# David Benjamin Antieau

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## Date of birth and citizenship

16 December 1982 • USA

## Academic positions

| | |
|---|---|
| 2020- | *Professor*, Northwestern University. |
| 2017-2020 | *Associate Professor*, University of Illinois at Chicago. |
| 2014-2017 | *Assistant Professor*, University of Illinois at Chicago. |
| 2013-2014 | *Acting Assistant Professor*, the University of Washington. |
| 2010-2013 | *RTG Assistant Adjunct Professor*, UCLA. |

## Areas of specialization

Brauer groups • (derived) algebraic geometry • $K$-theory

## Education

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|---|---|
| 2010 | PhD in Mathematics, University of Illinois at Chicago. |
| 2006 | MSc in Mathematics, University of Illinois at Chicago. |
| 2004 | AB in Philosophy, University of Chicago. |

## Dissertation

The spectral index of Brauer classes, advised by Henri Gillet.

## Awards

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|---|---|
| 2020-2021 | Simons Fellowship of \$114,722. |
| 2020 | Rising Star Researcher of the Year Award, UIC. |
| 2018 | $K$-Theory Prize of \$1,000 in recognition for contributions to the subject, given by the $K$-Theory |

Foundation. This prize is given out every 4 years to 2 young researchers in the field at a satellite conference of the ICM.

## Research support

2020-2023    PI of NSF Grant of $417,261 for the project *Cyclotomic spectra and $p$-divisible groups.*

2016-2020    PI of NSF CAREER Award DMS-1552766 of $454,942 for the project *CAREER: Higher Brauer Groups and Topological Azumaya Algebras.*

2016    UIC Visitors' Fund Award of $2,500 to support David Gepner's visit to UIC in April 2016.

2016    Co-PI of LAS Faculty Award of $49,000 for the project *The Mathematical Computing Laboratory: an undergraduate research center.*

2015    UIC Visitors' Fund Award of $5,000 to support speakers for the Midwest Topology Seminar at UIC in February, 2015.

2013-2016    PI of NSF Grant DMS-1307505 of $101,279 for the project *Topological methods for Azumaya algebras.*

2014-2016    SQuaRE at the American Institute of Mathematics on the geometry of Azumaya algebras in dimension 3, three week-long small group workshops with Asher Auel, Colin Ingalls, Daniel Krashen, and Max Lieblich.

2013    AMS-Simons Travel Grant of $4,000. Declined due to award of NSF grant.

2009    AMS Travel Grant Award of $500 to attend the 2010 Joint Meetings.

2009    Midwest Topology Network Grant of $1,000 to attend *Homotopy theory and applications* at University of Nebraska, Lincoln.

## Research memberships

MSRI, Berkeley, 22 January to 3 May 2019.

Hausdorff Institute of Mathematics, Bonn, 7-27 May 2017.

University of Copenhagen, 12-19 June 2016.

Hausdorf Institute of Mathematics, Bonn, 1-30 June 2015.

## Publications *&* talks

JOURNAL ARTICLES

B. Antieau and B. Williams, *The topological period-index conjecture*, to appear in Math. Res. Let.

B. Antieau and T. Nikolaus, *Cartier modules and cyclotomic spectra*, to appear in J. Amer. Math. Soc.

B. Antieau, *Periodic cyclic homology and derived de Rham cohomology*, Annals of K-theory **4** (2019), no. 3, 505–519.

B. Antieau, A. Mathew, and T. Nikolaus, *On the Blumberg–Mandell Künneth theorem for $TP$*, Selecta Mathematica **24** (2019), no. 5, 4555–4576.

B. Antieau and G. Vezzosi, *A remark on the Hochschild–Kostant–Rosenberg theorem in characteristic*

$p$, to appear in Annali della Scuola Normale di Pisa.

B. Antieau and J. Heller, *Some remarks on topological $K$-theory of dg categories*, Proc. Amer. Math. Soc. **146** (2018), 4211–4219.

B. Antieau, A. Auel, C. Ingalls, D. Krashen, and M. Lieblich, *Period-index bounds for arithmetic threefolds*, Inventiones mathematicae **216** (2019), no. 2, 301–335.

B. Antieau, D. Gepner, and J. Heller, *K-theoretic obstructions to bounded $t$-structures*, Invententiones mathematicae **216** (2019), no. 1, 241–300.

B. Antieau and L. Meier, *The Brauer group of the moduli space of elliptic curves*, to appear in Algebra & Number Theory.

B. Antieau and E. Elmanto, *A primer for unstable motivic homotopy theory*, Surveys on Recent Developments in Algebraic Geometry, Proc. Sympos. Pure Math. **95** (2017), 305–370.

B. Antieau and B. Williams, *Prime decomposition for the index of a Brauer class*, Annali della Scuola Normale di Pisa, Classe di Scienze (5) **XVII** (2017), 277–285.

B. Antieau and G. Stevenson, *Derived categories of representations of small categories over commutative noetherian rings*, Pacific Journal of Mathematics **283** (2016), no. 1, 21–42.

B. Antieau, *On the integral Tate conjecture for finite fields and representation theory*, Algebraic Geometry **3** (2016), no. 2, 138–149.

B. Antieau, T. Barthel, and D. Gepner, *On localization sequences in the algebraic K-theory of ring spectra*, Journal of the European Mathematical Society **20** (2018), no. 2, 459–487.

B. Antieau and K. Chan, *Maximal orders in unramified central simple algebras*, Journal of Algebra **452** (2015), 94–105.

B. Antieau, D. Krashen, and M. Ward, *Derived categories of torsors for abelian schemes*, Advances in Mathematics **306** (2017), 1–23.

B. Antieau and B. Williams, *The prime divisors of the period and index of a Brauer class*, Journal of Pure and Applied Algebra **219** (2015), no. 6, 2218–2224.

B. Antieau and B. Williams, *Topology and purity for torsors*, Documenta Mathematica **20** (2015), 333–355.

B. Antieau, *Twisted derived equivalences for affine schemes*, Brauer groups and obstruction problems (Palo Alto, 2013), Progress in mathematics, vol. 320, Birkhauser Basel, 2017, 7–12.

B. Antieau, *A reconstruction theorem for abelian categories of twisted sheaves*, J. reine angew. Math. **2016** (2016), no. 712, 175–-188.

B. Antieau, *A local-global principle for the telescope conjecture*, Advances in Mathematics **254** (2014), 280–299.

B. Antieau, *Étale twists in noncommutative algebraic geometry and the twisted Brauer space*, Journal of Noncommutative Geometry **11** (2017), no. 1, 161–192.

B. Antieau and D. Gepner, *Brauer groups and étale cohomology in derived algebraic geometry*, Geometry & Topology **18** (2014), no. 2, 1149–1244.

B. Antieau and B. Williams, *On the classification of oriented $3$-plane bundles over a $6$-complex*, Topology and its Applications **173** (2014), 91–93.

B. Antieau and B. Williams, *Unramified division algebras do not always contain Azumaya maximal orders*, Inventiones mathematicae **197** (2014), no. 1, 47–56.

B. Antieau and B. Williams, *The topological period-index problem over 6-complexes*, Journal of Topology **7** (2014), 617–640.

B. Antieau and B. Williams, *Serre-Godeaux varieties and the étale index*, Journal of K-theory **11** (2013), no. 2, 283–295.

B. Antieau, D. Gepner, and J. Gómez, *Actions of $K(\pi, n)$-spaces on $K$-theory and uniqueness of twisted $K$-theory*, Trans. Amer. Math. Soc. **366** (2014), no. 7, 3631–3648.

B. Antieau and B. Williams, *The period-index problem for twisted-topological K-theory*, Geometry & Topology **18** (2014), no. 2, 1115–1148.

B. Antieau, *On a theorem of Hazrat and Hoobler*, Proc. Amer. Math. Soc. **141** (2013) no. 8, 2609–2613.

B. Antieau, A. Ovchinnikov, and D. Trushin, *Galois theory of difference equations with periodic parameters*, Communications in Algebra **42** (2014), no. 9, 3902–3943.

B. Antieau, *Cohomological obstruction theory for Brauer classes and the period-index problem*, Journal of K-theory **8** (2011), no. 3, 419–435.

B. Antieau, *Čech approximation to the Brown-Gersten spectral sequence*, Homology, Homotopy and Applications **13** (2011), no. 1, 319–348.

PREPRINTS

B. Antieau, A. Mathew, M. Morrow, and T. Nikolaus, *On the Beilinson fiber square*, `arxiv:2003.12541`.

B. Antieau and R. Datta, *Valuation rings are derived splinters*, `arxiv:2002.01067`.

B. Antieau and E. Elmanto, *Descent for semiorthogonal decompositions*, `arxiv:1912.08970`.

B. Antieau, B. Bhatt, and A. Mathew, *Counterexamples to Hochschild–Kostant–Rosenberg in characteristic $p$*, `arxiv:1909.11437`.

B. Antieau and D. Bragg, *Derived invariants from topological Hochschild homology*, `arxiv:1906.12267`.

N. Addington, B. Antieau, S. Freie, and K. Honigs, *Rational points and derived equivalence*, `arxiv:1906.02261`.

B. Antieau, *On the uniqueness of $\infty$-categorical enhancements of triangulated categories*, `arxiv:1812.01526`.

LECTURE SERIES

*Derived algebraic geometry*, Introductory workshop: derived algebraic geometry and birational geometry and moduli spaces, MSRI, 31 January to 8 February 2019.

*Derived algebraic geometry*, Derived algebraic geometry and chromatic homotopy theory, Newton Institute, 24-28 September 2018.

*Topological K-theory*, Second Chicago summer school in geometry and topology, University of Chicago, 25-29 July 2016.

*Computations and applications*, Introduction to unstable motivic homotopy theory, Universität Münster, Germany, 10-12 June 2016.

*Introduction to derived algebraic geometry*, Derived algebraic geometry with a focus on derived symplectic techniques, University of Warwick, England, April 2015.

*On de Rham–Witt derived invariants*, Derived categories and geometry in positive characteristic, 30 June to 6 July 2019, Warsaw, Poland.

*Cartier modules and cyclotomic spectra*, CATS5, Lisbon, 26 September to 5 October 2018.

*Cartier modules and cyclotomic spectra*, Witt vectors, deformations, and absolute geometry, University of Vermont, 17 July 2018.

*Weibel's conjecture after Kerz*, Universität Münster, 26 June 2018.

*Cyclotomic spectra and Dieudonné modules II*, Equivariant homotopy theory and $K$-theory, Berlin, 22 June 2018.

*Dieudonné modules and cyclotomic spectra*, $\infty$-categories, $\infty$-operads, and their applications, CMO-BIRS, 10 May 2018.

*Cyclotomic spectra and crystals*, MPIM, 11 January 2018.

*Negative and homotopy K-theory of ring spectra and extensions of the theorem of the heart*, Recent trends in algebraic cycles, algebraic $K$-theory, and motives at the Mathematical Congress of the Americas, Montreal, 25 July 2017.

*Negative and homotopy K-theory of ring spectra and extensions of the theorem of the heart*, Triangulated Categories and Geometry - a conference in honour of Amnon Neeman, Universität Bielefeld, 16 May 2017.

*Negative and homotopy K-theory of ring spectra and extensions of the theorem of the heart*, Workshop: K-theory in algebraic geometry and number theory, Hausdorff Institute for Mathematics, 15 May 2017.

*Preface to the theory of higher Azumaya algebras*, Conference on invertible objects and duality in DAG and homotopy theory, Universität Regensburg, 4 April 2017.

*K-theory of t-categories*, London, 8 June 2016.

*The Brauer group of the moduli stack of elliptic curves*, King's College, London, 7 June 2016.

*Negative and homotopy K-theory of ring spectra and extensions of the theorem of the heart*, Universität Bonn, 10 May 2016.

*Prime decompositions in period-index problems via representation theory*, The use of linear algebraic groups in geometry and number theory, Banff International Research Station, September 2015.

*Dévissage, hearts, traces, and units in $K$-theory*, Workshop on homotopy theory, manifolds, and field theories, Max Planck Institute for Mathematics, June 2015.

*Derived categories of genus $1$ curves*, ICM satellite conference on K-theory and related topics, Beijing, August 2014.

*Algebraic topology and algebraic torsors*, UBC, March 2014.

*Derived categories of genus $1$ curves*, University of Zurich, March 2014.

*Derived categories of genus $1$ curves*, Universität Bielefeld, March 2014.

*Brauer groups and étale cohomology in derived algebraic geometry*, Virginia Conference on Algebraic Topology, June 2012.

*Topological $K$-theory of dg categories*, Symplectic geometry and homotopy theory, UCLA, 12-14 December 2018.

*The Beilinson $t$-structure and $TC$*, Mini-conference on topological cyclic homology, Northwestern University, 3-4 November 2018.

*Cartier modules and cyclotomic spectra*, Midwest Topology Seminar, University of Kentucky, 8-9 September 2018.

*The topological period-index problem*, Southern California Algebraic Geometry Seminar, USC, 14 April 2018.

*Discrete approximations*, Graduate Research Opportunities for Women, Northwestern University, 15 October 2017.

*The Brauer group of the moduli stack of elliptic curves*, Spring 2017 JHU-UMD Algebra and Number Theory Day, Johns Hopkins University, 15 April 2017.

*Vector bundles and motivic homotopy theory*, 2015 Algebraic Geometry Summer Research Institute Bootcamp, July 2015.

*Localization sequences in K-theory and a question of Rognes*, Higher structures and cohomology theories, University of Pittsburgh, March 2015.

*Derived categories of elliptic fibrations*, Homological Methods in Algebraic Geometry, University of Wisconsin-Madison, April 2014.

*Thick subcategories of compact $R$-module spectra*, Cascade Topology Seminar, 2-3 November 2013.

*Topology and purity for torsors*, Bellingham Algebraic Geometry Seminar, 20 October 2013.

*Derived categories of principal homogeneous spaces of abelian varieties*, Southern California Algebraic Geometry Seminar, April 2013.

*Azumaya maximal orders do not always exist*, Special session "The Brauer Group in Algebra and Geometry" at the AMS Joint Meetings, January 2013.

*Topological perspectives on the period-index problem*, 10th Brauer Group Conference, 6-10 August 2012.

*The étale index of division algebras*, Special session "Homotopy theory and K-theory" at the AMS Western Section Meeting, 10 October 2010.

*Galois theory for difference equations with difference parameters*, Special session "Differential Galois theory and group representations" at the AMS Joint Meetings, 15 January 2010.

*Division algebras, the period-index conjecture and topological methods* at University of Arizona, 2 March 2017.

*The topological period-index problem* at University of Oregon, 10 April 2018.

*The topological period-index conjecture* at Rice University, 13 February 2018.

*The Brauer group of the moduli stack of elliptic curves* at Northwestern University, 1 May 2017.

*The Brauer group of the moduli stack of elliptic curves* at University of Arizona, 1 March 2017.

*Negative and homotopy $K$-theory of ring spectra and extensions of the theorem of the heart* at MIT, 27 February 2017.

*The Brauer group of the moduli stack of elliptic curves* at Stony Brook, 7 February 2017.

*The Brauer group of the moduli stack of elliptic curves* at UIUC, 29 November 2016.

*The Brauer group of the moduli stack of elliptic curves* at Purdue University, 16 November 2016.

*The Brauer group of the moduli stack of elliptic curves* at the Courant Institute at New York University, 3 May 2016.

*The Brauer group of the moduli stack of elliptic curves* at Yale University, 3 March 2016.

*Topological obstructions for algebraic objects* at Northwestern University, 2 November 2015.

*Recent work on the integral Hodge conjecture* at University of Michigan, 7 October 2015.

*Derived categories of elliptic fibrations* at Northwestern University, 5 February 2015.

*Localization sequences in $K$-theory and a question of Rognes* at University of Chicago, 27 January 2015.

*Some problems on maximal orders in division algebras* at Columbia University, 5 September 2014.

*Division algebras and representations of complex Lie groups* at University of Illinois at Chicago, 20 February 2014.

*Division algebras and representations of complex Lie groups* at University of Illinois at Urbana-Champaign, 21 January 2014.

*Division algebras and representations of complex Lie groups* at Indiana University, 15 January 2013.

*Division algebras and representations of complex Lie groups* at University of Virginia, 13 January 2013.

*Division algebras and representations of complex Lie groups* at University of South Carolina, 10 January 2014.

*Division algebras and representations of complex Lie groups* at University of Maryland, 15 November 2013.

*Twisted $K$-theory and division algebras* at University of Maryland, 15 November 2013.

*Derived algebraic geometry and derived categories of genus $1$ curves* at University of Washington, 1 October 2013.

*Derived algebraic geometry and derived categories of genus $1$ curves* at University of Nebraska, Lincoln, 12 September 2013.

*Topology and purity for torsors* at Purdue University, 5 September 2013.

*Brauer spaces of commutative ring spectra* at University of California-Riverside, 13 November 2012.

*Maximal orders in unramified division algebras* at Wayne State University, 4 September 2012.

*Maximal orders in unramified division algebras* at UIC, 29 August 2012.

*The period-index problem for topological spaces* at University of Nebraska, Lincoln, 7 November 2011.

*The period-index problem for topological spaces* at University of Washington, 4 October 2011.

*The étale index of division algebras* at Claremont, 16 November 2010.

*Cohomological obstructions for Brauer classes* at USC, 13 September 2010.

*Cohomological obstructions for Brauer classes* at UCLA, 20 January 2010.

*Galois theory for difference equations with difference parameters* at the Kolchin Seminar at CUNY, 30 October 2009.

## Conference organization

Co-organizer of a 3-week program on motivic homotopy theory, to take place 11-31 July 2021 in Park City, Utah.

Co-organizer of "Chromatic homotopy theory and algebraic $K$-theory," to take place 23-28 May 2021 at BIRS–Oaxaca.

Co-organizer of "Vitamin $K_1$: Kerz–Strunk–Tamme," a workshop dedicated to the proof of Weibel's conjecture, 30 May to 1 June 2018, UIC.

Co-organizer of a summer school on "Trace methods in algebraic $K$-theory," 7-11 August 2017, Indiana University.

Co-organizer of a summer school on "Topological approaches to algebraic and arithmetic geometry," September 2016, University of Georgia.

Co-organizer of a summer school on algebraic topology, 25-29 July 2016, University of Chicago.

Co-organizer of a summer school on "Unstable motivic homotopy theory," 10-12 June 2016 in Münster, Germany.

Co-organizer of the Midwest Topology Seminar on 28 February 2015 at UIC.

Co-organizer of a special session entitled "Brauer groups and Galois cohomology" at the AMS Southeastern Spring Section Meeting of the AMS in Knoxville, TN in March 2014.

## Service to the profession

Mentor for the 2019 European Talbot Workshop on Algebraic K-Theory, Rheinböllen, Germany, July 2019.

Mentor for the Bootcamp for the 2015 Algebraic Geometry Summer Research Institute, University of Utah, July 2015.

Referee (36 papers), including for Publ. Math. IHES, Advances in Mathematics, Algebra & Number Theory, Annales scientifiques de l'ENS, Forum of Mathematics: Sigma, Journal of Algebraic Geometry, PNAS, JAMS, Journal of Topology, and Bulletin of the LMS.

Quick reporter (31 papers).

Reader (2 books), for Cambridge University Press.

Outside examiner for Elden Elmanto's PhD.

Reviewer for MathSciNet (10 reviews).

Panelist for NSF (one panel).

Outside reviewer for an NSA grant application.

Contributor to the open-source math software system SAGE (4 refereed patches).

## Advising

Xing Gu, PhD 2017, co-advised with Brooke Shipley. Currently a postdoc at Melbourne.

Tasos Moulinos, PhD 2018, co-advised with Brooke Shipley. Currently a postdoc in Toulouse.

Jānis Lazovskis, PhD 2019. Currently a postdoc in Aberdeen

Victor Jatoba, PhD expected 2020.

Harry Smith, PhD expected 2020.

Joel Stapleton, PhD expected 2020.

Micah Darrell, PhD expected 2022.