William Hardesty

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Education

- **University of Georgia** — Athens, Georgia
  Ph.D. Mathematics — *2011- 2016*
- **University of Maryland, Baltimore County** — Baltimore, Maryland
  B.S. Mathematics and Computer Science — *2007 - 2011*
  - Minor: Computer Science
  - GPA: 4.0 (*summa cum laude*)

Employment

- **Westlake University** — Hangzhou, Zhejiang
  Assistant Professor — *2021-2022*
- **University of Sydney** — Sydney, New South Wales
  Research Fellow, Level B — *2019-2021*
- **Louisiana State University** — Baton Rouge, Louisiana
  Postdoctoral Researcher — *2016-2019*

Research Interests

Representation theory, algebraic geometry, derived categories, Springer theory, tensor categories, perverse sheaves, co-t-structures, categorification

Publications

13. (with P. Achar) Silting complexes of coherent sheaves and the Humphreys conjecture, submitted, arXiv:1810.06157.
12. (with P. Achar) Nilpotent centralizers and good filtrations, to appear in **Transformation Groups**.
11. (with P. Achar) Co-t-structures on derived categories of coherent sheaves and the cohomology of tilting modules, to appear in **Representation Theory**.
10. (with P. Achar, S. Riche) Integral exotic sheaves and the modular Lusztig–Vogan bijection, to appear in **Journal of the London Mathematical Society**.
9. On the centralizer of a balanced nilpotent section, submitted, arXiv:1810.06157.

8. Explicit calculations in an infinitesimal singular block of SL_N, **Proceedings of the Edinburgh Mathematical Society** 65 (1), 19 - 52.

7. (with P. Achar, S. Riche) Conjectures on tilting modules and antispherical p-cells, to appear in **RIMS Kokyuroku Bessatsu**, arXiv:1812.09960.

6. (with P. Achar, S. Riche) Representation theory of disconnected reductive groups, **Documenta Mathematica** 25 (2020), 2149-2177.

5. (with P. Achar) Calculations with graded perverse coherent sheaves, **The Quarterly Journal of Mathematics** 70 (4), 1327-1352.

4. (with P. Achar, S. Riche) On the Humphreys conjecture on support varieties, **Transformation Groups** 24 (3), 597-657.

3. On support varieties and the Humphreys conjecture in type A, **Adv. Math.** 329 (2018), 392–421.

2. (with D. Nakano, P. Sobaje) On the existence of Mock Injective modules for algebraic groups, **Bull. Lond. Math. Soc.** 49 (2017).

1. Support varieties of line bundle cohomology groups for $SL_3(k)$, **J. Algebra** 448 (2016), 127-173.

Invited Presentations

- University of Bonn Representation Theory Seminar (January 2021)
- $D^b(days)$: An informal journey into derived categories of coherent sheaves - Sydney, Australia (February 2020)
- Representations of Lie and Jordan Algebras, Their Representations and Applications - Chengdu, China (January 2020)
- University of Sydney Algebra Seminar (September 2019)
- International Conference on Representation Theory (ICRT8) - Harbin, China (July 2019)
- AMS special session on Geometric Methods in Representation Theory - Auburn, Alabama (March 2019)
- AMS special session on Representations of Lie algebras, algebraic groups, and quantum groups - Auburn, Alabama (March 2019)
- Oberwolfach Seminar: Character Formulas for Reductive Algebraic Groups - Oberwolfach, Germany (November 2018)
- Théorie géométrique des représentations" in Besse, France (September 2018)
- University of Louisiana Lafayette Algebra Seminar (April 2018)

- University of South Alabama, Colloquium (November 2017)
- University of South Alabama, Algebra Seminar (November 2017)
- AMS Special Session on Geometric Methods in Representation Theory - Charleston, South Carolina (March 2017)
- AMS Special Session on Lie Theory, Representation Theory and Geometry - Athens, Georgia (March 2016)
- AMS Special Session on Categorical and Geometric Methods in Representation Theory - Seattle, Washington (January 2016)
- 8th Southeastern Lie Theory Workshop on Algebraic and Combinatorial Representation Theory - Raleigh, North Carolina (October 2015)
- Southwest Group Theory Day 2015 - Tucson, Arizona (March 2015)

Teaching Experience

- Spring 2019: Math 1552 (Calculus II), Louisiana State University
- Spring 2019: Math 2020 (Discrete Mathematics), Louisiana State University
- Spring 2018: Math 2065 (Ordinary Differential Equations), Louisiana State University
- Fall 2016: Math 1551 (Honors Calculus I), Louisiana State University
- Fall 2015: Math 2250 (Calculus I), University of Georgia
- Fall 2014: Math 1113 (Precalculus), University of Georgia
- Spring 2014: Math 2250 (Calculus I), University of Georgia
- Fall 2013: Math 1113 (Precalculus), University of Georgia

Awards, Grants & Honours

- Graduate Student Travel Grant to the Joint Mathematics Meetings 2016
- University of Georgia, Graduate Student Assistantship 2011-2013
- Outstanding Graduating Senior in Mathematics, University of Maryland, Baltimore County 2010

Technical Skills

- Programming Experience
  - Python, C++ Java, MATLAB
- Markup Languages
  - LaTeX, Beamer, XML, HTML
- Software
  - Maple, FEniCS,AUTO, SymPy

Undergraduate Applied Mathematics Research

- **Research Experience for Undergraduates (REU)** George Mason
  Applied Mathematics *June 2009 - August 2009*
  - "Nucleation and Spinodal Decomposition in Ternary-component Alloys"
  - Modeled the dynamics of phase seperation in multi-component alloys using the AUTO math package.
  - Website: `http://math.gmu.edu/reu/`
  - Advisors: Dr. Thomas Wanner and Dr. Evelyn Sander
- **Undergraduate Research Project** University of Maryland, Baltimore County
  Applied Mathematics *June 2010 - February 2011*
  - "Electromagnetic modeling and simulation for surface enhanced Raman spectroscopy"
  - Employed FEniCS, a numerical finite element package, to solve Maxwell's equation on complex multi-layered surfaces.
  - Website: `https://personal.utdallas.edu/~jwz120030/`
  - Advisor: Dr. John Zweck

Service

- Co-organizer for the Southeastern Lie Theory Worskhop XI (Baton Rouge, May 2019)
- Service as a T.A. for Oberwolfach Seminar: Character Formulas for Reductive Algebraic Groups - Oberwolfach, Germany (November 2018)
- Service as an anonymous referee for *International Mathematics Research Notices*, *Journal of Combinatorial Theory, Series A*, and conference proceedings.

References

- Daniel Nakano, Distinguished Research Professor (**Advisor**)
  Department of Mathematics, University of Georgia
  Email: nakano@math.uga.edu

- Pramod Achar, Professor (**Postdoc Mentor, Collaborator**)
  Mathematics Department, Louisiana State University
  Email: pramod@math.lsu.edu

- Simon Riche, Professor (**Collaborator**)
  Laboratoire de Mathématiques Blaise Pascal, Université Clermont Auvergne
  Email: Simon.Riche@uca.fr

- Roman Bezrukavnikov, Professor (**Colleague**)
  Mathematics Department, Massachusetts Institute of Technology
  Email: bezrukav@math.mit.edu

- James Oxley, Boyd Professor (**Teaching Reference**)
  Mathematics Department, Louisiana State University
  Email: oxley@math.lsu.edu