CURRICULUM VITAE

SAMUEL J. HARRIS

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EMPLOYMENT

2022–	Assistant Professor, Department of Mathematics & Statistics, Northern Arizona University
2019–2022	Visiting Assistant Professor, Department of Mathematics, Texas A&M University

EDUCATION

2015—2019	Doctor of Philosophy in Mathematics, Supervisor: Vern Paulsen University of Waterloo, Canada Thesis title: Unitary correlation sets and their applications
2014—2015	Master of Mathematics, Supervisor: Laurent Marcoux University of Waterloo, Canada Project title: Kadison similarity problem and similarity degree
2009—2013	Bachelor of Mathematics, Honours Pure Mathematics & Applied Mathematics Minor University of Waterloo, Canada

RESEARCH INTERESTS

Operator algebras, operator systems, quantum information theory

PREPRINTS

(1) "Quantum no-signalling bicorrelations" (with Michael Brannan, Ivan Todorov and Lyudmila Turowska) Available at arXiv:2302.04268.

PUBLICATIONS

(2) "Universality of graph homomorphism games and the quantum coloring problem," Annales Henri Poincaré, to appear. Available at arXiv:2305.18116.

(3) "Crossed product equivalence of quantum automorphism groups," International Mathematics Research Notices (online), 2023. (with Michael Brannan, Floris Elzinga and Makoto Yamashita) Available at arXiv:2202.04714.

(4) "Synchronicity for quantum non-local games," Journal of Functional Analysis, Volume 284, Issue 2, 2023, 109738. (with Michael Brannan, Ivan Todorov and Lyudmila Turowska) Available at arXiv:2106.11489.

(5) "The quantum-to-classical graph homomorphism game," Journal of Mathematical Physics, Volume 63, Issue 11, 2022, 112204. (with Michael Brannan and Priyanga Ganesan) Available at arXiv:2009.07229.

(6) "Synchronous games with ∗-isomorphic game algebras," Quantum Information and Computation. Volume 22, Issues 11&12, 2022, pp. 924–946. Available at arXiv:2109.04859.

(7) "Bipartite matrix-valued tensor product correlations that are not finitely representable," Communications in Mathematical Physics. Volume 382, 2021, pp. 709–720. Available at arXiv:1806.08745.

(8) "Bigalois extensions and the graph isomorphism game," Communications in Mathematical Physics, Volume 375, 2020, pp. 1777-1809. (with Michael Brannan, Alexandru Chirvasitu, Kari Eifler, Vern Paulsen, Xiaoyu Su and Mateusz Wasilewski) Available at arXiv:1812.11474.

(9) "Quantum teleportation and super-dense coding in operator algebras," International Mathematics Research Notices, Volume 2021, Issue 12, 2021, pp. 9146–9179. (with Li Gao and Marius Junge) Available at arXiv:1709.02785.

(10) "A non-commutative unitary analogue of Kirchberg's conjecture," Indiana University Mathematics Journal, Volume 68, Issue 2, 2019, pp. 503–536. Available at arXiv:1608.03229.

(11) "Crossed products of operator systems," Journal of Functional Analysis, Volume 276, Issue 7, 2019, pp. 2156–2193. (with Se-Jin Kim) Available at arXiv:1803.10759.

(12) "Schur multipliers and mixed unitary maps," Journal of Mathematical Physics, Volume 59, Issue 11, 2018, 112201, 11pp. (with Rupert Levene, Vern Paulsen, Sarah Plosker and Mizanur Rahaman) Available at arXiv:1807.06491.

(13) "Connes' embedding problem and winning strategies for quantum XOR games," Journal of Mathematical Physics, Volume 58, Issue 12, 2017, 122203, 9pp. Available at arXiv:1706.02349.

(14) "Unitary correlation sets," Integral Equations and Operator Theory, Volume 89, Issue 1, 2017, pp. 125–149. (with Vern Paulsen) Available at arXiv:1612.02791.

AWARDS AND HONORS

- Postdoctoral Fellowship (September 2019–August 2021), Natural Sciences and Engineering Research Council, Canada
- Rai Mathematics Graduate Scholarship (September 2018–April 2019), Faculty of Mathematics, University of Waterloo
- Ontario Graduate Scholarship (September 2018–August 2019), Faculty of Mathematics, University of Waterloo
- President's Graduate Scholarship (September 2018–August 2019), Faculty of Mathematics, University of Waterloo
- Huawei Prize for Best Research Paper by a Mathematics Graduate Student (February 2018), Faculty of Mathematics, University of Waterloo
- Ontario Graduate Scholarship (September 2017–August 2018), Faculty of Mathematics, University of Waterloo
- President's Graduate Scholarship (September 2017–August 2018), Faculty of Mathematics, University of Waterloo
- Peter F. Bronfman Graduate Scholarship (September 2016–April 2017), Faculty of Mathematics, University of Waterloo
- Joseph Wai-Hung Liu Graduate Scholarship (May 2017–August 2017), Faculty of Mathematics, University of Waterloo
- Ontario Graduate Scholarship (September 2016–August 2017), Faculty of Mathematics, University of Waterloo
- President's Graduate Scholarship (September 2016–August 2017), Faculty of Mathematics, University of Waterloo
- Canada Graduate Scholarship–Master's (September 2015–August 2016), Natural Sciences and Engineering Research Council of Canada
- Ontario Graduate Scholarship (September 2015–August 2016), Faculty of Mathematics, University of Waterloo (declined)
- President's Graduate Scholarship (September 2015–August 2016), Faculty of Mathematics, University of Waterloo
- Ontario Graduate Scholarship (September 2014–August 2015), Faculty of Mathematics, University of Waterloo
- President's Graduate Scholarship (September 2014–August 2015), Faculty of Mathematics, University of Waterloo

Courses Taught

Courses taught at Northern Arizona University:
- MAT 316 (Linear Algebra), Spring 2024
- MAT 431 (Elementary Real Analysis), Spring 2024
- MAT 239 (Differential Equations), Fall 2023
- MAT 531 (Real Analysis), Fall 2023
- MAT 316 (Linear Algebra), Summer 2023
- MAT 239 (Differential Equations), Spring 2023
- MAT 535 (Complex Analysis), Spring 2023
- MAT 316 (Linear Algebra), Fall 2022
- MAT 531 (Real Analysis), Fall 2022

Courses taught at Texas A&M University:
- MATH 433 (Applied Algebra), Summer 2022 (online)
- MATH 323 (Linear Algebra), Spring 2022
- MATH 433 (Applied Algebra), Spring 2022
- MATH 470 (Communication and Cryptography), Fall 2021
- SCEN 100 (Hullabaloo U–First Year Experience), Fall 2021
- MATH 433 (Applied Algebra), Summer 2021 (online)
- MATH 409 (Advanced Calculus I), Spring 2021 (online)
- MATH 251 (Engineering Mathematics III), Fall 2020 (online)
- MATH 433 (Applied Algebra), Summer 2020 (online)
- MATH 308 (Differential Equations), Spring 2020 (partially online)
- MATH 251 (Engineering Mathematics III), Fall 2019

Courses taught at the University of Waterloo:
- MATH 127 (Calculus 1 for the Sciences), Winter 2019
- PMATH 336 (Introduction to Group Theory and Applications), Spring 2018

Teaching Assistantships:
- MATH 118 (Calculus 2 for Engineering), Spring 2019
- MATH 647 (Foundations of Calculus I), Fall 2018
- PMATH 347 (Groups and Rings), Fall 2018
- AMATH/PMATH 332 (Applied Complex Analysis), Winter 2018
- PMATH 453/753 (Functional Analysis), Fall 2017
- MATH 145 (Algebra: Advanced Level), Fall 2017
- MATH 640 (Number Theory for Teachers), Fall 2016
- PMATH 453/753 (Functional Analysis), Fall 2015
- MATH 147 (Calculus 1: Advanced Level), Fall 2015
- PMATH 450/650 (Lebesgue Integration and Fourier Analysis), Winter 2015
- MATH 109 (Mathematics for Accountants), Fall 2015

Other Positions:
- Web Site Manager (Pure Mathematics, University of Waterloo), January 2017–August 2017.

Professional Activities

- Co-organizer for AMS Special Session on Recent Developments in Operator Algebras and Quantum Information Theory; AMS Eastern Sectional Fall 2023, University at Buffalo, Buffalo, NY (September 9 & 10, 2023).
- Peer leader for teaching small group (MATH 251 - Engineering Mathematics III), Fall 2020, Texas A&M University.
- Reviewer: Proceedings of the Royal Society of Edinburgh A; Quantum Information Processing; Quantum Information and Computing; Theory of Quantum Computation, Communication, and Cryptography; Experimental Mathematics; Annales Henri Poincaré; Proceedings of the American Mathematical Society.

- "Quantum reductions of synchronous games to graph games," Noncommutative Harmonic Analysis and Quantum Information, Institut Mittag-Leffler (Royal Swedish Academy of Sciences, Djursholm, Sweden), June 15, 2023.
- "Quantum reductions of synchronous games to graph games," Canadian Mathematical Society Summer Meeting 2023 (Session on Quantum Information Theory), June 3, 2023.
- "Connections between quantum colorings and quantum automorphism groups," ASU-ERAU C^*-seminar, Embry-Riddle Aeronautical University (Prescott, AZ), April 5, 2023.
- "Quantum isomorphisms of quantum and classical graphs," Nebraska-Iowa Functional Analysis Seminar, University of Nebraska-Lincoln, March 25, 2023.
- "Quantum isomorphisms of quantum graphs: a new approach," Joint Mathematics Meetings 2023, AMS Special Session on Advances in Operator Algebras, January 7, 2023.
- "Non-local games and graphs," Mathematics Colloquium, Northern Arizona University, April 18, 2022.
- "Unitary error bases and embeddings of certain universal quantum groups," Joint Mathematics Meetings, April 8, 2022. (Online)
- "Non-local games and graphs," Mathematics Colloquium, University of Maryland, April 6, 2022.
- "Linking graph coloring games to quantum automorphism groups," AMS Spring Central Sectional, March 26, 2022. (Online)
- "Synchronous games with 'equivalent' winning strategies," Quantum information learning seminar, University of Copenhagen, March 23, 2022. (Online)
- "Interplay between quantum automorphism groups and non-local games," Analysis Seminar, Baylor University, February 23, 2022.
- "Non-local games and graphs," Mathematics Colloquium, University of Winnipeg, February 18, 2022.
- "Unitary error bases and applications to quantum automorphism groups," Operator Theory Talks for Early Researchers (OTTER) Math Meeting, January 7, 2022.
- "Applications of graph coloring games to quantum automorphism groups," Analysis Seminar, University of Waterloo, November 24, 2021.
- "Equivalent synchronous non-local games," Canadian Operator Theory Symposium (COSy), May 31, 2021.
- "Homomorphism games for quantum graphs," Non-local games in quantum information theory, American Institute of Mathematics (AIM), May 19, 2021. (Online)
- "∗-Equivalences in synchronous games," Great Plains Operator Theory Symposium (GPOTS), May 13, 2021. (Online)
- "Non-local games and entanglement," Operator Algebras Seminar, Purdue University, March 23, 2021. (Online)
- "Non-local games and graphs," Brazos Analysis Seminar, March 21, 2021. (Online)
- "Non-local games and entanglement," Inverse Problems and Analysis seminar, University of Delaware, March 17, 2021. (Online)
- "The quantum-to-classical graph homomorphism game," Quasar Seminar, University of Ottawa, February 11, 2021. (Online)
- "Non-local games, correlations and graphs," Operator Algebras and Quantum Information Seminar (QCIAO), February 4, 2021. (Online)
- "Non-local games with two players," Department Colloquium, University of Houston, December 16, 2020. (Online)
- "The graph isomorphism game," 2TART Presents: Operator Theory with its Applications, August 13, 2020. (Online)
- "Operator system crossed products," Analysis Seminar, University of Houston, November 15, 2019.
- "Separating the matrix-valued bipartite correlation sets," Canadian Mathematical Society Summer Meeting, University of Regina, June 9, 2019.

- "Matrix-valued Tsirelson correlations," Linear Analysis Seminar, Texas A&M University, June 3, 2019.
- "Crossed products of operator systems," Great Plains Operator Theory Symposium, Texas A&M University, May 29, 2019.
- "Separating matrix-valued generalizations of the bipartite Tsirelson correlation sets," American Mathematical Society Fall Sectional Meeting, University of Delaware, September 29, 2018.
- "Crossed products of operator systems," Young Mathematicians in C^*-algebras, Katholieke Universitet Leuven, August 16, 2018.
- "Non-spatial matrix-valued Tsirelson correlations," Fields Institute, University of Toronto, June 12, 2018.
- "Connes' embedding problem and quantum XOR games," Centre for Mathematics of Quantum Theory, University of Copenhagen, February 28, 2018.
- "Unitary correlation sets and quantum XOR games," Workshop on Operator Systems in Quantum Information, University of Guelph, August 14, 2017.
- "Connes' embedding problem and quantum XOR games," Probabilistic and Algebraic Methods in Quantum Information Theory, Texas A&M University, July 18, 2017.
- "Connes' embedding problem and quantum XOR games," Great Plains Operator Theory Symposium, Texas Christian University, May 23, 2017.
- "Unitary correlation sets," Analysis Seminar, University of Waterloo, January 27, 2017.
- "A non-commutative unitary analogue of Kirchberg's conjecture," Operator Algebras Seminar, Fields Institute, University of Toronto, October 11, 2016.

Conferences/Workshops Attended

- Noncommutative harmonic analysis and quantum information theory, Institut Mittag-Leffler, Djursholm, Sweden, June 12-16, 2023.
- Canadian Mathematical Society (CMS) Summer Meeting–Session on quantum information theory, University of Ottawa, Ottawa, ON, June 2-4, 2023.
- Nebraska-Iowa Functional Analysis Seminar, March 25-26, 2023, Lincoln, NE.
- Joint Mathematics Meetings, January 6-7, 2023, Boston, MA.
- Joint Mathematics Meetings, April 7-8, 2022. (Online)
- AMS Spring Central Sectional Meeting, March 26-27, 2022. (Online)
- Operator Theory Talks for Early Researchers (OTTER) Math Meeting, January 6-7, 2022. (Online)
- Canadian Operator Theory Symposium (COSy), University of Guelph, May 31-June 4, 2021. (Online)
- Non-local games in quantum information theory, American Institute of Mathematics (AIM), May 17-21, 2021. (Online)
- Great Plains Operator Theory Symposium (GPOTS), Washington University at St. Louis, May 10-14, 2021. (Online)
- Brazos Analysis Seminar, March 20-21, 2021. (Online)
- Operator Algebras and Quantum Information Seminar (QCIAO), Spring 2021. (Online)
- Brazos Analysis Seminar, November 7-8, 2020. (Online)
- 2TART Presents: Operator Theory with its Applications, August 10-13, 2020. (Online)
- Brazos Analysis Seminar, Baylor University, Waco, Texas, November 9–10, 2019.
- Canadian Mathematical Society Summer Meeting, University of Regina, Regina, Saskatchewan, June 7–10, 2019.
- Great Plains Operator Theory Symposium, Texas A&M University, College Station, Texas, May 28–June 1, 2019.
- American Mathematical Society Fall Eastern Sectional Meeting, University of Delaware, Newark, Delaware, September 29–30, 2018.
- Young Mathematicians in C^*-algebras, Katholieke Universitet Leuven, Leuven, Belgium, August 13–17, 2018.
- Canadian Mathematical Society Winter Meeting, University of Waterloo, Waterloo, December 8–11, 2017.

- Workshop on Operator Systems in Quantum Information, University of Guelph, Guelph, Ontario, August 14–17, 2017.
- Summer Informal Regional Functional Analysis Seminar, Texas A&M University, College Station, Texas, July 21–23, 2017.
- Probabilistic and Algebraic Methods in Quantum Information Theory, Texas A&M University, College Station, Texas, July 17–21, 2017.
- Great Plains Operator Theory Symposium 2017, Texas Christian University, Fort Worth, Texas, May 22–26, 2017.
- Canadian Operator Theory Symposium 2016, Université de Montréal, Montréal, Québec, June 13–17, 2016.
- Great Plains Operator Theory Symposium 2016, University of Illinois (Urbana-Champaign), Urbana-Champaign, Illinois, May 23–27, 2016.
- Canadian Mathematical Society Winter Meeting, Université du Québec à Montréal, Montréal, Québec, December 4–7, 2015.
- Canadian Operator Theory Symposium 2015, University of Waterloo, Waterloo, Ontario, June 15–19, 2015.