

# Matthew H. Faust

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## Education

Aug. 2014– **B.S. Computer Engineering and B.S. Mathematics**,  
May 2018 *University of Illinois at Urbana-Champaign*.  
Aug. 2018– **PhD Mathematics**, *Texas A&M University*,  
Present Doctoral advisors: Wencai Liu and Frank Sottile.

## Preprints

- *Irreducibility of the Dispersion Relation for Periodic Graphs*. Matthew Faust, Jordy Lopez Garcia, Feb 2023, DOI: 10.48550/ARXIV.2302.11534
- *Critical Points of Discrete Periodic Operators*. Matthew Faust, Frank Sottile, Preprint, June 2022, DOI: 10.48550/ARXIV.2206.13649.

## Publications

- *The Surprising Accuracy of Benford's Law in Mathematics*. Zhaodong Cai, Matthew Faust, A.J. Hildebrand, Junxian Li, Yuan Zhang, *The American Mathematical Monthly*, (2020), DOI: 10.1080/00029890.2020.1690387.  
◦ *Subject of a 2021 Paul R. Halmos - Lester R. Ford Award*
- *Leading Digits of Mersenne Numbers*, Zhaodong Cai, Matthew Faust, A.J. Hildebrand, Junxian Li, Yuan Zhang, *Experimental Mathematics*, (2019), DOI: 10.1080/10586458.2018.1D551162.

## Presentations

- *Likelihood Correspondence* (60 minute talk, 60 m.t) Algebraic Statistics and Our Changing World: Apprenticeship week, IMSI Chicago, Illinois, October 4, 2023
- *Irreducibility of Bloch Varieties (IoBV)* (25 m.t) Great Lakes Mathematical Physics (GLaMP), Oberlin Ohio, June 10, 2023
- *IoBV* (50 m.t) Copenhagen-Jerusalem Combinatorics Seminar, Zoom, March 30, 2023
- *IoBV* (25 m.t) AMS Spring Southeastern Section Meeting, Special Session on Quasi-periodic Schrödinger operators and quantum graphs, Atlanta, GA, March 19, 2023
- *Irreducibility of Bloch and Fermi Varieties (IoBFV)* (25 m.t) JMM AMS Special Session on Applied Enumerative Geometry, Boston, MA, January 4, 2023
- *IoBFV* (25 m.t) SIAM-TXLA 2022, Houston, Texas, November 5, 2022
- *IoBFV* (50 m.t) Louisiana State University Applied Analysis Seminar, Baton Rouge, Louisiana, October 11, 2022
- *IoBFV* (50 m.t) Texas A&M Algebra and Combinatorics Seminar, College Station, Texas, October 7, 2022
- *Critical Points of Discrete Periodic Operators (CPoDPO)* (25 m.t) QMath15, Davis, California, September 14, 2022
- *CPoDPO* (25 m.t) Effective Methods in Algebraic Geometry (MEGA), Krakow, Poland, June 23, 2022
- *CPoDPO* (25 m.t) GLaMP, Michigan State University, East Lansing, Michigan, June 11, 2022
- *CPoDPO* (25 m.t) JMM AMS Special Session on Structured Polynomial Systems In Mathematics and Its Applications, Zoom, April 6, 2022
- *CPoDPO* (25 m.t) AMS Spring Sectional, Zoom, March 26, 2022
- *CPoDPO* (25 m.t) Conference on spectral theory of ergodic quantum systems, Zoom, March 12, 2022
- *CPoDPO* (50 m.t) Texas A&M MPHA seminar, College Station, Texas, March 11, 2022
- *CPoDPO* (25 m.t) SIAM TX-LA, South Padre Island, Texas, Nov. 7, 2021
- *CPoDPO* (50 m.t) Texas A&M MPHA seminar, College Station, Texas, April 30, 2021
- *Leading Digit Distribution, Continued Fractions, and Probabilistic Diophantine Approximation* (Poster) UIUC Undergraduate Research Symposium, Champaign, Illinois, April 27, 2017
- *Leading Digit Distribution, Continued Fractions, and Probabilistic Diophantine Approximation* (Poster) Joint Mathematics Meetings, Atlanta, GA, January 6, 2017.
- *A local Benford Law for a class of arithmetic sequences* (20 m.t) Young Mathematicians Conference, Ohio State University, Columbus, OH, August 19-21, 2016.

- *A local Benford Law for a class of arithmetic sequences*(15 m.t) MAA MathFest, Columbus, OH, August 4 - 7, 2016
- *Randomness and regularities in the leading digits of number-theoretic sequences* (20 m.t) Rose-Hulman Undergraduate Mathematics Conference, Terre Haute, IN, April 22-23, 2016.
- *Local and global randomness in the leading digits of arithmetic sequences*(Poster), UIUC Undergraduate Research Symposium, Champaign, Illinois, April 21, 2016.

## Conference Organization

- Mini-symposium Organizer: Discrete and Continuous Schrödinger Operators SIAM TX-LA (Nov 3-5 2023).
- Local Organizer:Spectral Theory and Applications at Texas A&M (Oct 13-15 2023).

## Recent journal referees

- The American Mathematical Monthly (2022).

## Teaching Experience

- 2021 Summer **Instructor for Math 142 (Business Calc)**, *Texas A&M University*, College Station, TX.
- Five week course, virtually lectured daily through zoom.
- 2018-present **Teaching Assistant**, *Texas A&M University*, College Station, TX.
- Fall 2023 Math 613 (Graph Theory)
  - Summer 2023: Math 601
  - Summer 2022: Math 308 (Differential Equations)
  - Spring 2022: Math 416 (Modern Algebra II)
  - Fall 2021: Math 147 (Calculus I for Biological Sciences)
  - Spring 2021: Math 415 (Modern Algebra II)
  - Fall 2020: Math 300 (Foundations of Mathematics)
  - Summer 2020: Math 151 (Engineering Mathematics I)
  - Spring 2020: Math 151 (Engineering Mathematics I)
  - Fall 2019: Math 152 (Engineering Mathematics II)
  - Spring 2019: Math 220 (Foundations of Mathematics)
  - Fall 2018: Math 220 (Foundations of Mathematics)
- 2016-2017 **Course Assistant**, *University of Illinois*, Champaign, IL.
- Fall 2017: Math 231 (Calculus II) grader
  - Fall 2016: CS 374 (Introduction to Algorithms) course assistant
  - Spring 2016: CS 374 (Introduction to Algorithms) course assistant

## Honors

- 2021 **2021 Paul R. Halmos - Lester R. Ford Award.**
- 2018 **Math Algebraic-Combinatorics Scholarship ICLUE.**
- 2014–2018 **Edmund J. James Scholar.**
- 2014 – 2015 **ECE Grainger Freshman Scholarship.**
- 2014 – 2015 **IL Engineering Achievement Scholarship.**

## Outreach

- Fall 2022 **Directed reading program**, *Texas A&M University*, College Station, TX.
- Led a student through selected readings in the philosophy of mathematics.
- Aug. 2022 – **Liu TAMU REU 2022**, *Texas A&M University*, College Station, TX.
- May 2023
- Ongoing Fall REU project studying Floquet isospectrality on the rectangular lattice.
  - Assisted Professor Wencai Liu and Dr. Rodrigo Matos in leading five students.
- Jun. 2022 – **Sottile TAMU REU 2022**, *Texas A&M University*, College Station, TX.
- Present
- Ongoing REU project, with a previous DRP student, studying discrete periodic operators.
  - In the spring, I led the student through *Ideals, Varieties, and Algorithms* by Cox, Little, O'Shea.
  - Currently, we are employing a computational cluster to gather data and build conjectures.
- Spring 2022 **Directed reading program**, *Texas A&M University*, College Station, TX.
- Leading a student reading *Thinking About Mathematics* by Shapiro.

- Fall 2021 **Directed reading program**, *Texas A&M University*, College Station, TX.  
◦ Led a student reading *Topological Crystallography* by Sunada.  
◦ This reading evolved into an ongoing REU project with the student.
- May 2021 – **Sottile TAMU REU 2021**, *Texas A&M University*, College Station, TX.
- August 2021 ◦ Worked with two students in an REU focused on the application of algebraic geometry to problems in mathematical physics.
- 2020 Spring **Directed reading program**, *Texas A&M University*, College Station, TX.  
◦ Led a student reading *Introduction to Quantum Graphs* by Berkolaiko and Kuchment.
- 2020 **Mentor for Peer Mentoring Program**.
- Summer 2019 **Panelist for TAMU REU graduate school discussion panel**.

## ———— Software Contributions

- NormalToricVarieties package for Macaulay2 (contributor).
- MatrixFactorization package for Macaulay2 (contributor, package in development).