Haochen Wu

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Education

- *Dartmouth College,* Hanover, NH, expected June 2026
  Ph.D. in Mathematics
  Thesis Advisor: John Voight, Asher Auel

- *Wake Forest University,* Winston-Salem, NC, May 2021
  M.A. in Mathematics
  Thesis Advisor: Jeremy Rouse
  GPA: 3.945

- *Wake Forest University,* Winston-Salem, NC, May 2019
  B.S. in Mathematics
  Honors in Mathematics
  Minor in Music
  Thesis Advisor: Jeremy Rouse
  Overall GPA: 3.782; Mathematics GPA: 3.942

Research Interests

Number theory, quadratic forms, modular and automorphic forms

Publications

- *An orthogonal perspective on Gauss composition*, joint with John Voight, preprint. https://arxiv.org/abs/2511.03987

  We revisit Gauss composition over a general base scheme, with a focus on orthogonal groups. We show that the Clifford and norm functors provide a discriminant-preserving equivalence of categories between binary quadratic modules and pseudoregular modules over quadratic algebras. This perspective synthesizes the constructions of Kneser and Wood, reconciling algebraic and geometric approaches and clarifying the role of orientations and the natural emergence of narrow class groups. As an application, we restrict to lattices and show that binary orthogonal eigenforms correspond to Hecke characters.
- *Hilbert modular forms from orthogonal modular forms on binary lattices*, in preparation.
- *On the number of representations by primitive positive-definite integer-valued quaternary quadratic forms*, in preparation.

Academic Experience

- PhD Thesis (in progress)
  - ➢ Give a categorical generalization of Gauss composition over schemes.
  - ➢ Make explicit the relationship between Hilbert modular forms and orthogonal modular forms obtained arising from positive definite binary lattices over the ring of integers of totally real number fields.

- Master Thesis
  - ➢ Title: On the number of representations by primitive positive-definite integer-valued quaternary quadratic forms
  - ➢ Prove that there exists a primitive positive-definite integer-valued quaternary quadratic form Q represents a positive integer more times than each element in a given finite set of primitive positive-definite integer-valued quaternary quadratic forms.
- Undergraduate Thesis
  - ➢ Title: Ordered Bell numbers and sum of two squares
  - ➢ Investigate modular properties of ordered Bell numbers and show that the heuristic probability that infinitely many of ordered Bell numbers are primes is 1.
  - ➢ Construct the formula to show that there are infinitely many integers m such that each of $m+1$, $m+2$, $m+4$, $m+5$, and $m+8$ is a sum of two squares.

Contributed Talks

- *Hilber modular forms from orthogonal modular forms on binary lattices*, Maine-Quebec Number Theory Conference, Orono, Maine, Oct 4-5, 2025
- *Hilbert modular forms from orthogonal modular forms on binary lattices*, LMFDB, Computation, and Number Theory, ICERM, July 7-11, 2025
- *Hilbert modular forms from orthogonal modular forms on binary lattices,* 37th Automorphic Forms Workshop, University of North Texas, April 30-May 4, 2025
- *Hilbert modular forms from orthogonal modular forms on binary lattices,* UVM-Dartmouth Math Day, University of Vermont, April 27, 2025
- *Generalized Gauss composition and orthogonal modular forms for binary quadratic forms,* Southern Regional Number Theory Conference, Louisiana State University, March 29-30, 2025
- *On the number of representations by primitive positive-definite integer-valued quaternary quadratic forms*, Joint Mathematics Meeting AMS Special Session on Quadratic Forms and Theta Functions, Virtual, January 6, 2021

Conferences Attended

- Maine-Quebec Number Theory Conference, Orono, Maine, Oct 4-5, 2025
- LMFDB, Computation, and Number Theory, ICERM, July 7-11, 2025
- 37th Automorphic Forms Workshop, University of North Texas, April 30-May 4, 2025
- UVM-Dartmouth Math Day, University of Vermont, April 27, 2025
- Southern Regional Number Theory Conference, Louisiana State University, March 29-30, 2025
- Simons Collaboration on Arithmetic Geometry, Number Theory, and Computation Annual Meeting, New York, Jan 15-16, 2025
- Joint Mathematics Meetings, Seattle, Jan 8-11, 2025
- Algebraic Geometry Northeastern Series, Dartmouth College, Nov 8-10, 2024
- Sixteenth Algorithmic Number Theory Symposium, Massachusetts Institute of Technology, July 18, 2024
- CTNT 2024 Conference, University of Connecticut, June 14-16, 2024

- Langenhop Lecture & SIU Conference in Integral Quadratic Forms, Southern Illinois University, May 16-17, 2024
- Dartmouth-UVM Day, Dartmouth College, Feb 10, 2024
- Simons Collaboration on Arithmetic Geometry, Number Theory, and Computation Annual Meeting, New York, Jan 11-12, 2024
- Joint Mathematics Meetings, San Francisco, Jan 3-6, 2024
- Maine-Québec Number Theory Conference, University of Maine, September 31-October 1, 2023
- Monthly Meeting of Simons Collaboration on Arithmetic Geometry, Number Theory, and Computation, Dartmouth College, September 16, 2023
- University of North Carolina at Greensboro Summer School: Applications of Expander Graphs to Number Theory and Computer Science, May 24-28, 2021
- Joint Mathematics Meetings AMS Special Session on Quadratic Forms and Theta Functions, Virtual, January 6, 2021
- PAImetto Joint Arithmetic, Modularity, and Analysis Series, University of South Carolina, September 19-20, 2020
- Connecticut Summer School in Number Theory Conference, Virtual, June 12-14, 2020
- Arithmetic Geometry is Online in Zoom, Everyone, Virtual, March 25, 2020
- PAImetto Number Theory Series XXXIII, Clemson University, December 14-15, 2019
- Southeast Regional Meeting on Numbers, University of North Carolina at Greensboro, April 13-14, 2019

Professional Experience

- *Instructor*, Dartmouth College
  - ➢ Math 22: Linear Algebra, Fall 2025
  - ➢ Math 8: Calculus of Functions of One and Several Variables, Fall 2024
  - ➢ Math 3: Calculus, Fall 2023

- *Teaching Assistant*, Dartmouth College
  - ➢ Math 13: Calculus of Vector-Valued Functions, Spring 2023
  - ➢ Math 24: Linear Algebra, Spring 2023
  - ➢ Math 11: Accelerated Multivariable Calculus, Fall 2022
  - ➢ Math 13: Calculus of Vector-Valued Functions, Winter 2022
  - ➢ Math 3: Calculus, Fall 2021

- *Teaching Assistant*, Wake Forest University
  - ➢ MTH 121: Linear Algebra, Spring 2021
  - ➢ MTH 121: Linear Algebra, Fall 2020
  - ➢ MTH 117: Discrete Mathematics, Summer 2020
  - ➢ MTH 121: Linear Algebra, Summer 2020
  - ➢ MTH 112: Calculus with Analytic Geometry II, Spring 2020
  - ➢ MTH 113: Multivariable Calculus, Fall 2019

- *Tutor*, Math Center, Wake Forest University, September 2018 – May 2021

Outreach

- Family Math Night, Marion Cross School, Norwich VT, Nov 14 2024

Awards

- Outstanding Graduate Student Award in Mathematics, 2020
- Dean's List at Wake Forest University, 2016-2019
- The Joseph Pleasant and Marguerite Nutt Sloan Memorial Fund, 2017-2018
- Boteler Prize for the Pursuit of Excellence in Music, 2018