

Matthew Hase-Liu

Curriculum Vitae

Education

- 2021–2026 **Ph.D. in Math**, *Columbia University*, New York, NY.
(expected) Interests: Algebraic geometry and number theory. Advisor: Will Sawin.
- 2017–2021 **A.B./S.M. in Math/CS**, *Harvard College*, Cambridge, MA.

Awards

- 2021 Fellowship Recipient, NSF Graduate Research Fellowship Program
- 2020, 2018 John Harvard Scholar, Harvard College Faculty of Arts and Sciences
- 2019 Certificate of Distinction in Teaching, Harvard University Derek Bok Center for Teaching and Learning
- 2018 Detur Book Prize, Harvard College Faculty of Arts and Sciences
- 2018 Rank 107.5/4638, William Lowell Putnam Mathematical Competition

Papers, Talks, Conferences, and Seminars

Publications and preprints

1. A converse to geometric Manin's conjecture for general low degree hypersurfaces, <https://arxiv.org/abs/2501.12506>, submitted.
2. Terminal singularities of the moduli space of curves on low degree hypersurfaces and the circle method (with Jakob Glas), <https://arxiv.org/abs/2412.14923>, submitted.
3. Non-smoothness of moduli spaces of curves on hypersurfaces (with Amal Mattoo), <https://arxiv.org/abs/2412.04618>.
4. A geometric approach to functional equations for general multiple Dirichlet series over function fields, <https://arxiv.org/abs/2405.18152>, submitted.
5. A higher genus circle method and an application to geometric Manin's conjecture, <https://arxiv.org/abs/2402.10498>, submitted.
6. Sum-product phenomena for planar hypercomplex numbers (with Adam Sheffer), **European Journal of Combinatorics**, Volume 89, Oct 2020, <https://arxiv.org/abs/1812.09547>.

Talks and
posters

1. AMS New England Graduate Student Conference, 04/25: ???, invited talk.
2. Tufts Algebra, Geometry, and Number Theory Seminar, 04/25: *Terminality of the moduli space of curves on low degree hypersurfaces and the circle method*, invited talk.
3. University of Maryland Number Theory and Representation Theory Seminar, 03/25: *Investigating singularities of moduli spaces with analytic number theory*, invited talk.
4. Philadelphia Area Number Theory Seminar, 10/24: *Geometric aspects of general multiple Dirichlet series over function fields*, invited talk.
5. Harvard–MIT Algebraic Geometry Seminar, 10/24: *A circle method for algebraic geometers*, invited talk.
6. Enumerative Geometry and Arithmetic, 3/24: *A higher genus circle method and an application to geometric Manin's conjecture*, poster.
7. Monodromy and Its Applications, 12/23: *Functional equations for multiple Dirichlet series over function fields*, contributed talk.
8. MAGNTS 2023, 10/23: *The mapping space of a smooth projective curve to a smooth hypersurface of low degree*, poster.
9. CANT 2019, 5/19: *Sum-product phenomena for planar hypercomplex numbers*, invited talk.

Conferences
and
workshops

1. Institut Mittag-Leffler, 07/25: *Full circle: 100 years of the circle method*.
2. AIM workshop, 04/25: *Moments in families of L-functions over function fields*.
3. AMS New England Graduate Student Conference, 04/25.
4. AIM workshop, 11/24: *Nilpotent counting problems in arithmetic statistics*.
5. Enumerative Geometry and Arithmetic, 3/24.
6. Monodromy and Its applications, 12/23.
7. MAGNTS 2023, 10/23.
8. SLMATH summer graduate school, 7/23: *Introduction to derived algebraic geometry*.
9. Second JNT biennial conference, 7/22.
10. Anabelian days down in Georgia, 4/22.
11. PCMI summer school, 7/21: *Quadratic forms, Milnor K-theory, and arithmetic*.
12. CANT 2019, 5/19.

Organized
seminars

1. *Exponential sums and equidistribution*, learning seminar, Spring 2025.
2. *Function field arithmetic and geometry*, learning seminar, Spring 2024.
3. *Cohomology and analytic number theory over function fields*, learning seminar, Fall 2022.
4. *Abelian reasons and a variety of examples to care about abelian varieties*, learning seminar, Spring 2022.
5. *DWIC: Dg With Infty Categories Seminar*, learning seminar, Fall 2021.

Activities

- 2025– Organizer for Directed Reading Program (DRP) at Columbia
- 2023– Graduate student editor for Columbia Journal of Undergraduate Mathematics
- 2023 Graduate student mentor for Polymath Jr.
- 2023– Mentor for Directed Reading Program (DRP) at Columbia
- 2020 Co-founder and mentor for Mathematics Online Reading Program for High schoolers (MORPH)
- 2018–2021 Co-president of Harvard University Mathematics Association (HUMA)
- 2017–2019 Social chair of Harvard Gender Inclusivity in Mathematics

Employment

- 2024 **Calculus I instructor**, *Columbia University*.
- 2021– **Teaching assistant**, *Columbia University*.
- 2019–2020 **Course assistant**, *Harvard College*.
- 2018 **Machine learning intern**, *Otter.ai*.
- 2017 **Software engineering intern**, *Otter.ai*.

Computer Skills

Python, Java, C/C++, HTML/CSS/JavaScript, Linux, SageMath, Tensorflow, Git

Languages

- English **Native (U.S. citizen)**
- Japanese **Fluent (Japanese citizen)**