Erik Holmes

Curriculum Vitae

370 Woodbine Ave
Toronto, ON, Canada
✆ +1 (808) 798 5697
✉ eholmes@math.toronto.edu
🖥 https://erikholmesmath.com

Education

Aug 2021 **Ph.D. in Mathematics**, *University of Hawaii at Manoa.*
Dissertation: *The Shape of Pure Prime Degree Number Fields*
Advisor: Rob Harron

May 2014 **B.S. in Mathematics**, *Boise State University.*

Employment

Sept 2023- **Postdoctoral Fellow**, *University of Toronto.*
Present   Toronto, ON, Canada

Sept 2021- **Postdoctoral Associate**, *University of Calgary.*
Aug 2023 Calgary, AB, Canada

Research Interests

Algebraic and computational number theory, arithmetic statistics, and arithmetic dynamics

Publications/Preprints

Published / Accepted

2026 **Shapes of Unit Lattices in D_p Number Fields**, with Rob Harron and Sameera Vemulapalli, accepted to *Mathematische Zeitschrift.*

2026 **Unit Lattices of D_4-Quartic Number Fields with Signature** $(2, 1)$, with Sara Chari, Sergio R. Zapata Ceballos, Fatemeh Jalalvand, Rahinatou Yuh Njah Nchiwo, Kelly O'Connor, Fabian Ramirez, and Sameera Vemulapalli, accepted to *Journal of Number Theory.*

2025 **Adelic Perturbation of Rational Functions and Applications**, with Félix Baril Boudreau and Khoa D. Nguyen, *Mathematische Annalen.*

2025 **On the Shapes of Pure Prime Degree Number Fields**, *Journal de Théorie des Nombres de Bordeaux.*

2021 **Shapes of Pure Prime Degree Number Fields**, ProQuest Dissertations Publishing (Dissertation, No. 28718070).

2017 **Sorting Permutations: Games, Genomes, and Cycles**, with K. Adamyk, G. Mayfield, D. J. Moritz, M. Scheepers, and B. Tenner, *Discrete Mathematics, Algorithms and Applications.*

2016 **Maximal Waring Ranks of Monomials and Sums of Coprime Monomials**, with P. Plummer, J. Siegert, and Z. Teitler, *Communications in Algebra.*

In Preparation

2025+ **Geometry and Shape of Log Unit Lattices in Sextic Number Fields**, with Jose Cruz, Fatemeh Jalalvand, Enrique Nunez Lon-Wo, Renate Scheidler, and Ha Tran, TeamUP! collaboration (in preparation).

In Progress

Shapes of Sextic Fields and Log Terms in Malle's Conjecture, with Rob Harron and Ila Varma.
(In progress)

Shape of Log Unit Lattices in D_4-Octic Number Fields, with Sara Chari, Sergio R. Zapata Ceballos, Fatemeh Jalalvand, Kelly O'Connor, and Sameera Vemulapalli. (In progress)

Other Writings

2021 **Category, Measure, and Forcing**, with Sam Coskey, *Open Math Notes*, American Mathematical Society.
Undergraduate thesis later expanded into graduate course lecture notes.

Teaching Experience

Mentoring

In addition to formal instruction, I meet regularly with graduate students in number theory, have co-supervised a Masters project and have led research collaborations (see **Mentorship & Supervision**).

University of Toronto

Math 136 **Calculus for Life Sciences**, Winter 2025.
Math 135 **Calculus for Life Sciences**, Fall 2023, 2025.

University of Calgary

Math 275 **Calculus for Engineers and Scientists**, Fall 2022.
Math 265 **University Calculus I**, Fall 2021.
Math 211 **Linear Methods I**, Spring 2023.

University of Hawaii

Math 242 **Calculus II**, Summer 2017.
Math 216 **Applied Calculus II**, Spring 2020.
Math 203 **Business Calculus**, Summer 2015.
Math 161 **Precalculus and Elements of Calculus**, Fall 2018.
Math 134 **Precalculus: Elementary Functions**, Fall 2020.

Teaching Assistant

Math 331 **Introduction to Real Analysis**, Fall 2019.
Math 242 **Calculus II**, Spring 2017.
Math 241 **Calculus I**, Spring 2019, Spring 2016.
Math 215 **Applied Calculus I**, Fall 2016, Fall 2015.
Math 140 **Precalculus: Trigonometry and Analytic Geometry**, Fall 2016, Spring 2015, Fall 2014.
Math 100 **Survey of Mathematics**, Spring 2018, Fall 2017.

Conference Talks and Workshops

Invited Talks and Presentations

Dec. 2025 **"Rigidity in the Shapes of Additive and Multiplicative Lattices"**, *CMS Winter Meeting*, University of Toronto, Invited Speaker.

Apr. 2024 **"Shapes of Lattices in Number Theory"**, *Alberta Number Theory Days XV*, Banff, AB, Invited speaker.

Mar. 2023 **"*Shapes, distributions and asymptotics in number theory*"**, *Department of Mathematics and Statistics Colloquium Series*, University of Calgary, Invited speaker.

Dec. 2023 **"Shapes and Asymptotics in Number Theory"**, *CMS Winter Meeting, Special Session on Number Theory by Early Career Researchers*, Montreal, QC, Invited speaker.

Oct. 2022 **"Archimedean Invariants of Number Fields"**, *AMS Western Sectional Meeting, Arithmetic Dynamics Session*, Salt Lake City, UT, Invited speaker.

Jan. 2019	**"Shapes of Sextic $C_3 \wr C_2$-Fields: Equidistribution, Malle's Conjecture, and Detection of Log Terms in Klüners"**, *Joint Mathematics Meetings, Arithmetic Statistics Special Session*, Baltimore, MD, Invited speaker.

Organized Research Groups

May 2025	**The Geometry of Log Unit Lattices**, *PIMS–BIRS TeamUp! Collaboration*, Kelowna, BC, Funded research group; co-organizer examining algebraic and geometric properties of log unit lattices.
Jun. 2024	**Rethinking Number Theory**, *Virtual.*
	Took part in the fifth year of RNT: a program designed to promote diversity and inclusivity in number theory through research collaborations

Other Presentations and Workshops

Apr. 2023	**"Statistics of Lattices"**, *Arithmetic, Algebra, and Algorithms*, Edinburgh, UK.
Aug. 2022	**Specialization and Effectiveness in Number Theory**, *Banff, AB, Canada.*
Jun. 2022	**"A Study of Shapes"**, *Equidistribution and Arithmetic Dynamics*, University of Oklahoma.
Sept. 2020	**"Unit Shapes"**, *Front Range Number Theory Day*, Virtual, Lightning talk.
Jun. 2018	**"Shapes of Number Fields and Malle's Heuristics"**, *Communicating Mathematics Effectively Workshop*, University of Washington, Early-career workshop.
Nov. 2016	**"Modular Forms and L-Functions"**, *L-Function Seminar*, University of Hawaii at Manoa, Two-part lecture.
Aug. 2016	**Sage Days 81**, *Honolulu, HI.*
Dec. 2015	**RTG Workshop in Arithmetic Dynamics**, *University of Michigan.*
Dec. 2013	**"Selection Principles and Cardinal Characteristics"**, *BoiseCrypt Conference*, Boise, ID.
Dec. 2013	**"Sorting Permutations by the Ciliate Decryptome"**, *AGC Seminar*, Boise, ID.
Jul. 2013	**"Game Theory and Algebraic Structures"**, *REU in Mathematics Symposium*, Boise, ID, Group presentation.

Service and Outreach

Professional Service

2022–present	**Referee**, Referee for peer-reviewed journals in number theory and related fields.
2025	**Committee Member**, *EDI Committee, University of Toronto.*
	Supporting equity, diversity, and inclusion initiatives within the department, including organizing a postdoc writing café and managing a Discord server to connect and mentor postdoctoral researchers.
2023	**Conference Organization**, *Alberta Number Theory Days.*
	Co-organizer of number theory conference: included writing successful grant applications, organizing talks, and connecting researchers in both Canada and the US.
2022	**Examiner**, *PhD Proposal Committee, University of Calgary*, Computational number theory.

Mentorship and Supervision

2026	**PROMYS India**, *Faculty Research Mentor*, India Institute of Science (IISC).
	Design computational projects on unit shapes for diverse student backgrounds
2024	**Co-leader**, *Rethinking Number Theory Research Group*, (virtual).
	Co-led and mentored a group of six early-career mathematicians on unit lattices in number theory.
2022-2023	**Co-supervisor**, *Masters student, University of Calgary*, Project in algebraic number theory.
2020	**PROMYS India (postponed)**, *Graduate Research Mentor, Ashoka University.*
2017–2020	**Mentor**, *University of Hawaii at Manoa*, Advised incoming graduate students on coursework, quals, and professional development.

Outreach and Community-Building

2025   **Organizer**, *Math postdoc discord*, University of Toronto, Created discord to connect new and existing postdocs at UofT.

2023   **Founder**, *Math Writing Café*, University of Calgary, Founded and organized weekly writing sessions fostering community among graduate students and postdocs.

2016–2019   **Be a Scientist Night**, *Institute for Human Services, Honolulu, HI*, Annual outreach event for underprivileged children introducing STEM topics.

2015–2019   **Organizer**, *Graduate Student Tea Time, University of Hawaii*, Created a twice-weekly community space; later absorbed into AMS student chapter.

2018–2019   **Secretary and Treasurer**, *AMS Student Chapter of Hawaii*, University of Hawaii.

2017   **Research Group in Arithmetic Dynamics**, *University of Hawaii*, Implemented Doyle–Krumm algorithm in Sage with a student team.

Citizenship

Canadian, United States Permanent Resident.

References

Research

Rob Harron, *Quantitative Researcher*, Radix Trading, robert.harron@gmail.com.

Khoa Nguyen, *Professor*, University of Calgary, dangkhoa.nguyen@ucalgary.ca.

Arul Shankar, *Professor*, University of Toronto, arul.shnkr@gmail.com.

Ila Varma, *Associate Professor*, University of Toronto, ila@math.toronto.edu.

Teaching

Lindsey Shorser, *Assistant Professor (Teaching stream)*, University of Toronto, lshorser@math.toronto.edu.