

Contact Information

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Employment

1. J.L. Doob Research Assistant Professor *with Marius Junge* August 2021-Current
 Department of Mathematics, University of Illinois at Urbana-Champaign

Education

- Ph.D., Mathematics, Purdue University August 2015- April 2021
 Thesis: "On the abstract structure of operator systems and applications to quantum information theory"
 Advisor: Thomas J. Sinclair
- B.A., Mathematics, San José State University December 2014
 Advisor: Timothy Hsu

Appointments

5. Institute Affiliate August 2021-Current
 Illinois Quantum Information Science and Technology Center
4. J.L. Doob Research Assistant Professor August 2021-May 2024
 Department of Mathematics, University of Illinois at Urbana-Champaign
3. Andrews Fellow of Mathematics August 2015-December 2020
 Department of Mathematics, Purdue University
2. Purdue Research Foundation Fellow June 2019-June 2020
 Department of Mathematics, Purdue University
1. GAANN Fellow January 2016-January 2018
 Department of Mathematics, Purdue University

Visiting Research Positions/Extended Stays

3. Visiting Researcher June-July 2022
 Mathematisches Institut WWU Münster
2. Thematic Research Program: Operator Algebras, Groups and Applications May 2019
 to Quantum Information, Instituto de Ciencias Matematicas, Madrid, Spain
1. Long Program on Quantitative Linear Algebra, Institute for Pure March-June 2018
 and Applied Mathematics, University of California, Los Angeles, California, USA

Short Research Visits

6. Department of Mathematics, University of Virginia, Host: Ben Hayes April 2022
5. Army Cyber Institute, United States Military Academy, West Point February 2020
 Host: Travis Russell

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| 4. Department of Mathematics, University of Illinois at Urbana-Champaign
Host: Marius Junge | October 2019 |
| 3. Department of Mathematics, University of Virginia, Host: Ben Hayes | October 2019 |
| 2. Department of Mathematics, Sam Houston State University, Host: Damon Hay | March 2019 |
| 1. Department of Mathematics, Texas A&M, Host: Gilles Pisier | March 2019 |

Research Interests

- Tensor theory of operator spaces
- Tensor theory of operator systems
- Quantum information theory
- Operator algebras

Publications and Preprints

6. An index for inclusions of operator systems (with Colton Griffin and Thomas Sinclair) (2022).
arXiv:2203.05710. Submitted
5. Approximating projections by quantum operations (with Colton Griffin, Aneesh Khilnani, and Thomas Sinclair) (2022) arXiv:2203.02627. Submitted
4. Matricial Archimedean order unit spaces and quantum correlations (with Travis Russell and Mark Tomforde). (2021) arXiv:2109.11671. To appear: Indiana University Mathematics Journal
3. A universal representation for quantum commuting correlations (with Travis Russell and Mark Tomforde). (2021) arXiv:2102.05827. To appear: Annales Henri Poincaré.
2. An abstract characterization for projections in operator systems (with Travis Russell). (2020) arXiv:2006.03094. To appear: Journal of Operator Theory
1. \mathcal{R} we living in the matrix? (with Rolando de Santiago). Notices of the American Mathematical Society. Volume 66, Number 8, (2019), Pgs. 1216-1224.

Honors and Awards

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| 6. AMS Travel Grant
American Mathematical Society | March 2020 |
| 5. Purdue Research Foundation Grant
Department of Mathematics, Purdue University | June 2019 |
| 4. GAANN Fellowship
Department of Mathematics, Purdue University | January 2016 |
| 3. Andrews Fellowship
Department of Mathematics, Purdue University | August 2015 |
| 2. Mervin L. Kedy Scholarship
Department of Mathematics, Purdue University | August 2015 |
| 1. College of Science Dean's Scholar
College of Science, San Jose State University | December 2014 |

Presentations

Invited

28. Lecture Series, KnOttawa Summer School 2022, Kansas State University July 2022
 Lecture Series Topic: Quantum Information Theory
 (a) Lecture 1: TBD
 (b) Lecture 2: TBD
 (c) Lecture 3: TBD
 (d) Lecture 4: TBD
 (e) Lecture 5: TBD
27. Kleines Seminar, WWU Münster, June 2022
 Title: TBD
26. Oberseminar C^* -algebren, WWU Münster, June 2022
 Title: TBD
25. Operator Theory Seminar, University of Virginia April 2022
 Title: Matricial Archimedean Order Unit Spaces and Quantum Correlations
24. AMS Spring Southeastern Sectional Meeting on “Advances in Operator Algebras” March 2022
 University of Virginia
 Title: TBD (Meeting Canceled)
23. Plenary Lecture, Southeastern Analysis Meeting, University of Florida March 2022
 Title: Matricial Archimedean Order Unit Spaces and Quantum Correlations
22. Functional Analysis Seminar, University of California San Diego February 2022
 Title: Matricial Archimedean Order Unit Spaces and Quantum Correlations
21. Department of Mathematics & Statistics Colloquium, San José State University September 2021
 Title: From Correlation Sets to Tensor Products of C^* -algebras: The Connes-Kirchberg Problem
20. Expository Lecture Series, Groundwork for Operator Algebras Lecture Series (GOALS), July 2021
 Michigan State University, East Lansing, Michigan
 (a) Lecture 1: Completely Positive Maps and Applications
 (b) Lecture 2: Lance’s Weak Expectation Property and Kirchberg’s Conjecture
19. Special Session on Advances in Operator Algebras, Joint Mathematics Meeting January 2021
 Washington D.C.
 Title: An Abstract Characterization for Projections in Operator Systems
18. Special Session: “If You Build It They Will Come”: Presentations by Scholars in the January 2021
 National Alliance for Doctoral Studies in the Mathematical Sciences,
 Joint Mathematics Meeting, Washington D.C.
 Title: A Look into the Abstract Theory of Operator Systems and Some Applications to Quantum Information Theory
17. Operator Theory Seminar, University of Iowa November 2020
 Title: Projections in Operator Systems and Applications to Quantum Information Theory
16. East Coast Operator Algebras Symposium, University of Virginia October 2020
 Title: Projections in Operator Systems and Applications to Quantum Information Theory

15. Mathematical Physics and Operator Algebras Seminar, Michigan State University September 2020
 - (a) Lecture 1: Operator Spaces and Operator Systems: An Exposition.
 - (b) Lecture 2: An Abstract Characterization for Projections in Operator Systems.
14. Rings and Wings Seminar, Algebras and Rings in Colorado Springs Center (ARCS) September 2020
 University of Colorado at Colorado Springs
 Title: An Abstract Characterization for Projections in Operator Systems
13. Oberseminar C^* -algebren, WWU Münster, June 2020
 Title: An Abstract Characterization for Projections in Operator Systems
12. 2TART Conference, University of Florida June 2020
 Title: An Abstract Characterization for Projections in Operator Systems
11. Operator Algebras Mini-Workshop, University of Virginia March 2020
 Title: On Operator Systems Containing Symmetries
10. Quantitative Linear Algebra Reunion Conference at Lake Arrowhead, Institute December 2019
 for Pure and Applied Mathematics, University of California, Los Angeles
 Title: Tensor Products and Categorical Properties of Matrix Convex Sets
9. Analysis Seminar, University of Illinois at Urbana-Champaign October 2019
 Title: Matrix Convex Sets, Tensor Products, and Noncommutative
 Choquet Boundaries
8. Operator Theory Seminar, University of Virginia October 2019
 Title: Matrix Convex Sets, Tensor Products, and Noncommutative
 Choquet Boundaries
7. Mathematics Colloquium, Sam Houston State University March 2019
 Title: On Operator Spaces and Submaximality
6. Linear Analysis Seminar, Texas A&M March 2019
 Title: On Operator Systems and Matrix Convexity
5. Graduate Research Day, Purdue University November 2018
 Title: Lance's WEP and Operator System Nuclearity
4. Quantitative Linear Algebra Culminating Workshop at Lake Arrowhead June 2018
 University of California, Los Angeles
 Title: Lance's Weak Expectation Property and The Tensor Theory of Operator Systems
3. Quantitative Linear Algebra General Seminar Series, Institute for Pure and April 2018
 Applied Mathematics, University of California, Los Angeles
 Title: Characterizations of Operator Systems Via Tensor Product Nuclearity Part II
2. Quantitative Linear Algebra General Seminar Series, Institute for Pure and April 2018
 Applied Mathematics, University of California, Los Angeles
 Title: Characterizations of Operator Systems Via Tensor Product Nuclearity Part I
1. Department of Mathematics and Statistics Colloquium, San José State University April 2015
 Title: C^* -Algebras and Real Operator Systems

Contributed

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| 4. Early Career Workshop in Operator Theory & Operator Algebras,
Indiana University and Purdue University
Title: A Universal Representation for Quantum Commuting Correlations | February 2021 |
| 3. Wabash Annual Mini-Conference, IUPUI, Indianapolis, IN
Title: Matrix Convex Sets, Tensor Products, and Noncommutative
Choquet Boundaries | September 2019 |
| 2. Northern California Undergraduate Mathematics Conference, Saint Mary's College
Title: Real Operator Systems in M_n | March 2015 |
| 1. American Mathematical Society Joint Mathematics Meetings, AMS Session on
Functional Analysis
Title: Real Operator Systems in M_n | January 2015 |

Conferences/Workshops Attended

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| 27. Operator Algebras, Dynamics, and Groups. ICM Satellite Conference
University of Copenhagen | July 2022 |
| 26. Advancing Quantum Mechanics with Mathematics and Statistics, IPAM
University of California Los Angeles | March-June 2022 |
| (a) Workshop IV: Monte Carlo and Machine Learning Approaches
in Quantum Mechanics | May 2022 |
| (b) Workshop III: Large-scale Certified Numerical Methods in Quantum Mechanics | May 2022 |
| (c) Workshop II: Model Reduction in Quantum Mechanics | April 2022 |
| (d) Workshop I: Multiscale Approaches in Quantum Mechanics | March-April 2022 |
| 25. AMS Spring Central Sectional Meeting on "Recent Developments in Operator
Algebras", Purdue University | March 2022 |
| 24. AMS Spring Southeastern Sectional Meeting on "Advances in Operator Algebras"
University of Virginia (Meeting Canceled) | March 2022 |
| 23. Southeastern Analysis Meeting, University of Florida | March 2022 |
| 22. Groundwork for Operator Algebras Lecture Series, Michigan State University | July 2021 |
| 21. Early Career Workshop in Operator Theory & Operator Algebras
Indiana University and Purdue University | February 2021 |
| 20. Entropy Inequalities, Quantum Information and Quantum Physics
Institute for Pure and Applied Mathematics, University of California, Los Angeles | February 2021 |
| 19. Joint Mathematics Meeting, Washington D.C. | January 2021 |
| 18. East Coast Operator Algebras Symposium, University of Virginia | October 2020 |
| 17. Groundwork for Operator Algebras Lecture Series (GOALS)
Michigan State University | June-July 2020 |
| (a) Groundwork for Operator Algebras Lecture Series (GOALS)
Culminating Workshop | July 2020 |
| 16. Noncommutative Geometry and Operator Algebras Spring Institute
Vanderbilt University | May 2020 |

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| 15. Operator Algebras Mini-Workshop, University of Virginia | March 2020 |
| 14. Quantitative Linear Algebra Reunion Conference at Lake Arrowhead, Institute for Pure and Applied Mathematics, University of California, Los Angeles, USA | December 2019 |
| 13. QLA Meets QIT, Purdue University | November 2019 |
| 12. Classification Problems in von Neumann Algebras, Banff International Research Station for Mathematical Innovation and Discovery (BIRS) | September 2019 |
| 11. Wabash Mini-Conference, IUPUI | September 2019 |
| 10. Thematic Research Program: Operator Algebras, Groups and Applications to Quantum Information, Visiting Researcher, Instituto de Ciencias Matematicas, Madrid, Spain | May 2019 |
| (a) Workshop II: Mathematical Aspects of Quantum Information Theory | May 2019 |
| (b) School II: Applications to Quantum Information Theory | May 2019 |
| 9. Brazos Analysis Seminar, University of Houston | March 2019 |
| 8. Wabash Mini-Conference, IUPUI | September 2018 |
| 7. Quantitative Linear Algebra, Visiting Scholar/Researcher, Institute for Pure and Applied Mathematics, University of California, Los Angeles | March-June 2018 |
| (a) Workshop IV: Quantitative Linear Algebra Culminating Workshop | June 2018 |
| (b) Workshop III: Random Matrices and Free Probability | May 2018 |
| (c) Workshop II: Approximation Properties in Operator Algebras and Ergodic Theory | May 2018 |
| (d) Workshop I: Expected Characteristic Polynomial Techniques and Applications | April 2018 |
| 6. Classification of Group von Neumann Algebras, American Institute of Mathematics, San Jose, California, USA | January 2018 |
| 5. Wabash Mini-Conference, IUPUI | September 2017 |
| 4. East Coast Operator Algebras Seminar, Loyola University | October 2016 |
| 3. Workshop on Non-Commutative Analysis, University of Iowa | June 2016 |
| 2. Great Plains Operator Theory Symposium, University of Illinois at Urban-Champaign | May 2016 |
| 1. East Coast Operator Algebras Seminar, University of Iowa | October 2015 |

Other Conferences Attended/Outreach

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| 9. Panelist, Finding and Getting Jobs: A Panel Discussion
Purdue University | April 2021 |
| 8. Q&A Moderator, Fields of Success, Stories from Math Alliance Alumni
Math Alliance Field of Dreams Conference, Institute for Mathematics and its Applications, University of Minnesota (virtual) | November 2020 |
| 7. Panelist, Grad School Life, Career Paths in the Mathematical Sciences: An IMA/Math Alliance Workshop, Institute for Mathematics and its Applications, University of Minnesota, USA | July 2020 |
| 6. Panelist, Finding Your Focus in Graduate School: The Many Focuses of a Math Sciences PhD., Career Paths in the Mathematical Sciences: An IMA/Math Alliance Workshop, Institute for Mathematics and its Applications, University of Minnesota, USA | June 2019 |

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| 5. Panelist, Maximizing Opportunities, Math Alliance Field of Dreams, St. Louis, USA | November 2018 |
| 4. Math Alliance Field of Dreams Conference, St. Louis, USA | November 2018 |
| 3. Latinos in the Mathematical Sciences, Institute for Pure and Applied Mathematics, University of California, Los Angeles | March 2018 |
| 2. Math Alliance Field of Dreams Conference, St. Louis, USA | November 2017 |
| 1. Math Alliance Field of Dreams Conference, St. Louis, USA | November 2016 |

Teaching

University of Illinois at Urbana-Champaign

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| • Math 492 Select topics in quantum information theory (16 students)
Illinois Geometry Lab, University of Illinois at Urbana-Champaign | Spring 2022 |
| • Math 415 Applied Linear Algebra (280 students) | Spring 2022 |
| • Math 125 Elementary Linear Algebra (80 students) | Fall 2021 |

Purdue University

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| • Math 16200 Plane Analytic Geometry And Calculus II (Recitation) | Summer 2021 |
| • Math 16010 Applied Calculus 1 (Instructor) | Spring 2021 |
| • Math 26100 Multivariate Calculus (Recitation) | Fall 2017 |
| • Math 16600 Analytic Geometry and Calculus II (Recitation) | Spring 2017 |

Advising

University of Illinois at Urbana-Champaign

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| • Chieh Hsu (Undergraduate), Physics | May 2022-Present |
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Service

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| • Seminar Committee Member, Illinois Quantum Information Science and Technology Center (IQIST), University of Illinois at Urbana-Champaign | August 2022-Current |
| • Scholarship Board Member, Sloan University Center of Exemplar Mentoring at Illinois
University of Illinois at Urbana-Champaign | September 2021-Current |
| • Mentor, Sloan University Center of Exemplar Mentoring at Illinois
University of Illinois at Urbana-Champaign | September 2021-Current |
| • TA, Groundwork for Operator Algebras Lecture Series (GOALS)
Michigan State University | June-July 2020 |

Conferences/Seminars Organized:

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| 7. Co-Organizer (with Marius Junge)
Operator Algebras Seminar
University of Illinois at Urbana-Champaign | August 2021-Current |
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6. Co-Organizer (with Rolando de Santiago, Thomas Sinclair and Andrew Toms) March 2022
AMS Spring Central Sectional Meeting on “Recent Developments in Operator Algebras”
Purdue University
5. Co-Organizer (with Marius Dadarlat and Thomas Sinclair) August 2019-May 2021
Operator Algebras Seminar
Purdue University
4. Organizer, Junior Operator Algebras Seminar August 2018-May 2021
Purdue University
3. Co-Organizer (with Thomas Sinclair), QLA (Quantitative Linear Algebra) November 2019
Meets QIT (Quantum Information Theory) Conference
Purdue University
2. Organizer, Quantitative Linear Algebra General Seminar Series March 2018-June 2018
Institute for Pure and Applied Mathematics
University of California, Los Angeles
1. Organizer, Quantitative Linear Algebra Open Problem Session March 2018-June 2018
Institute for Pure and Applied Mathematics
University of California, Los Angeles

Other:

- Graduate Student Representative August 2017-May 2018
Department of Mathematics, Purdue University
- Chapter President, Purdue University AMS Student Chapter August 2017-May 2018
Purdue University

References

- Marius Dadarlat, Professor of Mathematics, Purdue University,
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- Marius Junge, Professor of Mathematics, University of Illinois at Urbana-Champaign,
email: mjunge [at] illinois [dot] edu
- Vern Paulsen, Professor of Mathematics, University of Waterloo
email: vpaulsen [at] uwaterloo [dot] ca
- Gilles Pisier, Distinguished Professor of Mathematics, Texas A&M, Professor Emeritus of Mathematics,
Sorbonne Université,
email: gilles [dot] pisier [at] imj-prg [dot] fr
- Thomas J. Sinclair, Associate Professor of Mathematics, Purdue University,
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