

# Thomas Nevins

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## EDUCATION

**University of Chicago**, Ph.D., Mathematics, June, 2000.

**University of Notre Dame**, B.A. with highest honors, Mathematics and Philosophy, May, 1993.

## POSITIONS AND APPOINTMENTS

**University of Illinois at Urbana-Champaign**, Professor, Department of Mathematics, 2016–present.

**Simons Foundation Fellow** in Mathematics, 2017–2018.

**Mathematical Sciences Research Institute**, Research Member, Fall 2014.

**Mathematisches Forschungsinstitut Oberwolfach**, Simons Visiting Professor, May 2014.

**All Souls College, University of Oxford**, Visiting Fellow, Trinity Term 2013.

**Mathematical Sciences Research Institute**, Research Professor, Spring 2013.

**University of Illinois at Urbana-Champaign**, Associate Professor, Department of Mathematics, 2009–2016.

**University of Illinois at Urbana-Champaign**, Assistant Professor, Department of Mathematics, 2004–2009.

**University of Michigan**, Assistant Professor, Department of Mathematics, 2000–2004.

**Mathematical Sciences Research Institute**, Postdoctoral Fellow, Spring 2002.

## HONORS AND AWARDS

**Campus Award** for Excellence in Undergraduate Teaching, UIUC, 2017.

**Liberal Arts and Sciences Dean's Award** for Excellence in Undergraduate Teaching, 2017.

**Associate**, Center for Advanced Study, UIUC, Fall 2014.

**Distinguished Teaching Award for Tenured Faculty**, Department of Mathematics, University of Illinois at Urbana-Champaign, 2013.

**Helen Corley Petit Scholar**, College of Liberal Arts and Sciences, University of Illinois at Urbana-Champaign, 2009–2010.

**NAS-Cinvestav Lecturer**, Cinvestav, Mexico City, December, 2008.

**Beckman Fellow**, Center for Advanced Study, UIUC, 2007–2008.

**NSF Postdoctoral Research Fellow**, University of Michigan, 2001–2004.

**NDSEG Graduate Fellow** (Department of Defense), University of Chicago, 1993–1997.

## PUBLICATIONS AND PREPRINTS

- [1] “Degrees of convex dependence in recursively enumerable vector spaces,” *Ann. Pure Appl. Logic* **60** (1993), no. 1, 31–47.
- [2] “Representability for some moduli stacks of framed sheaves,” *Manuscr. Math.* **109** (2002), 85–91.
- [3] “Moduli spaces of framed sheaves on certain ruled surfaces over elliptic curves,” *Internat. J. Math.* **13** (2002), no. 10, 1117–1151.
- [4] “Cusps and  $\mathcal{D}$ -modules,” with D. Ben-Zvi, *J. Amer. Math. Soc.* **17** (2004), 155–179.
- [5] “Geometry of Calogero-Moser systems,” with J. Hurtubise, *Ann. Inst. Fourier* **55** (2005), no. 6, 2091–2116.
- [6] “Stringy Chern classes of singular varieties,” with T. de Fernex, E. Lupercio, and B. Uribe, *Advances in Math.* **208** (2007), no. 2, 597–621.
- [7] “A localization principle for orbifold theories,” with T. de Fernex, E. Lupercio, and B. Uribe, in “Recent Developments in Algebraic Topology,” A. Ádem et al., eds., *AMS Contemp. Math.* **407** (2006), 113–133.
- [8] “Sklyanin algebras and Hilbert schemes of points,” with J.T. Stafford, *Adv. in Math.* **210** (2007), no. 2, 405–478.
- [9] “From solitons to many-body systems,” with D. Ben-Zvi, *Pure Appl. Math. Q.* **4** (2008), no. 2 (F. Bogomolov special issue), 319–361.
- [10] “Flows of Calogero-Moser systems,” with D. Ben-Zvi, *Int. Math. Res. Not.* **2007** (2007), article ID rnm105, 38 pages, doi:10.1093/imrn/rnm105.
- [11] “Perverse bundles and Calogero-Moser spaces,” with D. Ben-Zvi, *Compositio Math.* **144** (2008), no. 6, 1403–1428.
- [12] “Descent of coherent sheaves and complexes to geometric invariant theory quotients,” *J. Algebra* **320** (2008), no. 6, 2481–2495.
- [13] “Mirabolic Langlands duality and the quantum Calogero-Moser system,” *Transformation Groups* **14** (2009), no. 4, 931–983.
- [14] “W-symmetry of the adèlic Grassmannian,” with D. Ben-Zvi, *Commun. Math. Phys.* **293** (2010), no. 1, 185–204.
- [15] “ $\mathcal{D}$ -bundles and integrable hierarchies,” with D. Ben-Zvi, *J. Eur. Math. Soc.* **13** (2011), no. 6, 1503–1565.
- [16] “Moduli spaces for point modules on naive blow-ups,” with S. Sierra, *Algebra & Number Theory* **7** (2013), no. 4, 795–834.
- [17] “Derived equivalence for quantum symplectic resolutions,” with K. McGerty, *Selecta Math. (N.S.)* **20** (2014), no. 2, 675–717.
- [18] “Naive blowups and canonical birationally commutative factors,” with S. Sierra, *Math. Z.* **280** (2015), no. 3, 1125–1161.
- [19] “Compatibility of  $t$ -structures for quantum symplectic resolutions,” with K. McGerty, *Duke Math. J.* **165** (2016), no. 13, 2529–2585.
- [20] “Quantizations, representations, and Morse theory,” *Notices Amer. Math. Soc.* **63** (2016), no. 9, 1013.
- [21] “Categorical cell decomposition of quantized symplectic algebraic varieties,” with G. Bellamy, C. Dodd, and K. McGerty, *Geometry & Topology*, accepted for publication.

- [22] “Morse decomposition for  $\mathcal{D}$ -module categories on stacks,” with K. McGerty, preprint, [arXiv:1402.7365](https://arxiv.org/abs/1402.7365).
- [23] “Kirwan surjectivity for quiver varieties,” with K. McGerty, preprint, [arXiv:1610.08121](https://arxiv.org/abs/1610.08121).
- [24] “Springer theory for symplectic Galois groups,” with K. McGerty, pre-arXiv preprint, <http://www.math.uiuc.edu/~nevins/papers/springer-2016-0922.pdf>.

## RESEARCH GRANTS

- NSF Research Grant** DMS-1502125, 2015–2018, \$250,001.
- NSF Conference Grant** DMS-1600220, 2016, \$35,000, “Advances in geometric representation theory” (co-PI with S. Kitchen).
- Campus Research Board Grant**, University of Illinois, 2015, \$24,223.
- Campus Research Board Grant**, University of Illinois, 2013, \$22,620.
- NSF Research Grant** DMS-1159468, 2012–2015, \$139,895. [Part of a Focused Research Group with Ben-Zvi, Freed, Frenkel, Hopkins, Moore, Nadler, Neitzke, and Teleman.]
- Campus Research Board Grant**, University of Illinois, 2012, \$18,500.
- NSA Research Grant** H98230-12-1-0216, 2012–2014, \$64,411.
- NSF Research Grant** DMS-0757987, 2008–2012, \$120,000.
- NSF Research Grant** DMS-0500221, 2005–2009, \$110,712.
- Campus Research Board Grant**, University of Illinois, 2005, \$24,226.

## INVITED LECTURES

### **2017:**

- Clay Math Institute, *Workshop on Modern Moduli Theory*, September.
- University of Oxford, *Modern Moduli Theory* Graduate School, September.
- University of Texas-Austin, *GADGET Seminar*, April.
- Columbia University, *Algebraic Geometry Seminar*, April.
- United States Military Academy (West Point), Colloquium, April.
- University of Illinois at Chicago, *Geometry, Topology, and Dynamics Seminar*, January.

### **2016:**

- Minneapolis, *AMS Central Sectional Meeting* (invited plenary address), October.
- Chapel Hill, *Workshop on Symplectic Varieties and Geometric Representation Theory*, October.
- Northwestern University, *Representation Theory, Integrable Systems and Quantum Field Theory*, April.
- Perimeter Institute, *Symplectic Duality and Gauge Theory*, April.

### **2015:**

- Oxford, *Derived Structures in Algebraic Geometry and Representation Theory*, September.
- Salt Lake City, *AMS Summer Research Institute in Algebraic Geometry*, July.
- Boston, *Geometry and Representation Theory of Symplectic Resolutions*, May.
- University of Illinois at Chicago, *Algebraic Geometry Seminar*, April.

**2014:**

Stony Brook, *Colloquium*, October.

Research Institute for Mathematical Sciences, Kyoto, *Geometric Representation Theory*, July.

University of Oxford, *Algebraic and Symplectic Geometry Seminar*, May.

Oberwolfach, *Interactions between Algebraic Geometry and Noncommutative Algebra*, May.

University of Toronto, *Geometric Representation Theory Seminar*, April.

University of Utah, *Representation Theory Seminar*, February.

**2013:**

University of Oxford, *Algebraic and Symplectic Geometry Seminar* and *Representation Theory Seminar*, series of three lectures, May.

University of Notre Dame, *SUMR Reunion Conference*, March.

MSRI, *Members Seminar*, February.

**2012:**

Northwestern University, *Colloquium*, December.

University of Wisconsin, *Algebraic Geometry Seminar*, November.

University of Michigan, *Algebraic Geometry Seminar*, November.

CIRM, Luminy, France, *Representation Theory and Symplectic Algebraic Geometry*, July.

Northwestern University, *Spring School on Algebraic Microlocal Analysis*, May.

AMS Special Session on *Geometric Representation Theory*, Lawrence, Kansas, April.

University of Texas-Austin, *GADGET Seminar*, February.

**2011:**

University of Manchester, *ARTIN (Algebras and Representation Theory in the North)* meeting, December.

Royal Society Kavli Centre and University of Oxford, *Workshop on Symplectic Resolutions, Quantum Cohomology, and Symplectic Reflection Algebras*, July.

Isle of Skye, *New Developments in Noncommutative Algebra and Its Applications*, June/July.

University of Notre Dame, *Mathematical Aspects of Quantization Conference*, June.

University of Pennsylvania, *Math/Physics Seminar*, April.

Northwestern University, *Geometry and Physics Seminar*, April.

Purdue University, *Algebraic Geometry Seminar*, February.

**2010:**

University of Illinois at Chicago, *Algebraic Geometry Seminar*, November.

Oberwolfach, *Interactions between Algebraic Geometry and Noncommutative Algebra*, May.

**2009:**

University of Maryland, *Algebra and Number Theory Seminar*, December.

Chicago, *Algebraic Geometry: a Conference in Honor of Anatoly Libgober's 60th Birthday*, October.

University of Notre Dame, *Colloquium*, October.

**2008:**

Cinvestav, Mexico City, *2008 NAS-Cinvestav Lectures*, December.

University of Manchester, *Geometry Seminar*, May.

University of Edinburgh, *Algebra Seminar*, May.

University of Oxford, *Algebraic and Symplectic Geometry Seminar*, May.

Imperial College, London, *London Topology and Geometry Seminar*, May.  
AMS Special Session on  $\mathcal{D}$ -Modules, Indiana University, April.

**2007:**

CRM Montréal, *Workshop on Nonlinear Integral Transforms*, August.  
University of Michigan, *Workshop on F-Singularities and  $\mathcal{D}$ -Modules*, August.  
Northwestern University, *Trends in Noncommutative Geometry*, May.  
Ohio State University, *Algebraic Geometry Seminar*, May.  
University of Michigan, *Workshop on “ $\mathcal{D}$ -Bundles and Integrable Hierarchies,”*, May.  
University of Wisconsin-Madison, *Algebraic Geometry Seminar*, April.  
University of Texas-Austin, *Geometry Seminar*, March.

**2006:**

AMS Special Session on *Birational Geometry*, University of Cincinnati, October.  
Boston University, *Geometry Seminar*, October.  
Ohio State University, *Algebraic Geometry Seminar*, May.

**2005:**

Western Algebraic Geometry Seminar, Salt Lake City, December.  
Cornell University, *Oliver Club (Colloquium) and Lie Groups Seminar*, November.  
Northwestern University, *Geometry/Physics Seminar*, November.  
Northern Illinois University, *Colloquium*, November.  
AMS Special Session on Noncommutative Algebra and Geometry, Santa Barbara, April.

**2004:**

Columbia University, *Algebraic Geometry Seminar*, April.  
Princeton University, *Geometry, Representation Theory, and Moduli Seminar*, March.  
University of Oregon, *Colloquium*, February.  
Michigan State University, *Colloquium*, January.  
University of Kansas, *Colloquium and Algebra Seminar*, January.  
University of Illinois at Urbana-Champaign, *Colloquium*, January.  
University of Notre Dame, *Colloquium and Algebra Seminar*, January.  
University of Utah, *Colloquium and Algebraic Geometry Seminar*, January.  
Ohio State University, *Algebraic Geometry Seminar*, January.

**2003:**

SUNY Buffalo, *Colloquium*, December.  
Kansas State University, *Colloquium*, December.  
University of Massachusetts–Amherst, *Colloquium*, December.  
Johns Hopkins University, *Algebraic and Complex Geometry Seminar*, December.  
Ohio State University/Univ. of Michigan Algebraic Geometry Workshop, November.  
Cornell University, *Oliver Club (Colloquium) and Lie Groups Seminar*, November.  
CRM, Montréal, *Mathematical Physics Seminar*, November.  
University of Illinois at Urbana-Champaign, *Algebraic Geometry Seminar*, September.  
Michigan State University, *Symplectic Geometry Seminar*, April.  
AMS Session on Algebraic Geometry and Integrable Systems, NYU, April.

**2002:**

Rice University, *Algebraic Geometry Seminar*, November.

University of Pennsylvania, *Algebra Seminar*, September.

MSRI, *Workshop on Non-Abelian Hodge Theory*, April.

UC Berkeley/Stanford University, *Joint “Compactifications” Seminar*, March.

**2000–2001:**

University of Wisconsin–Madison, *Topology/Geometry Seminar*, February 2001.

University of Illinois at Urbana–Champaign, *Differential Geometry Seminar*, October 2000.

University of Notre Dame, *PDE, Complex Analysis, and Differential Geometry Seminar*, May 2000.

University of Pennsylvania, *Math/Physics Seminar*, April 2000.

University of Michigan, *Algebraic Geometry Seminar*, January 2000.

## GRADUATE STUDENTS/POSTDOCS SUPERVISED

Artan Sheshmani (Ph.D. 2011, UIUC): thesis on higher rank Pandharipande-Thomas invariants (advised jointly with Sheldon Katz). Postdocs at UBC, Max Planck, Ohio State; currently tenured Associate Professor at Aarhus University (Denmark).

Mee Seong Im (Ph.D. 2014): thesis on semi-invariants for filtered representations of quivers. Currently at West Point.

Chunyi Li (Ph.D. 2014): thesis on (Poisson) deformations of Hilbert schemes of points on del Pezzo surfaces. Currently postdoc at Univ. of Edinburgh.

Current advisor for:

- Matej Penciak (fifth-year);
- Itziar Ochoa (fourth-year);
- Shiyu Shen (fourth-year);
- Joshua Wen (third-year).

Postdoctoral mentor for Jason Lo (2015–2016), Emily Cliff (2016–2019).

## TEACHING EXPERIENCE (SINCE 2000)

### University of Illinois at Urbana-Champaign

Classic Papers in Algebraic Geometry and Geometric Representation Theory (Math 595), Fall 2016.

An advanced graduate course working through papers on various topics, including Beilinson-Bernstein localization and Hecke algebras; Brill-Noether theory; the decomposition theorem; symplectic resolutions;  $\ell$ -adic cohomology; and more.

Introduction to Representation Theory (Math 506), Fall 2016. A second-year graduate level introduction to representations of finite groups, culminating in the Okounkov-Vershik approach to symmetric groups.

Modern Algebraic Geometry 2 (Math 595), Spring 2016. Second semester of schemes and their cohomology.

Algebra I (Math 500), Fall 2015. First-year grad course in algebra.

Modern Algebraic Geometry (Math 512), Fall 2015. A course in schemes and their cohomology for second-year graduate students.

Introduction to Algebraic Geometry (Math 511), Spring 2015. A first course on algebraic varieties for graduate students.

Introduction to Abstract Algebra (Math 417), Spring 2015. A first course in algebra for undergraduates.

Calculus III (Math 241), Fall 2013. Two large sections of a lecture course in multivariable calculus.

Calculus III (Math 241), Fall 2012. Two large sections of a lecture course in multivariable calculus.

Calculus III (Math 241), Fall 2011. Two large sections of a lecture course in multivariable calculus.

Non-Euclidean Geometry (Math 402), Fall 2010. A junior-senior-level course in Euclidean and non-Euclidean geometry.

Algebraic Geometry II (Math 595), Fall 2010. A second course on algebraic varieties and schemes for graduate students.

Algebraic Geometry I (Math 511), Spring 2010. A first course on the geometry of algebraic varieties for graduate students.

Non-Euclidean Geometry (Math 402), Spring 2010. A junior-senior-level course in Euclidean and non-Euclidean geometry.

Linear Algebra with Financial Applications (Math 410), Fall 2009. A course in linear algebra for Actuarial Science majors.

Linear Algebra with Financial Applications (Math 410), Spring 2009.

$\mathcal{D}$ -Modules and Beilinson-Bernstein Localization (Math 595), Spring 2009. A graduate course developing  $\mathcal{D}$ -modules, category  $\mathcal{O}$ , and the BB proof of the Kazhdan-Lusztig conjecture.

Linear Analysis on Manifolds (Math 524), Autumn 2008. A course in complex geometry and Hodge theory.

Calculus III (Math 241), Spring 2008. A large lecture course in multivariable calculus.

Calculus III (Math 241), Spring 2007. A large lecture course in multivariable calculus.

Honors Algebraic Geometry (Math 428), Autumn 2006. A first course in algebraic geometry for undergraduates, focusing on the geometry of algebraic curves. *Named to "Incomplete List."*

Honors Algebra I (Math 427), Spring 2006. An introductory, example-oriented course on groups, rings, and fields for Honors Mathematics undergraduates.

Algebraic Geometry II (Math 595), Autumn 2005. A course on cohomology of varieties with applications to the geometry of curves and surfaces for second-year graduate students.

Algebraic Geometry I (Math 511), Spring 2005. A course in schemes and their cohomology for second-year graduate students.

Fundamental Mathematics (Math 347), Autumn 2004. A first course in reading and writing proofs for undergraduates.

Abstract Algebra I (Math 500), Autumn 2004. A first-semester graduate course in groups, rings, and fields for mathematics graduate students.

### **University of Michigan**

Introduction to Linear Algebra (Math 513), Winter 2003. Taught a course in abstract linear algebra for graduate students in engineering and talented undergraduates.

Honors Calculus I (Math 185), Autumn 2001. Taught a rigorous one-variable calculus course for talented undergraduates.

Multivariable Calculus (Math 215), Winter 2001. Taught a multivariable calculus course (including managing a graduate student assistant).

Calculus I (Math 115), Autumn 2000. Taught a discussion- and group-work based calculus course (three sections).

## PROFESSIONAL SERVICE

Organizer, AMS Special Session “Quantum Field Theories and Geometric Representation Theory,” Minneapolis, October, 2016.

Organizer, “Advances in geometric representation theory,” Ann Arbor, May, 2016.

Organizer, Banff workshop “Geometric unification from six-dimensional physics,” May, 2015.

Local organizer, Workshop on “Wall-crossing in mathematics and physics,” Urbana, May, 2010.

Organizer, AMS Special Session on “Topological field theories, representation theory, and algebraic geometry,” AMS Sectional Meeting, Urbana-Champaign, March 2009.

Organizer, Algebraic Geometry Seminar, University of Illinois at Urbana-Champaign, many years 2004–2016.

Graduate student mentor, VIGRE Teaching Apprenticeship Program, University of Michigan, Winter 2003.

Organizer (with G. Bini, G. Farkas, and A. Gibney) of *Conference on Curves and Their Moduli* (AMS Special Session), Ann Arbor, March 2002.

Referee/reviewer for *Advances in Mathematics*, AMS *Mathematical Surveys and Monographs* series, Birkhäuser *Progress in Mathematics* series, *Compositio Math.*, *Duke Mathematical Journal*, *GAFA*, *Inventiones Math.*, *Journal of Algebra*, *Journal of Algebraic Geometry*, *Journal of the American Mathematical Society*, *Journal of Pure and Applied Algebra*, *Mathematical Research Letters*, *Math Reviews*, *Quarterly Journal of Mathematics*, *Representation Theory*, *Selecta Math.*, *Topology*, *Transformation Groups*.

Reviewer for National Security Agency, National Science Foundation.

## DEPARTMENTAL AND UNIVERSITY SERVICE

College of Liberal Arts and Sciences Honors Council, 2015–2017.

UIUC Honorary Degrees Committee, 2016–2018.

University of Illinois Faculty Senate, 2016–2018.

Mathematics Chair Review Committee, 2016.

Mathematics Department Executive Committee, 2013–2015.

Mathematics Graduate Affairs Committee, 2010–2011, 2011–2012 (chair), Fall 2012, 2016–2017 (chair).

Mathematics Grievance Committee, 2012–2013.

Mathematics Graduate Review Committee, 2012–2013.

UIUC Senate Educational Policy Committee, Spring 2012.

Mathematics Chair Search Committee, 2011.



Feasibility Study Steering Committee (for renovation of Altgeld and Illini Halls) (Chair), 2010–2011.

College of Liberal Arts and Sciences Awards Committee, 2008–2010.

Mathematics Department Space Committee (Chair), 2009–2010.

Algebraic Geometry Area Chair, 2006–2007, 2008–2011, 2013–2014, and 2015–2016.

Capricious Grading Committee, 2008–2010 and 2015–2017.

Academic Disciplinary Committee, 2008–2010 and 2015–2017.

Mathematics Honors Committee, 2006–2007.

Postdoc Hiring Committee, 2004–2006 (chair, 2005–2006).

Algebra Comprehensive Exam Committee, 2005–2006 and 2015–2017.

Graduate Teaching Awards Committee, 2005–2006, 2015–2016.

Mathematics Chair Search Committee, 2006.

Peer reviewer for Campus Research Board.