

# Andre Kornell

## Curriculum Vitae

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### Education

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

### Employment

- 2022–present **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*

### Publications

- 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, *Characterizations of homomorphisms among unital completely positive maps*, [arXiv:2403.07229](https://arxiv.org/abs/2403.07229) (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](https://arxiv.org/abs/2310.12256) (2023).
- G. Bezhanishvili and A. Kornell, *On the structure of modal and tense operators on a Boolean algebra*, [arXiv:2308.08664](https://arxiv.org/abs/2308.08664) (2023).
- J. Harding and A. Kornell, *Completely hereditarily atomic OMLs*, to appear in *Mathematica Slovaca*, [arXiv:2308.08508](https://arxiv.org/abs/2308.08508) (2023).
- A. Kornell, *A natural deduction system for orthomodular logic*, *The Review of Symbolic Logic*, 1–40 (2023).
- A. Kornell, *Axioms for the category of sets and relations*, [arXiv:2302.14153](https://arxiv.org/abs/2302.14153) (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).

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## Talks

*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  $\Sigma$  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.

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## Teaching

### **Dalhousie University**

2023 CS 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