Shimizu	FALL 2024–SPRING 2026
<b>California Institute of Technology</b> , Pasadena, CA Caltech–Tsinghua Joint Postdoctoral Fellow Mentor: Elena Mantovan	FALL 2023–SPRING 2024

## EDUCATION

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<b>University of California-Berkeley</b> , PhD, Mathematics Advisor: Xinyi Yuan Thesis Title: Results on Unlikely Intersection Problems	AUGUST 2023
<b>Princeton University</b> , AB, Mathematics, <i>Summa Cum Laude</i> , <i>Phi Beta Kappa</i> , <i>Sigma Xi</i> Minor: Computer Science Senior Thesis Advisor: Chris Skinner Thesis Title: An Elliptic Curve Based Perspective on the Arithmetic of Pell Conics GPA: 3.95/4.00	MAY 2017
<b>ETH Zurich</b> , Exchange Student Thesis Advisor: Richard Pink Thesis Title: The Class Number Formula for Quadratic Fields and Related Results	FALL 2015

## PAPERS AUTHORED

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Bialgebraic Varieties of the Gamma function, *submitted*, available at arXiv:2509.24982  
Towards the Colmez Conjecture, *to appear in Acta Arithmetica*, available at arXiv:2505.06541  
Algebraic Independence of Special Points on Shimura Varieties, *submitted*, available at arXiv:2405.14084  
Heights of Special Points on Quaternionic Shimura Varieties, *submitted*, available at arXiv:2309.08886  
Algebraic Varieties and Automorphic Functions, with Sebastian Eterović, *International Mathematics Research Notices*, 2025(4). doi.org/10.1093/imrn/rnaf029

## AWARDS AND FELLOWSHIPS

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ICCM Graduate Thesis Award	JANUARY 2025
Certificate of Teaching and Learning in Higher Education	MAY 2021
UC Berkeley Summer Grant	JULY 2020
Outstanding Graduate Student Instructor Award	MARCH 2019
Sigma Xi Book Award	MAY 2017
George B. Covington Prize in Mathematics	MAY 2017
William-Lowell Putnam Competition Honorable Mention	MAR 2017

## TALKS

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### Invited

*Mini-Course on the André–Oort Conjecture*. East Normal University, 8–15 Jan 2026.  
*The André–Oort Conjecture and the Colmez Conjecture*. Number Theory Seminar, East Normal University, 8 Jan 2026.  
*p-adic Periods of CM Abelian Varieties*. 2025 Symposium on Number Theory and Arithmetic Geometry, Sanya International Math Forum, 16 Dec 2025.  
*Functional Transcendence for the Euler Gamma Function*. Algebra and Number Theory Seminar, University of Vienna, 25 Nov 2025.

*Functional Transcendence Theorems*. Postdoc Workshop IV, Tsinghua University, 23 Aug 2025.  
*Special Values of L-Functions*. Number Theory Day, Huazhong University of Science and Technology, 10 July 2025.  
*Heights on Quaternionic Shimura Varieties*. Number Theory Seminar, Fudan University, 25 May 2025.  
*Unlikely Intersection Problems and the Pila–Zannier Method*. 29 Mar 2025.  
*Unlikely Intersection Problems and the Pila–Zannier Method*. Research Seminar in Model Theory, University of Vienna, 26 Feb 2025.  
*Unlikely Intersection Problems and the Pila–Zannier Method*. Number Theory Seminar, University of Waterloo, 11 Feb 2025.  
*Unlikely Intersection Problems and the Pila–Zannier Method*. International Conference of Chinese Mathematicians, 5 Jan 2025.  
*Unlikely Intersection Results*. Postdoc Workshop VI, Tsinghua University, 23 Nov 2024.  
*Heights on Quaternionic Shimura Varieties*. p-adic Methods in Number Theory and Arithmetic Geometry, Tianyuan Mathematics Research Center, 12 Nov 2024.  
*The Pila–Zannier Method*. BIMS–Tsinghua Lunch Number Theory Seminar, Tsinghua University, 29 Sep 2024.  
*Heights on Quaternionic Shimura Varieties*. Number Theory Seminar, Tsinghua University, 26 Sep 2024.  
*Heights on Quaternionic Shimura Varieties*. Automorphic Forms and Representation Theory Seminar, Purdue University, 22 Feb 2024.  
*Heights on Quaternionic Shimura Varieties*. Algebra and Number Theory Seminar, University of California–Los Angeles, 27 Nov 2023.  
*Existential Closedness Problems*. Algebra and Number Theory Seminar, University of Rochester, 11 Nov 2021.  
*Solving Exponential-Algebraic Equations*. Mathematics Teacher-Scholar Symposium, Reed College, 22 May 2021.  
*Complex Multiplication, BSD, Gross-Zagier, and Beyond*. Number Theory Seminar, UC Berkeley, 14 Oct 2020.  
*Computation with Degree-Rips Bifiltrations*. Tutorial on Multiparameter Persistence, Computation, and Applications, University of Minnesota, 15 Aug 2018.

## Selected Other

*Heights on Quaternionic Shimura Varieties*. Number Theory Seminar, UC Berkeley, 26 Oct 2022.  
*Introduction to Shimura Varieties*. Number Theory Seminar, UC Berkeley, 19 Oct 2022.  
*The Andre-Oort Conjecture for Shimura Varieties*. Arithmetic Geometry Seminar, UC Berkeley, 29 Apr 2022.  
*The Uniform Bogomolov Conjecture*. Number Theory Seminar, UC Berkeley, 20 Apr 2022.  
*Zeta Functions à la Langlands-Kottwitz*. Number Theory Seminar, UC Berkeley, 21 Apr 2021.  
*Intersection of Varieties and Automorphic Forms*. Arithmetic Geometry Seminar, UC Berkeley, 2 Apr 2021.  
*p-divisible Groups and Dieudonné Modules*. Number Theory Seminar, UC Berkeley, 24 Sep 2020.  
*Ax-Schanuel for the  $j$ -Function*. Number Theory Seminar, UC Berkeley, 1 Apr 2020.  
*Galois Orbits of Torsion Points*. Number Theory Seminar, UC Berkeley, 18 Mar 2020.  
*The Ax-Schanuel Theorem*. Number Theory Seminar, UC Berkeley, 19 Feb 2020.  
*The Chowla-Selberg Formula*. Arithmetic Geometry Seminar, UC Berkeley, 25 Nov 2019.  
*The Gross-Zagier Formula*. Number Theory Seminar, UC Berkeley, 1 May 2019.  
*Heegner Points*. Number Theory Seminar, UC Berkeley, 24 Apr 2019.  
*Abelian Varieties over Finite Fields*. Seminar on Faltings’ Proof of the Mordell Conjecture, Peking University, 10 Oct 2018.  
*Class Field Theory and Tate Thesis*. Number Theory Seminar, UC Berkeley, 20 Sep 2017.  
*An Elliptic Curve Based Perspective on the Arithmetic of Pell Conics*. Thesis Defense, Princeton University, 12 May 2017.

## OUTREACH ACTIVITIES

Tsinghua International School SIGMA Program, Instructor	FALL 2025-SPRING 2026
Tsinghua University Learning Seminar–Integral Models of Shimura Varieties, Organizer	SPRING 2025
Tsinghua Qiuzhen College Mentor Program, Mentor	FALL 2024-SPRING 2025
Caltech Number Theory Seminar, Organizer	FALL 2023-SPRING 2024
Caltech Number Theory Learning Seminar–Lawrence–Venkatesh Method, Organizer	SPRING 2024
Caltech Number Theory Learning Seminar–Shimura Varieties, Organizer	WINTER 2024
Caltech Number Theory Learning Seminar–Abelian Varieties, Organizer	FALL 2023
Graduate Student Equity and Inclusion Coordinator	FALL 2021-SPRING 2023
Math, Physics, and Statistics Undergraduate Diversity, Equity,	

Inclusion, and Advancement Task Force, Member	FALL 2019-SPRING 2021
Unbounded Representation Student Group, President	SPRING 2019-SPRING 2023
Sexual Violence and Sexual Harassment Prevention Training, Instructor	FALL 2018-SPRING 2023
Berkeley Math Circle, Instructor	SPRING 2018-SPRING 2024
Math Taught the Right Way, Instructor	SPRING 2018-SPRING 2023
Berkeley Math Equity and Inclusion Committee, Member	FALL 2018-SPRING 2019
Berkeley Graduate Assembly, Representative	FALL 2017-SPRING 2018
Mercer County Math Circle, Organizer	SPRING 2015-SPRING 2017

## CONFERENCES ATTENDED

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2025 Symposium on Number Theory and Arithmetic Geometry (invited speaker), Sanya International Math Forum, December 2025  
Arithmetic and Diophantine Geometry, via Ergodic Theory and o-minimality (participant), IHES, September 2025  
Galois Differential Theories and Transcendence (participant), CIRM - Marseille, February 2025  
International Conference of Chinese Mathematicians (invited speaker), Shanghai, January 2025  
p-adic Methods in Number Theory and Arithmetic Geometry (invited speaker), Tianyuan Mathematics Center, November 2024  
The Mordell Conjecture 100 Years Later (participant), MIT, July 2024  
Periods and  $L$ -values of Motives (participant), Simons Foundation, June 2024  
Visions in Arithmetic and Beyond: Celebrating Peter Sarnak's Work and Impact (participant), Princeton University, June 2024  
AIM Workshop on Analytic, Arithmetic, and Geometric Aspects of Modular Forms (participant), February 2024  
AIM Workshop on Arithmetic Intersection Theory on Shimura Varieties (participant), January 2024  
Arizona Winter School on Unlikely Intersections (participant), March 2023  
Reed College Mathematics Teacher-Scholar Symposium (speaker), May 2021  
Arizona Winter School on Automorphic Forms Beyond  $GL_2$  (participant), March 2021  
Arizona Winter School on Non-Abelian Chabauty (participant), March 2020  
Hawaii Number Theory (participant), March 2019  
Arizona Winter School on Topology and Arithmetic (participant), March 2019  
Tutorial on Multiparameter Persistence, Computation, and Applications (invited speaker), University of Minnesota, August 2018  
Arizona Winter School on Iwasawa Theory (participant), March 2018

## TEACHING

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### California Institute of Technology

#### *Instructor*

Math 7, Elementary Number Theory	SPRING 2024
Math 120B, Graduate Algebra–Galois Theory	WINTER 2024

### University of California, Berkeley

#### *Lead Instructor*

Math 74, Transition to Upper-Division Mathematics (Eval: 6.27/7)	FALL 2021
Math 10A, Calculus, Statistics, and Combinatorics (Eval: 6.53/7)	SUMMER 2018

#### *Graduate Student Instructor (GSI)*

Math 74, Transition to Upper-Division Mathematics (Eval: 6.52/7)	FALL 2020
Math 113, Abstract Algebra	FALL 2019
Math 115, Number Theory (Eval: 6.17/7)	FALL 2019
Math 53, Multivariable Calculus	SUMMER 2019
Math 10B, Calculus, Statistics, and Combinatorics (Eval: 6.82/7)	SPRING 2017, SPRING 2018
Math 10A, Calculus, Statistics, and Combinatorics (Eval: 6.72/7)	FALL 2017

### Princeton University

#### *Undergraduate Teaching Assistant*

MAT 346, Abstract Algebra II	SPRING 2017
MAT 335, Complex Analysis	FALL 2016
MAT 215, Introductory Real Analysis	SPRING 2016
MAT 218, Honors Introductory Multivariate Real Analysis	FALL 2014

## LANGUAGES

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Native: English, Chinese

## COMPUTER LANGUAGES

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Intermediate Knowledge: Java, Python, C, C++, MATLAB, L<sup>A</sup>T<sub>E</sub>X

Basic Knowledge: JavaScript, Linux environment, R