Daniel Berwick-Evans

Education

Ph.D., Math	University of California Berkeley (Advisor: P. Teichner)	2013
M.Phil., Physics	University of Cambridge (Advisor: A. Lasenby)	2006
B.A., Physics & Math	Oberlin College	2005

Employment

University of Illinois, Urbana–Champaign	Assistant Professor	2018-present
University of Illinois, Urbana–Champaign	J.L. Doob Assistant Professor	2015–2018
Stanford University	Szegö Assistant Professor	2013-2015

Grants and awards

NSF research grant, "CAREER: Elliptic cohomology and quantum field theory," $550,000, 2024-2029.

NSF research grant, "Elliptic Cohomology, Geometry, and Physics," $240,670, 2022-2025.

University of Illinois Research Board grant, "Quantum symmetries and algebraic topology," $29,573, 2022-2025.

N. Tenney Peck Teaching Award in Mathematics, $1,000, 2022.

Simons Collaboration grant, "Elliptic cohomology and physics," $42,000, 2021-2022 (terminated in 2022 to accept NSF grant).

NSF conference grant, $33,081 "Equivariant elliptic cohomology and geometric representation theory," 2019-2023.

Outstanding Graduate Student Instructor (Berkeley Departmental Award), 2009.

Cambridge Overseas Trust Fellow, 2005.

Edward T. Wong Prize in Mathematics (Oberlin Departmental Award), 2005.

Robert Weinstock Award in Physics (Oberlin Departmental Award), 2004.

Papers accepted for publication

(1) Classifying spaces of infinity-sheaves, with Pedro Boavida de Brito and Dmitri Pavlov, to appear in Algebraic and Geometric Topology, 33 pages.
(2) Smooth one-dimensional topological field theories are vector bundles with connection, with Dmitri Pavlov, to appear in Algebraic and Geometric Topology, 23 pages.
(3) Chern characters and supersymmetric field theories, to appear in Geometry and Topology, 24 pages.
(4) Supersymmetric localization, modularity and the Witten genus, to appear in Journal of Differential Geometry, 20 pages.
(5) Power operations in the Stolz–Teichner program, with Tobias Barthel and Nathaniel Stapleton, Geometry and Topology 26(4), 75 pages (2022).
(6) Equivariant elliptic cohomology, gauged sigma models, and discrete torsion, Trans. Amer. Math. Soc. 375, 58 pages (2022).

(7) Supersymmetric field theories and the elliptic index theorem with complex coefficients, Geometry and Topology, Volume 25(5), 97 pages (2021).
(8) A de Rham model for complex analytic equivariant elliptic cohomology, with Arnav Tripathy, Advances in Mathematics, Volume 380, 62 pages (2021).
(9) Lie 2-algebras of vector fields, with Eugene Lerman, Pacific Journal of Math, 34 pages (2020).
(10) Representation theory and the elliptic frontier, with Emily Cliff, Nora Ganter, Arnav Tripathy and Josh Wen, Notices of the American Mathematical Society, Volume 66, 4 pages (2019).
(11) Perturbative $N = 2$ supersymmetric quantum mechanics and L-theory with complex coefficients, Letters in Mathematical Physics, Volume 106, 20 pages (2016).
(12) The Chern-Gauss-Bonnet Theorem via supersymmetric Euclidean field theories, Communications in Mathematical Physics, Volume 335, 36 pages (2015).
(13) Deflection of Pulsar Signal Reveals Compact Structures in the Galaxy, with Alex Hill, Dan Stinebring, Curtis Asplund, Wendy Everett, and Natalie Hinkel, Astrophysical Journal Letters, 619, L171 (2005).
(14) Pulsar Scintillation Arcs. I. Frequency Dependence, with Alex Hill, Dan Stinebring, Henry Barnor, and Aaron Webber, Astrophysical Journal, 599, 457 (2003).

Submitted papers

(1) Averaging Property of Wedge Product and Naturality in Discrete Exterior Calculus, with Anil Hirani and Mark Schubel, `https://arxiv.org/abs/2310.00725`, 10 pages (2023).
(2) Flat principal 2-group bundles and flat string structures, with Emily Cliff, Laura Murray, Apurva Nakade, and Emma Phillips, 41 pages (2023).
(3) String structures, 2-group bundles, and a categorification of the Freed–Quinn line bundle, with Emily Cliff, Laura Murray, Apurva Nakade, and Emma Phillips, `https://arxiv.org/abs/2110.07571`, 28 pages (2021).
(4) Discrete Vector Bundles with Connection and the Bianchi Identity, with Anil Hirani and Mark Schubel, `https://arxiv.org/abs/2104.10277`, 25 pages (2021).
(5) A model for complex analytic equivariant elliptic cohomology from quantum field theory, with Arnav Tripathy, `https://arxiv.org/abs/1805.04146`, 87 pages (2020).

Preprints

(1) How do field theories detect the torsion in topological modular forms?, `https://arxiv.org/abs/2303.09138`, 115 pages (2023).
(2) The families index for 1|1-dimensional Euclidean field theories, `https://arxiv.org/abs/2303.09207`, 73 pages (2023).
(3) The families Clifford index and differential KO-theory, `https://arxiv.org/abs/2303.09091`, 37 pages (2023).
(4) Topological q-expansion and the supersymmetric sigma model, `https://arxiv.org/abs/1510.06464`, 70 pages (2017).
(5) The equivariant Chern character as super holonomy on loop stacks, with Fei Han `https://arxiv.org/abs/1610.02362`, 11 pages (2016)

(6) Twisted equivariant differential K-theory from gauged supersymmetric mechanics, https://arxiv.org/abs/1510.07893, 10 pages (2015).
(7) Perturbative sigma models, elliptic cohomology and the Witten genus, http://arxiv.org/abs/1311.6836, 39 pages (2013).

Conferences Co-organized

Midwest Topology Seminar, Fall 2023

https://sites.google.com/view/mengguo/midwest2023FA

Topological Moonshine, Summer 2023 (NSF funded)

https://sites.google.com/view/mengguo/moonshine/

Elliptic cohomology and Physics, Summer 2020 (Perimeter Institute)

https://www2.perimeterinstitute.ca/conferences/elliptic-cohomology-and-physics

Geometric Representation Theory and Equivariant Elliptic Cohomology, Summer 2019 (Mathematics Research Community funded by AMS and NSF)

http://www.ams.org/programs/research-communities/2019MRC-Geometry

Elliptic cohomology days, Summer 2019 (NSF funded)

https://www.maths.usyd.edu.au/u/emilyc/MRC/EEC.html

QFTahoe, Spring 2013

http://categorified.net/QFTahoe-Schedule.pdf

Seminars Co-organized

Mathematical Physics Seminar, Fall 2017-present (UIUC)

Topology Seminar, Fall 2019-present (UIUC)

Twisted equivariant K-theory and topological modular forms, Fall 2023 (UIUC)

Free fermions and von Neumann algebras, Spring 2023 (UIUC)

Twisted equivariant K-theory and conformal field theory, Fall 2022 (UIUC)

Elliptic cohomology and Physics, Summer-Fall 2021 (online)

Supersymmetric quantum mechanics, Spring 2020 (UIUC)

The Wess–Zumino–Witten model, Summer 2017 (UIUC)

Twisted equivariant K-theory, Fall 2016 (UIUC)

Topology Seminar, Fall 2013-2015 (Stanford)

Elliptic cohomology and the Witten genus, Fall 2013 (Stanford)

Student topology seminar, Fall 2012 (Berkeley)

Witten in the '80s, Fall 2011 (Berkeley)

Conformal field theory seminar, Spring 2011 (Berkeley)

Costello's construction of the Witten genus, Fall 2010 (Max Planck)

Physics for topologists, Spring 2010 (Berkeley)

Professional Service

Manuscript reviewer for: Advances in Mathematics; Communications of the American Mathematical Society; Geometry and Topology; Compositio Mathematica; Communications in Mathematical Physics; Journal of Geometry and Physics; Homotopy, Homology, and its Applications; Algebraic and Geometric Topology; Memoirs of the American Mathematical Society; Mathematical Physics, Analysis, and Geometry.

NSF Panel Reviewer (2023), Deutsche Forschungsgemeinschaft Reviewer (2023).

Committee work (at UIUC): Executive Committee (2022-present), Elections Committee (2022), Teaching Awards (2020-2021), Graduate Teaching Awards (2019-2021), Graduate Admissions (2021), Hiring Committee (2020), Comprehensive Exams (Algebra, 2018-2022).

Advising and mentoring

- Postdocs mentored: Kiran Luecke, 2022-present; Meng Guo, 2021-present; Emily Cliff, 2018-2019, now tenure track at Université de Sherbrooke.
- Graduate students advised: Langwen Hui, 2021-present (co-advised with Charles Rezk); Saaber Pourmotabbed, 2021-present (co-advised with Sheldon Katz); Yigal Kamel, 2021-present; Connor Grady, 2020-present; Alexander Pacun, 2020-present; Dileep Menon, 2017-2019 (co-advised with Matt Ando), now at Booking.com; Mark Schubel, 2016-2018 (co-advised with Anil Hirani), Now at Apple.
- Graduate students mentored: Nicole Yamzon, 2020-present (advisor: Matt Ando), Joshua Wen, 2020, now a postdoc at Northeastern (advisor: Tom Nevins); Apurva Nakade, 2019-2021, now a postdoc at Northwestern (advisor: Nitu Kitchloo); Laura Murray, 2019-2021, now tenure track at Providence College (advisor: Stephan Stolz); Emma Philips, 2019-present (advisor: Maria Basterra).
- Undergraduate students mentored: Reese Ramos (2023-present); Yi Jin (2023-present); Charles Cooper (2023-present); Nathan Baker (2023-present); Ethan Huang (2023-present); Stevie Ridens (2023-present); Matthew Niemiro (2022-2023); Josh Utley (2021-2022), now masters student at FAU Erlangen-Nürnberg; Xingjian Di, now PhD student at NYU (2021); Yikai Teng, now PhD student at Rutgers (2021); Eric Liang (2021), now PhD student at Stony Brook; Jameson Dong, now PhD student at CalTech (2021).

Invited Talks

- Supersymmetric field theories and elliptic cohomology, Duke Topology Seminar, October 2023.
- What is the Atiyah–Singer index theorem?, Lunch seminar, CMSA (Harvard), October 2023.
- Supersymmetric field theories and elliptic cohomology, MIT Topology Seminar, October 2023.
- Field theories and formal group laws, 2nd Transatlantic Transchromatic Homotopy Theory Conference, Regensburg, Germany, August 2023.
- Supersymmetric field theories and elliptic cohomology, Higher Structures in Functorial Field Theory, Regensburg, Germany, August 2023.

- Supersymmetric field theories and elliptic cohomology, Homotopy: fruit of the fertile furrow, Cambridge, UK, June 2023
- The elliptic genus with background gauge symmetry, Mathematical Physics Seminar, Oxford, UK, June 2023
- How do field theories detect the torsion in topological modular forms?, Geometric/Topological Quantum Field Theories and Cobordisms, NYU Abu Dhabi, March 2023.
- Modular forms, physics, and topology, Department Colloquium, University of Kentucky, January 2023.
- Twists, string structures, and 2-groups, Loop space and higher category workshop, Huazhong University of Science and Technology, December 2022.
- How do field theories detect the torsion in topological modular forms?, Workshop on Topology and QFT, Notre Dame, June 2022.
- Supersymmetric field theories and topological modular forms, Spring School on Field Theories and Algebraic Topology, Utrecht, May 2022 (4 part lecture series).
- Modular forms, supersymmetric field theories, and algebraic topology, Topology Seminar, Max Planck Institute for Mathematics, May 2022.
- Modular forms, physics, and topology, Colloquium, Einstein Institute of Mathematics (Jerusalem), April 2022.
- How do field theories detect the torsion in topological modular forms?, BZR Seminar, UT Austin, February 2022.
- How do field theories detect the torsion in topological modular forms?, "Generalized Cohomology and Physics mini-workshop," International Center for Theoretic Physics (Trieste), November 2021.
- How do field theories detect the torsion in topological modular forms?, Oxford Topology Seminar, October 2021.
- How do field theories detect the torsion in topological modular forms?, CRM Intensive Research Program Higher Homotopical Structures, Barcelona, February 2021.
- How do field theories detect the torsion in topological modular forms?, Bonn Topology Seminar, January 2021.
- How do field theories detect the torsion in topological modular forms?, Bochum Topology Seminar, January 2021.
- Cohomology theories and formal group laws, Arbeitsgemeinschaft: Elliptic Cohomology according to Lurie, Oberwolfach, April 2019.
- Elliptic cohomology and quantum field theory, University of Kentucky, March 2019.
- Elliptic cohomology and quantum field theory, University of California Davis, March 2019.
- Spaces of field theories in algebraic topology, Army Research Office workshop on condensed matter, February 2019.
- A geometric model for complex analytic equivariant elliptic cohomology, University of Chicago, October 2018.
- A geometric model for equivariant elliptic cohomology, International Workshop on Algebraic Topology, Shenzhen, China, June 2018.
- Modular forms, physics, and topology, Chinese University of Hong Kong, June 2018.
- Modular forms, physics, and topology, Northwestern, May 2018.
- Modular forms, physics, and topology, UC Boulder, April 2018.

- Hamiltonian and Lagrangian perspectives on elliptic cohomology, Mini-workshop on QFT and TMF, Notre Dame, September 2017.
- Field theories and elliptic cohomology from the vantage of characters, MIT Topology Seminar, April 2017.
- Hamiltonian and Lagrangian perspectives on elliptic cohomology, Boston University Geometry Seminar, April 2017.
- Supersymmetric field theories and elliptic cohomology, Mathematical Physics Seminar, Perimeter Institute for Theoretic Physics, April 2017.
- Hamiltonian and Lagrangian perspectives on elliptic cohomology, Cohomology Theories, Categories, and Applications, University of Pittsburgh, March 2017.
- Field theories and elliptic cohomology from the vantage of characters, Midwest Topology Seminar, Notre Dame, February 2017.
- Field theories and elliptic cohomology, University of Bochum Topology Seminar, January 2017.
- Elliptic cohomology, loop group representations, and 2-dimensional field theories, University of Lisbon Topology Seminar, July 1016.
- Supersymmetric field theories and elliptic cohomology, University of Regensburg Topology Seminar, March 2016.
- Elliptic cohomology, loop group representations, and 2-dimensional field theories, Mathematical Physics Seminar, Perimeter Institute for Theoretic Physics, February 2016.
- Effective field theories and elliptic cohomology, Homotopical methods in quantum field theory, IBS Center for Geometry and Physics, Pohang Korea, January 2016.
- An effective field theory model for elliptic cohomology at the Tate curve, UC Berkeley Representation Theory Seminar, April 2015.
- An effective field theory model for elliptic cohomology at the Tate curve, University of Oregon Topology Seminar, March 2015.
- Sigma models, elliptic cohomology and the Witten genus, IBS Center for Geometry and Physics, Pohang Korea, January 2015
- Perturbative sigma models and elliptic cohomology with complex coefficients, AMS Sectional, UC San Francisco, October 2014.
- Perturbative sigma models and elliptic cohomology with complex coefficients, Modular Invariants in Topology and Analysis, University of Regensburg, September 2014.
- Gauged sigma models and equivariant elliptic cohomology, Johns Hopkins Topology Seminar, April 2014.
- Gauged sigma models and 2-equivariant elliptic cohomology, Stanford University Topology Seminar March 2014.
- Gauged sigma models and equivariant elliptic cohomology, UC Berkeley, February 2014.
- Sigma models, elliptic cohomology and the Witten genus, UT Austin Geometry Seminar, September 2013.
- Concordance spaces for sheaves, UC Riverside Topology Seminar, May 2013.
- Two dimensional Yang-Mills theory and string topology of classifying spaces, String topology workshop, University of Copenhagen, April 2013.
- Supersymmetric sigma models, elliptic cohomology and the Witten genus, Northwestern Topology Seminar, March 2013.

- Supersymmetric sigma models, elliptic cohomology and the Witten genus, Notre Dame Topology Seminar, March 2013.
- Supersymmetric sigma models, elliptic cohomology and the Witten genus, Boston University Topology Seminar, February 2013.
- Supersymmetric sigma models, elliptic cohomology and the Witten genus, Workshop on Topological Aspects of Quantum Field Theories, Singapore, January 2013.
- Supersymmetric field theories and manifold topology, Stanford University, Topology Seminar, October 2012.
- Spaces of field theories and the topology of manifolds, Notre Dame, FRG Conference on Topology and Field Theories, June 2012.
- Supersymmetric field theories and cohomology, Notre Dame, Topology Seminar, February 2012.
- Integration and topological field theories, UC Berkeley, Subfactor Seminar, November 2011.
- From topological to supersymmetric: sigma models and gauge fixing, UC Santa Barbara, Station Q Seminar, November 2011.
- Supersymmetric field theories and topology, UC Davis, String Theory Seminar, November 2011.
- Supersymmetric field theories, manifold invariants, and the Chern-Gauss-Bonnet Theorem, UC Santa Barbara, Station Q Seminar, September 2011.
- Supersymmetry and topology, UC Berkeley, Geometry, Representation Theory and Some Physics Seminar, September 2011.
- 0|2-Dimensional field theories and the Chern-Gauss-Bonnet formula, FRG Chern-Simons Workshop, Berkeley, January 2011.
- Topology and supersymmetric field theories, Hamburg, Algebra and Mathematical Physics Seminar, December 2010.
- Supersymmetric field theories, sigma models and topology, Muenster, Topology Oberseminar, December 2010.
- Very low dimensional supersymmetric field theories, Utrecht, Topology Seminar, November 2010.
- The Chern-Gauss-Bonnet Theorem via supersymmetric field theory, Goettingen, Higher Index Theory and Differential K-Theory Workshop, October 2010.
- Supersymmetric sigma models and topology, Notre Dame, Topology Seminar, March 2010.