

David Ben-Zvi

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EDUCATION

Harvard University, Ph.D., Mathematics, 1999.

Princeton University, B.A. Summa Cum Laude, Mathematics, 1994.

POSITIONS AND APPOINTMENTS

University of Texas at Austin, Joe B. and Louise Cook Professor of Mathematics, 2013–present.

University of Texas at Austin, Professor, Department of Mathematics, 2014–present.

University of California at Berkeley, Visiting Professor, Spring 2014.

Mathematical Sciences Research Institute, Research Professor (Eisenbud and Simons Professorships), Fall 2014.

University of Texas at Austin, Associate Professor, Department of Mathematics, 2008–2014.

Simons Center for Geometry and Physics, Visitor, Spring 2012.

Institute for Advanced Study, Member, Spring 2008.

Northwestern University, Visiting Assistant Professor, Fall 2004.

University of Texas at Austin, Assistant Professor, Department of Mathematics, 2003–2008.

University of Chicago, L.E. Dickson Instructor, Department of Mathematics, 1999–2003.

Mathematical Sciences Research Institute, Postdoctoral Fellow, Spring 2002.

The Geometry Center, University of Minnesota, Apprentice and Visitor, 1991–1994.

HONORS, AWARDS AND GRANTS

Plenary lecture, Clay Research Conference, Oxford, September 2016.

Fellow of the American Mathematical Society, elected in inaugural class, 2012.

National Science Foundation (NSF) Focused Research Group grant, “In and around Theory X”. \$466,862.00. Co-PI, 2012–2015.

NSF Research and Training Group grant, Geometry and Topology Group Grant, 2012–2017.

President’s Associates Centennial Teaching Fellowship in Mathematics, University of Texas, 2011–13.

NSF DMS Five-Year Individual Grant, “Geometric Harmonic Analysis and Applications”, \$444,405.00. 2011–2016

AIM SQuaRE Grant, “Baum-Connes Conjecture and Geometric Representation Theory”, 2008–2014

Plenary Lecture, AMS Central Sectional Meeting, Baylor University, 2009.

London Math Society Invited Lecture Series, Oxford, 2007.

NSF CAREER Award, “Representation Theory on Curves”, \$400,000.00. 2005–2010

NSF DMS Individual Grant, “Algebraic Geometry of Difference Operators and Real Bundles”, \$113,819.00. 2004–2007

Summer Research Assignment, University of Texas, 2004

NSF Postdoctoral Research Fellowship, “New Geometries from Loop Groups and Conformal Algebras”, University of Chicago, 1999–2001

NSF Graduate Fellowship, Harvard University, 1994–1997

Princeton University Math Department Undergraduate Prizes, 1993 Brown Prize, 1994 Covington Prize and 1994 Miller Prize

Barry M. Goldwater Scholarship, 1993–4.

Awards for “Outside In”: (Geometry Center video production, credits as Animator and Script Writer) First Place in 1998 International Congress of Mathematicians VideoMath Contest. Shown at SIGGRAPH 94 Electronic Theater, won awards at NICOGRAPH, London Effects and Animation Festival, Prix Pixel Imagina, and Prix Ars Electronica, and was featured on the cover of Scientific American.

PUBLICATIONS

- [1] A Quantization on Riemann Surfaces with Projective Structure (with I. Biswas.) *Letters in Mathematical Physics*, **54** (2000) 73–82.
- [2] **Book**: Vertex Algebras and Algebraic Curves (with E. Frenkel). Mathematical Surveys and Monographs 88, American Mathematical Society 2001. (Reviewed by Y.-Z. Huang in Bull. AMS Vol. 39 No. 4 (2002) 585–591.) Featured Review MR1849359 (2003f:17036).
- [3] Spectral Curves, Opers and Integrable Systems (with E. Frenkel). *Pub. Math. IHÈS* **94** (2001) 87–159. Featured Review MR1896178 (2003j:14047).
- [4] Theta Functions and Szegő Kernels (with I. Biswas). math.AG/0211441. *Int. Math. Res. Notices* **24** (2003) 1305–1340.

- [5] Opers and Theta Functions (with I. Biswas). e-print math.AG/0204301. *Adv. Math.* **181** (2004) no.2, 368–395.
- [6] Cusps and \mathcal{D} -modules (with T. Nevins). e-print math.AG/0212094. *Jour. Amer. Math. Soc.* **17** no.1 (2004) 155–179.
- [7] Geometric Realization of the Segal–Sugawara Construction (with E. Frenkel). e-print math.AG/0301206. In: *Topology, Geometry and Quantum Field Theory*. Proc., 2002 Oxford Symposium in Honour of the 60th Birthday of Graeme Segal. *London Math Soc. Lecture Note Series* **308**, 2004.
- [8] Flows of Calogero–Moser Systems (with T. Nevins). e-print math.AG/0603072. *Inter. Math Res. Notices* **23** (2007).
- [9] From Solitons to Many–Body Systems (with T. Nevins). e-print math.AG/0310490. *Pure and Applied Math Quarterly*, Vol. 4 No.2 (2008), 319–361. (Bogomolov special issue, part I)
- [10] Moduli Spaces. In: *Princeton Companion to Mathematics*, T. Gowers, J. Barrow–Green and I. Leader (Eds). Princeton University Press, Princeton, NJ, 2008.
- [11] Supersymmetry of the Chiral de Rham Complex (with R. Heluani and M. Szczesny). e-print math.QA/0601532. *Compositio Math.* **144** no.2 (2008), 503–521.
- [12] Perverse Bundles and Calogero–Moser Spaces (with T. Nevins). e-print math.AG/0610097. *Compositio Math.* **144** no. 6 (2008), 1403–1428.
- [13] Loop Spaces and Langlands Parameters (with D. Nadler). e-print arXiv:0706.0322.
- [14] Integral Transforms and Drinfeld Centers in Derived Algebraic Geometry (with J. Francis and D. Nadler). e-print arXiv:0805.0157. *Jour. Amer. Math. Soc.* **23** (2010), 909–966.
- [15] \mathcal{W} -Symmetry of the Adelic Grassmannian (with T. Nevins). e-print arXiv:0807.4992. *Comm. Math. Phys.* **293**, Issue 1 (2010), 185–204.
- [16] \mathcal{D} -Bundles and Integrable Hierarchies (with T. Nevins). e-print math.AG/0603070. Subject of Workshop at U. of Michigan, 5/2007. *Jour. European Math Soc.* **13**, Issue 6, (2011) 1503–1565.
- [17] Loop Spaces and Connections (with D. Nadler). e-print arXiv:1002.3636. *J. of Topology* (2012) 5(2): 377–430.
- [18] Loop Spaces and Representations (with D. Nadler). e-print arXiv:1004.5120. *Duke Math J.* (2013) **162** (9), 1587–1619.
- [19] The character theory of a complex group (with D. Nadler). e-print arXiv:0904.1247. Submitted.
- [20] Elliptic Springer Theory (with D. Nadler). arXiv:1302.1753. *Compositio Math.* 151 (2015) 1568–1584.
- [21] Beilinson–Bernstein Localization over the Harish–Chandra Center (with D. Nadler). arXiv:1209.0188. Submitted.
- [22] Morita Equivalence for Convolution Categories: Appendix to [BFN] (with J. Francis and D. Nadler). arXiv:1209.0193
- [23] Nonlinear Traces (with D. Nadler). arXiv:1305.7175
- [24] Secondary Traces (with D. Nadler). arXiv:1305.7177
- [25] A Spectral Incarnation of Affine Character Sheaves (with D. Nadler and A. Preygel). arXiv:1312.7163. To appear, *Compositio Math.*
- [26] Integral Transforms for Coherent Sheaves (with D. Nadler and A. Preygel). arXiv:1312.7164. To appear, *J. European Math Soc.*

- [27] Integrating Quantum Groups over Surfaces (with A. Brochier and D. Jordan). arXiv:1501.04652.
- [28] Betti Spectral Gluing (with D. Nadler). arXiv:1602.07379.
- [29] Quantum Character Varieties and Braided Module Categories (with A. Brochier and D. Jordan). arXiv:1606.04769.
- [30] Betti Geometric Langlands (with D. Nadler). arXiv:1606.08523.

ADVISING AND MENTORING

Mentor to NSF Postdoctoral Fellow David Jordan, 2011–2013.

Mentor to Postdoc Sam Gunningham, 2013–.

Carl Mautner, Ph.D. 2010. Currently Assistant Professor of Math, UC Riverside.

Parker Lowrey, Ph.D. 2010. Currently at Activision.

Dustan Levenstein, Undergraduate Honors Thesis 2013. Dean’s Honored Graduate.

Pavel Safronov, Ph.D. 2014. Currently at Oxford.

Hendrik Orem, Ph.D. 2015. Currently at Utrecht.

Iordan Ganev, Ph.D. 2016. Currently at IST Vienna.

Lee Cohn, current doctoral student.

Vaibhav Murali, current doctoral student.

Richard Hughes, current doctoral student (jointly with Andy Neitzke).

Rustam Antia, current doctoral student.

Surya Raghavendran, Undergraduate Honors Thesis 2016. Williams Scholar.

GRADUATE COURSES

(UT Austin unless otherwise stated)

Topological Field Theory and Geometric Representation Theory. Fall 2016.

Algebraic Geometry. Spring 2016.

Literacy Seminar in Geometry. Spring 2009, Fall 2013.

Differential Topology Prelim Course. Spring 2013.

Representation Theory via SL_2 . Spring 2005, Spring 2012.

Algebra Prelim Course. Fall 2010.

Lie Groups. Fall 2009.

Geometric Langlands. Fall 2007.

Complex Geometry. Spring 2007.

Riemannian Geometry. Fall 2005.

Conformal Field Theory and Representation Theory. Spring 2003, U. of Chicago.

UNDERGRADUATE COURSES

(UT Austin unless otherwise stated)

Differential and Integral Calculus. 408C-D: Fall 2003-Spring 2004. 408K: Spring 2011, Fall 2012, Fall 2015. 408L: Fall 2006, Fall 2008, Fall 2011, Spring 2014.

Math 341: Linear Algebra. Spring 2006.

Honors Calculus. Math 161: Fall 2000. Math 162: Winter 2000, Winter 2001. U. of Chicago.

Math 54W – Linear Algebra and Differential Equations (TA), Berkeley 1998.

SERVICE TO MATHEMATICS COMMUNITY

Associate Editor, *Advances in Mathematics*, 2005-2012.

Referee for journals including *Inventiones Mathematicae*, *Journal of the AMS*, *Duke Mathematical Journal*, *Acta Math.*, *Compositio Math*, *Selecta Math*, *Journal of Algebraic Geometry*, *Transformation Groups*, *Journal of Physics A*, *Moscow Mathematical Journal*, *Commun. Math. Physics*.

Multiple National Science Foundation grant and review panels.

Reviewer for NSF, NSA and several international grant boards.

AMS Central Section Program Committee, Member 2012, Chair 2013.

WORKSHOPS ORGANIZED

Co-organizer, Simons Center Workshop on Geometric Representation Theory. January 2016.

Lead organizer, MSRI Semester Program on Geometric Representation Theory. Fall 2014.

Co-organizer, MSRI Introductory Workshop on Geometric Representation Theory. September 2014.

Co-organizer, TAGS (Texas Algebraic Geometry Symposium) 2007, 2010, 2013.

Co-organizer, Workshop on New Mathematical Methods in Quantum Gauge Theories. Aspen Center for Physics, Summer 2010.

Co-organizer, Special Session on Representation Theory and Topological Field Theory. AMS Regional Meeting at the University of Illinois Urbana-Champaign. March 2009

DEPARTMENTAL SERVICE

(Mathematics Department, UT Austin unless stated otherwise)

FII Committee in Algebra and Combinatorics (Chair), 2016–

Review Committee (Chair), 2015–6

Member of triads for Andrew Blumberg, Dan Freed, Francesco Maggi, Travis Schedler (chair), Ronny Hadani (chair), Mikhail Khovanov (chair).

Postdoc committee 2013–4

Strategic Planning Committee, 2012–
Chairs Committee, 2011–
Annual Review Committee, 2011, 2016
Hiring committee, 2008–2012, 2013–4
Organizer, Mathematics Department Colloquia. U. of Chicago, 1999-2003.

SELECTED LECTURES

Invited Lecture Series and Minicourses:

TBA. États de la Recherche: Derived Algebraic Geometry. Toulouse, June 2017.

Algebraic Geometry of Topological Field Theories. Advances in geometric representation theory. U. of Michigan, May 2016.

Geometry of Extended Field Theories. Workshop on Geometric Unification from Six-Dimensional Physics. BIRS, May 2015.

Topological field theory and Geometric Langlands. Workshop on Singular Supports and Geometric Langlands. CIRM Luminy, March 2015.

Representation Theory on the Torus. Workshop on Geometric Representation Theory, RIMS Kyoto, January 2015.

Representation theory from six dimensions. Workshop on Mathematical Aspects of Six-Dimensional Quantum Field Theory, UC Berkeley, December 2014.

\mathcal{D} -modules. Introductory Workshop, MSRI Program on Noncommutative Algebraic Geometry. January 2013.

Categorical Representation Theory. Leader, week-long workshop at U. of Oregon. August 2012.

Gauge Theory and Representation Theory I-V. Second International School on Geometry and Physics: Geometric Langlands and Gauge Theory, CRM (Barcelona), March 2010.

Topological Field Theory and Representation Theory I-IV. Workshop on Topological Field Theories. Northwestern University, May 2009.

Topological Field Theory and Geometric Langlands I-IV. Workshop on Geometric Langlands and Physics. KITP Santa Barbara, July 2008.

D-bundles and integrable hierarchies. Co-plenary speaker, Workshop on article “D-bundles and Integrable Hierarchies” with T. Nevins. U. of Michigan, May 2007.

The Geometric Langlands Program. The London Math Society 2007 Invited Lecture Series. Oxford University. April 2007.

The Geometric Langlands Program. Invited Lecture Series, Winter School, Mathematisches Institut Göttingen. January 2007.

Geometry of Derived Categories. Minicourse, Graduate Student Warmup Workshop for AMS Summer Institute in Algebraic Geometry. W. of Washington Seattle. July 2005.

Vertex, Chiral and Factorization Algebras I-III. Workshop on Vertex Algebras and their Applications. E.Schrödinger Institute, Vienna. June 2005.

The Geometric Langlands Program. Plenary lecture series, 2005 Talbot Workshop. New Hampshire, February 2005.

Vertex Algebras and Algebraic Curves I-X. U. of Pennsylvania. September 2002.

Opers I-III. Geometric Langlands Workshop, CRM Montreal. April 2002.

Introduction to Geometric Langlands I-III. Workshop on Stacks and Moduli Spaces, MSRI Berkeley. January 2002.

Vertex Algebras I-IV. Algebraic Geometry and Langlands Program Workshop, TIFR Mumbai. January 2002.

Colloquia:

Gauge Theory as Representation Theory. Plenary lecture, Clay Research Conference, Oxford, September 2016.

Geometric Harmonic Analysis. UC Berkeley, March 2015.

Geometric Harmonic Analysis. Northwestern, May 2014.

Geometric Harmonic Analysis. Faculty colloquium, U. of Texas Austin, April 2014.

Traces, Fixed Points, Characters, Loops. Penn. State, March 2013.

The Fundamental Lemma. UT Austin, January 2010.

Loop spaces and connections. Plenary lecture, AMS Central Sectional Meeting. Baylor University, October 2009.

Langlands Duality and Topological Field Theory. Yale University. January 2008.

Langlands Duality and Topological Field Theory. Brandeis-Harvard-MIT-Northeastern Joint Colloquium. November 2007.

From Loop Groups to Lie Groups. U. of Pennsylvania. September 2007.

Loop Spaces and Langlands Parameters. Columbia U. February 2007.

Hecke Algebras and Real Groups. UT Arlington. March 2006.

Real Groups and Langlands Duality. Northwestern U. November 2004.

Solitons and Noncommutative Geometry. University of California, Berkeley. October 2003.

Solitons and Noncommutative Geometry. Rice U. October 2003.

One-Dimensional Algebra. Cohen Prize Lecture, University of Chicago. May 2003.

One-Dimensional Algebra. Keynote Lecture, 29th Annual Graduate Mathematics Conference, Syracuse University. April 2003.

Solitons and Many-Body Systems. U. of Minnesota. January 2003.

Solitons and Many-Body Systems. U.C. Davis. January 2003.

Solitons and Many-Body Systems. U. of Massachusetts, Amherst. December 2002.

Differential Solitons and Algebraic Geometry. U. of Michigan. October 2002.

Geometric Langlands for Beginners. Special Departmental Colloquium, U. of Chicago. May 2001.

Moduli spaces and vertex algebras. SUNY Stony-Brook. April 2000.

Geometry of Integrable Systems. UC Riverside. March, 1999.

Invited Conference Talks:

- TBA. Gauge Theory and Categorification, IPAM, March 2017.
- TBA. Geometric Representation Theory and Beyond, Clay Research Workshop, Oxford, September 2016.
- Betti Langlands. Derived structures in geometry and representation theory. Oxford, September 2015.
- Hecke algebras and geometric Langlands in genus one. Geometric Representation Theory. Cargese, July 2014.
- Algebraic geometry of topological field theories. Reimagining the foundations of algebraic topology. MSRI. April 2014.
- Singular supports of coherent sheaves in representation theory. Southwest Local Algebra Meeting (SLAM), Texas A&M, March 2014.
- Loops, Characters and Elliptic Curves. Aspects of Topology (Graeme Segal 70th birthday conference). Oxford. December 2012.
- Characters and character sheaves. Symplectic Geometry and Representation Theory, Luminy. July 2012.
- Geometry of Harish-Chandra characters. Texas Algebraic Geometry Symposium, Texas A&M. April 2012.
- Geometry of Harish-Chandra characters. Stanford Topology Seminar. March 2012.
- Geometric Character Theory. Strings-Math 2011, University of Pennsylvania.
- Character Theory for Complex Groups. Workshop on Macdonald Polynomials and Geometry, Clay Math Institute. March 2010.
- Langlands duality for 3d gauge theories. Gauge Theory and Representation Theory. Institute for Advanced Study, November 2007.
- Langlands duality for character sheaves. Fourier-Mukai and Nahm transforms. CRM Montreal, August 2007.
- Langlands duality and topological field theory. Quantum Geometry. Aspen Center for Physics, July 2007.
- Loop Spaces and Langlands Parameters. Noncommutative Geometry. Northwestern U., May 2007.
- Geometric Langlands. Workshop on Moduli of Vector Bundles. Clay Foundation, October 2006.
- Langlands Duality and Real Groups. Michigan/Ohio State Algebraic Geometry Workshop. Ohio State U., April 2006.
- Langlands Duality and Real Groups. Texas Geometry and Topology Conference, U. of Texas Austin. October 2005.
- What's the deal with Geometric Langlands? AMS Algebraic Geometry Boot Camp, U. of Washington. July 2005.
- Hilbert Schemes, Perverse Bundles and D Bundles. Session on Noncommutative Geometry, AMS Sectional Meeting, U.C. Santa Barbara. March 2005.
- The Langlands Program. Loop Spaces and Elliptic Cohomology, in honor of Jack Morava. U. of Toronto, October 2004.
- Calogero-Moser Spaces, Perverse Bundles and D-Bundles. Infinite-Dimensional Aspects of Representation Theory and Applications, University of Virginia. May 2004.

Calogero-Moser, KP and D-Bundles. AMS Southeast Regional Meeting, Florida State University. March 2004.

Geometric Langlands and Hitchin Systems. Special Meeting on Geometric Langlands and String Theory. Institute for Advanced Study. March 2004.

Noncommutative Geometry and Soliton Equations. Noncommutative Algebraic Geometry, Mittag-Leffler Institute. January 2004.

Noncommutative Geometry and Soliton Equations. Geometric Methods in Algebra and Number Theory. U. of Miami, December 2003.

\mathcal{D} -bundles and Grassmannians. Representations of infinite-dimensional Lie algebras and applications, University of California, Santa Barbara. October 2003.

Geometry and the Sugawara Construction. Representations of Loop Groups Conference, UCLA. November 2001.

Affine Springer Fibers and Cartans of Loop Groups. AMS Regional Meeting at Providence College. October, 1999.

Formal Higgs Bundles and Integrable Systems. Vector Bundles on Algebraic Curves '99. Salamanca, June 1999.

Cartan Subgroups of Loop Groups. Lie Groups, Lie Algebras and their Representations, UCLA. December, 1998.

KdV and Algebraic Geometry. Generalized Kac-Moody Algebras, Oberwolfach. July, 1998.

Grassmannians, Connections and Integrable Systems. AMS Regional Meeting at UC Davis. April, 1998.

Everting the Sphere. Smith College Regional Geometry Institute. August 1993.

Regular Homotopy and Sphere Eversions. MSRI Conference on Visualization of Geometric Structures. October 1992.