Daniel Barter

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Employment

- **Lawrence Berkeley National Laboratory.** November 2020 - . Postdoctoral Fellow in the Applied Energy Materials Group. Working on short time scale simulations of metal ion batteries.
- **Mercury Technologies, Inc.** April 2020 - August 2020. Software Engineer. Added many features to the backend web server. Diagnosed and fixed a race condition which was causing hundreds of errors per minute to go unlogged.
- **University of California, Santa Barbara.** September 2019 - March 2020. Lecturer and Postdoctoral Fellow. Course coordinator for Calculus 4.
- **Australian National University.** February 2018 - August 2019. Postdoctoral fellow. Worked on constructing new exactly solvable quantum field theories using tools from algebraic topology and low dimensional category theory.
- **University of Sydney.** August 2017 - January 2018. Postdoctoral researcher in Physics. Learned quantum field theory by interacting with researchers in condensed matter physics and quantum information theory.
- **University of Michigan.** September 2012 - May 2016. Graduate student instructor for calculus 1, 2 and 3. Taught classes with 20-30 students, three times a week. Held office hours. Helped students use Mathematica. Graded homework/exams.
- **University of Sydney.** March 2011 - June 2012. Tutor for calculus 1 and 2. Supervised problem sessions and graded homework/exams.

Education

- PhD, Mathematics, University of Michigan. September 2012 - May 2017. Specialized in representation theory. Thesis: Some Remarks about the Interaction between Quantum Algebra and Representation Stability.
- B.Sc with First Class Honours and University Medal, Pure Mathematics, University of Sydney. March 2008 - December 2011.

Papers

- doi:10.26434/chemrxiv-2021-c2gp3. Template-free reaction networks enable predictive and automated analysis of complex electrochemical reaction cascades. Joint work with Evan Spotte-Smith, Sam Blau and others.
- arXiv:2110.03644. Computing associators of endomorphism fusion categories. Joint with Jacob Bridgeman and Ramona Wolf.
- arXiv:1907.06692. Computing data for Levin-Wen with defects. Joint with Jacob Bridgeman. **Published** in Quantum.
- arXiv:1901.08069. Computing Defects Associated to Bounded Domain Wall Structures: The $\mathbf{Vec}(\mathbb{Z}/p\mathbb{Z})$ case. Joint with Jacob Bridgeman. **Published** in Journal of Physics A.

- arXiv:1810.09469. Fusing Binary Interface Defects in Topological Phases: The $\mathbf{Vec}(\mathbb{Z}/p\mathbb{Z})$ case. Joint with Jacob Bridgeman and Corey Jones. **Published** in Journal of Mathematical Physics.
- arXiv:1806.01279. Domain walls in topological phases and the Brauer-Picard ring for $\mathbf{Vec}(\mathbb{Z}/p\mathbb{Z})$. Joint with Jacob Bridgeman and Corey Jones. **Published** in Communications in Mathematical Physics.
- arXiv:1706.03645. Deligne categories and representations of the infinite symmetric group. Joint with Inna Entova-Aizenbud and Thorsten Heidersdorf. **Published** in Advances in Mathematics.
- arXiv:1611.00071. Eigenvalues of rotations and braids in spherical fusion categories. Joint with Corey Jones and Henry Tucker. **Published** in Journal of Algebra.
- arXiv:1610.05204. Computing the minimal model for the quantum symmetric algebra.
- arXiv:1610.05248. A remark about 6j symbols and young semi-normal form.
- arXiv:1509.04228. Noetherianity and rooted trees.

Software

- RNMC. High performance statistical mechanics Monte Carlo simulator.
- HiPRGen. Program for generating reaction networks, using MPI for multi-node parallelism.

Invited Talks

- Perimeter Institute Mathematical Physics Seminar, 2019, Computing Renormalization Invariant Properties of Levin-Wen phases.
- University of Sydney quantum information seminar, 2019, What group of logical operations for the toric code is generated by Dehn twists and anyon loops?
- Sydney Quantum Information Theory Workshop, 2019, Computing Renormalization Invariant Properties of Levin-Wen Models.
- Subfactors in Sydney, 2019, Computing Bimodule Associators in the Brauer-Picard 3-Category.
- University of Newcastle CARMA-CEEHE Workshop on Diagramatic Reasoning, 2018, Diagrammatic methods for computing defect fusion in topological phases.
- University of Sydney quantum information seminar, 2018, Binary interface defect fusion in Levin-Wen models.
- University of Sydney algebra seminar, 2018, Fusion categories and (2+1)-dimensional topological quantum field theory.
- University of Sydney quantum information seminar, 2018, Fusion categories, 2D LRE topological phases and Brauer-Picard rings.
- Scott's Kioloa conference, 2017, One way Modular Tensor Categories arise in condensed matter physics.
- Berkeley combinatorics seminar, 2015, Combinatorial categories, configuration spaces and tensorial species.
- Michigan theoretical computer science seminar, 2014, Tensor rank and stability in representation theory.