

# David Jordan

## Current position

Chancellor's Fellow and Lecturer, University of Edinburgh, Sep 2013-present.

## Previous employment

NSF Postdoctoral Fellow (MSPRF) and Bing Instructor, University of Texas, Jul 2011-Aug 2013.

## Education

- Ph.D. Mathematics, Massachusetts Institute of Technology, June 2011.
- B.S. Mathematics (minor: physics), University of Oregon, June 2006. *Summa Cum Laude*, Phi Beta Kappa.

## Research Fields

Representation theory, quantum algebra, tensor categories.

My research centers on quantization problems in geometric representation theory. In particular, I am interested in fusion categories, deformation quantization, quantum groups, Hecke algebras,  $D$ -modules, and quantum Hamiltonian reduction. Currently, I am working to develop  $q$ -deformations of many constructions in Springer theory, with connections to quantum field theory, low-dimensional topology, moduli spaces of local systems, and multiplicative difference operators.

## Research

### *Publications in Refereed Journals*

- D. Jordan, *Quantized multiplicative quiver varieties*, Adv. Math, Volume 250, 15 January 2014, Pages 420-466. [arXiv:1010.4076](#).
- D. Jordan, *Quantum  $D$ -modules, elliptic braid groups, and double affine Hecke algebras*, Int. Math. Res. Notices, Vol 2009, 24 pages. [arxiv:0805.2766](#).
- D. Jordan and X. Ma, *Quantum symmetric pairs and representations of the double affine Hecke algebras of type  $C^\vee C_n$* , Selecta Math. (N.S.) 17 (2011), no. 1, 139181. [arxiv:0908.3013](#).
- P. Grossman, D. Jordan, and N. Snyder, *Cyclic extensions of fusion categories via the Brauer-Picard groupoid*, Quantum Topology, to appear 2013. [arxiv:1211.6414](#).
- D. Jordan and E. Larson, *On the classification of certain fusion categories*, J. Noncommut. Geom. 3 (2009), no. 3, 481499. [arxiv:0812.1603](#).
- A. Bapat and D. Jordan, *Lower central series in symmetric tensor categories*, J. Algebra 373 (2013), 299311. [arxiv:1001.1375](#).
- N. Arbesfeld and D. Jordan, *New results on the lower central series quotients of a free associative algebra*, J. Algebra, Volume 323, Issue 6, 15 March 2010, Pages 1813-1825. [arxiv:0902.4899](#).
- B. Bond and D. Jordan, *The lower central series of the symplectic quotient of a free associative algebra*, J. Pure Appl. Algebra 217 (2013), no. 4, 689699. [arxiv:1111.2316](#).
- S. Bhupatiraju, P. Etingof, D. Jordan, W. Kuzmaul and J.Li, *Lower central series of a free associative algebra over the integers and finite fields*, J. Algebra 372 (2012), 251274. [arXiv:1203.1893](#).

*Papers Under Review*

- D. Jordan and H. Orem, *An algebro-geometric construction of lower central series of associative algebras*. [arXiv:1302.3992](https://arxiv.org/abs/1302.3992).
- Y. Chen, P. Etingof, D. Jordan and M. Zhang, *Poisson traces in positive characteristic*, [arxiv:1112.6385](https://arxiv.org/abs/1112.6385).

**Academic Experience***The University of Texas at Austin, Department of Mathematics*

- **Instructor:** Introduction to Quantum Groups and Geometric Representation Theory M 392C (graduate topics course), Spring 2013.
- **Instructor:** Advanced Calculus with Applications M427L, Fall 2012.
- **Instructor:** Introduction to Linear Algebra w/ proofs M341, Fall 2012.

*Massachusetts Institute of Technology, Department of Mathematics*

- **Instructor:** Multivariable Calculus. Interphase summer program for incoming freshmen, Office of Minority Education, Summer 2009, Summer 2010.
- **Teaching Assistant:**
  - 18.03, Differential Equations, Spring 2010
  - 18.02, Multivariable Calculus, Fall 2009
  - 18.821, Project Lab in Mathematics, Fall 2008.
- **Research Mentor:**
  - Undergraduate Research Opportunities Program, Fall 2009-Present
  - Summer Program for Undergraduate Research, Summer 2009
  - Research Science Institute, Summer 2007 & 2008.

*Other Institutes*

- Instructor (of 6-10 yr. olds), Harvard Math Circle, Spring 2010, Fall 2010.
- Visiting Research Fellow, University of Strasbourg IRMA, June 2008.
- Research Assistant, NSF REU at University of Wisconsin, Summer 2004.
- Research Assistant, NSF REU at Pennsylvania State Univeristy, Summer 2003.

**Honors & Awards***Awards*

- Charles and Holly Housman Award for Excellence in undergraduate teaching, MIT Dept. of Math, 2010.
- Hartley Rogers Prize for mentoring undergraduate research, MIT Dept. of Math 2009.
- NSF Graduate Research Fellowship Honorable Mention, 2008.
- E.E. and E.J. Decou Prize, University of Oregon, Dept. of Mathemaics, 2005, 2006.
- Curtis Prize, University of Oregon, Dept. of Mathematics, 2003.

*Fellowships*

- NSF Mathematical Sciences Postdoctoral Research Fellow, Jun 2011-Present.

- Broad Foundation Fellow, Fall 2006.
- NSF Research Experiences for Undergraduates, University of Wisconsin, Summer 2004.
- Mathematics Advanced Studies Semester Merit Fellowship.
- NSF Research Experiences for Undergraduates, University of Pennsylvania, Summer 2003.

## Invited Lectures

### *Conferences*

- Algebra and Representation Theory in the North, November 2013.
- Subfactors in Maui, Maui HI, July 2011, 2012, and 2013.
- Lie groups, Lie algebras, their representations, and related topics, University of Southern California, May 2012.
- Young Researchers Workshop on Higher Algebraic and Geometric Structures: Modern Methods in Representation Theory, Fields Institute, Toronto, May 2012.
- Representation Theory & Geometry, ETH Zurich, April 2012.
- Twenty-five years of representation theory of quantum groups, August 2011.

### *Department Seminars*

- “Quantum differential operators, and the torus  $T^2$ ”, University of Glasgow, October 2013, University of York, October 2013, IFP Lausanne November 2013.
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- “Surface braid groups, quantum groups, and quantum D-modules,” Northwestern University algebra seminar, April 2013
- “Quantized multiplicative quiver varieties,” UC Berkeley GRASP seminar, March 2012.
- “Classifying spaces for fusion categories,” Texas A& M, September 2011.
- “Quantum D-modules, character varieties and double affine Hecke algebras,” University of Illinois, Urbana-Champaign, October 2010.
- “Fusion categories of dimension  $pq^2$ ,” Lie Groups and Quantum Mathematics Seminar. Rutgers University, February 2009.
- “Quantum D-modules and higher genus braid groups,” Lie Theory Seminar. UC Riverside, December 2009.
- “Quantum symmetric pairs and the double affine braid group of type  $C_n^\vee C_n$ ,” Séminaire Algèbre. Université Claude Bernard Lyon 1, September 2009.
- “Quantum D-modules and elliptic braid groups,” Algèbres envelopantes. University of Paris, 7, June 2008.
- “Quantum D-modules and elliptic braid groups,” Séminaire Quantique. IRMA, University of Strasbourg, June 2008.

### *AMS Meetings*

- Joint Meetings, AMS special session: Hopf algebras and their representations. New Orleans, January 2011.
- Joint Meetings, MAA Invited Paper Session on Topics in Hopf Algebras. New Orleans, January 2011.
- AMS sectional meeting, special session: Hecke algebras and deformations in geometry and topology. Macalester College, April 2010.

- AMS sectional meeting, special session: Noncommutative algebraic geometry. University of Kentucky, March 2010.
- AMS sectional meeting, special session: Fusion categories. Baylor University, October 2009.

## Professional Activities

### *Conference and workshops attended*

- AIM Workshop: Classifying fusion categories, Palo Alto, March 2012.
- NSF/CBMS Regional Conference on Quiver Varieties and Quantum Affine Algebras, NCSU May 2010.
- Shanks Workshop on Fusion categories, Vanderbilt University, February 2010.
- Quiver varieties, Donaldson-Thomas invariants and instantons, CIRM Luminy, September 2009.
- Summer School and Conference in Geometric Representation Theory and Extended Affine Lie Algebras, University of Ottawa, Ontario, Canada, June 2009.
- Algebraic Lie Structures with Origins in Physics Isaac Newton Institute for Mathematical Sciences, Cambridge UK.
- Visiting Research Fellow IRMA Strasbourg, May 28-June 28, 2008.
- Dynamical Quantum Groups and Fusion Categories, CIRM Luminy, April 14-18, 2008.
- Affine Lie algebras and chiral structures, Talbot Workshop, Salem MA March 30- April 4.
- Algebraic-Geometric Derived Categories and Applications Institute for Advanced Studies, Princeton, NJ March 10-14.

## Services to Community

- Organizer, Current Literature in Geometry and Topology Seminar, Aug 2012-Present.
- Organizer, Back Porch Seminar, Aug 2011-Present.
- Organizer, MIT Pure Math Grad Student Seminar (weekly), 2008-2009.
- American Mathematical Society (MathSciNet) Reviewer.
- Referee for *Journal of Algebra*, *Selecta Mathematica*, *International Math Research Notices*, and *Transformation groups*.

## Contact information

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