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# GENE S. KOPP

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USA

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## EMPLOYMENT

**Louisiana State University**, Baton Rouge, LA, USA, Autumn 2022–present

Assistant Professor (tenure-track)

**Purdue University**, West Lafayette, IN, USA, Autumn 2021–Summer 2022

Golomb Visiting Assistant Professor

**University of Bristol and Heilbronn Institute for Mathematical Research**, Bristol, UK, Autumn 2017–Summer 2021

Heilbronn Research Fellow

**University of Michigan**, Ann Arbor, MI, USA, Autumn 2011–Spring 2017

Graduate Student Instructor (7 semesters)

NSF RTG Graduate Student Fellow (2 semesters)

Graduate Student Research Assistant (3 semesters)

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## EDUCATION

**University of Michigan**, Ann Arbor, MI, USA

Ph.D., Mathematics, 2017

Advisor: Jeffrey C. Lagarias

Ph.D. thesis: **Indefinite Theta Functions and Zeta Functions**

**University of Chicago**, Chicago, IL, USA

B.S., Mathematics, with honors, 2011

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## PRIZES

**SIAM Student Paper Prize** (\$1000 cash, plus travel to SIAM annual conference), awarded annually to up to three “student author(s) of the most outstanding paper(s) accepted by SIAM journals within three years of the nomination deadline,” 2018.

**Third Prize, Outstanding Presentation Competition**, Young Mathematicians Conference, The Ohio State University, 2010.

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## RESEARCH AND TRAVEL GRANTS

NSF standard grant DMS #2302514 for “Modular Cocycles, Explicit Class Field Theory, and Quantum Designs” (\$219,228), 2023–2026.

Heilbronn Referral Initiative to reward successful recruitment efforts (£1000), 2018–2019.

Heilbronn Focused Research Grant for number-theoretic methods in dispersive PDE (£2000), 2017–2018.

## **CONFERENCE AND WORKSHOP GRANTS**

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NSF standard grant DMS #2502726 for “Bayou Arithmetic Research Days” (\$30,000, with co-PIs Olivia Beckwith and Pranabesh Das), 2025–2028.

Grant from the Number Theory Foundation for “Southern Regional Number Theory Conference” (\$2000, joint with Ling Long and Fang-Ting Tu), Spring 2025.

NSF standard grant DMS #2341365 for “Southern Regional Number Theory Conference” (\$35,000, with co-PI Fang-Ting Tu), 2024–2025.

Grant from the Number Theory Foundation for “Southern Regional Number Theory Conference” (\$3000, joint with Ling Long and Fang-Ting Tu), Spring 2024.

Grant from the Number Theory Foundation for “Bayou Arithmetic Research Days” (\$1000, joint with Olivia Beckwith and Pranabesh Das), Autumn 2023.

Grant from the Number Theory Foundation for “Bayou Arithmetic Research Days” (\$1500, joint with Olivia Beckwith), Spring 2023.

Grant from the Number Theory Foundation for “Bayou Arithmetic Research Days” (\$1620, joint with Olivia Beckwith), Autumn 2022.

Grant from the Journal of Number Theory (Elsevier) for “Bayou Arithmetic Research Days” (\$1680, joint with Olivia Beckwith), Autumn 2022.

Heilbronn Grant for Focused Research Workshop on “Synthesizing approaches to the Stark conjectures” (£7500, joint with Owen Patashnick), Spring 2022.

Heilbronn Grant for Focused Research Workshop on “Zauner’s Conjecture” (£2000), Spring 2019.

## **RESEARCH ARTICLES (PREPRINTS)**

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### **14. Unit-generated orders of real quadratic fields I. Class number bounds**

22 pages; joint w/ Jeffrey C. Lagarias

### **13. A constructive approach to Zauner’s conjecture via the Stark conjectures**

177 pages; joint w/ Marcus Appleby and Steven T. Flammia

Posted as arXiv:2501.03970 in Jan 2025. Submitted for publication.

### **12. The Shintani–Faddeev cocycle: Stark units from $q$ -Pochhammer ratios**

85 pages

Posted as arXiv:2411.06763 in Nov 2024. Submitted for publication.

### **11. SIC-POVMs and orders in real quadratic number fields**

49 pages; joint w/ Jeffrey C. Lagarias

Posted as arXiv:2407.08048 in Jul 2024. Submitted for publication.

## **RESEARCH ARTICLES (PUBLICATIONS)**

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### **10. Ray class groups and ray class fields for orders of number fields**

65 pages; joint w/ Jeffrey C. Lagarias

*Essential Number Theory*, 4(1):1–65, 2025.

Originally posted as arXiv:2212.09177 in Dec 2022.

**9. On 2-superirreducible polynomials over finite fields**

10 pages; joint w/ Jonathan Bober, Lara Du, Dan Fretwell, and Trevor Wooley

*Indagationes Mathematicae*, in press, 2024.

Originally posted as arXiv:2309.15304 in Sept 2023.

**8. A Kronecker limit formula for indefinite zeta functions**

22 pages

*Research in the Mathematical Sciences*, 10(24):1–22, 2023.

Originally posted as arXiv:2010.16371 in Oct 2020.

**7. Indefinite zeta functions**

34 pages

*Research in the Mathematical Sciences*, 8(17):1–34, 2021.

Originally posted as arXiv:1912.12364 in Dec 2019.

**6. SIC-POVMs and the Stark conjectures**

27 pages

*International Mathematics Research Notices*, 2021(18):13812–13838, 2021.

Originally posted as arXiv:1807.05877 in Jul 2018.

**5. Generating weights for the Weil representation of cyclic quadratic modules of even order**

24 pages; joint w/ Luca Candelori and Cameron Franc

*Journal of Number Theory*, 180:474–497, 2017.

Originally posted as arXiv:1606.07844 in Jun 2016.

**4. The arithmetic geometry of resonant Rossby wave triads**

22 pages

*SIAM Journal on Applied Algebra and Geometry*, 1(1):352–373, 2017.

Originally posted as arXiv:1605.04637 in May 2016.

**3. The limiting spectral measure for ensembles of symmetric block circulant matrices**

41 pages; joint w/ Murat Koloğlu and Steven J. Miller; appendices w/ Frederick W.

Strauch and Wentao Xiong

*Journal of Theoretical Probability*, 26(4):1020–1060, 2013.

Originally posted as arXiv:1008.4812 in Aug 2010.

**2. Robust coin flipping**

23 pages; joint w/ John D. Wiltshire-Gordon

In *Advances in Cryptology—EUROCRYPT 2012*, 172–194. Springer, 2012.

Originally posted as arXiv:1009.4188 in Sept 2010.

**1. On the number of summands in Zeckendorf decompositions**

16 pages; joint w/ Murat Koloğlu, Steven J. Miller, and Yinghui Wang

*Fibonacci Quarterly* 49(2):116–131, 2011.

Originally posted as arXiv:1008.3204 in Aug 2010.

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**SURVEY ARTICLES AND OTHER MATHEMATICAL PUBLICATIONS**

**Rubel's Problem: from Hayman's List to the Chabauty Method** (with Edward Crane). Feature article in *LMS Newsletter*, 492:24–29, Jan 2021.

## TEACHING

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**Analytic Number Theory** (graduate level), Louisiana State University, principal instructor, Autumn 2025.

**Calculus II**, Louisiana State University, principal instructor, Spring 2025.

**Calculus I**, Louisiana State University, principal instructor, Spring 2024.

**Algebraic Number Theory** (graduate level), Louisiana State University, principal instructor, Autumn 2023.

**Honors Calculus I**, Louisiana State University, principal instructor, Autumn 2022.

**Analytic Number Theory** (graduate level), Louisiana State University, principal instructor, Autumn 2022.

**Abstract Algebra**, Purdue University, principal instructor, Spring 2022.

**Linear Algebra** (2 sections), Purdue University, principal instructor, Autumn 2021.

**Topics in Modern Geometry**, University of Bristol, co-instructor, Autumn 2018.

**Calculus II**, University of Michigan, principal instructor, Autumn 2015.

**Calculus II**, University of Michigan, principal instructor, Winter 2014.

**Foundations of Computer Science**, University of Michigan, teaching assistant, Autumn 2013.

**Calculus I**, University of Michigan, principal instructor, Winter 2013.

**Differential Equations**, University of Michigan, teaching assistant, Autumn 2012.

**Calculus I**, University of Michigan, principal instructor, Winter 2012.

**Data, Functions & Graphs**, University of Michigan, principal instructor, Autumn 2011.

## MENTORSHIP

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Ph.D. advisor for students:

- Oluwaferanmi David Agbolade, current student, Louisiana State University
- Murtadha Aljanabi, current student, Louisiana State University
- Koustav Mondal, current student, Louisiana State University (jointly advised with Fang-Ting Tu)

Honors thesis supervisor for undergraduate student Thomas Emerick, Louisiana State University, Spring 2026.

Reading course supervisor for undergraduate student David Aiken, Louisiana State University, Spring 2026.

Faculty mentor (pre-candidacy) for Ph.D. student Oluwaferanmi David Agbolade, Louisiana State University, Autumn 2022–Spring 2025.

Reading course supervisor for Ph.D. student Archisman Bhattacharjee, Louisiana State University, Autumn 2024, Spring 2025.

Reading course supervisor for undergraduate student Hailey Garcia, Louisiana State University, Spring 2024.

Member on doctoral committee for Ph.D. student Brian Grove (LSU, Mathematics, 2025).

Dean's representative on doctoral committees for Alireza Kheirkhahan (LSU, Computer Science, 2022) and Megan Chesal (LSU, Medical Physics, 2023).

Mentor for undergraduate student Michael Ren for a project on “Arithmetic of optimal projective packings,” University of Bristol and online, Summer 2021.

Co-mentor (with Cameron Franc) for undergraduate students Aleyah Dawkins and Aaditya Sharma for a project on “Modular forms and hypergeometric differential equations,” University of Michigan REU, Summer 2015.

## **RESEARCH TALKS**

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**AMS Southeastern Sectional Meeting**, Tulane University, Autumn 2025.

**Shanks Conference 2025: Constructive Functions**, Vanderbilt University, Spring 2025.

AMS Special Session on Counting and Asymptotics in Number Theory, **AMS Eastern Regional Meeting**, Hartford, Connecticut, Spring 2025.

Automorphic Forms and Representation Theory Seminar, **Purdue University**, Spring 2025.

Algebra Seminar, **University of North Texas**, Winter 2025.

Number Theory Seminar, **Vanderbilt University**, Autumn 2024.

**ICMS Workshop on Recent Progress on Hilbert’s 12th Problem**, Edinburgh, UK, Summer 2024.

**ICERM workshop: Recent Progress on Optimal Point Distributions and Related Fields**, Providence, Rhode Island, Summer 2024.

Number Theory Seminar, **University of Georgia**, Spring 2024.

The Web of Modularity, **Tulane University**, Spring 2024.

AMS Special Session on Mock Modular Forms, Physics, and Applications, **Joint Mathematics Meetings**, San Francisco, California, Winter 2024.

**Institute for Advanced Study/Princeton University** Number Theory Seminar, Autumn 2023.

AMS Special Session on Number Theory and Friends, **AMS Southeastern Sectional Meeting**, University of South Alabama, Autumn 2023.

35th **Automorphic Forms Workshop**, Louisiana State University, Spring 2023.

Number Theory Seminar, **University of Mississippi**, Spring 2023.

Number Theory Seminar, **Duke University**, Spring 2023.

Algebra and Combinatorics Seminar, **Tulane University**, Spring 2023.

**Codes and Expansions (CodEx) Seminar** (online), Spring 2022.

**Five College Number Theory Seminar** (online), Spring 2022.

Automorphic Forms and Representations Seminar, **Purdue University** (online), Spring 2022.

**Focused Research Workshop on Synthesizing Approaches to the Stark Conjectures**, University of Bristol, Spring 2022.

**Southern Regional Number Theory Conference (plenary talk)**, Louisiana State University, Spring 2022.

Heilbronn Number Theory Seminar, **University of Bristol** (online), Winter 2022.

**Paris–Montreal** number theory working seminar (online), Autumn 2021.

Tenth Annual **Upstate Number Theory Conference**, Union College, Autumn 2021.

Purdue Analytic Number Theory and Harmonic Analysis (PANTHA) Seminar, **Purdue University** (online), Autumn 2021.

**SIAM Conference on Applied Algebraic Geometry** (online), Summer 2021.

**Summer of Frame Theory (SOFT)** (online), Summer 2021.

Number Theory Seminar, **Louisiana State University** (online), Spring 2021.

Colloquium, **Louisiana State University** (online), Spring 2021.

AMS Special Session on Quadratic Forms and Theta Functions, **Joint Mathematics Meetings** (online), Winter 2021.

Number Theory Seminar, **Kansas State University** (online), Autumn 2020.

Virtual Mathematics Seminar, **Royal Holloway University of London** (online), Autumn 2020.

Number Theory Seminar, **Vanderbilt University** (online), Autumn 2020.

**Codes and Expansions (CodEx) Seminar** (online), Summer 2020.

**Young Researchers in Algebraic Number Theory**, Warwick, UK, Autumn 2019.

Number Theory Seminar, **Rutgers University**, Autumn 2019.

**SIAM Conference on Applied Algebraic Geometry**, Bern, Switzerland, Summer 2019.

Algebra and Number Theory Seminar, **University of Kentucky**, Winter 2019.

Number Theory Seminar, **The Ohio State University**, Winter 2019.

Quebec-Vermont Number Theory Seminar, **McGill University**, Autumn 2018.

Quantum Physics Seminar, **University of Massachusetts Boston**, Autumn 2018.

**Young Researchers in Algebraic Number Theory**, Sheffield, UK, Autumn 2018.

**Bristol-Oxbridge-Warwick-London (BOWL)** 1-day meeting, Oxford, UK, Autumn 2018.

**Building Bridges: 4th EU/US Workshop on Automorphic Forms and Related Topics**, Budapest, Hungary, Summer 2018.

**SIAM Annual Meeting (prize lecture)**, Portland, Oregon, Summer 2018.

Linfoot Number Theory Seminar, **University of Bristol**, Autumn 2017.

Mathematics Seminar, **University of Saskatchewan**, Autumn 2017.

PDE Seminar, **Georgia Institute of Technology**, Autumn 2016.

Contributed talk, **AMS Central Sectional Meeting**, Minneapolis, Minnesota, Autumn 2016.

AMS Special Session on Representation Theory, Automorphic Forms and Related Topics, **AMS Central Sectional Meeting**, Minneapolis, Minnesota, Autumn 2016.

Chicago Number Theory Day, **University of Illinois Chicago**, Spring 2015.

**Institute of Mathematical Statistics Asia Pacific Rim Meeting** (w/ Murat Koloğlu, Steven J. Miller, and Karen Shen), Tsukuba, Japan, Summer 2012.

EECS Theory Seminar, **University of Michigan**, Winter 2012.

**Young Mathematicians Conference**, Ohio State University, Autumn 2010.

## **K–12 OUTREACH**

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Activity facilitator for Girls in STEM at Tulane (GiST) for 5th–7th graders, Autumn 2025–present.

Activity facilitator for Boys at Tulane in STEM (BATS) for 5th–7th graders, Spring 2025–present.

Activity facilitator for the Julia Robinson Mathematics Festival webinar series for K–12 students, Spring 2020–Summer 2020.

Activity leader for the Julia Robinson Mathematics Festival for K–12 students, Joint Mathematics Meeting, Denver, Colorado, Winter 2020.

Activity leader/facilitator for Michigan Math Circles for middle school and high school students, Autumn 2012–Winter 2015.

Course assistant for Knot Theory course for high school students at the Young Scholars Program, University of Chicago, Summer 2009.

Co-instructor of the Number Theory Seminar for high school students at the Ross Mathematics Program, The Ohio State University, Summer 2008.

Counselor at the Ross Mathematics Program, The Ohio State University, Summers 2007 and 2008.

## **LEADERSHIP AND SERVICE**

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Member of the LSU College of Science Innovation and Engagement Committee, Autumn 2025–present.

Seminar chair for the LSU Algebra and Number Theory Seminar, Autumn 2022–present.

Founder (w/ Olivia Beckwith) of Bayou Arithmetic Research Days (BARDs).

- Organizer (w/ Olivia Beckwith and Pranabesh Das) of BARD 6, Louisiana State University, Autumn 2026.
- Organizer (w/ Olivia Beckwith and Pranabesh Das) of BARD 5, Xavier University of Louisiana, Spring 2025.
- Organizer (w/ Olivia Beckwith and Pranabesh Das) of BARD 4, Tulane University, Autumn 2024.
- Organizer (w/ Olivia Beckwith and Pranabesh Das) of BARD 3, Louisiana State University, Autumn 2023.
- Organizer (w/ Olivia Beckwith) of BARD 2, Tulane University, Spring 2023.
- Organizer (w/ Olivia Beckwith) of BARD 1, Louisiana State University, Autumn 2022.

Organizer (w/ Ling Long, Fang-Ting Tu, and postdoc and graduate student co-organizers) of the Southern Regional Number Theory Conference (SRNTC).

- SRNTC 2025, Louisiana State University (hybrid event), Spring 2025.
- SRNTC 2024, Louisiana State University (hybrid event), Spring 2024.
- SRNTC 2023, Louisiana State University (hybrid event), Spring 2023.
- SRNTC 2022, Louisiana State University (hybrid event), Spring 2022.

Organizer (w/ Fang-Ting Tu and Jingbo Liu) of the AMS Special Session on Quadratic Forms, Modular Forms, and Applications, Joint Mathematics Meetings, Boston, Massachusetts, Winter 2023.

Organizer (w/ Kate Thompson and Allison Arnold-Roksandich) of the AMS Special Session on Quadratic Forms, Theta Function, and Modularity, Joint Mathematics Meetings, online, Spring 2022.

Organizer (w/ Owen Patashnick) of the Focused Research Workshop on Synthesizing Approaches to the Stark Conjectures, University of Bristol (hybrid event), Spring 2022.

Organizer (w/ Daniel Fretwell; later, w/ Catherine Hsu) of the Heilbronn number theory seminar, University of Bristol, Autumn 2017–Spring 2019 and Autumn 2020–Spring 2021.

Organizer (w/ Edna Jones) of the AMS Special Session on Quadratic Forms and Theta Functions, Joint Mathematics Meetings, online, Winter 2021.

Judge for the MAA Undergraduate Student Poster Session, Joint Mathematics Meeting, online, Winter 2021.

Judge for the MAA Undergraduate Student Poster Session, Joint Mathematics Meetings, Denver, Colorado, Winter 2020.

Referee for: Annals of Mathematics, Communications in Nonlinear Science and Numerical Simulation, Finite Fields and Their Applications, IEEE Transactions on Information Theory, Journal of Mathematical Physics, Journal of Number Theory, The Ramanujan Journal, Research in the Mathematical Sciences

## **CODING PROJECTS**

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Contributing developer to **Zauner.jl: A Julia package for computing SICs and related objects**, Winter 2025–present.

Contributing developer to **Game of Sloanes: A game to find putatively optimal packings in complex projective space with the goal of proving optimality of as many packings as possible**, Summer 2025–present.