

Matthew Litman

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Employment

Assistant Professor – University College Dublin, 2024-Present

Lecturer – University of California, Davis, 2024-Present

Teaching Assistant, Associate Instructor – University of California, Davis, 2017-2023

Education

Ph.D in Mathematics (2023), M.S. in Mathematics (2019), University of California, Davis
Advisor: Elena Fuchs
Thesis: *Explorations in Number Theory*

B.S. in Mathematics w. Honors (2017), Schreyer Honors College, Penn State University
Minors: Statistics, Geophysics
Thesis: *Sphere Eversion: Analysis of a Veridical Paradox*
Advisor: Sergei Tabachnikov
Phi Kappa Phi

MASS Program 2015 Graduate. Department of Mathematics, Penn State University

Publications

1. "Residue sums of Dickson polynomials over finite fields", joint with T. Brazelton, J. Harrington, and T.W.H. Wong. *Journal of Number Theory* **264** (2024) pp.1–26.
2. "Error Approximation for Backwards and Simple Continued Fractions", joint with C. Bjorklund. *Research in Number Theory* **10**, 2 (2024). DOI: 10.1007/s40993-023-00481-7.
3. "Orbits on K_3 Surfaces of Markoff Type", joint with E. Fuchs, J. Silverman, and A. Tran, *Experimental Mathematics* (2023). DOI: 10.1080/10586458.2023.2239265.
4. "Every arithmetic progression contains infinitely many b -Niven numbers", joint with J. Harrington and T.W.H. Wong, *Bulletin of the Australian Mathematical Society* (2023). DOI: 10.1017/S0004972723000758.
5. "A Cryptographic Hash Function from Markoff Triples", joint with E. Fuchs, K. Lauter, and A. Tran, *Mathematical Cryptology* **1** (1) (2021) pp. 103–121.
6. "Beyond Expansion II: Achieving or Exceeding the Ramanujan-quality Exponent of Distribution", Arbeitsgemeinschaft: Thin Groups and Super-Approximation Workshop Report 2021/50 (2021) pp. 57–61.
7. "Möbius Disjointness for Skew Products on the Heisenberg Nilmanifold", joint with Z. Wang, *Proceedings of the American Mathematical Society* **147** (2019) pp. 2033–2043.
8. "Flow Instabilities Due to Interfacial Surfactant/Polar Oil Material in a Hele-Shaw Cell", joint with A. Belmonte and Z. Niroobakhsh. *Physical Review Letters* **E 96** (2017), 053102.

9. "On Consecutive Primitive n th Roots of Unity Modulo q ", joint with T. Brazelton, J. Harrington, and S. Kannan, *Journal of Number Theory* 174 (2017) pp. 494–504.

Preprints

1. "Connectivity of Markoff mod- p graphs and maximal divisors", joint with J. Eddy, E. Fuchs, D. Martin, and N. Tripeny, arxiv 2308.07579, *Submitted* (2023).
2. "Asymptotic Density of Apollonian-Type Orbits", joint with A. Sheydvasser, arXiv 2108.06358 (2021).

Presentations

1. Special Session on Recent Developments on Markoff Triples, Joint Mathematics Meetings, January 2024. *Connectivity of Markoff mod p Graphs and Maximal Divisors*
2. Number Theory Seminar, University of Illinois at Urbana-Champaign, March 2023. *Markoff-type K_3 Surfaces: Local and Global Finite Orbits.*
3. Number Theory Seminar, Duke University, November 2022. *Markoff-type K_3 Surfaces: Local and Global Finite Orbits.*
4. Dynamics, Geometry, and Groups Seminar, Queen's University, October 2022. *Markoff-type K_3 Surfaces: Local and Global Finite Orbits.*
5. Number Theory Seminar, Queen's University, October 2022. *Error Approximation for Backwards and Simple Continued Fractions.*
6. Number Theory Seminar, University of Colorado Boulder, October 2022. *Markoff-type K_3 Surfaces: Local and Global Finite Orbits.*
7. Front Range Number Theory Day, University of Colorado Boulder, October 2022. *Residue Sums for Dickson Polynomials.*
8. Algebra & Discrete Math Seminar, University of California Davis, January 2022. *Markoff-type K_3 Surfaces: Local and Global Finite Orbits.*
9. Algebra Seminar, University of California San Diego, January 2022. *Markoff-type K_3 Surfaces: Local and Global Finite Orbits.*
10. Number Theory Seminar, University of Washington, November 2021. *Markoff-type K_3 Surfaces: Local and Global Finite Orbits.*
11. Arbeitsgemeinschaft on Thin Groups and Super-Approximation, Mathematisches Forschungsinstitut Oberwolfach, October 2021. *Beyond Expansion II: Achieving or Exceeding the Ramanujan-quality Exponent of Distribution.*
12. Mid-Atlantic Seminar on Numbers V (MASON V), Towson University (Virtual), March 2021. *Distinct Residues of Lucas Polynomials over \mathbb{F}_q .*
13. Number Theory Series in Los Angeles II, Occidental College, February 2020. *Error Approximation for Backwards and Simple Continued Fractions.*
14. UC Davis Student-Run Research Seminar, UC Davis, January 2020. *Error Approximation for Backwards and Simple Continued Fractions.*
15. Illustrating Algebra and Number Theory, ICERM, October 2019. *Approximation Properties for Backwards and Standard Continued Fractions.*

16. Mathematical Outing for Undergraduates, Penn State University, April 2017. *Continued Fractions and Symbolic Coding via the Moduli Space $SL(2, \mathbf{R})/SL(2, \mathbf{Z})$.*
17. Undergraduate Exhibition, Penn State University, April 2017. Poster Presentation: *Möbius Disjointness for Skew Products on the Heisenberg Nilmanifold.*
18. Joint Mathematics Meetings, Atlanta, GA, January 2017. Poster Presentation: *Consecutive Elements of Order n in \mathbb{F}_q .*
19. Mid-Atlantic Seminar on Numbers I (MASON I), Towson University, October 2016. *On Consecutive Primitive n th Roots of Unity Modulo q .*
20. Young Mathematicians Conference, Ohio State University, August 2016. *On Consecutive Primitive n th Roots of Unity Modulo q .*

Awards and Positions

Awards

Spring 2022 William Karl Schwarze Scholarship, Department of Mathematics, University of California, Davis

Spring 2021 Henry L. Alder Prize for Excellence in Teaching, Department of Mathematics, University of California, Davis

Spring 2021 Yueh-Jing Lin Fund, Department of Mathematics, University of California, Davis

Spring 2017 Mary Lister McCammon Award, Department of Mathematics, Penn State University

2016-2017 Undergraduate Research Grant on Mobius Disjointness, Eberly College of Science

2016-2017 Class of 1922 Memorial Scholarship

Fall 2015 Overall Outstanding Performance, MASS Program

2015-2017 Remmey Family Trustee Scholarship

2015-2017 Aldine Cech Honors Scholarship

2013-2017 Penn State Academic Grant

2013-2015 Strawbridge Memorial Trustee Scholarship

Positions

2023-2024 Co-Organizer of 2024 JMM Special Session on "Covering Systems of the Integers and Their Applications"

2020-2021 Graduate Program Committee Chair, University of California, Davis

2016-2017 Secretary for Math Club, Penn State University