Andre Kornell

Curriculum Vitae

☑ kornell@nmsu.edu☑ www.kornell.science

Education

2015 Ph.D., University of California, Berkeley, Mathematics
2006 A.B., Princeton University, Mathematics

Employment

2024–present Postdoctoral Fellow in Mathematics, New Mexico State University
2022–2024 Research Associate in Mathematics, Dalhousie University
2019–2022 Postdoctoral Fellow in Computer Science, Tulane University
2018–2019 Lecturer in Mathematics, University of California, Davis
2015–2018 Visiting Assistant Professor of Mathematics, University of California, Davis

Awards

2024 Birkhoff-von Neumann Prize, International Quantum Structures Association

Publications

G. Bezhanishvili and A. Kornell, *On the structure of modal and tense operators on a Boolean algebra*, Algebra Universalis **86**, 13 (2025).

A. Kornell, *Axioms for the category of sets and relations*, Theory and Applications of Categories **44**, no. 10, 305–325 (2025).

A. Kornell, *Characterizations of homomorphisms among unital completely positive maps*, Linear Algebra and Its Applications **709**, 314–330 (2025).

G. Bezhanishvili and A. Kornell, *The category of topological spaces and open maps does not have products*, Advances in Mathematics **458**, pt. A, 109963 (2024).

J. Harding and A. Kornell, *Completely hereditarily atomic* OML*s*, Mathematica Slovaca **74**, no. 5, 1107–1126 (2024).

A. Kornell, *A natural deduction system for orthomodular logic*, Review of Symbolic Logic **17**, no. 3, 910–949 (2024).

A. Kornell, B. Lindenhovius, and M. Mislove, *Categories of quantum cpos*, arXiv:2406.01816 (2024).

C. Heunen, A. Kornell, and N. van der Schaaf, *Axioms for the category of Hilbert spaces and linear contractions*, Bulletin of the London Mathematical Society **56**, no. 4, 1532–1549 (2024).

A. Kornell, *Discrete quantum structures II: Examples*, Journal of Noncommutative Geometry **18**, no. 2, 411–450 (2024).

A. Kornell, *Discrete quantum structures I: Quantum predicate logic*, Journal of Noncommutative Geometry **18**, no. 1, 337–382 (2024).

A. Kornell and P. Selinger, Some improvements to product formula circuits for Hamiltonian simulation, arXiv:2310.12256 (2023).

A. Kornell, B. Lindenhovius, and M. Mislove, *A category of quantum posets*, Indagationes Mathematicae **33**, no. 6, 1137–1171 (2022).

C. Heunen and A. Kornell, *Axioms for the category of Hilbert spaces*, Proceedings of the National Academy of Sciences of the United States of America **119**, no. 9, e2117024119 (2022).

X. Jia, A. Kornell, B. Lindenhovius, M. Mislove, and V. Zamdzhiev, *Semantics for Variational Quantum Programming*, Proceedings 49th ACM SIGPLAN Symposium on Principles of Programming Languages (POPL 2022), Proceedings of the ACM on Programming Languages **6**, 26, 1–31 (2022).

A. Kornell, B. Lindenhovius, and M. Mislove, *Quantum CPOs*, Proceedings 17th International Conference on Quantum Physics and Logic (QPL 2020), Electronic Proceedings in Theoretical Computer Science **340**, 174–187 (2021).

A. Kornell, Quantum sets, Journal of Mathematical Physics 61, 102202 (2020).

A. Kornell, *Quantum extensions of ordinary maps*, Proceedings of the American Mathematical Society **148**, 1971–1986 (2020).

A. Kornell, *Quantum collections*, International Journal of Mathematics **28**, no. 12, 1750085 (2017).

Talks

On the category of quantum graphs, Workshop on Quantum Graphs, Saarland University (2025), invited.

From quantum uncertainty to quantum groups, Quantum Structures, Free University of Brussels (2024), invited.

On the category of sets and relations, Boolean algebras, Lattices, Universal Algebra, Set Theory, and Topology, University of South Carolina at Charlotte (2023), plenary.

Categories of Hilbert spaces, AMS Spring Western Sectional Meeting, California State University, Fresno (2023), invited.

Bounded operators and binary relations, Logic Seminar, University of Ottawa (2023), invited. Categories of Hilbert spaces, New York City Noncommutative Geometry Seminar (2023), invited.

Four categories of Hilbert spaces, Colloquium, New Mexico State University (2022), invited.

Categories as predicate models, Foundations Seminar, New Mexico State University (2022), invited.

Natural deduction in quantum logic, Boolean algebras, Lattices, Universal Algebra, Set Theory, and Topology, Chapman University (2022).

Axioms for the category of Hilbert spaces, Topos Institute (2022), invited.

Natural deduction in quantum logic, Quantum Structures, Calabria (2022).

Natural deduction in quantum logic, Quantum Physics and Logic, University of Oxford (2022).

Natural deduction in quantum logic, Applied Logic, Philosophy, and History of Science Seminar (2021), invited.

Quantum posets and quantum powersets, AMS Spring Western Sectional Meeting (2021), invited.

Finite quantum structures, New York City Noncommutative Geometry Seminar (2020), invited.

Quantum predicate logic with equality, International Conference on Quantum Physics and Logic (2020).

Quantum CPOs, Programming Languages for Quantum Computing, Principles of Programming Languages, New Orleans (2020).

Analogs of functions in quantum information theory, Quantum Information at LSU and Tulane, Tulane University (2019).

Interpreting propositions in discrete quantum structures, Focused Research Group on Noncommutative Mathematics and Quantum Information, University of Bristol (2019), invited.

Quantum extensions of ordinary maps, Analysis Seminar, University of Waterloo (2019).

Quantum sets, Symposium on Compositional Structures, University of Birmingham (2018).

Quantum extensions of ordinary maps, Oxford Advanced Seminar on Informatic Structures, University of Oxford (2018).

The logic of Σ formulas, Boolean algebras, Lattices, Universal Algebra, Set Theory, and Topology, University of Denver (2018).

Reasoning about incomplete structures, AMS-ASL Special Session on Set Theory, Logic, and Ramsey Theory, Joint Mathematics Meetings, San Diego (2018).

Operator algebras when every set is Lebesgue measurable, Subfactor Seminar, Vanderbilt University (2014).

V*-algebras, East Coast Operator Algebras Symposium, Fields Institute (2014).

Dodging the quantum set problem, Great Plains Operator Theory Symposium, University of California, Berkeley (2013).

On the category of von Neumann algebras, West Coast Operator Algebras Seminar, University of Oregon (2012), invited.

Teaching

New Mexico State University

- 2024 Math 401/530: Mathematics of Quantum Information **Dalhousie University**
- 2023 CSCI 1300: Calculus in Computer Science

University of California, Davis

- 2019 MAT 16A: Short Calculus
- 2018 MAT 21A: Calculus
 - MAT 108: Introduction to Abstract Mathematics
 - MAT 199: Special Study for Advanced Undergraduates

MAT 17B: Calculus for Biology and Medicine

- 2017 MAT 21A: Calculus
 - MAT 215A: Topology
 - MAT 21C: Calculus
 - MAT 202: Functional Analysis
- 2016 MAT 147: Topology
 - MAT 16C: Short Calculus
 - MAT 108: Introduction to Abstract Mathematics
 - MAT 125A: Real Analysis
- 2015 MAT 125A: Real Analysis

University of California, Berkeley

2007 MAT 53: Multivariable Calculus