

Joel Kamnitzer

Education

University of California, Berkeley, Department of Mathematics
PhD, 2005, thesis: Mirković-Vilonen cycles and polytopes, advisor: Allen Knutson.

University of Waterloo, Departments of Pure Mathematics and Applied Mathematics
B Math, 2001.

Positions

University of Toronto, Assistant Professor, July 2008 - present.

Mathematical Sciences Research Institute, Member, Jan - May 2008.

UC Berkeley, Postdoctoral Fellow and Visiting Assistant Professor, Aug 2006 - May 2008.

Massachusetts Institute of Technology, Postdoctoral Fellow, Sept 2005 - Aug 2006.

Fields of interest

Representation theory, algebraic geometry, combinatorial representation theory, knot homology.

Publications

1. S. Cautis, J. Kamnitzer, and A. Licata, Coherent sheaves on quiver varieties and categorification; math.AG/1104.0352.
2. B. Fontaine, J. Kamnitzer, G. Kuperberg, Buildings, spiders, and geometric Satake; math.QA/1103.3519.
3. P. Baumann and J. Kamnitzer, Preprojective algebras and MV polytopes, math.RA/1009.2469.
4. J. Kamnitzer and C. Sadanand, Modules with 1-dimensional socle and components of Lusztig quiver varieties in type A, in *Combinatorial Aspects of Commutative Algebra and Algebraic Geometry*, proceedings of the 2009 Abel symposium, 2011; math.RT/1009.0272.
5. S. Cautis and J. Kamnitzer, Braid groups and geometric categorical Lie algebra actions; math.AG/1001.0619.
6. J. Kamnitzer, Lectures on geometric constructions of representations of GL_n , in *Geometric Representation Theory and Extended Affine Lie Algebras*, Fields Institute Communications, 2011; math.RT/0912.0569.
7. S. Cautis, J. Kamnitzer, and A. Licata, Categorical geometric skew Howe duality, *Invent. Math.*, **180**, no. 1 (2010), 111–159; math.AG/0902.1795.

8. S. Cautis, J. Kamnitzer, A. Licata, Coherent sheaves and categorical $\mathfrak{sl}(2)$ actions, *Duke Math. J.*, **154**, no. 1 (2010), 135–179; math.AG/0902.1796.
9. S. Cautis, J. Kamnitzer, A. Licata, Derived equivalences for cotangent bundles of Grassmannians via categorical $\mathfrak{sl}(2)$ actions; math.AG/0902.1797.
10. J. Kamnitzer, The Beilinson-Drinfeld Grassmannian and symplectic knot homology, in *Grassmannians, Moduli spaces and vector bundles*, Clay Mathematics Proceedings, 2011; arXiv:0811.1730.
11. S. Cautis and J. Kamnitzer, Knot homology via derived categories of coherent sheaves II, $\mathfrak{sl}(m)$ case, *Invent. Math.*, **174** no. 1 (2008), 165–232; math.AG/0710.3216.
12. J. Kamnitzer and P. Tingley, The crystal commutor and Drinfeld’s unitarized R-matrix, *J. of Alg. Comb.* **29** no. 3, 315–335; math.QA/0707.2248.
13. J. Kamnitzer, Hives and the fibres of the convolution morphism, *Selecta Math. N.S.* **13** no. 3 (2007) 483–496; math.AG/0705.1698.
14. S. Cautis and J. Kamnitzer, Knot homology via derived categories of coherent sheaves I, $\mathfrak{sl}(2)$ case, *Duke Math. J.* **142** no. 3 (2008), 511–588; math.AG/0701194.
15. J. Kamnitzer and P. Tingley, A definition of the crystal commutor using Kashiwara’s involution, *J. of Alg. Comb.* **29** no. 2 (2009), 261–268; math.QA/0610952.
16. P. Etingof, A. Henriques, J. Kamnitzer, and E. Rains, The cohomology ring of the real locus of the moduli space of stable curves of genus 0 with marked points, *Annals of Mathematics*, **171**, no. 2, (2010) 731–777; math.AT/0507514.
17. J. Kamnitzer, Crystal structure on Mirković-Vilonen polytopes, *Adv. in Math.* **215** no. 1, (2007) 66–93; math.QA/0505398.
18. J. Kamnitzer, Mirković-Vilonen cycles and polytopes, *Annals of Mathematics*, **171**, no. 1, (2010) 245–294; math.AG/0501365.
19. A. Henriques and J. Kamnitzer, The octahedron recurrence and $\mathfrak{gl}(n)$ crystals, *Adv. in Math.* **206**, no. 1 (2006), 211–249; math.CO/0408114.
20. A. Henriques and J. Kamnitzer, Crystals and coboundary categories, *Duke Math. J.* **132**, no. 2 (2006), 191–216; math.QA/0406478.
21. J. Kamnitzer and R. B. Mann, Super Liouville black holes. *Nucl. Phys. B* **609** (2001), no. 3, 429–441.
22. J. M. Borwein, J. D. Broadhurst, and J. Kamnitzer, Central binomial sums, multiple Clausen values, and zeta values. *Exper. Math.* **10** (2001), no. 1, 25–34; hep-th/0004153.
23. Armitage et al., Construction and initial beam tests of the Atlas tungsten forward calorimeter. *Nucl. Phys. B, Proc. Suppl.* **78** (1999) 171–175.

Teaching experience

University of Toronto, Winter 2011.

Taught MAT 1196HS, representation theory of compact groups.

Taught MAT 247, second course in linear algebra (advanced).

University of Toronto, Fall 2009.

Taught MAT 1155HS / 448HF, introduction to commutative algebra and algebraic geometry.

University of Toronto, Winter 2009.

Taught MAT 1344HS, graduate symplectic geometry.

UC Berkeley, Spring 2007.

Was the sole instructor for Math 172, undergraduate combinatorics.

UC Berkeley, Fall 2002, Spring 2005.

Taught a section of Math 53, multivariable calculus, and a section of Math 1B, calculus.

Awards and Grants

André Aisenstadt Prize, Centre de recherches mathématiques, 2012.

Province of Ontario Early Researcher Award, 2010–2015.

NSERC Discovery Grant, 2008–2013.

UC Berkeley Distinguished Teaching Award, 2007.

Herb Alexander Prize, 2005 (for best thesis in UC Berkeley math department).

American Institute of Mathematics Five Year Fellowship, 2005–2010.

NSERC Postgraduate Scholarship B, 2003–2005.

Julie Payette-NSERC Research Scholarship, 2001–2003.

University of Waterloo Alumni Gold Medal, 2001.

NSERC Undergraduate Summer Research Award, 1999 and 2000.

Putnam Competition Honourable Mention, 1999.

University of Waterloo KD Fryer Entrance Scholarship, 1997–2001.

International Physics Olympiad Silver Medal, 1997.

Conference talks

Program on Langlands Duality in Representation Theory and Gauge Theory, Jerusalem, Dec 2010.

Workshop on Hitchin fibration and the fundamental Lemma, Duntroon, Aug 2010.

Affine Schubert calculus, Toronto, July 2010.

Categorification and low-dimensional topology, Stony Brook, June 2010.

Whittaker functions, crystals, and quantum groups, Banff, May 2010.

Connections in geometry and physics, Waterloo, May 2010.

CMS meeting, Lie algebras and representation theory session, Windsor, December 2009.

Conference on geometric representation theory and extended affine Lie algebras, Ottawa, July 2009.

Summer school on geometric representation theory and extended affine Lie algebras, Ottawa, June 2009 (5 lectures).

Abel symposium on combinatorial aspects of algebraic geometry and commutative algebra, Voss, June 2009.

Categorification and geometrization in representation theory, Glasgow, April 2009 (2 lectures).

AMS meeting, Algebra, geometry and combinatorics session, Urbana-Champaign, March 2009.

CMS meeting, Infinite-dimensional Lie algebra session, Ottawa, December 2008.

Conference in honour of Peter Orlik, Toronto, August 2008.

Topics in Combinatorial representation theory, Berkeley, March 2008.

Conference on Algebraic-Geometric Derived Categories and Applications, Princeton, March 2008.

Workshop on homological mirror symmetry and related topics, Miami, January 2008.

SACNAS conference, Low dimensional topology and quantum geometry symposium, Kansas City, October 2007.

Algebraic Analysis and Around, Kyoto, June 2007 (poster session).

Link homology and categorification, Kyoto, May 2007 (3 lectures).

Lie algebra workshop, Ottawa, April 2007.

Buildings and combinatorial representation theory workshop, Palo Alto, March 2007.

Winter School on Knot Theory and Representations, Plenary Speaker, Austin, Jan 2007.

CMS meeting, Knot homologies session, Toronto, Dec 2006.

AMS meeting, Combinatorial Representation Theory session, Fayetteville, Nov 2006.

EMS Summer School, Arithmetic and Geometry Around Quantization, Istanbul, June 2006 (2 lectures).

AMS meeting, Arrangements and Configuration Spaces session, Durham, April 2006.

Flavours of Groups conference, Banff, Nov 2005.

AMS meeting, Algebraic Combinatorics and Geometry session, Eugene, Nov 2005.

AMS meeting, Noncommutative algebra session, Eugene, Nov 2005.

Schubert Varieties and Schubert Calculus workshop, Fields Institute, Toronto, June 2005.

CMS meeting, Geometry and Combinatorics session, Waterloo, June 2005.

AMS meeting, Algebraic Geometry and Combinatorics session, Santa Barbara, April 2005.

Western Algebraic Geometry Seminar, Seattle, April 2005.

Geometric Langlands workshop, New Hampshire, March 2005.

AMS meeting, Modern Schubert Calculus session, Evanston, October 2004.

Representations of Algebraic Groups, Quantum Groups and Lie Algebras conference, Utah,

June 2004.

Formal Power Series and Algebraic Combinatorics conference, Vancouver, June 2004.

Seminar and Colloquium talks

Yale University, colloquium, Mar 2011.

Centre de recherches mathématiques, André Aisenstadt Prize lecture, Feb 2011.

University of Western Ontario, Geometry/Topology seminar, Feb 2010.

MIT, Colloquium, Nov 2009.

MIT, Geometry seminar, Nov 2009.

Columbia University, NY joint symplectic geometry seminar, Nov 2009.

Georg-August-Universität Göttingen, Courant lecture series, May 2009 (3 lectures).

Université de Strasbourg, Séminaire Quantique, May 2009.

UC Berkeley, Representation theory, geometry, and combinatorics seminar, Feb 2009.

University of Toronto, Geometric representation seminar, Jan 2009.

York University, Applied algebra seminar, Nov 2008.

University of Western Ontario, Colloquium, Oct 2008.

University of North Carolina, Colloquium, Oct 2008.

Brown University, Colloquium, Oct 2008.

University of Toronto, Symplectic geometry seminar, Sept 2008.

University of Michigan, Algebraic geometry seminar, Sept 2008.

Queens University, Algebraic geometry seminar, Sept 2008.

Mathematical Sciences Research Institute, Reductive groups seminar, Apr 2008.

Stanford University, Algebraic geometry seminar, Apr 2008.

UC Berkeley, Topology seminar, Apr 2008.

UC Berkeley, Colloquium, Mar 2008.

Institute for Advanced Study, Categories and knot theory seminar, Mar 2008.

California Institute of Technology, Algebraic geometry seminar, Feb 2008.

University of Oregon, Colloquium, Oct 2007.

Rice University, Colloquium, Oct 2007.

UC Davis, Colloquium, Oct 2007.

San Francisco State University, Algebra, geometry and combinatorics seminar, March 2007.

Columbia University, Gauge theory and symplectic geometry seminar, Feb 2007.

University of British Columbia, Representation theory seminar, Jan 2007.

University of British Columbia, Colloquium, Jan 2007.

University of Toronto, Colloquium, Dec 2006.
University of Waterloo, Colloquium, Dec 2006.
UC Riverside, Lie theory seminar, Oct 2006.
UC Berkeley, Representation theory, geometry, and combinatorics seminar, Oct 2006.
Universität zu Köln, Algebra seminar, June 2006.
Boston University, Geometry seminar, March 2006.
UC Berkeley, Combinatorics seminar, Feb 2006.
UC Berkeley, Representation theory, geometry, and combinatorics seminar, Feb 2006.
Stanford University, Algebraic geometry seminar, Feb 2006.
Stanford University, Representation theory seminar, Feb 2006.
UT Austin, GRASP seminar, Jan 2006.
UT Austin, Geometry seminar, Jan 2006.
Massachusetts Institute of Technology, Lie groups seminar, Sept 2005.
École Polytechnique Fédérale de Lausanne, Group theory seminar, June 2005.
UC Davis, Geometry/Topology seminar, April 2005.
Stanford University, Algebraic geometry seminar, Feb 2005.
Northwestern University, Algebra seminar, November 2004.
Massachusetts Institute of Technology, Lie groups seminar, October 2004.
University of Toronto, Symplectic geometry seminar, October 2004.
York University, Applied algebra seminar, September 2004.
UC Berkeley, Representation theory, geometry, and combinatorics seminar, Sept 2004.
UC Davis, Representation theory and discrete math seminar, May 2004.
University of Oregon, Colloquium, May 2004.
UC Berkeley, Lie algebras, combinatorics, and geometry seminar, April 2004.

Referee service

Referee for: *Inventiones Mathematicae*, *Journal of the AMS*, *Duke Mathematical Journal*, *Representation theory*, *Journal of Algebra*, *Compositio Mathematica*, *Advances in Mathematics*, *Selecta Mathematica*, Cambridge University Press, *Homology, Homotopy, and its Applications*, *Transactions of the AMS*, *International Mathematics Research Notices*, *Discrete Applied Mathematics*, *Journal of Combinatorial Theory*, *Journal of Algebra*, *Fundamenta Mathematicae*, *Transformation Groups*, *Mathematische Annalen*, *Journal of the Korean Mathematical Society*, *Quantum Topology*, *Mathematische Zeitschrift*, *Canadian Journal of Mathematics*

Reviewer for *Mathematics Reviews*.

Reviewer of workshop proposals for Banff International Research Station (BIRS).

Reviewer of grant proposal for National Security Agency (NSA).

Organization of conferences and seminars

Organizer of Representation theory and symplectic algebraic geometry workshop, CIRM, France, July 2012.

Organizer of Southern Ontario Groups and Geometry workshop, Fields Institute, Toronto, April 2011.

Organizer of Duntroon workshop on Hitchin fibration and the fundamental Lemma, Duntroon, Aug 2010.

Organizer of Southern Ontario Groups and Geometry workshop, Fields Institute, Toronto, Oct 2009.

Organizer of University of Toronto, geometric representation theory seminar, 2008-2011.

Organizer of UC Berkeley, representation theory, geometry and combinatorics seminar, spring 2007.

Organizer of UC Berkeley, graduate student seminar, 2002.

Personal

Canadian Citizen.

Comfortable in written and oral French. Basic level in oral Hebrew.

Born October 30, 1978 in Toronto, Canada.